# FORMER STERLING TRANSFORMER CORP.

**510 DRIGGS AVENUE**
**BROOKLYN, NEW YORK**
**Block 2312 Lot 23**
**SITE No. C224203**

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# REMEDIAL ACTION WORK PLAN

February 2016
*Revised May 2016*

*Prepared for:*
187 North 8 Street Owner LLC
266 Broadway Suite 501
Brooklyn, NY 11211

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# CERTIFICATIONS

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


| 076508 | 6/2/2016 | |
|---|---|---|
| NYS Professional Engineer # | Date | Signature |

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## *ATTACHMENTS*

## LIST OF ACRONYMS

| Acronym | Definition |
|---|---|
| AMC | AMC Engineering |
| AWQS | Ambient Water Quality Standards |
| BCA | Brownfield Cleanup Agreement |
| BCP | Brownfield Cleanup Program |
| BTEX | Benzene, Toluene, Ethylbenzene and Xylene |
| CQMP | Construction Quality Management Plan |
| DUSR | Data Usability Statement Report |
| EBC | Environmental Business Consultants |
| FER | Final Engineering Report |
| HDPE | High Density Polyethylene |
| IRM | Interim Remedial Measure |
| NYC | New York City |
| NYCDEP | New York City Department of Environmental Protection |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| PS | Public School |
| PVC | Polyvinyl Chloride |
| RAO | Remedial Action Objectives |
| RAWP | Remedial Action Work Plan |
| RI | Remedial Investigation |
| RSCOs | Recommended Site Cleanup Objectives |
| SCG | Standards, Criteria, and Guidelines |
| SMMP | Soil/Materials Management Plan |
| SMP | Site Management Plan |
| SSDS | Sub-slab Depressurization System |
| SWPPP | Stormwater Pollution Prevention Plan |
| SVOCs | Semi-Volatile Organic Compounds |
| USEPA | United States Environmental Protection Agency |
| UST | Underground Storage Tank |
| VOCs | Volatile Organic Compounds |

# EXECUTIVE SUMMARY

## Site Description/Physical Setting/Site History

This Remedial Action Work Plan (RAWP) was prepared on behalf of was prepared on behalf of 187 North 8 Street Owner LLC for the property known as the Former Sterling Transformer Corp. Site, located at 510 Driggs Avenue, Brooklyn, New York. An application for acceptance into the New York State Brownfield Cleanup Program (BCP) was submitted to the New York State Department of Environmental Conservation (NYSDEC) on December 2, 2014. The application was determined to be complete on December 12, 2014. On March 6, 2015, the DEC notified the North 8 Street Owner LLC that the Site had been accepted to the BCP (Site No. C224203) with the applicant defined as a Volunteer. The Brownfield Cleanup Agreement was executed on June 1 2015.

An unrestricted use is proposed for the property. When completed, the Site will be redeveloped with a new 6-story mixed-use commercial residential building which will cover the entire Site. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

The street address for the Site is 510 Driggs Avenue, Brooklyn, NY (**Figure 1**). The Site is located in the City of New York and Borough of Brooklyn. The Site has approximately 175 ft of street frontage on Driggs Avenue and 100 feet of street frontage on N. 8th Street (**Figure 2**). Currently the property is an asphalt paved vacant lot surrounded by an 8 foot high chain link fence. The Site was previously used as a warehouse, transformer manufacturer, a chair manufacturer and a garage with underground tanks.

The Site is currently owned by the Volunteer, 187 North 8 Street Owner LLC. The property is a vacant lot and has been so since 2006. The Volunteer purchased the property in October 2014.

## Summary of the Remedial Investigation

A Remedial Investigation was completed at the Site in August 2015 through September 2015 and documented in a Remedial Investigation Report dated February 2016. The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and any other impacted media; to identify the source(s) of the contamination; to assess the impact of the

contamination on public health and/or the environment; and to provide information to support the development of a Remedial Work Plan to address the contamination.

Activities completed under the RI:

- Sampling for non-petroleum contaminants such as pesticides, PCBs and metals in soil and groundwater including the analysis of soil and groundwater samples
- Soil sampling and analysis for petroleum compounds in soil samples from 8 soil boring locations;
- The installation of 7 groundwater monitoring wells
- The collection and analysis of groundwater samples for petroleum compounds;
- The collection of analysis of soil gas samples for VOCs from 7 soil gas sampling locations.

The results of sampling performed during this RI, identified petroleum related VOCs (high conc. of 181,120 ug/kg) and naphthalene (high conc. of 620,000 ug/kg) in soil to a minimum depth of 20 feet in the central and south central area of the Site. Although a UST was known to be historically located in the south central area of the Site the presence of the these same compounds in the central area of the Site combined with the high concentrations of naphthalene suggest it may be related to condensate associated with a MGP gas holder which may have been present on the Site.

CVOCs consisting mainly of TCE and its degradents were present in soil in the central and southeastern areas of the Site to a depth of 21 ft. The property was known to have been occupied by a manufacturer of small transformers used in radios and other electronic deices so it is reasonable to conclude that TCE was historically stored and used at the Site. The TCE is undergoing reductive dechlorinization as evidenced by the presence of cis-DCE and vinyl chloride.

Historic fill material has been identified across the Site to depths as great as 15 feet below grade. The historic fill material contains semi-volatile organic compounds, pesticides and metals including chromium, lead, mercury and nickel above unrestricted use SCOs.

Groundwater impacts from petroleum were limited to benzene in three wells 2.1 ug/L to 23 ug/L. The highest concentrations were reported in the southeast area of the Site. CVOCs were reported in all of the groundwater sampling locations with the highest concentrations of 119 ug/L and, 1,700 ug/L reported in the southeastern corner of the Site.

Soil gas sampling identified generally low levels of petroleum related volatile organic compounds with the exception of benzene in one sample. There did not appear to be any correlation in concentration or distribution of petroleum VOCs in soil vapor with the source area.

CVOCs were reported in all of the soil vapor samples with concentrations ranging from 767.74 $\mu g/m^3$ to 167,479 $\mu g/m^3$. There did not appear to be a direct correlation of CVOCs in soil and that in soil vapor though concentrations in soil gas were generally highest in the eastern portion of the Site while CVOCs in soil were highest in the south-central and southeastern areas of the Site.

**Qualitative Human Health Exposure Assessment**

The qualitative exposure assessment identified potential completed routes of exposure to construction workers and remediation workers through inhalation, ingestion and dermal contact of petroleum VOCs, SVOCs, CVOCs, pesticides and heavy metals during excavation activities. The Health and Safety Plan prepared for the site identifies such exposures and provides instructions for on-site workers to minimize potential exposure.

CVOCs in soil vapor may also be migrating off-site near there east and northeast property lines. The adjacent multi-use building to the north includes commercial retail and garage space on the first floor and residential apartments on floors 2-4. The building also has a basement level which is used for utilities, storage and a tenant laundry room.

Potential environmental impacts through the groundwater to surface water discharge were considered unlikely based on the concentrations of VOCs in groundwater, the groundwater flow direction at the Site and the distance and location of the nearest surface water body.

**Summary of the Remedy**

The remedy recommended for the Site is a Track 1 alternative (Alternative 1) which consists of the removal of all on-site soils which exceed the UUSCOs and the remediation of petroleum impacted groundwater. It is expected that a Track 1 alternative will require excavation to a minimum depth of 15 feet across the Site with additional excavation to 25 feet below grade in the petroleum /CVOC impacted area. Excavation will continue to a depth of 25 ft site-wide, for construction of the new building. In addition all fill material with parameters above unrestricted SCOs will be removed from the Site and properly disposed of at an off-site facility. The remedy will include the following items:

1. Excavation of soil/fill exceeding Track 1 unrestricted use SCOs as listed in **Table 1** to depths as great as 15 feet below grade site-wide and to 25 ft or greater within the petroleum / CVOC impacted areas and as needed to meet Track 1 SCOs;
2. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
3. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 1 SCOs;
4. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
5. Dewatering and treatment of VOC impacted groundwater before discharging to the NYC sewer system under a NYCDEP sewer discharge permit.
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in **Table 1**, (2) all Federal, State and local rules and regulations for handling and transport of material.
7. If Track 1 SCOs are not achieved, a composite cover system consisting of the concrete building slab will be constructed.
8. .If Track 1 cleanup is not achieved, implementation of a Site Management Plan (SMP) for long term maintenance of the Engineering Controls.
9. If Track 1 cleanup is not achieved, an Environmental Easement will be filed against the Site to ensure implementation of the SMP.

Although the goal of the remedy will be to remove all soil exceeding the Track 1 SCOs, if Track 1 SCOs cannot be achieved then a Track 2 remedy may result.

# REMEDIAL ACTION WORK PLAN

## 1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) was prepared on behalf of was prepared on behalf of 187 North 8 Street Owner LLC for the property known as the Former Sterling Transformer Corp. Site, located at 510 Driggs Avenue, Brooklyn, New York. An application for acceptance into the New York State Brownfield Cleanup Program (BCP) was submitted to the New York State Department of Environmental Conservation (NYSDEC) on December 2, 2014. The application was determined to be complete on December 12, 2014. On March 6, 2015, the DEC notified the North 8 Street Owner LLC that the Site had been accepted to the BCP (Site No. C224203) with the applicant defined as a Volunteer. The Brownfield Cleanup Agreement was executed on June 1 2015.

This RAWP summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between August 2015 and September 2015. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site does not pose a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources.

A formal Remedial Design document will not be prepared.

### 1.1 SITE LOCATION AND DESCRIPTION

The street address for the Site is 510 Driggs Avenue, Brooklyn, NY (**Figure 1**). The Site is located in the City of New York and Borough of Brooklyn. The Site has approximately 175 ft of street frontage on Driggs Avenue and 100 feet of street frontage on N. 8th Street (**Figure 2**). Currently the property is an asphalt paved vacant lot surrounded by an 8 foot high chain link

fence. The Site was previously used as a warehouse, transformer manufacturer, a chair manufacturer and a garage with underground tanks.

The elevation of the Site ranges from 18 to 21 feet above the National Geodetic Vertical Datum (NGVD). The area topography gradually slopes to the north. The depth to groundwater beneath the Site is approximately 12 feet below grade. Based on regional groundwater elevation maps, groundwater flows to the north.

A boundary map will be attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The 0.43-acre property is fully described in **Attachment A – Metes and Bounds.**

## 1.2 CONTEMPLATED REDEVELOPMENT PLAN

The redevelopment project consists of the construction of a new 6 story mixed-use commercial-residential building which will cover the entire Site. Plans include a full height basement level requiring excavation of the entire Site to a depth of 25 ft below grade. With groundwater present at 12 feet below grade, dewatering will be required during construction of the building's foundation.

The project includes 51,000 sf of of commercial / retail space and 18,000 sf of residential apartments. The basement level will be used for parking, meter rooms, residential storage space and bicycle racks.

## 1.3 DESCRIPTION OF SURROUNDING PROPERTY

The area surrounding the property is highly urbanized and predominantly consists of multi-family residential buildings with mixed-use buildings (residential w/ first floor retail) along main corridors such as Driggs Avenue which borders the property to the east and Bedford Avenue located just one block to the northwest. The area is marked by late 19th and early 20th century rowhouses with commercial and industrial properties interspersed throughout the residential sections. The area to the west of the Site was historically characterized by heavy industry and manufacturing. Following a steady decline of manufacturing in the area from the late 1960's

through the 1980's, many of the industrial properties were vacated leaving the buildings to be vandalized and become derelict. There are no schools or daycare centers in the immediate area of the Site, however there are several schools located to the south and southeast within 1,200 ft of the Site. There are no other identified sensitive receptors (i.e. nursing homes, hospitals, etc.) located in the vicinity of the Site.

# 2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The field work portion of the Remedial Investigation was conducted by EBC in November and December 2015. The investigation is summarized in the sections below. Further details are provided in the Remedial Investigation Report (EBC January 2016).

## 2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

### 2.1.1 Soil Borings

A total of eight soil borings (14B1-14B8) were advanced on August 25, 2015 to identify source areas and to obtain general soil quality information present at the Site (**Figure 4**).

At each soil boring location soil samples were collected continuously in 5-foot intervals from grade to a depth of 15 to 25 feet below grade using a Geoprobe™ 6720DT, probe drilling machine. The Geoprobe™ system uses a direct push hydraulic percussion system to drive and retrieve core samplers. Soil samples were retrieved using a 1.25-inch diameter, 5-foot long dual-tube sampler with disposable acetate liners. Soil recovered from each soil boring was field screened by an environmental professional for the presence of VOCs with a photo-ionization detector (PID) and visually inspected for evidence of contamination.

In accordance with the RI work plan three soil samples were retained for laboratory analysis from all borings with the exception of 14SB1 in which two samples were retained.

Retained samples were submitted for laboratory analysis of one or more of the following analyses: volatile organic compounds (VOCs) by EPA Method 8260, semi-volatile organic compounds (SVOCs) by EPA Method 8270, TAL Metals, pesticides and PCBs by EPA Method 8081/8082. Soil boring locations are identified in **Figure 4**.

### 2.1.2 Monitoring Wells

Seven groundwater monitoring wells, MW1 through MW7, were installed at the Site on August 26, 2015. All of the wells were installed with a track mounted probe drilling machine. Wells MW1-MW3 and MW6 were installed to a depth of approximately 20 feet below grade with 10

feet of 1-inch diameter 0.010-inch slotted PVC well screen and 10 feet of PVC riser. Wells MW1 and MW5-MW7 were installed to a depth of 20 ft with 10 ft of well screen. Wells MW2 and MW3 were installed to depths of 19 ft and 17 ft, respectively with 10 ft of well screen.

A No. 00 morie filter-pack sand filled the annulus surrounding the screen within two feet above the top of the screen. A one-foot hydrated bentonite seal was then placed on top of the filter sand and the remainder of the borehole was backfilled to grade. Following installation, each of the wells were surveyed to determine relative casing elevation to the nearest 0.01 ft and horizontal position to the nearest 0.1 ft. Monitoring well specifications, elevation and depth to water readings are provided in **Table 2**. Monitoring well locations are identified in **Figure 5.** Well completion reports detailing monitoring well construction are provided in **Appendix B**.

Prior to sampling, a synoptic round of depth-to-groundwater (DTW) measurements was obtained from the wells on September 9, 2015 to determine the water table elevation and to calculate the volume of standing water in the well.

### 2.1.3 Samples Collected

A summary of the sampling performed during the RI is provided in **Table 2**.

#### 2.1.3.1 Soil Samples

A total of twenty-three soil samples were collected from 8 soil borings for laboratory analysis of VOCs (EPA Method 8260), SVOCs (EPA Method 8270), TAL metals and pesticides/PCBs (EPA Method 8081/8082).

#### 2.1.3.2 Groundwater Samples

Groundwater samples were obtained from six of the seven water table monitoring wells. All groundwater samples from the monitoring wells were analyzed for VOCs / SVOCs by EPA method 8260 / 8270, pesticides / PCBs by EPA method 8081 / 8082 and target analyte list (TAL) metals.

2.1.3.3 Soil Gas Samples

To assess the presence of VOCs in soil gas beneath the site, seven soil vapor implants were installed at the Site and sampled on September 8, 2015. The vapor implants (Geoprobe™ Model AT86 series), were constructed of a 6-inch length of double woven stainless steel wire and installed to a depth of 8 ft below grade using Geoprobe™ equipment.

All soil gas samples were collected over a 2 hr sampling period.

Soil vapor samples were collected in accordance with the procedures as described in section 2.4 of the approved RIR and the *Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH 10/06).*

### 2.1.4 Chemical Analytical Work Performed

Each soil and groundwater sample was placed in pre-cleaned laboratory supplied glassware, and placed in a cooler packed with ice for transport to the laboratory. Laboratory services for soil and groundwater sample analysis were provided by Phoenix Environmental Laboratories of Manchester, CT, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11301).

Retained soil samples were submitted for laboratory analysis of one or more of the following analyses: volatile organic compounds (VOCs) by EPA Method 8260, semi-volatile organic compounds (SVOCs) by EPA Method 8270, TAL Metals, pesticides and PCBs by EPA Method 8081/8082.

All groundwater samples from the monitoring wells were analyzed for VOCs / SVOCs by EPA method 8260 / 8270, target analyte list (TAL) metals by EPA method 6010 and Pesticides/PCBs by method 8081/8082. Soil gas samples were analyzed for VOCs by USEPA Method TO-15.

### 2.1.5 Documentation

A map showing the locations of the soil borings is provided in **Figure 4.** The locations of the monitoring wells and soil gas sample collection points are provided in **Figure 5**. The results of

sample soil, groundwater and soil gas samples collected during the RI are summarized in **Tables 3** through **14**. Below is a summary of the RI findings.

The results of sampling performed during this RI, identified petroleum related VOCs (high conc. of 181,120 ug/kg) and naphthalene (high conc. of 620,ooo ug/kg) in soil to a minimum depth of 20 feet in the central and south central area of the Site. The source may be related to historic USTs or condensate associated with a MGP gas holder which may have been present on the Site. SVOCs related to a petroleum release were also present in soil the southern portion of the site in an area where a historic UST was located.

Historic fill material has been identified across the Site to depths as great as 15 feet below grade. The historic fill material contains SVOCs and metals including chromium, lead, mercury and nickel above unrestricted use SCOs.

Groundwater impacts from petroleum were limited to benzene in three wells at relatively low concentrations. The highest concentrations (18-23 ug/L) were reported in wells located in the southeast area of the Site. CVOCs were reported in all of the groundwater sampling locations with the highest concentrations (1,700 ug/L) also reported in the southeastern corner of the Site.

Soil vapor sampling identified generally low levels of petroleum related volatile organic compounds (BTEX) and there did not appear to be any correlation in concentration or distribution of petroleum VOCs in soil vapor with the source area.

CVOCs were reported in all of the soil vapor samples with concentrations to 167,479 µg/m3. There did not appear to be a direct correlation of CVOCs in soil and that in soil vapor though concentrations in soil gas were generally highest in the eastern portion of the Site while CVOCs in soil were highest in the south-central and southeastern areas of the Site.

## 2.2 SIGNIFICANT THREAT

The NYSDEC and NYSDOH will review the RI Report and will determine whether the Site does or does not pose a significant threat to human health and the environment. Notice of that

determination will be provided during the public comment period, through fact sheet No. 2 and the Proposed Decision Document.

## 2.3 SITE HISTORY

### 2.3.1 Past Uses and Ownership

The Site is currently owned by the Requestor, 187 North 8 Street Owner LLC. The property is a vacant lot and has been so since 2006. The Requestor purchased the property in October 2014.The property was most recently occupied by a parking company.

A review of Sanborn maps shows that in 1887 the Site was occupied three single family residential homes. Between 1905 and 1916, the northern portion of the site was developed with a commercial storage building. By 1942, southern portions of the site were developed with a garage. Between 1942 and 1951, the garage was converted to an industrial building and occupied by a chair manufacturer. The chair manufacturer was replaced by a transformer manufacturer (Sterling Transformer) circa 1965 and later by food warehouse circa 1991. Both buildings were demolished in 2006.

In addition to the history as documented above, an 1855 map obtained by National Grid (successor to Brooklyn Union Gas) appears to indicate that a gas works and holder, typically associated with the storage of gas from manufactured gas plants (MGP) was present on the Site at that time. However, by 1887 the holder was gone and the property was developed with residential homes. A listing of previous owners and operators for the property is as follows:

**Previous Owners**

| Dates | Name | Comments | Contact Info |
|---|---|---|---|
| Prior to 6/28/1968 | Esther Zimtbaum | Deed | 34 Plaza Street, Brooklyn NY 11238 |
| From 6/28/1968 to 4/17/1973 | Alan Zimtbaum | Deed | 349 Crook Bed Road, Mountainside, NJ 07092 |
| From 4/17/1973 to 1/2/2007 | Richfield Properties LLC | Deed | 101 Richardson Street, Brooklyn, NY 11211 |
| From 1/2/2007 to 7/24/2014 | 510 Driggs Avenue LLC | Deed | 101 Richardson Street, Brooklyn, NY 11211 |
| From 7/24/2014 to 9/17/2014 | JMD Driggs LLC | Deed | 101 Richardson Street, Brooklyn, NY 11211 |
| From 9/17/2014 to Present | 187 North 8 Street Owner LLC | Deed | 266 Broadway, Suite 501, Brooklyn, NY 11211 |

**Previous Operators**

| Dates | Name | Comments | Contact Info |
|---|---|---|---|
| Sometime between 1916 and 1942 to sometime between 1942 and 1951 | Garage | Sanborn Maps | 510 Driggs Avenue, Brooklyn, NY 11211 |
| Sometime between 1942 and 1951 to sometime between 1951 and 1965 | Ideal Chair Co. | Sanborn Maps Internet Search | 510 Driggs Avenue, Brooklyn, NY 11211 |
| Sometime between 1951 and 1965 to sometime between 1989 and 1991 | Sterling Transformer | Sanborn Maps Internet Search | 510 Driggs Avenue, Brooklyn, NY 11211 |
| From 1991 to 2006 | Wonder Foods | Sanborn Maps | 510 Driggs Avenue, Brooklyn, NY 11211 |
| From 2006 to present | Vacant lot | Sanborn Maps | 510 Driggs Avenue, Brooklyn, NY 11211 |

### 2.3.2 Summary of Previous Reports

Environmental investigations performed at the Site include the following:

- Phase I Environmental Site Assessment Report - DPV (March 2014)
- Geophysical Survey - Hager-Richter Geoscience, Inc. (March 2014)
- Phase II Subsurface Investigation Data Summary - EBC (October 2014)

*March 2014 – Phase I Environmental Site Assessment (DPV)*

DPV concluded that "Based on the results of the site inspection, records review and interviews, it was determined that there were several RECs identified with regard to the subject site. RECs are those conditions which could adversely affect the environmental integrity of the property."

DPV identified the following RECs:

- The 1942 Sanborn map depicts the presence of a gasoline tank at the south-central portion of the site. No information regarding the current status of this tank and/or soil quality in its vicinity was available for review. As such, there is a potential for spills or release from the tank to have impacted the subsurface.

- The Sanborn maps indicated that portions of the subject property were historically occupied by a garage, chair manufacturer and a transformer manufacturer. As such, there is a potential for historic site operations to have impacted soil, groundwater and/or soil

vapor quality beneath the subject property. Further, the subject property was identified as a New York City Department of City Planning (NYCDCP) Environmental "E" declaration site due to its historic use and the presence of the UST.

Based upon its findings, DPV recommended the following:

- A geophysical survey (e.g., magnetometer and/or ground penetrating radar surveys) should be conducted on the southern portion of the property to evaluate the presence of the suspected underground storage tank (UST), as well as the configurations of existing underground utilities in advance of a soil boring program. It is important to note that clearing of all vehicles or other obstructions in the vicinity of the suspected USTs would be necessary to facilitate the geophysical survey and any subsequent sampling.

- If present, any historic USTs should be removed in accordance with New York State Department of Environmental Conservation (NYSDEC) and New York City Fire Department (FDNY) regulations. Any identified geophysical anomalies should be further investigated through the excavation of test pits, with soil samples collected for laboratory analysis as warranted. It is important to note that excavation areas may be necessary to facilitate the geophysical survey and any subsequent sampling.

- To evaluate potential impacts related to historic usage of the subject property and to satisfy the NYCDCP and New York City Office of Environmental Remediation (NYCOER) requirements related to the site's listing as an "E"-designated property, a subsurface investigation should be performed. At a minimum, the investigation should include the installation of soil borings with the collection of representative soil, groundwater and/or soil vapor samples for laboratory analysis to document subsurface conditions and determine the nature and extent of contamination (if present).

*March 2014 - Geophysical Survey (H-R Geoscience)*

Harer-Richter Geoscience, Inc. (H-R) performed a geophysical survey of the Site on March 7, 2014 to locate underground storage tanks and utilitity conduits that mey have been present on the

Site. The geophysical survey was conducted using three complementary geophysical methods: time domain electromagnetic induction (EM61), ground penetrating radar (GPR), and precision utility location (PUL).

H-R concluded the following:

- No UST with: (1) electrical properties sufficiently contrasting with the surrounding soils to produce an EM anomaly or GPR reflections, or (2) a capacity of 500 gallons or more was detected within the effective depth of penetration of the GPR signal. Whether a UST occurs at a depth greater than the effective depth of penetration of the GPR signal (approximately 3-4 feet) or in areas inaccessible to the geophysical survey cannot be determined from the geophysical data.

- Dry wells and associated piping were detected.

- Segments of possible utilities and small unidentified buried objects were detected.

- A small area of buried metal was detected.

*October 2014 - Phase II Invesitgation Data Summary (EBC)*

The field work portion of the Phase II was performed on September 30, 2014 and included the installation of three soil borings and three groundwater samples. Shallow soil samples were analyzed for RCRA metals, TCLP lead and PCBs. Deep samples, from the water table interface, could only be obtained from two borings and were analyzed for VOCs by USEPA 8260 and SVOCs by USEPA 8270. Groundwater samples were analyzed for VOCs only. Laboratory services were provided by Phoenix Environmental Laboratories of Manchester, CT 06040, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11301).

The depth to groundwater at the site is approximately 12 feet below grade. Soil at the site is described as historic fill materials to a depth of approximately 15 feet below the surface followed by native brown fine sand with silt and some clay.

Laboratory results identified petroleum VOCs including benzene above Restricted Residential Soil Cleanup Objectives (SCOs) and trimethylbenzene, ethylbenzene, toluene and xylene above unrestricted and groundwater protection SCOs. The concentration of total VOCs (when including naphthalene) were reported as high as 1,173,800 ug/kg. SVOCs including chysene, fluoranthene, fluorine, ideno(1,2,3-cd)pyrene, naphthalene, phrenanthene and pyrene were all reported above Restricted Residential SCOs. Total SVOCs were reported at 4,358,000 ug/kg at the B3 location.

VOCs were reported in all three groundwater samples above water quality standards and included both petroleum and chlorinated solvent compounds. Total petroleum VOCs were reported to 20,850 ug/L with chlorinated VOCs to 1,027 ug/L.

## 2.4 GEOLOGICAL CONDITIONS

Long Island's present configuration is primarily the result of glaciation which during the Pleistocene Era, predominately that of the last ice age, the Wisconsin, which ended about ten thousand years ago. Two advances of the Wisconsin ice sheet during the Upper Pleistocene of the Quaternary Period caused the island to be blanketed with till, ice contact stratified drift, outwash deposits and deposits composed of clay, silt, sand, gravel and boulders. The terminal moraines and the north shore are composed primarily of stratified drift with some till. The area between the moraines and south of them are mostly the outwash deposits. Central and South Long Island are of the glaciofluvial origin. The Pleistocene deposits lie atop the gently-dipping Cretaceous rocks.

The bedrock was eroded to a peneplain before the overlying Cretaceous sediments were deposited; its surface shows signs of later erosion by Pleistocene glaciation in the north. Bedrock crops out in northwestern Queens County near the East River and slopes southward at about eighty (80) feet per mile. Consequently, the overlying formations form a southward-dipping wedge that attains a maximum thickness of one-thousand fifty (1,050) feet in the southeast corner of Queens County. The maximum thickness of unconsolidated deposits in Kings County is about eight-hundred (800) feet in southeast Kings.

Overlying bedrock is the Raritan Formation of Late Cretaceous age, consisting of the Lloyd Sand Member and an upper, unnamed clay member. Overlying the Raritan Formation is the Magothy Formation and Matawan Group, undifferentiated, also of Late Cretaceous age, the Jameco Gravel of Pleistocene age, the Gardiners Clay of Pleistocene age, upper Pleistocene deposits of Wisconsin age, and a generally thin soil mantle of Holocene age. Holocene beach deposits make up most of the Rockaway Peninsula and Coney Island in the south, and Holocene salt-marsh deposits underlie and fringe the south-shore bay areas. Artificial filling has been done in low and swampy shoreline areas. Because Holocene deposits occur in relative small areas of Kings and Queens and are not significant water bearers, they are not included in the geologic descriptions that follow. The four distinct formations on Long Island: The Upper Glacial, the Jameco, the Magothy and the Lloyd aquifers. They all occur in the unconsolidated materials overlying the bedrock.

Soil at the site is described as historic fill materials to a depth of approximately 15 feet below the surface followed by native brown fine sand with silt and some clay.

Groundwater at the Site is present under water table conditions at a depth of 11.85 to 13.89 feet below grade. Based upon on-site measurements, groundwater flow is to the northeast (**Figure 6**).

Considering the poor quality of groundwater in the area, including high levels of sodium and magnesium associated with saltwater intrusion and impacts from petroleum and industrial solvents related to the former commercial / industrial use of the area, there is no anticipated future groundwater use.

## 2.5 CONTAMINATION CONDITIONS

### 2.5.1 Conceptual Model of Site Contamination

VOC contamination at the Site consists of petroleum related contaminants in soil to a minimum depth of 21 feet in the central and south central area of the Site. This same area also had the highest concentrations of naphthalene. Although a UST was known to be historically located in the south central area of the Site in the vicinity of highest petroleum VOCs and napthalene, the

presence of the these same compounds in the central area of the Site combined with the high concentrations of naphthalene suggest it may be related to condensate associated with a MGP gas works / holder which is believed to have been present on the Site between 1855 and 1887.

However if a gas holder were present and removed, fill materials should be considerable deeper than the 10 to 15 feet of fill documented at the Site. It is therefore also possible that the release occurred from former underground petroleum tanks and then migrated north with groundwater flow. This scenario is plausible as both the petroleum VOCs and naphthalene were higher in 14B4 at the southern end of the Site than they were in 14B3 to the north.

In either case there appears to be very little transfer of petroleum VOCs or naphthalene to the dissolved phase as groundwater was only impacted with relatively low levels of benzene. NAPL did appear to be present, however, in MW2.

CVOCs consisting mainly of TCE and its degradents were present in soil in the central and southeastern areas of the Site to a depth of 21 ft. The property was known to have been occupied by a manufacturer of small transformers used in radios and other electronic deices so it is reasonable to conclude that TCE was historically stored and used at the Site. However, the distribution of CVOCs in soil is similar to that of the petroleum VOCs / naphthalene though the highest concentrations were reported in the 14B6 (southeast area) and 14B3 (central area) and not in 14B4 (south property line). The TCE is undergoing reductive dechlorinization as evidenced by the presence of cis-DCE and vinyl chloride.

The TCE migrated from the source area through the soil column to the water table and has transferred to the dissolved phase. Although cis-DCE was found in groundwater in low but elevated concentrations throughout the Site, the CVOCs in groundwater are generally limited to the southeast corner of the property and do not appear to be migrating with groundwater flow.

The CVOCs in soil are also transferring to the vapor phase and appear to be migrating north along the eastern half of the property, though the potential exists to migrate in other directions as well.

### 2.5.2 Description of Areas of Concern

The source area identified during the RI includes an area in the mid-central portion of the Site in the vicinity of 14B3, extending southeast to 14B4 and 14B6. The source area includes petroleum VOCs, chlorinated VOCs (SVOCs) and naphthalene. The highest petroleum VOCs (181,120 ug/kg) were located at 14B4 in the southern area of the site near a former UST, at a depth of 21 ft below grade. CVOCs were highest at 14B6 (23,800) in the southeastern area of the site at a depth of 17 ft. Napthalene was highest at the 14B4 location at a concentration of 620,000 ug/kg.

SVOCs were also associated with the 14B4 location at 21 feet. Although SVOCs were reported in other borings, the depth at which they were present and the higher concentrations indicate that they are related to petroleum at this location and not fill materials.

### 2.5.3 Soil/Fill Contamination

VOC contamination at the Site consists of petroleum related contaminants in soil to a minimum depth of 21 feet in the central and south central area of the Site. This same area also had the highest concentrations of naphthalene.

CVOCs consisting mainly of TCE and its degradents are also present in soil in the central and southeastern areas of the Site to 21 ft below grade.

Historic fill material has been identified across the Site to depths as great as 15 feet below grade. The historic fill material contains semi-volatile organic compounds, pesticides and metals including chromium, lead, mercury and nickel above unrestricted use SCOs.

#### 2.5.3.1 Summary of Soil/Fill Data

Soil sample results from the RI are summarized in **Tables 3-6**. Further information on soil sample collection, handling and analysis can be found in the RI Report (EBC 2/16).

2.5.3.2 Comparison of Soil/Fill with SCGs

**Table 7** shows sample results above Track 1 Unrestricted SCOs for all overburden soil at the Site. **Figure 7** is spider map which shows soil sampling locations and summarizes shallow and deep sample results above Track 1 Unrestricted SCOs for all overburden soil.

### 2.5.4 On-Site and Off-Site Groundwater Contamination

Groundwater impacts from petroleum were limited to benzene in three wells (MW1, MW3, MW6) at concentrations ranging from 2.1 ug/L to 23 ug/L. The highest concentrations were reported in MW1 and MW3 located in the southeast area of the Site.

CVOCs were reported in all of the groundwater sampling locations with the highest concentrations reported in MW1 (119 ug/L) and MW3 (1,700 ug/L)

SVOC detections above groundwater standards were limited to those polynuclear aromatic hydrocarbons (PAHs) with a 2 per trillion standard. Exceedances of the part per trillion standards for PAHs were reported in wells MW3, MW5 and MW7. SVOCs reported in the parts per trillion range are a function of the laboratories ability to achieve extremely low detection limits and general background conditions.

Several dissolved metals were detected above standards including sodium, iron and manganese were detected above standards throughout the Site. The metals detected in groundwater are consistent with general groundwater quality throughout the area and are generally considered to be associated with over pumping of the aquifer in the past and saltwater intrusion.

2.5.4.1 Summary of Groundwater Data

The results of groundwater samples collected during the RI are summarized in **Tables 8-12**. Further information on groundwater sample collection, handling and analysis can be found in the RI Report (EBC 2/16).

2.5.4.2 Comparison of Groundwater with SCGs

Sample results above GA groundwater standards in monitor wells prior to the remedy are shown in **Table 13**. Spider maps which show groundwater sampling locations and summarize results above GA groundwater standards prior to the remedy are shown in **Figure 8**.

### 2.5.5 On-Site and Off-Site Soil Vapor Contamination

With the exception of benzene in one sample (SG5), Total petroleum-related VOCs were generally low in soil vapor samples across the Site. There did not appear to be any correlation in concentration or distribution of petroleum VOCs in soil vapor with the source area.

CVOCs were reported in all of the soil vapor samples with concentrations ranging from 767.74 µg/$m^3$ in SG6 to 167,479 µg/$m^3$ in SG5. There did not appear to be a direct correlation of CVOCs in soil and that in soil vapor though concentrations in soil gas were generally highest in the eastern portion of the Site while CVOCs in soil were highest in the south-central and southeastern areas of the Site.

2.5.5.1 Summary of Soil Vapor Data

A table of soil vapor data collected prior to the remedy is shown in **Table 14**. Further information on soil gas sample collection, handling and analysis can be found in the RI Report (EBC 2/16). Soil vapor results are posted on **Figure 9**.

## 2.6 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

### 2.6.1 Qualitative Human Health Exposure Assessment

The objective of the qualitative exposure assessment under the Brownfields Cleanup Program (BCP) is to identify potential receptors to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur. An exposure pathway has five elements; a contaminant source, release and transport mechanisms, point of exposure, route of exposure and a receptor population.

The potential exposure pathways identified below, represent both current and future exposure scenarios.

***Contaminant Source***

Source areas of the Site include petroleum VOCs and naphthalene in the central and south central area of the Site and CVOCs in the central and southeastern area of the Site.

Elevated levels of SVOCs, pesticides and metals are also present in fill materials throughout the Site to depths as great as 15 ft below grade.

***Contaminant Release and Transport Mechanism***

Petroleum / naphthalene contamination is present in subsurface soil in the central and south central areas of the Site. The contamination extends vertically to the groundwater interface. There appears to be limited transfer of petroleum VOC / naphthalene contaminants in soil to the groundwater despite the fact that impacted soil is in contact with the groundwater. There does not appear to be any significant transfer of petroleum VOCs / naphthalene to the vapor phase or concern for off-site vapor migration.

CVOCs present in soil in the central and southeastern areas of the site have also migrated to the water table resulting in some limited transfer to the dissolved phase. There appears to be minimal transport of CVOCs in groundwater however. CVOCs are transferring from impacted soil to the vapor phase in high concentrations and are migrating along north in the eastern half of the property though the potential exists to migrate in other directions as well.

***Point of Exposure, Route of Exposure and Potentially Exposed Populations***

Potential On-Site Exposures: Remediation workers and construction workers engaged in the excavation of impacted and non-impacted soil at the site may be exposed to petroleum VOCs / SVOCs, CVOCs and heavy metals through several routes including inhalation, ingestion and dermal contact. A site specific Health and Safety Plan has been developed to identify and minimize the potential hazards to on-site workers. Site trespassers could also be exposed to

impacted soil during excavation; however security measures including an 8 ft high construction fence and 24 hr security will minimize potential exposure through this route.

Potential Off-Site Exposures: Off-Site residents could also be exposed to dust or vapors during the excavation of impacted soil. A site specific Community Air Monitoring Plan has been developed to identify and minimize the potential for off-site exposure to residents through continuous air monitoring during excavation activity.

CVOCs in soil vapor may also be migrating off-site in multiple directions; particularly near there east and northeast property lines. The adjacent multi-use building to the north includes commercial retail and garage space on the first floor and residential apartments on floors 2-4. The building also has a basement level which is used for utilities, storage and a tenant laundry room.

The entire area is serviced by the New York City Water System which distributes water from the Croton Reservoir system. Since there are no public or private potable supply wells in the area, exposure from contact with tap water is not a concern.

### 2.6.2 Fish & Wildlife Remedial Impact Analysis

Since petroleum VOCs and CVOCs in groundwater may be migrating from and beneath the Site at low concentrations in an easterly direction, the groundwater to surface water discharge pathway was evaluated. The nearest body of water is the East River located ½ mile to the west. Therefore, based on the concentrations of contaminants currently in groundwater beneath the Site, the groundwater flow direction (northeast) and the distance and location to the East River (1/2 mile west) there are no expected impacts to surface water environments from contaminants migrating from the Site.

## 2.7 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

### 2.7.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-disposal/pre-release conditions.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

### 2.7.2 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation through the terrestrial food chain.

### 2.7.3 Soil Vapor

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

# 3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

## 3.1 EVALUATION OF REMEDIAL ALTERNATIVES

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance; and
- Land use.

The first two criteria are threshold criteria and must be satisfied in order for an alternative to be considered for selection. The remaining seven criteria are balancing criteria which are used to compare the positive and negative aspects of each of the remedial alternatives, provided the alternative satisfies the threshold criteria.

## 3.2 STANDARDS, CRITERIA AND GUIDANCE (SCG)

A criterion for remedy selection is evaluation for conformance with SCGs that are applicable, relevant and appropriate. Principal SCGs that are applicable, relevant and appropriate for evaluating the alternatives for remediation of this BCP site include the following:

- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response

- 10 NYCRR Part 67 – Lead
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- 6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
- 6 NYCRR Part 375 - 6 NYCRR Part 375 Environmental Remediation Programs Subparts 375-1, 375-3 and 375-6 (December 2006)
- 6 NYCRR Part 376 - Land Disposal Restrictions
- 6 NYCRR Part 608 - Use and Protection of Waters
- 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
- 6 NYCRR Part 750 through 758 - Implementation of NPDES Program in NYS ("SPDES Regulations")
- 6 NYCRR Part 375-6 Soil Cleanup Objectives
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1;
- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation - May 2010;
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan
- NYS Waste Transporter Permits – 6 NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364.
- TAGM 4059 - Making Changes To Selected Remedies (May 1998)
- STARS #1 - Petroleum-Contaminated Soil Guidance Policy
- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- DER-10, Technical Guidance for Site Investigation and Remediation, May 2010
- DER-23 / Citizen Participation Handbook for Remedial Programs, January 2010

- OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)

Additional regulations and guidance are applicable, relevant, and appropriate to the remedial alternatives and will be complied in connection with implementation of the remedial program; however, the list above is intended to represent the principal SCGs which should be considered in evaluating the remedial alternatives for the BCP site.

Conformance with the appropriate standards for remediation of contaminated soil is an important criterion in evaluating the remedial alternatives for the BCP site. Presently, in New York State 6 NYCRR Part 375 establishes the primary SCGs associated with remediation of contaminated soil at sites which are in the BCP. If proposing remediation pursuant to a Track other than Track 1 (Unrestricted Use), 6 NYCRR Part 375 requires evaluation of at least one remedial alternative pursuant to Track I (Unrestricted Use) and one other alternative developed by the applicant for the proposed use of the BCP site. The remedial alternatives presented in Section 3.3 of this work plan have been prepared in conformance with this requirement.

## 3.3 ALTERNATIVES ANALYSIS

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;

- Cost effectiveness;
- Community Acceptance; and
- Land use.

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. This analysis was prepared in accordance with 6 NYCRR Part 375-1.8(f) and Part 375-3.8(f) and Section 4.3(c) of NYSDEC DER-10. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

- Alternative 1 - Track 1, remediation of all soils above bedrock to unrestricted use criteria. Excavation to a minimum depth of 15 feet across the Site with the excavation of the petroleum and CVOC impacted areas to a depth of 25 feet or as needed to meet unrestricted use SCOs. The Alternative includes full dewatering / treatment of groundwater beneath the entire Site as part of installation of the new buildings foundation. This alternative does not allow the use of long-term institutional /engineering controls to address impacted media or prevent exposures which may be required beneath the new building. An SSD system is not required for this alternative since the building foundation will be well below the water table and since the cellar levels will consist of a parking garage with mechanical ventilation.

- Alternative 2 - Track 2, remediation of all soils to restricted residential criteria to a depth of 15 feet if soils below 15 feet do not represent a source of contamination. This alternative would require a slightly lesser degree of excavation than Alternative 1 to meet SCOs, however, the excavation depth planned for the new building will likely exceed the excavation depth needed to meet this alternative. This alternative does not allow the use of long-term institutional /engineering controls to meet soil cleanup objectives. Long-term institutional /engineering controls are allowed to address or prevent exposures from other impacted media. This alternative is provided as a contingency in the event that Track 1 SCOs cannot be met. Since the planned excavation depth for the new building is expected to satisfy SCOs for both Alternative 1 and Alternative 2, Alterative 2 has been added as a contingency in the event that Alternative 1 cannot be achieved.

## 3.4 REMEDIAL ALTERNATIVE 1

The following sections provide an evaluation of Alternative 1 based on the nine evaluation criteria as previously discussed.

### 3.4.1 Overall Protection of Human Health and the Environment

Alternative 1 will be protective of human health and the environment by eliminating constituents in soil related to petroleum, CVOCs and historic fill and remediating groundwater. The potential for human and environmental exposure to these constituents on-site will be eliminated by excavation of all petroleum contaminated and historic fill soils with parameters in excess of unrestricted criteria, disposing of excavated materials off-site, full dewatering and treatment of groundwater beneath the Site and backfilling as needed with certified clean fill, virgin mined materials or recycled concrete materials from a NYSDEC permitted recycling facility.

Potential post-remediation exposures to on-site residents from soil vapors are not expected to require the operation of SSD systems, though groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a Health and Safety Plan. Exposures to area residents from dust and/or vapors will be minimized through the use of engineering controls and through implementation of a Community Air Monitoring Plan (CAMP).

### 3.4.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 1 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to Track 1 unrestricted cleanup levels. SCGs for groundwater will also be achieved as impacted groundwater will be fully extracted and treated prior to discharge into the NYC sewer system (see Section 5.5.10). Compliance with SCGs for soil vapor is expected following completion of the remedial action.

### 3.4.3 Long-Term Effectiveness and Permanence

Alternative 1 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants or historic fill materials and by remediating groundwater. Under this Alternative, risk from soil impacts and groundwater will be eliminated. Aternative 1 will continue to meet RAOs for soil, groundwater and soil vapor in the future, providing a permanent long-term solution for the Site.

### 3.4.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting unrestricted objectives through excavation and from on-site groundwater by extraction, treatment and off-site discharge (sewer system) of groundwater beneath the Site during construction.

### 3.4.5 Short-Term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 1 is minimal.

Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic, will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities, will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan has also been prepared to minimize disturbance to the local roads and community.

### 3.4.6 Implementability

The techniques, materials and equipment to implement Alternative 1 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation and construction dewatering for the remediation of soils and groundwater are both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

### 3.4.7 Cost

Costs associated with Alternative 1 are estimated at approximately $ 1,743,549. This cost estimate includes the following elements and assumptions:

- Excavate as per the basement foundation plans for the new buildings to 25 ft below grade. Over-excavate as necessary to remediate petroleum / CVOC hot-spot areas and remove all historic fill at the Site.
- Disposal of approximately 3,166 cy of petroleum / CVOC contaminated soil as non-hazardous with lead levels <1500 ppm;
- Disposal of approximately 8,666 cy of historic fill soil as non-hazardous with lead levels <1,500 ppm;
- Disposal of approximately 4,370 cy of clean native soil for beneficial reuse;
- Groundwater dewatering and treatment during foundation construction; and,
- HASP and CAMP monitoring for the duration of the remedial activities.

### 3.4.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current M1-2 / R6A zoning. Following remediation, the Site will meet unrestricted use objectives which will exceed the objectives for its planned commercial-retail and residential use. A groundwater use restriction may be required to prevent future exposure to affected groundwater.

### 3.4.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP will be subject to a 45-day public comment period to determine if the community had comments

on the presented remedial alternatives and selected remedy. If no comments are received regarding Alternative 1, it will be considered to be acceptable to the community.

## 3.5 REMEDIAL ALTERNATIVE 2

The following sections provide an evaluation of Alternative 2 based on the nine evaluation criteria as previously discussed.

### 3.5.1 Overall Protection of Human Health and the Environment

Alternative 2 will be protective of human health and the environment by eliminating constituents in soil related to petroleum and historic fill and remediating groundwater. The potential for human and environmental exposure to these constituents on-site will be eliminated by excavation of all petroleum contaminated and historic fill soils with parameters in excess of unrestricted criteria, disposing of excavated materials off-site, full dewatering and treatment of groundwater beneath the Site and backfilling as needed with certified clean fill, virgin mined materials or recycled concrete materials from a NYSDEC permitted recycling facility.

Potential post-remediation exposures to on-site residents from soil vapors are not expected to require the operation of SSD systems, though groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity, workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a HASP. Exposures to area residents from dust and or vapors will be minimized through the use of engineering controls and through implementation of a CAMP.

### 3.5.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 2 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to restricted residential cleanup levels for the top 15 feet. SCGs for groundwater will also be achieved as impacted groundwater will be fully extracted and treated prior to discharge into the NYC sewer system (see Section 5.5.10). Compliance with SCGs for soil vapor is expected following completion of the remedial action by removal of all impacted soil and

groundwater and through the building's construction which will place the cellar level foundation 10 to 15 ft below the water table.

### 3.5.3 Long-term Effectiveness and Permanence

Alternative 2 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants above restricted residential objectives to a depth of 15 feet and by remediating groundwater. Under this Alternative risk from soil impacts and groundwater will be eliminated. Alternative 2 will continue to meet RAOs for soil groundwater and soil vapor in the future, providing a permanent long-term solution for the Site.

### 3.5.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 2 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting restricted residential objectives in the upper 15 feet and from on-site groundwater by extraction, treatment and off-site discharge (sewer system) of groundwater beneath the Site during construction.

### 3.5.5 Short-term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 2 is minimal. Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities will

minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

### 3.5.6 Implementability

The techniques, materials and equipment to implement Alternative 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation and construction dewatering for the remediation of soils and groundwater are both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

### 3.5.7 Cost

Costs associated with Alternative 2 are almost identical to Alternative 1 adding only those costs associated with preparation of a Site Management Plan and Environmental Easement package and are estimated at approximately $ 1,771,149. This cost estimate includes the following elements and assumptions:

- Excavate as per the basement foundation plans for the new buildings to 25 ft below grade. Over-excavate as necessary to remediate petroleum / CVOC hot-spot areas and remove all historic fill at the Site to Restricted Residential SCOs.
- Disposal of approximately 3,166 cy of petroleum / CVOC contaminated soil as non-hazardous with lead levels <1500 ppm;
- Disposal of approximately 8,666 cy of historic fill soil as non-hazardous with lead levels <1,500 ppm;
- Disposal of approximately 4,370 cy of clean native soil for beneficial reuse;
- Groundwater dewatering and treatment during foundation construction; and,
- HASP and CAMP monitoring for the duration of the remedial activities;
- Preparation of a Site Management Plan; and,
- Preparation and Filing of an Environmental Easement.

### 3.5.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current M1-2 / R6A zoning. Following remediation, the Site will meet restricted-residential use objectives which will meet

objectives for its planned mixed commercial-retail and residential use. A groundwater use restriction may be required to prevent future exposure to affected groundwater.

### 3.5.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP will be subject to a 45-day public comment period to determine if the community has any comments on the presented remedial alternatives and selected remedy. If no comments are received, it will be considered to be acceptable to the community.

## 3.6 SELECTION OF THE PREFERRED REMEDY

The remedy recommended for the site is a Track 1 alternative which consists of the removal and proper off-site disposal of all petroleum / CVOC contaminated soil and historic fill material with parameters above unrestricted SCOs.

Any backfill materials used at the site will either consist of clean native soil excavated from other areas of the site, virgin mined materials, recycled materials or certified fill which meets unrestricted SCOs.

Groundwater will be remediated through construction dewatering and treatment followed by discharge into the NYC sewer system.

### 3.6.1 Preferred Remedy Land Use Factor Evaluation

As required by Article 27, Title 14 of the Environmental Conservation Law 27-1415, the following land use factor evaluation examines whether the preferred alternative is acceptable based on the 14 criteria presented in the following subsections.

**Zoning**

The proposed redevelopment project, which includes the construction of new 6 story mixed-use commercial - residential building is in compliance with the M1-2 / R6A zoning. Therefore the project will be constructed as-of-right regardless of the remedy implemented. The preferred remedy will comply with current zoning.

**Applicable Comprehensive Community Master Plans or Land Use Plans**

The proposed redevelopment project and selected remedy are consistent with comprehensive master and land use plans, specifically the Williamsburg rezoning action (CEQR No. 04DCP003K). This area-wide comprehensive re-zoning was completed by the New York City Department of City Planning and adopted by the City Council in May 2005. The preferred remedy will be in full compliance with this applicable land use plan.

**Surrounding Property Uses**

The area surrounding the property is highly urbanized and predominantly consists of multi-family residential buildings with mixed-use buildings (residential w/ first floor retail) along main corridors such as Driggs Avenue which borders the property to the east and Bedford Avenue located just one block to the northwest. The area is marked by late 19th and early 20th century rowhouses with commercial and industrial properties interspersed throughout the residential sections. The area to the west of the Site was historically characterized by heavy industry and manufacturing.

Following a steady decline of manufacturing in the area from the late 1960's through the 1980's, many of the industrial properties were vacated leaving the buildings to be vandalized and become derelict. There are no identified sensitive receptors (i.e. nursing homes, day care centers, etc.) located downgradient of the Site. The area surrounding the property is highly urbanized and predominantly consists of multi-family residential buildings with mixed-use buildings (residential w/ first floor retail) along main corridors such as Bedford and Flushing Avenues.

The proposed project is compatible with the surrounding land use and will be in compliance with the current zoning. The proposed remedy will not interfere with surrounding property uses and considers the short term affects to neighboring properties.

**Citizen Participation**

Citizen participation for implementation of the preferred alternative will be performed in accordance with DER 23 and NYCRR Part 375-1.10 and Part 375-3.10. A Citizen Participation

Plan has been prepared and is available for public review at the identified document repositories (NYSDEC Region 2 Office, Leonard Branch of the Brooklyn Public Library).

**Environmental Justice Concerns**

The Site is not located within a potential environmental justice area. The NYSDEC defines a potential environmental justice area as a "minority or low-income community that may bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Environmental justice means the fair treatment and meaningful involvement of all people regardless of race, color, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Since the goal of the remedy will achieve the highest level of cleanup and will remove contaminated materials from the community, the remedy poses no environmental justice concerns.

**Land use designations**

The proposed remedy is consistent with land-use designations.

**Population growth patterns**

Population growth patterns support the proposed use for the Site. The preferred remedy will not negatively affect on population growth patterns.

**Accessibility to existing infrastructure**

The Site is accessible to existing infrastructure. The close proximity of the Site to the Brooklyn - Queens Expressway (I-287) will assist soil transportation and contractor access to the Site. The Site is also accessible to mass transit and is within walking distance to the L line with a subway

stop on Driggs Avenue and N. 7th Street (1 block to the south). The preferred remedy will not alter accessibility to existing infrastructure.

**Proximity to cultural resources**

The proposed remedy will not negatively impact cultural resources.

**Proximity to natural resources**

The proposed remedy will improve the local environment and will not negatively impact affect natural resources.

**Off-Site groundwater impacts**

The proposed remedy will improve potential off-site groundwater impacts by removing petroleum / CVOC impacted soil from the site and treating VOC impacted groundwater. The proposed remedy will not affect natural resources other than to potentially improve the quality of groundwater on a local basis.

**Proximity to floodplains**

No portion of the Site is located within a designated flood zone area. The nearest moderate risk flood zone is located 100 feet to the northeast and the nearest high risk flood zone is located 250 feet to the northwest.

**Geography and geology of the Site**

The selected remedy will excavate historic fill materials across the Site to a depth of 15 feet and petroleum / CVOC impacted soil in the central and southeastern areas of the site to a depth of 25 feet. Redevelopment will also remove soils to a depth of 25 feet for the basement levels of the new building. The selected alternative and development of the site have considered the geography and geology of the Site.

**Current Institutional Controls**

There are no institutional controls presently assigned to the Site.

## 3.7 SUMMARY OF SELECTED REMEDIAL ACTIONS

The remedy recommended for the Site is a Track 1 alternative (Alternative 1) which consists of the removal of all on-site soils which exceed the UUSCOs and the remediation of petroleum impacted groundwater. It is expected that a Track 1 alternative will require excavation to a minimum depth of 15 feet across the Site with additional excavation to 25 feet below grade in the petroleum /CVOC impacted area. Excavation will continue to a depth of 25 ft site-wide, for construction of the new building. In addition all fill material with parameters above unrestricted SCOs will be removed from the Site and properly disposed of at an off-site facility. The remedy will include the following items:

1. Excavation of soil/fill exceeding Track 1 unrestricted use SCOs as listed in **Table 1** to depths as great as 15 feet below grade site-wide and to 25 ft within the petroleum / CVOC impacted areas;
2. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
3. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 1 SCOs;
4. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
5. Dewatering and treatment of VOC impacted groundwater before discharging to the NYC sewer system under a NYCDEP sewer discharge permit.
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in **Table 1**, (2) all Federal, State and local rules and regulations for handling and transport of material.
7. .If Track 1 cleanup is not achieved, implementation of a Site Management Plan (SMP) for long term maintenance of the Engineering Controls.
8. If Track 1 cleanup is not achieved, an Environmental Easement will be filed against the Site to ensure implementation of the SMP.

Although the goal of the remedy will be to remove all soil exceeding the Track 1 SCOs, if Track 1 SCOs cannot be achieved then a Track 2 remedy may result.

All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP. Any anticipated deviations to the RAWP shall be submitted to the NYSDEC for review.

# 4.0 REMEDIAL ACTION PROGRAM

The objective of this section of the Remedial Action Work Plan, is to present a scope of work which will be approved by NYSDEC and when completely implemented will ready the BCP site for development under the Contemplated Use consistent with the requirements of the Brownfield Cleanup Program.

## 4.1 GOVERNING DOCUMENTS

Governing documents and procedures included in the Remedial Work Plan include a Site-specific Health and Safety Plan (HASP), a Community Air Monitoring Plan (CAMP), a Citizen Participation Plan, a Soil Management Plan (SoMP), a Quality Assurance Project Plan (QAPP), fluid management procedures, and contractors' site operations and quality control procedures. Highlights of these documents and procedures are provided in the following sections.

### 4.1.1 Health & Safety Plan (HASP)

Contractors and subcontractors will have the option of adopting this HASP or developing their own site-specific document. If a contractor or subcontractor chooses to prepare their own HASP, the Remedial Engineer will insure that it meets the minimum requirements as detailed in the site-specific HASP prepared for the Site.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926. Modifications to the HASP may be made with the approval of the Remedial Engineer (RE), Site Safety Manager (SSM) and/or Project Manager (PM).

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an

appropriate Health and Safety Plan and for the appropriate performance of work according to that plan and applicable laws.

The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

The Site Safety Coordinator will be Ms. Chawinie Miller. Her resume is provided in **Attachment F**. Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses. A copy of the Site Specific Health and Safety Plan is provided in **Attachment B.**

### 4.1.2 Quality Assurance Project Plan (QAPP)

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or a cold-pak(s) to maintain a temperature of $4^{o}$C.

Dedicated disposable sampling materials will be used for both soil and groundwater samples (if collected), eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash with alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Prepare field blanks by poring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory. Laboratory reports will be upgradeable to ASP category B deliverables for use in the preparation of a data usability report (DUSR). The QAPP for the Site is provided in **Attachment C**.

### 4.1.3 Construction Quality Assurance Plan (CQAP)

All construction work related to the remedy (i.e. soil excavation) will be monitored by EBC / AMC field personnel under the direct supervision of the Remedial Engineer. Monitoring during soil excavation will be performed to protect the health of site workers and the surrounding community. A Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) have been specifically developed for this project. These plans specify the monitoring procedures, action levels, and contingency measures that are required to protect public health.

All intrusive and soil disturbance activities will be monitored by an environmental professional (EP) under the direct supervision of the Remedial Engineer who will record observations in the site field book and complete a photographic log of the daily activities. The EP will provide daily updates to the Project Manager and Remedial Engineer who will both make periodic visits to the site as needed to assure construction quality. Daily updates will also be submitted to the NYSDEC. See section 4.4.1 Daily Reports.

### 4.1.4 Soil/Materials Management Plan (SoMP)

A SoMP has been prepared for excavation, handling, storage, transport and disposal of all soils/materials that are disturbed / excavated at the Site. The SoMP includes all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations. The SoMP is presented in Section 5.4.

### 4.1.5 Erosion and Sediment Control Plan (ESCP)

Erosion and sediment controls will be performed in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. Typical measures that will be utilized at various stages of the project to limit the potential for erosion and migration of soil include the use of hay bales, temporary stabilized construction entrances/exits, placement of silt fencing and/or hay bales around soil stockpiles, and dust control measures.

### 4.1.6 Community Air Monitoring Plan (CAMP)

The CAMP provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities.

The action levels specified require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air. The primary concerns for this site are vapors, nuisance odors and dust particulates.

The primary concerns for this site are vapors, nuisance odors and dust particulates. The CAMP prepared for implementation of the RAWP is provided in **Attachment D**.

### 4.1.7 Contractors Site Operations Plan (SOP)

The Remedial Engineer has reviewed all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirms that they

are in compliance with this RAWP. The Remedial Engineer is responsible to ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

### 4.1.8 Citizen Participation Plan (CPP)

The Citizen Participation Plan prepared for this project is provided in **Attachment E**. The public will be informed of key project documents and events through the distribution of fact sheets through the Department's List Serv. The public was initially informed of the Site and the opportunity to join the List Serv through an ad placed in the local newspaper and mailed fact sheets.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

Document repositories have been established at the following locations and contain all applicable project documents:

**Brooklyn Public Library – Leonard Branch**
81 Devoe Street
Brooklyn, NY 11211
(718) 486-3365

**Hours:**
Hours: Sunday: Closed
Monday: 10am- 6pm
Tuesday: 1pm- 8pm
Wednesday, Thursday & Friday: 10am- 6pm
Saturday: 10am – 5pm

**Brooklyn Community Board 1**
435 Graham Avenue,
Brooklyn, NY 11211
Phone: 718-389-0009

## 4.2 GENERAL REMEDIAL ACTION INFORMATION

### 4.2.1 Project Organization

The Project Manager for the Remedial Activity will be Mr. Robert Bennett. Overall responsibility for the BCP project will be Mr. Charles B. Sosik, P.G., P.HG. The Remedial Engineer for this project is Mr. Ariel Czemerinski, P.E. Resumes of key personnel involved in the Remedial Action are included in **Attachment F**.

### 4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Mr. Ariel Czemerinski, P.E. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site. The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will review all pre-remedial plans submitted by contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal, and will certify compliance in the Final Remediation Report. The Remedial Engineer will provide the certifications listed in Section 10.1 in the Final Engineering Report.

### 4.2.3 Remedial Action Schedule

The remedial action will begin with mobilization of equipment and material to the Site, which will begin approximately 1 week following RAWP approval and 10 days after the distribution of the remedial construction Fact Sheet. A pre-construction meeting will be held among NYSDEC, the Remedial Engineer, and the selected remedial contractor prior to site mobilization. Mobilization will be followed by soil removal and disposal and confirmation sampling. The

work is expected to take 6 months as part of the construction excavation and foundation installation.

### 4.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. DEC will be notified by the Applicant of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours.

### 4.2.5 Site Security

A construction fence will be erected around the entire property as required by the NYC Department of Buildings. The fence will be maintained as required and secured at the end of each work day.

### 4.2.6 Traffic Control

The Volunteer's construction management personnel will direct the arrival or departure of construction vehicles, and provide flag services as needed to maintain safe travel exiting and entering the Site from Bedford Avenue. Traffic related to on-going remedial activity will require the staging of 10-wheel dump trucks on Driggs Avenue on a daily basis during soil excavation activity. The soil disposal transport route will be as follows:

- ENTERING SITE - from the Brooklyn Queens Expressway heading south; take the Metropolitan Avenue Exit and turn right heading north on Union Avenue to N. 10$^{th}$ Street. Turn left on N. 10$^{th}$ Street, heading west to Driggs Avenue. Turn Left on Driggs Avenue heading south to the Site entrance on the right (2 blocks).

- EXITING SITE – Turn right onto Driggs Avenue heading south to N. 7$^{th}$ Street. Turn left onto N. 7$^{th}$ Street heading east to Roebling Street. Turn left on Roebling Street heading north to Union Avenue. Turn right on Union Avenue heading east to the Brooklyn-Queens Expressway. Pass beneath the Brooklyn-Queens Expressway and turn left onto

Meeker Avenue and continue to the on-ramp (bearing left) Brooklyn-Queens Expressway.

A map showing the truck routes is included as **Figure 10**.

### 4.2.7 Worker Training and Monitoring

An excavation contractor with appropriate experience, personnel and training (40 hr OSHA) is required to perform the removal of the CVOC and naphthalene impacted soil. After this material is removed the contractor will remove historic fill and uncontaminated soil. The excavation contractor's on-site personnel engaged in historic fill and native soil removal will have a minimum of 24 hour Hazardous Waste Operations and Emergency Response Operations training.

All field personnel involved in remedial activities will participate in training, if required under 29 CFR 1910.120, including 24 and 40-hour hazardous waste operator training and annual 8-hour refresher training. The Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign a HASP acknowledgment.

All on-site personnel engaged in remedial or sampling activities must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.

- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

### 4.2.8 Agency Approvals

The Applicant has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is attached in **Table 15**. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the Final Remediation Report.

### 4.2.9 NYSDEC BCP Signage

A project sign will be erected at the main entrance to the Site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the New York State Brownfield Cleanup Program. The sign will meet the detailed specifications provided by the NYSDEC Project Manager and contained in **Attachment G**.

### 4.2.10 Pre-Construction Meeting with NYSDEC

A pre-construction meeting with the Project Manager, Remedial Engineer, Construction Manager, Owner's Representative and the NYSDEC will take place prior to the start of major construction activities.

### 4.2.11 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in **Table 16**. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

### 4.2.12 Remedial Action Costs

The total estimated cost of the Remedial Action is $ 1,743,549. An itemized and detailed summary of estimated costs for all remedial activity is attached as **Attachment H**. This will be revised based on actual costs and submitted as an Appendix to the Final Remediation Report.

## 4.3 SITE PREPARATION

### 4.3.1 Mobilization

Mobilization will include the delivery of construction equipment and materials to the site. All construction personnel will receive site orientation and training in accordance with the site specific HASP, CAMP and established policies and procedures to be followed during the implementation of the RAWP. The remediation contractor, construction manager and all associated subcontractors will each receive a copy of the RAWP and the site specific HASP and will be briefed on their contents.

### 4.3.2 Erosion and Sedimentation Controls

Soil erosion and sediment control measures for management of storm water will be installed in accordance with the New York Guidelines for Urban Erosion and Sediment Control. Haybales and/or silt fence will be placed by the remedial contractor at locations surrounding excavation areas and within the perimeter fencing as needed, to control stormwater runoff and surface water

from exiting the excavation. These control measures will be installed prior to initiating the soil excavation.

### 4.3.3 Stabilized Construction Entrance(s)

Stabilized construction entrances will be installed at all points of vehicle ingress and egress to the Site. The stabilized entrances will be constructed of a 4 to 6-inch bed of crushed stone or crushed concrete which will be sloped back toward the interior of the Site. The stabilized entrances will be inspected on a daily basis during soil loading activities and reinforced as needed with additional stone/concrete material to prevent the accumulation of ruts, mud or soil.

### 4.3.4 Utility Marker and Easements Layout

The Applicant and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Applicant and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

### 4.3.5 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities including excavation is the sole responsibility of the Applicant and its contractors. The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. The Applicant and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this Plan. Further, the Applicant and its contractors are solely responsible for the implementation of all required,

appropriate, or necessary health and safety measures during performance of work under the approved Plan.

### 4.3.6 Equipment and Material Staging

All equipment and work materials will be staged on-Site in areas as designated by the General Contractor, and / or Construction Site Superintendant.

### 4.3.7 Decontamination Area

A temporary truck decontamination pad will be constructed to decontaminate trucks and other vehicles/equipment leaving the Site. The pad will be constructed by placing a 4 to 6-inch bed of stone aggregate such as crushed rock or RCA. The pad will be bermed at the sides and sloped back to the interior of the Site. The truck pad will be sized to accommodate the largest construction vehicle used and located in line with the stabilized construction entrance. The pad will be inspected on a daily basis during soil loading activities and reinforced as needed with additional stone/concrete material to prevent the accumulation of ruts, mud or soil.

### 4.3.8 Site Fencing

An 8-foot high chain-link fence is present around the portions of the Site which are not bordered by adjacent buildings (north, west) with entrance / exit gates located on Driggs Avenue. This fence will be properly secured at the end of the day and supplemented, as needed, by installing orange safety fencing around open excavations to ensure on-site worker safety.

### 4.3.9 Demobilization

Demobilization will consist of the restoration of material staging areas and the disposal of materials and/or general refuse in accordance with acceptable rules and regulations. Materials used in remedial activities will be removed and disposed properly. All equipment will be decontaminated prior to leaving the Site.

## 4.4 REPORTING

All daily and monthly Reports will be included in the Final Engineering Report.

### 4.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day in which remedial activity takes place. Daily reports will include:

- An update of progress made during the reporting day;
- Quantities of oxidant material applied at specific injection locations of the Site;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

### 4.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers within one week following the end of the month of the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,

- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

### 4.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG, PDF) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be included in the daily reports as needed, and a comprehensive collection of photos will be included in the Final Engineering Report.

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-Site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

### 4.4.4 Complaint Management Plan

Complaints from the public regarding nuisance or other Site conditions including noise, odor, truck traffic etc., will be recorded in the Site field book and reported to the NYSDEC via email on the same day as the complaint is received.

### 4.4.5 Deviations from the Remedial Action Work Plan

Minor deviations from the RAWP will be identified in the daily update report and will be noted in the Final Engineering Report. When deviations are reported, a brief discussion will be provided which will state the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy.

Major changes to the scope of work must be discussed with the NYSDEC and the NYSDOH prior to implementation. If the changes are considered to be significant enough, an addendum to the RAWP Work Plan will be prepared and submitted to NYSDEC / NYSDOH for review.

# 5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

Excavation work includes the following; the removal and off-Site disposal of the top 15 feet of soil across the Site with additional excavation to 25 feet below grade in the petroleum /CVOC impacted area. Excavation will continue to a depth of 25 ft site-wide, for construction of the new building. In addition all fill material with parameters above unrestricted SCOs will be removed from the Site. Soil excavation will be performed using conventional equipment such as track-mounted excavators, backhoes and loaders.

All excavation work will be performed in accordance with the Site-specific HASP and CAMP. If an underground storage tank (UST) is discovered during excavation the NYSDEC Project Manager will be immediately notified and the UST removed and closed in accordance with DER-10, NYSDEC PBS regulations and NYC Fire Department regulations. It is anticipated that the excavation of petroleum and CVOC soils will be performed by an excavation contractor using appropriately trained personnel (40 hr HAZWOPER). Historic fill materials and native soils will also be performed by the excavation contractor for the construction project using personnel with 24 hr HAZWOPER training.

Historic fill materials and petroleum contaminated soils will be excavated to a depth of approximately 15 feet (sitewide) and 25 feet (petroleum / CVOC hotspot) respectively, as needed to achieve SCOs. Excavation for the basement level of the new building will continue to a depth of approximately 25 feet. An excavation plan showing the excavation depths to achieve the Track 1 remedy is provided in **Figure 11**.

Dewatering will be required for excavation of contaminated areas and for foundation construction.

## 5.1 CONTINGENCY

### 5.1.1 Drainage Structure Removal Methods

The geophysical survey indicates that four drywells are present and connected to each of the four

surface at the Site. Prior to removal of the drainage structures, the UIC Director of the United States Environmental Protection Agency (USEPA) will be notified of the owners intent to close the wells in accordance with Title 40 of the Code of Federal Regulations (40 CFR) Section 144.12(a).

These structures will be uncovered and inspected for standing water / sludge. If this material is present, an Environmental Remediation Contractor will remove the standing water from each structure utilizing a liquids pump truck and disposed of at a licensed TSDF.

A Guzzler® or Vactor® truck will then be utilized to remove sediment/sludge (if present) from the base of each drywell until at least the base of the bottom of the deepest pre-cast concrete ring is exposed. Once a structure has been exposed enough to allow for unobstructed removal and minimal/no excavation cave-in, the pre-cast concrete lid will be removed as one piece (if possible) utilizing an excavator and hoisting straps/chains. Following removal of the lid/cap, each 4 foot pre-cast concrete ring will be lifted from the ground and set aside (if possible). If a concrete ring(s) could not be removed as a single unit, an excavator equipped with a hydraulic hammer (if necessary) will be utilized to break the pre-cast concrete ring within the ground into pieces that can be removed from the excavation by the excavator bucket. All concrete from the structures will be broken into pieces no larger than 4ft in diameter and stockpiled for disposal as construction and demolition debris.

The removal and remediation of the drywell structures will be performed by a qualified remedial contractor and fully trained personnel (40HR OSHA HAZWOPER).

### 5.1.2 UST Removal Methods

USTs, if encountered during excavation activities at the Site, will be removed in accordance with the procedures described under the NYSDEC Memorandum for the Permanent Abandonment of Petroleum Storage Tanks and Section 5.5 of Draft DER-10 as follows:

- Remove all product 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 of the tank
- Remove the fill tube and disconnect the fill, gauge, product and 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 a storage yard for cleaning
- If the tank is to be moved it must be transported by licensed waste transported. 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 tank 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).

### 5.1.3 Former Gas Holder Structure Removal Methods

There is some evidence that a gas holder may have been located on the property prior to 1887. If this structure is encountered it will assessed and removed in accordance with the following procedures to prevent the release of any contaminants which may be present inside the structure:

- Expose the perimeter of the structure to define its area and dimensions;

- Begin excavating soil within the structure to the water table;
- Check for the presence of NAPL and tars. If present remove with a vacuum truck;
- Perform dewatering inside and outside of the structure simultaneously;
- Remove the walls of the structure as the excavation proceeds. The interior water level and soil depth should remain lower than that outside of the structure at all times;
- Remove the base of the structure.

## 5.2 SOIL CLEANUP OBJECTIVES

The Soil Cleanup Objectives for this Site are listed in **Table 1**. **Table 7** summarizes all soil samples that exceed the SCOs proposed for this Remedial Action. Spider maps showing all soil samples that exceed the SCOs proposed for this Remedial Action are shown in **Figure 7**.

## 5.3 REMEDIAL PERFORMANCE EVALUATION (POST EXCAVATION END-POINT SAMPLING)

Post excavation (endpoint) soil samples will be collected from across the Site to verify that remedial goals have been achieved. Endpoint soil samples will be collected from the Site as follows:

(1) Site-wide endpoint soil samples will be collected following removal of all soil needed for construction of the buildings cellar level to verify that remedial goals have been achieved (**Figure 12**). The Site-wide endpoint soil samples will be analyzed for VOCs, SVOCs, pesticides, PCBs and metals. The collection of sidewall endpoint soil samples will be not be performed when soil is excavated to the property line.

### 5.3.1 End-Point Sampling Frequency

Endpoint sampling frequency will be in accordance with DER-10 section 5.4 which recommends the collection of one bottom sample per 900 sf of bottom area and one sidewall sample per 30 liner feet. Sidewall samples will not be collected where sheeting or shoring is present and will not be part of this program as soil will be fully excavated to the site boundaries.

### 5.3.2 Methodology

Collected samples be placed in glass jars supplied by the analytical laboratory and stored in a cooler with ice to maintain a temperature of 4 degrees C. Samples will either be picked up at the Site by a laboratory dispatched courier at the end of the day or transported back to the EBC /AMC office where they will be picked up the following day by the laboratory courier. All samples will be analyzed by a NYSDOH ELAP certified environmental laboratory

All post excavation (endpoint) soil samples will be analyzed for VOCs by EPA Method 8260B, SVOCs by EPA method 8270, pesticides/PCBs by EPA method 8081/8082 and TAL metals.

### 5.3.3 Reporting of Results

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format.

### 5.3.4 QA/QC

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of $4^{o}C$.

Dedicated disposable sampling materials will be used for soil samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight

samples collected. Field blanks will be prepared by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory.

### 5.3.5 DUSR

The DUSR provides a thorough evaluation of analytical data without third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. Verification and/or performance monitoring samples collected under this RAWP will be reviewed and evaluated in accordance with the Guidance for the Development of Data Usability Summary Reports as presented in Appendix 2B of DER-10. The completed DUSR for verification/performance samples collected during implementation of this RAWP will be included in the final Engineering Report.

### 5.3.6 Reporting of End-Point Data in FER

All endpoint data collected as part of this remedial action will be summarized and presented in the Final Engineering Report. The summary tables will include comparison of results to unrestricted SCOs to verify attainment of Track 1. Laboratory reports and the DUSR will be included as an appendix in the FER.

## 5.4 ESTIMATED MATERIAL REMOVAL QUANTITIES

It is expected that 3,166 cubic yards (4,749 tons) of petroleum / CVOC impacted soil will be generated by excavating the petroleum / CVOC area as shown on **Figure 11** to a depth of 25 ft. Historic fill material was also documented throughout the Site to depths as great as 15 feet below grade. Therefore, an estimated 8,666 cubic yards (12,999 tons) of historic fill material will be generated by excavating the remainder of the Site to 15 feet. An additional 4,370 cubic yards (6,555 tons) of clean native soil will be excavated to 25 feet below grade from the Site for construction of the proposed building's cellar. The clean native soil will require off-Site disposal at a beneficial reuse facility or other approved destination.

## 5.5 SOIL/MATERIALS MANAGEMENT PLAN

Excavated soil will be secured and temporarily stored on-site until arrangements can be made for off-site disposal. As an alternative, pre-characterization samples may be collected to allow the soil to be loaded directly on to trucks for transport to the disposal facility. Soils excavated from the CVOC hotspot, will be classified as hazardous unless DEC makes a contained-in determination classifying it as non-hazardous. Based on the levels of TCE reported in soil it is anticipated that DEC will make the contained-in determination. The remainder of the soils including petroleum contaminated soil and historic fill soil are expected to be classified as non-hazardous.

The final determination on classification will be based on the results of waste characterization analysis and the NYSDEC.

Soil excavation will be performed in accordance with the procedures described under Section 5.5 of 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 a calibrated photoionization detector (PID).

Final excavation depth, length, and width will be determined by the Remedial Engineer or his designee, and will depend on the horizontal and vertical extent of contaminated soils as identified through physical examination (PID response, odor, staining, etc.). Expansion of the excavation beyond the planned hotspot area is anticipated and can easily be accommodated.

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 HASP;

- 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 USTs 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 removal of overburden to access the top of the structure or 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. If possible, physically impacted soil will be removed using the backhoe or excavator, segregated from clean soils and overburden, and staged on separate 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 6-mil polyethylene sheeting while disposal options are determined. Sheeting 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 Remedial Engineer is satisfied with the removal effort, verification or confirmatory samples will be collected from the excavation as described in **Section 6.2** of this document.

### 5.5.1 Excavation Petroleum / CVOC Contaminated Soil

Petroleum / CVOC impacted soil is known to be present in the central and southeastern areas of the Site. The vertical extent is approximately 25 feet below grade. However, soil screening will be performed to determine the limits of the excavation with verification sampling performed to confirm removal of all petroleum / CVOC impacted soil. The excavation of the petroleum CVOC hot-spot area will be performed by a qualified contractor and fully trained (40 hr HAZWOPER) personnel.

### 5.5.2 Excavation Historic Fill Soil

Historic fill material is present beneath the site to depths which vary from 10 to 15 feet below grade. The historic fill material contains SVOCs, metals and pesticides above unrestricted and restricted use SCOs. Historic fill material will be segregated from non-contaminated native soils and disposed of off-Site at a permitted disposal facility.

Historic fill soil with lead levels above 1,000 mg/kg and those with lead levels above 3,000 mg/kg will require further segregation for disposal at alternate facilities. Excavated historic fill materials will be secured and temporarily stored on-Site until arrangements can be made for off-Site disposal. It is anticipated that the historic fill material will be classified as non-hazardous material. If this material is classified as non-hazardous, then the excavation of historic fill material will be performed by the excavation contractor for the construction project using trained personnel (24 hr HAZWOPER). If this material is classified as hazardous, then 40 hr HAZWOPER trained personnel will be needed to perform the excavation of this material.

### 5.5.3 Excavation of Native Soils

Native soils are present directly below the fill materials and will require excavation for basement areas and foundation components during construction of the new building. Since excavation of the basement areas will begin following removal of petroleum / CVOC contaminated soil and historic fill, it is expected that native soils will not be contaminated. However, if evidence of contamination is discovered during the excavation of basement areas, the contamination will be removed to the extent possible and segregated from clean native soils for proper disposal. Clean native soils will be stockpiled on-site and characterized for reuse on-site in areas over excavated

to remove historic fill. Any excess soil will be disposed of off-site as a beneficial re-use material upon approval by the NYSDEC Region 2's Division of Materials Management. Clean native soils utilized on-site will be subject to a testing program to verify that they meet unrestricted SCOs prior to use.

It is anticipated that the excavation of native soil materials will be performed by the excavation contractor for the construction project.

### 5.5.4 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by an environmental professional during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the Final Engineering Report.

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

### 5.5.5 Stockpile Methods

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced. Soils which exhibit strong odors will be completely sealed with heavy tarps or vapor suppressant foam.

### 5.5.6 Materials Excavation and Load Out

The Remedial Engineer or an EP under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

Where effective, the equipment will be "dry" decontaminated using a broom and/or brushes. If significant amounts of soil or other contaminants remain after the dry decontamination, the equipment will also be pressure washed before leaving the Site. The EP will be responsible for ensuring that all outbound trucks are dry-brushed or washed on the truck wash/equipment pad before leaving the Site until the remedial construction is complete. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking. The EP will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Plan.

Development-related grading cuts and fills will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill material and contaminated soil on-Site is prohibited. All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be located and shown on maps to be reported in the Final Engineering Report.

### 5.5.7 Materials Transport Off-Site

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Truck transport routes are as follows:

- ENTERING SITE - from the Brooklyn Queens Expressway heading south; take the Metropolitan Avenue Exit and turn right heading north on Union Avenue to N. 10$^{th}$ Street. Turn left on N. 10$^{th}$ Street, heading west to Driggs Avenue. Turn Left on Driggs Avenue heading south to the Site entrance on the right (2 blocks).

- EXITING SITE – Turn right onto Driggs Avenue heading south to N. 7$^{th}$ Street. Turn left onto N. 7$^{th}$ Street heading east to Roebling Street. Turn left on Roebling Street heading north to Union Avenue. Turn right on Union Avenue heading east to the Brooklyn-Queens Expressway. Pass beneath the Brooklyn-Queens Expressway and turn left onto Meeker Avenue and continue to the on-ramp (bearing left) Brooklyn-Queens Expressway.

These routes are shown in **Figure 10**.

These are the most appropriate routes to and from the Site and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes;

(c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development. Material transported by trucks exiting the Site will be secured with tight-fitting covers. Wet loads are not anticipated since the entire site will be dewatered prior to excavating soils. However, if wet soils are excavated they will be stockpiled within the excavation to dry or blended with dry soils. No loads of material capable of generating free liquid will be allowed to leave the Site. All trucks will be inspected, dry-brushed and / or washed, as needed, before leaving the site.

### 5.5.8 Materials Disposal Off-Site

Multiple disposal facility designations may be employed for the materials removed from the Site. Once final arrangements have been made, the disposal location(s) will be reported to the NYSDEC Project Manager. It is anticipated that the soil will be disposed of at up to 3 different facilities, based on the following classification:

- Non Hazardous - Contaminated (petroleum / CVOC) Low Lead < 1,000 mg/kg
- Non Hazardous - Contaminated (historic fill) Low Lead < 1,000 mg/kg
- Uncontaminated Native Soil - meets NJDSC Criteria for beneficial Reuse

The total quantity of material expected to be disposed off-Site is 16,202 cubic yards, including 3,166 cubic yards of petroleum / CVOC impacted soil, 8,666 cubic yards of historic fill material and 4,370 cubic yards of clean native soil.

*Hazardous Soil Disposal and Transport*

Soil classified as hazardous will be shipped under a hazardous waste manifest system. All hazardous waste transported and disposed of must have a USEPA ID Number and waste code and must be distributed in accordance with the regulatory requirements.

The multi-part manifest will be filled out for each load of soil shipped off of the Site. At a minimum, the following information will be recorded on each manifest:

1) Generator's Name, Address, and Phone Number
2) Destination Facility Name, Address and Phone Number
3) EPA ID Number
4) Waste classification code
5) Transporter Name, Address, Phone Number, License Plate Number, Driver Name, and SW Haulers Permit #
6) Signatures – Generator or an authorized agent for the generator shall print, sign, and date each non-hazardous material manifest after each truck is loaded. The transporter shall then sign and date noting time material was picked up at the site. Both the transporter and a representative of the disposal facility will sign the non-hazardous material manifest when the material has been delivered to disposal facility.

*Non-Hazardous Soil Disposal and Transport*

Non-hazardous historic fill material and petroleum / CVOC contaminated soil classified as non-hazardous, will be handled, at a minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Historical fill material and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Materials Management (DMM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DMM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone

number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

Soil classified as non-hazardous fill will be transported under a non-hazardous waste manifest obtained from the selected disposal facility. The multi-part manifest will be filled out for each load of soil shipped off of the Site. At a minimum, the following information will be recorded on each manifest:

1) Generator's Name, Address, and Phone Number
2) Destination Facility Name, Address and Phone Number
3) Transporter Name, Address, Phone Number, License Plate Number, Driver Name, and SW Haulers Permit #
4 Signatures – Generator or an authorized agent for the generator shall print, sign, and date each non-hazardous material manifest after each truck is loaded. The transporter shall then sign and date noting time material was picked up at the site. Both the transporter and a representative of the disposal facility will sign the non-hazardous material manifest when the material has been delivered to disposal facility.

A copy of the manifest will be retained by AMC on-Site personnel for each shipment. Final signed manifests will be forwarded by the disposal facility to the generator. Copies of the final manifests will be presented in the FER.

*Clean Soil Disposal*

Clean native soil removed from the Site for development purposes (i.e. basement levels) will be handled as unregulated or beneficial use disposal. This soil will undergo a testing program to confirm that it meets Unrestricted Use SCOs or Residential / Groundwater Protection SCOs prior to unregulated disposal or meets Unrestricted Use SCOs prior to reuse on-Site. Confirmation testing of clean soils will be in accordance with DER-10 Section 5.4(e)(10) as follows:

| **Contaminant** | **VOCs** | **SVOCs, Inorganics & PCBs/Pesticides** | |
|---|---|---|---|
| **Soil Quantity (cubic yards)** | **Discrete Samples** | **Composite** | **Discrete Samples/Composite** |
| 0-50 | 1 | 1 | Each composite sample for analysis is created from 3-5 discrete samples from representative locations in the fill. |
| 50-100 | 2 | 1 | |
| 100-200 | 3 | 1 | |
| 200-300 | 4 | 1 | |
| 300-400 | 4 | 2 | |
| 400-500 | 5 | 2 | |
| 500-800 | 6 | 2 | |
| 800-1000 | 7 | 2 | |
| 1000 | Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER | | |

Uncontaminated native soil confirmed by the above testing program and removed from the site, will be disposed of as C&D material (if approved) or sent to a beneficial re-use facility. The final destination of soils whether classified as contaminated or uncontaminated must be approved by the NYSDEC.

*C&D and Scrap Metal Disposal*

Concrete demolition material generated on the Site from building slabs, parking areas and other structures will be segregated, sized and shipped to a concrete recycling facility. Concrete crushing or processing on-Site is prohibited. Asphalt removed from the parking areas will be sent to a separate recycling facility.

Additionally, it is common to encounter scrap metals and large boulders (greater than one foot in diameter) during excavation which may not be accepted by either the licensed disposal facility or the C&D facility. These materials will be segregated and subsequently recycled at local facilities. Uncontaminated metal objects will be taken to a local scrap metal facility.

Bricks and other C&D material are also not accepted by most soil disposal facilities if present at greater then 5% by volume. This material, if encountered, will be sent to a C&D landfill or other C&D processing facility if approved by the DEC. C&D material of this type is most often encountered on sites in which former basement structures have been filled in with material from

demolishing a former building. There was no evidence of former basement areas identified during previous investigations performed at the Site.

*Scale Tickets*

All trucks to be utilized for transport of hazardous or non-hazardous contaminated soil shall be weighed before and after unloading at the disposal facility. Disposal facilities must provide truck scales capable of generating load tickets measured in tons. The tonnage transported and disposed will be determined by the disposal facility and reported on a certified scale ticket which will be attached to each returned manifest. Weights will be reported on the certified scale ticket as Tare and Gross weights.

*C&D Transport Tickets / Bills of Lading*

Bill of Lading system or equivalent will be used for the disposal of C&D and related materials. Documentation for materials disposed of at recycling facilities (such as metal, concrete, asphalt) and as non-regulated C&D will include transport tickets for each load stating the origin of the material, the destination of the material and the quantity transported. This information will be reported in the Final Engineering Report.

*Disposal Facility Documentation*

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Applicant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

The Final Engineering Report will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

### 5.5.9 Materials Reuse On-Site

Re-use of on-Site clean native soil will only be allowed if the material is found to meet Unrestricted Use SCOs (for Track 1) or Restricted Residential Use SCOs (for Track 2) through the verification testing program detailed above. The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site.

Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos. Concrete crushing or processing on-Site is prohibited. Contaminated on-Site material, including historic fill material and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

### 5.5.10 Fluids Management

As the depth to groundwater at the site is approximately 13 feet above the planned excavation depth, dewatering operations will be employed during construction. Dewatering fluids will be handled, transported and disposed of in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by the NYCDEP. Note that both the pumping and the treatment system will include odor controls so that the system does not generate objectionable odors during operation. The pumping and treatment system design will be detailed in the NYCDEP discharge permit submittal. This submittal as well as the approved permit will be provided to the DEC prior to initiating dewatering operations.

Based on conditions observed during dewatering operations on projects in the immediate area of the Site, it is expected that flow rates will not approach that required for a Long Island well permit. However, a permit package will be submitted to the NYSDEC Division of Water to obtain a LI well permit equivalency under the BCP, as a contingency should conditions vary considerably from expected.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site. Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream or river) is prohibited without a SPDES permit.

### 5.5.11 Backfill from Off-Site Sources

Off-site fill material may be needed to stabilize the entrance - exit areas of the Site, for temporary driveways for loading trucks and as an underlayment to structural components of the new buildings including slabs and footings. Recycled Concrete Aggregate (RCA) derived from recognizable and uncontaminated concrete and supplied by facilities permitted by, and in full compliance with Part 360-16 and DSNY regulations, is an acceptable form of backfill material. The Remedial Engineer is responsible for ensuring that the facility is compliant with the registration and permitting requirements of 6 NYCRR Part 360 and DSNY regulations at the time the RCA is acquired. RCA imported from compliant facilities does not require additional testing unless required by NYS DEC and DSNY under its terms of operations for the facility. Documentation of part 360-16 and DSNY compliance must be provided to the Remedial Engineer before the RCA is transported to the Site.

Fill material may also consist of virgin mined sand, gravel or stone products. Materials from a virgin mined source may be imported to the Site without testing provided that that the material meets the specifications of the geotechnical engineer, Remedial Engineer, and Redevelopment Construction Documents and that the source of the material is approved by the Remediation Engineer and the NYSDEC Project Manager.

The source approval process will require a review of the following information:

- The origin of the material;
- The address of the facility which mines/processes the material;
- A letter from the facility stating that the material to be delivered to the site is a virgin mined material and that it has not been co-mingled with other materials during processing or stockpiling.

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site. Material from industrial sites, spill sites or other potentially contaminated sites will not be imported to the Site.

The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that all import of soils from off-Site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan".

Under no circumstances will fill materials be imported to the site without prior approval from the NYSDEC Project Manager. If sufficient documentation is not obtained, fill materials will be tested at a frequency consistent with that as specified in Table 4 of NYSDEC CP-51 Soil Cleanup Guidance Policy. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

### 5.5.12 Stormwater Pollution Prevention

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for

replacing silt fencing damaged due to weathering. Erosion and sediment control measures identified in the RAWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters Silt fencing or hay bales will be installed around the entire perimeter of the remedial construction area.

### 5.5.13 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs). These analyses will not be limited to STARS parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will be also included in daily and periodic electronic media reports.

### 5.5.14 Community Air Monitoring Plan

The Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at construction sites.

The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air. The primary concerns for this site are odors associated with groundwater purging and sampling.

Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report. The complete CAMP developed for this site is included in **Attachment D**.

### 5.5.15 Odor, Dust and Nuisance Control Plan

The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan."

#### 5.5.15.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site and on-Site. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Applicant's Remediation Engineer, who is responsible for certifying the Final Engineering Report.

All necessary means will be employed to prevent on and off-Site nuisances. At a minimum, procedures will include: (a) use of closed settling tanks and carbon treatment of exhaust air from the pumping / dewatering system (b) limiting the area of open excavations; (c) shrouding open excavations with tarps and other covers; and (d) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (e) direct load-out of soils to trucks for off-Site disposal; (f) use of chemical odorants in spray or misting systems, (g) use of perimeter misting systems; and, (h) use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and

handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

#### 5.5.15.2 Dust Control Plan

A dust suppression plan that addresses dust management during invasive on-Site work, will include, at a minimum, the items listed below:

- Dust suppression will be achieved though spraying water directly onto off-road areas including excavations and stockpiles.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water application.

#### 5.5.15.3 Nuisance Control Plan

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work. A plan will be developed and utilized by the contractor for all remedial work and conforms, to NYCDEP noise control standards.

# 6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

If a Track 1 cleanup is achieved, all on-Site soil remaining after completion of remediation will meet Track 1 Unrestricted Use SCOs and an Institutional Control (IC) will not be required to protect human health and the environment.

However, if a Track 1 cleanup is not achieved, the Track 2 alternative will be implemented as a contingency and an IC will be required. The Track 2 alternative will allow restricted residential use of the property. Long-term management of the IC will be executed under an environmental easement recorded with the NYC Department of Finance, Office of the City Register.

If Track 1 is not achieved, long-term management of ICs and of residual contamination will be executed under a site-specific Site Management Plan (SMP) that will be developed and submitted to DEC, if needed. The FER will report residual contamination on the Site in tabular and map form.

# 7.0 ENGINEERING CONTROLS

The intent of this project is to achieve Track 1 Cleanup criteria, however, if a Track 1 Cleanup is not achieved, an Engineering Control in the form of an engineered cap will be required for this remedy.

If Track 1 is not achieved, the Site will be restricted to restricted residential, commercial and industrial uses and a site cover may be required to allow for the intended use of the Site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or two feet of soil meeting the SCOs as set forth in 6 NYCRR Part 375-6.7(d) and Table 375-6.8(b). The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

# 8.0 INSTITUTIONAL CONTROLS

Since the intent of this project is to achieve Track 1 cleanup criteria, institutional controls are not expected to be part of the final remedy for the Site.

If Track 1 cleanup is not achieved, Institutional Controls (ICs) will be incorporated into the remedy to render the overall Site remedy protective of public health and the environmental. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a Site Management Plan (SMP).

If required, a Site-Specific Environmental Easement will be recorded with the City of New York to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on the Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs.

The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

## 8.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. If the Site will have residual contamination after completion of all Remedial Actions than an Environmental Easement is required. If an Environmental Easement is needed following completion of the remedy an Environmental Easement approved by NYSDEC will be filed and recorded with the City of New York. The Environmental Easement (if needed) will be submitted as part of the Final Remediation Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the City of New York before the Certificate of Completion can be issued by NYSDEC. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan (SMP), which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls which will be needed to support Engineering Controls are:

- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- Compliance with the Environmental Easement by the Grantee and the Grantee's successor's is required;
- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the Controls;
- NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable;

## 8.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the Certificate of Completion (COC) for the Remedial

Action. The Site Management Plan is submitted as a separate and independent document from the FER. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated [month, year], and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The Site Management Plan will be based on a calendar year and will be due for submission to NYSDEC by March 1 of the year following the reporting period.

No exclusions for handling of residual contaminated soils will be provided in the Site Management Plan (SMP). All handling of residual contaminated material will be subject to provisions contained in the SMP.

# 9.0 FINAL ENGINEERING REPORT

A Final Engineering Report (FER) and Certificate of Completion (COC) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The Final Engineering Report will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete Site Management Plan (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Environmental Easement. This determination will be made by NYSDEC in the context of the Final Engineering Report review.

The Final Engineering Report will include written and photographic documentation of all remedial work performed under this remedy. The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

The FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-6. A table that shows exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that

shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

The FER will provide a thorough summary of all residual contamination that exceeds the SCOs defined for the Site in the RAWP and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the FER.

The Final Engineering Report will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

## 9.1 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the Final Engineering Report. The certification will be signed by the Remedial Engineer who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped. The certification will include the following statements:

*I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Work Plan (or Remedial Design or Plans and Specifications) was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Work Plan (or Remedial Design or Plans and Specifications).*

If the Remedial Action Work Plan (or Remedial Design or Plans and Specifications) identifies time frames to be achieved by the remedial program, the certification must include:

*The data submitted to DER demonstrates that the remediation requirements set forth in the Remedial Work Plan (or Remedial Design or Plans and Specifications) and all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in the work plan (or Remedial Design or Plans and Specifications).*

If the remedial program requires ICs or ECs, the certification will include:

*All use restrictions, institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.*

If the remedial program requires applicable SMP, the certification will include:

*A Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER.*

If the remedial program requires financial assurance, the certification will include:

*Any financial assurance mechanisms required by DEC pursuant to Environmental Conservation Law have been executed.*

# 10.0 SCHEDULE

The remedial action will begin with mobilization of equipment and material to the Site which will begin approximately 2 weeks following RAWP approval and within 10 days of the distribution of the Construction Fact Sheet. Mobilization will be followed by removal and disposal of the USTs (if present) followed by excavation and disposal of petroleum impacted soil, historic fill materials and native soil, followed by confirmation sampling. The work is expected to take approximately 6 months as part of the construction excavation and foundation installation. The schedule of tasks completed under this RAWP is as follows:

| | |
|---|---|
| Conduct pre-construction meeting with NYSDEC | Within 1 week of RAWP approval |
| Mobilize equipment to the site and construct truck pad and other designated areas | Within 2 weeks following the pre-construction meeting and issuance of Pre-Construction Fact Sheet |
| Begin excavation of USTs (if present) | Immediately following mobilization |
| Mobilize Excavation Contractor and equipment to the Site | Immediately following excavation of UST week |
| Complete excavation and disposal of historic fill material and clean native soil. | Within 6 months of mobilization |
| Perform endpoint verification of entire site | Performed in sequence as final depth of each excavated area is complete. |
| Submit SMP (as a contingency) if Track 1 Cleanup is not achieved | By August 15$^{th}$ of the year in which the COC is sought or as required by DEC. |
| Submit FER | By September 15$^{th}$ of the year in which the COC is sought or as required by DEC. |

# ***TABLES***

# TABLE 1
## SOIL CLEANUP OBJECTIVES
## SOIL IMPORT CRITERIA

| Contaminant | CAS Number | Unrestricted Use |
|---|---|---|
| **Metals** | | |
| Arsenic | 7440-38-2 | 13 [c] |
| Barium | 7440-39-3 | 350 [c] |
| Beryllium | 7440-41-7 | 7.2 |
| Cadmium | 7440-43-9 | 2.5 [c] |
| Chromium, hexavalent [e] | 18540-29-9 | 1 [b] |
| Chromium, trivalent [e] | 16065-83-1 | 30 [c] |
| Copper | 7440-50-8 | 50 |
| Total Cyanide [e, f] | | 27 |
| Lead | 7439-92-1 | 63 [c] |
| Manganese | 7439-96-5 | 1600 [c] |
| Total Mercury | | 0.18 [c] |
| Nickel | 7440-02-0 | 30 |
| Selenium | 7782-49-2 | 3.9[c] |
| Silver | 7440-22-4 | 2 |
| Zinc | 7440-66-6 | 109 [c] |
| **PCBs/Pesticides** | | |
| 2,4,5-TP Acid (Silvex) [f] | 93-72-1 | 3.8 |
| 4,4'-DDE | 72-55-9 | 0.0033 [b] |
| 4,4'-DDT | 50-29-3 | 0.0033 [b] |
| 4,4'-DDD | 72-54-8 | 0.0033 [b] |
| Aldrin | 309-00-2 | 0.005 [c] |
| alpha-BHC | 319-84-6 | 0.02 |
| beta-BHC | 319-85-7 | 0.036 |
| Chlordane (alpha) | 5103-71-9 | 0.094 |

# TABLE 1
# SOIL CLEANUP OBJECTIVES

| Contaminant | CAS Number | Unrestricted Use |
|---|---|---|
| delta-BHC [g] | 319-86-8 | 0.04 |
| Dibenzofuran [f] | 132-64-9 | 7 |
| Dieldrin | 60-57-1 | 0.005 [c] |
| Endosulfan I [d, f] | 959-98-8 | 2.4 |
| Endosulfan II [d, f] | 33213-65-9 | 2.4 |
| Endosulfan sulfate [d, f] | 1031-07-8 | 2.4 |
| Endrin | 72-20-8 | 0.014 |
| Heptachlor | 76-44-8 | 0.042 |
| Lindane | 58-89-9 | 0.1 |
| Polychlorinated biphenyls | 1336-36-3 | 0.1 |
| **Semivolatile organic compounds** | | |
| Acenaphthene | 83-32-9 | 20 |
| Acenapthylene [f] | 208-96-8 | 100 [a] |
| Anthracene [f] | 120-12-7 | 100 [a] |
| Benz(a)anthracene [f] | 56-55-3 | 1 [c] |
| Benzo(a)pyrene | 50-32-8 | 1 [c] |
| Benzo(b)fluoranthene [f] | 205-99-2 | 1 [c] |
| Benzo(g,h,i)perylene [f] | 191-24-2 | 100 |
| Benzo(k)fluoranthene [f] | 207-08-9 | 0.8 [c] |
| Chrysene [f] | 218-01-9 | 1 [c] |
| Dibenz(a,h)anthracene [f] | 53-70-3 | 0.33 [b] |
| Fluoranthene [f] | 206-44-0 | 100 [a] |
| Fluorene | 86-73-7 | 30 |
| Indeno(1,2,3-cd)pyrene [f] | 193-39-5 | 0.5 [c] |
| m-Cresol [f] | 108-39-4 | 0.33 [b] |
| Naphthalene [f] | 91-20-3 | 12 |
| o-Cresol [f] | 95-48-7 | 0.33 [b] |

# TABLE 1
# SOIL CLEANUP OBJECTIVES

| Contaminant | CAS Number | Unrestricted Use |
|---|---|---|
| p-Cresol [f] | 106-44-5 | 0.33 [b] |
| Pentachlorophenol | 87-86-5 | 0.8 [b] |
| Phenanthrene [f] | 85-01-8 | 100 |
| Phenol | 108-95-2 | 0.33 [b] |
| Pyrene [f] | 129-00-0 | 100 |
| **Volatile organic compounds** | | |
| 1,1,1-Trichloroethane [f] | 71-55-6 | 0.68 |
| 1,1-Dichloroethane [f] | 75-34-3 | 0.27 |
| 1,1-Dichloroethene [f] | 75-35-4 | 0.33 |
| 1,2-Dichlorobenzene [f] | 95-50-1 | 1.1 |
| 1,2-Dichloroethane | 107-06-2 | 0.02 [c] |
| cis -1,2-Dichloroethene [f] | 156-59-2 | 0.25 |
| trans-1,2-Dichloroethene [f] | 156-60-5 | 0.19 |
| 1,3-Dichlorobenzene [f] | 541-73-1 | 2.4 |
| 1,4-Dichlorobenzene | 106-46-7 | 1.8 |
| 1,4-Dioxane | 123-91-1 | 0.1 [b] |
| Acetone | 67-64-1 | 0.05 |
| Benzene | 71-43-2 | 0.06 |
| n-Butylbenzene [f] | 104-51-8 | 12 |
| Carbon tetrachloride [f] | 56-23-5 | 0.76 |
| Chlorobenzene | 108-90-7 | 1.1 |
| Chloroform | 67-66-3 | 0.37 |
| Ethylbenzene [f] | 100-41-4 | 1 |
| Hexachlorobenzene [f] | 118-74-1 | 0.33[b] |
| Methyl ethyl ketone | 78-93-3 | 0.12 |
| Methyl tert-butyl ether [f] | 1634-04-4 | 0.93 |
| Methylene chloride | 75-09-2 | 0.05 |

# TABLE 1
# SOIL CLEANUP OBJECTIVES

| Contaminant | CAS Number | Unrestricted Use |
|---|---|---|
| n - Propylbenzene [f] | 103-65-1 | 3.9 |
| sec-Butylbenzene [f] | 135-98-8 | 11 |
| tert-Butylbenzene [f] | 98-06-6 | 5.9 |
| Tetrachloroethene | 127-18-4 | 1.3 |
| Toluene | 108-88-3 | 0.7 |
| Trichloroethene | 79-01-6 | 0.47 |
| 1,2,4-Trimethylbenzene [f] | 95-63-6 | 3.6 |
| 1,3,5-Trimethylbenzene[f] | 108-67-8 | 8.4 |
| Vinyl chloride[f] | 75-01-4 | 0.02 |
| Xylene (mixed) | 1330-20-7 | 0.26 |

All soil cleanup objectives (SCOs) are in parts per million (ppm).

**Footnotes**

[a] The SCOs for unrestricted use were capped at a maximum value of 100 ppm. See Technical Support Document (TSD), section 9.3.

[b] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.

[c] For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.

[d] SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.

[e] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

[f] Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with "NS". Where such contaminants appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD.

TABLE 2
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Remedial Investigation Sampling Summary

| Matrix | Location | Number of Samples | Rationale for Sampling | Laboratory Analysis |
|---|---|---|---|---|
| **Total (Soils)** | | **23** | | |
| Subsurface soil (0 to 5 feet) | 8 soil borings throughout the Site. | 8 | To evaluate the extent of soil impact and obtain information on soil quality at the Site. | VOCs EPA Method 8260B, SVOCs EPA Method 8270, Pesticides / PCBs EPA Method 8081/8082, TAL Metals |
| Subsurface soil (10 to 15 feet) | 8 soil borings throughout the Site. | 8 | To evaluate the extent of soil impact and obtain information on soil quality at the Site. | VOCs EPA Method 8260B, SVOCs EPA Method 8270 |
| Subsurface soil (15 to 25 feet) | 1 soil boring throughout the Site. | 7 | To evaluate the extent of soil impact and obtain information on soil quality at the Site. | VOCs EPA Method 8260B, SVOCs EPA Method 8270, Pesticides / PCBs EPA Method 8081/8082, TAL Metals |
| **Total (Groundwater)** | | **6** | | |
| Groundwater (below water table) | From 6 monitoring wells across the Site. | 6 | To assess groundwater quality at the Site. | VOCs EPA Method 8260B, SVOCs EPA Method 8270, Pesticide / PCBs EPA Method 8081/8082, Dissolved Metals |
| **Total (Soil Gas)** | | **7** | | |
| Soil Gas (8 ft below grade) | 7 soil gas implant locations installed 8 ft beneath the first floor level across the Site. | 7 | To evaluate soil gas across the Site. | VOCs EPA Method TO15 |

TABLE 3
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Volatile Organic Compounds

| COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B1 | | | | 14B2 | | | | | | 14B3 | | | | | | 14B4 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (20-25') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (15-18') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (20-21') 8/25/2015 | |
| | | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | |
| | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| 1,1,1,2-Tetrachlorothane | | | < 20 | 20 | < 22 | 22 | < 16 | 16 | < 22 | 22 | < 4.4 | 4.4 | < 23 | 23 | < 1200 | 1,200 | < 700 | 700 | < 24 | 24 | < 32 | 32 | < 24000 | 24,000 |
| 1,1,1-Trichloroethane | 680 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,1,2,2-Tetrachloroethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,1,2-Trichloroethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,1-Dichloroethane | 270 | 26,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 250 | 250 | < 250 | 250 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,1-Dichloroethene | 330 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | 0.5 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 250 | 250 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,1-Dichloropropene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,2,3-Trichlorobenzene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,2,3-Trichloropropane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,2,4-Trichlorobenzene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,2,4-Trimethylbenzene | 3,600 | 52,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | 0.43 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 14,000 | 3,000 | 240 | 700 | < 270 | 270 | < 7.9 | 7.9 | 27,000 | 6,000 |
| 1,2-Dibromo-3-chloropropane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,2-Dibromomethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,2-Dichlorobenzene | 1,100 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,2-Dichloroethane | 20 | 3,100 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,2-Dichloropropane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,3,5-Trimethylbenzene | 8,400 | 52,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | 1.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 9,600 | 300 | 89 | 700 | < 270 | 270 | < 7.9 | 7.9 | 16,000 | 6,000 |
| 1,3-Dichlorobenzene | 2,400 | 4,900 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,3-Dichloropropane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,4-Dichlorobenzene | 1,800 | 13,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 1,4-dioxane | | | < 99 | 99 | < 100 | 100 | < 81 | 81 | < 100 | 100 | < 87 | 87 | < 100 | 100 | < 6000 | 6,000 | < 14000 | 14,000 | < 100 | 100 | < 100 | 100 | < 120000 | ####### |
| 2,2-Dichloropropane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 2-Chlorotoluene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 2-Hexanone (Methyl Butyl Ketone) | | | < 25 | 25 | < 28 | 28 | < 20 | 20 | < 28 | 28 | < 22 | 22 | < 29 | 29 | < 1500 | 1,500 | < 3500 | 3,500 | < 30 | 30 | < 40 | 40 | < 30000 | 30,000 |
| 2-Isopropyltoluene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 4-Chlorotoluene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| 4-Methyl-2-Pentanone | | | < 25 | 25 | < 28 | 28 | < 20 | 20 | < 28 | 28 | < 22 | 22 | < 29 | 29 | < 1500 | 1,500 | < 3500 | 3,500 | < 30 | 30 | < 40 | 40 | < 30000 | 30,000 |
| Acetone | 50 | 100,000 | < 49 | 49 | 21 | 50 | 6.9 | 41 | < 50 | 50 | < 44 | 44 | < 50 | 50 | < 3000 | 3,000 | < 7000 | 7,000 | < 50 | 50 | < 50 | 50 | < 60000 | 60,000 |
| Acrolein | | | < 20 | 20 | < 22 | 22 | < 16 | 16 | < 22 | 22 | < 17 | 17 | < 23 | 23 | < 1200 | 1,200 | < 2800 | 2,800 | < 24 | 24 | < 32 | 32 | < 24000 | 24,000 |
| Acrylonitrile | | | < 20 | 20 | < 22 | 22 | < 16 | 16 | < 22 | 22 | < 8.7 | 8.7 | < 23 | 23 | < 1200 | 1,200 | < 1400 | 1,400 | < 24 | 24 | < 32 | 32 | < 24000 | 24,000 |
| Benzene | 60 | 4,800 | < 4.9 | 4.9 | 0.57 | 5.6 | 0.42 | 4.1 | < 5.5 | 5.5 | 1 | 4.4 | 0.59 | 5.8 | 4,100 | 3,000 | 2,800 | 700 | < 5.9 | 5.9 | 2.3 | 7.9 | 8,600 | 6,000 |
| Bromobenzene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Bromochloromethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Bromodichloromethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Bromoform | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Bromomethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Carbon Disulfide | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Carbon tetrachloride | 760 | 2,400 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Chlorobenzene | 1,100 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Chloroethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Chloroform | 370 | 49,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 250 | 250 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Chloromethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| cis-1,2-Dichloroethene | 250 | 100,000 | < 4.9 | 4.9 | 87 | 250 | 5.2 | 4.1 | < 5.5 | 5.5 | 62 | 250 | 6.4 | 5.8 | 870 | 300 | 7,600 | 700 | 0.73 | 5.9 | 570 | 240 | 730 | 6,000 |
| cis-1,3-Dichloropropene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Dibromochloromethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Dibromomethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Dichlorodifluoromethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | 0.88 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Ethylbenzene | 1,000 | 41,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 7,000 | 300 | 640 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | 21,000 | 6,000 |
| Hexachlorobutadiene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Isopropylbenzene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | 910 | 6,000 |
| m&p-Xylenes | 260 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 17,000 | 3,000 | 820 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | 62,000 | 6,000 |
| Methyl Ethyl Ketone (2-Butanone) | 120 | 100,000 | < 30 | 30 | < 34 | 34 | < 24 | 24 | < 33 | 33 | < 26 | 26 | < 35 | 35 | < 1800 | 1,800 | < 4200 | 4,200 | < 35 | 35 | < 48 | 48 | < 36000 | 36,000 |
| Methyl t-butyl ether (MTBE) | 930 | 100,000 | < 9.9 | 9.9 | < 11 | 11 | < 8.1 | 8.1 | < 11 | 11 | < 8.7 | 8.7 | < 12 | 12 | < 600 | 600 | < 700 | 700 | < 12 | 12 | < 16 | 16 | < 12000 | 12,000 |
| Methylene chloride | 50 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Naphthalene | 12,000 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | 0.9 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 300,000 | 30,000 | 6,500 | 700 | 61 | 270 | 52 | 240 | 620,000 | 85,000 |
| n-Butylbenzene | 12,000 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| n-Propylbenzene | 3,900 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 190 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| o-Xylene | 260 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 9,200 | 3,000 | 230 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | 21,000 | 6,000 |
| p-Isopropyltoluene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | 0.72 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 440 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | 780 | 6,000 |
| sec-Butylbenzene | 11,000 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Styrene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 1,000 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | 1,100 | 6,000 |
| Tert-butyl alcohol | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 270 | 270 | < 7.9 | 7.9 | < 6000 | 6,000 |
| tert-Butylbenzene | 5,900 | 100,000 | < 99 | 99 | < 110 | 110 | < 81 | 81 | < 110 | 110 | < 87 | 87 | < 120 | 120 | < 6000 | 6,000 | < 14000 | 14,000 | < 120 | 120 | < 160 | 160 | < 120000 | ####### |
| Tetrachloroethene | 1,300 | 19,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Tetrahydrofuran (THF) | | | < 9.9 | 9.9 | < 11 | 11 | < 8.1 | 8.1 | < 11 | 11 | < 8.7 | 8.7 | < 12 | 12 | < 600 | 600 | < 1400 | 1,400 | < 12 | 12 | < 16 | 16 | < 12000 | 12,000 |
| Toluene | 700 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | 8,600 | 3,000 | 290 | 700 | 0.72 | 5.9 | < 7.9 | 7.9 | 22,000 | 6,000 |
| trans-1,2-Dichloroethene | 190 | 100,000 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | 2.6 | 4.4 | < 5.8 | 5.8 | 33 | 150 | 160 | 150 | < 5.9 | 5.9 | 3 | 7.9 | < 6000 | 6,000 |
| trans-1,3-Dichloropropene | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| trabs-1,4-dichloro-2-butene | | | < 9.9 | 9.9 | < 11 | 11 | < 8.1 | 8.1 | < 11 | 11 | < 8.7 | 8.7 | < 12 | 12 | < 600 | 600 | < 1400 | 1,400 | < 540 | 540 | < 16 | 16 | < 12000 | 12,000 |
| Trichloroethene | 470 | 21,000 | 1.7 | 4.9 | 110 | 280 | 65 | 290 | 0.66 | 5.5 | 41 | 350 | 2.1 | 5.8 | 3,300 | 300 | 3,700 | 700 | 360 | 270 | 390 | 240 | 6,000 | 6,000 |
| Trichlorofluoromethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Trichlorotrifluoroethane | | | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | < 4.4 | 4.4 | < 5.8 | 5.8 | < 300 | 300 | < 700 | 700 | < 5.9 | 5.9 | < 7.9 | 7.9 | < 6000 | 6,000 |
| Vinyl Chloride | 20 | 900 | < 4.9 | 4.9 | < 5.6 | 5.6 | < 4.1 | 4.1 | < 5.5 | 5.5 | 2.6 | 4.4 | 2.2 | 5.8 | 290 | 300 | 2,600 | 700 | < 5.9 | 5.9 | 16 | 7.9 | < 6000 | 6,000 |
| **Total BTEX Concentration** | | | 0 | | 0.57 | | 0.42 | | 0 | | 1 | | 0.59 | | 45900 | | 4780 | | 0.72 | | 2.3 | | 134600 | |
| **Total VOCs Concentration** | | | 1.7 | | 218.57 | | 80.67 | | 0.66 | | 110.58 | | 11.29 | | 375923 | | 25669 | | 422.45 | | 1033.3 | | 801120 | |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 3
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Volatile Organic Compounds

| COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B5 | | | | | | 14B6 | | | | | | 14B7 | | | | | | 14B8 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (15-19.5') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (15-17') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (15-20') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (20-25') 8/25/2015 | |
| | | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | | µg/Kg | |
| | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| 1,1,1,2-Tetrachlorothane | | | < 4.8 | 4.8 | < 17 | 17 | < 20 | 20 | < 21 | 21 | < 17 | 17 | < 1600 | 1,600 | < 21 | 21 | < 6.0 | 6.0 | < 18 | 18 | < 21 | 21 | < 18 | 18 | < 25 | 25 |
| 1,1,1-Trichloroethane | 680 | 100,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,1,2,2-Tetrachloroethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,1,2-Trichloroethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,1-Dichloroethane | 270 | 26,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 250 | 250 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,1-Dichloroethene | 330 | 100,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 300 | 300 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,1-Dichloropropene | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2,3-Trichlorobenzene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2,3-Trichloropropane | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2,4-Trichlorobenzene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2,4-Trimethylbenzene | 3,600 | 52,000 | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | **150** | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | **1** | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2-Dibromo-3-chloropropane | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2-Dibromomethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2-Dichlorobenzene | 1,100 | 100,000 | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2-Dichloroethane | 20 | 3,100 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,2-Dichloropropane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,3,5-Trimethylbenzene | 8,400 | 52,000 | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | **47** | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,3-Dichlorobenzene | 2,400 | 4,900 | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,3-Dichloropropane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,4-Dichlorobenzene | 1,800 | 13,000 | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 1,4-dioxane | | | < 97 | 97 | < 86 | 86 | < 100 | 100 | < 100 | 100 | < 86 | 86 | < 8000 | 8,000 | < 100 | 100 | < 100 | 100 | < 90 | 90 | < 100 | 100 | < 91 | 91 | < 100 | 100 |
| 2,2-Dichloropropane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 2-Chlorotoluene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 2-Hexanone (Methyl Butyl Ketone) | | | < 24 | 24 | < 21 | 21 | < 25 | 25 | < 26 | 26 | < 22 | 22 | < 2000 | 2,000 | < 27 | 27 | < 30 | 30 | < 23 | 23 | < 26 | 26 | < 23 | 23 | < 31 | 31 |
| 2-Isopropyltoluene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 4-Chlorotoluene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| 4-Methyl-2-Pentanone | | | < 24 | 24 | < 21 | 21 | < 25 | 25 | < 26 | 26 | < 22 | 22 | < 2000 | 2,000 | < 27 | 27 | < 30 | 30 | < 23 | 23 | < 26 | 26 | < 23 | 23 | < 31 | 31 |
| Acetone | 50 | 100,000 | **11** | 48 | **6.4** | 43 | **8.7** | 50 | **7.6** | 50 | < 43 | 43 | < 4000 | 4,000 | **12** | 50 | < 50 | 50 | < 45 | 45 | **19** | 50 | < 46 | 46 | < 50 | 50 |
| Acrolein | | | < 19 | 19 | < 17 | 17 | < 20 | 20 | < 21 | 21 | < 17 | 17 | < 1600 | 1,600 | < 21 | 21 | < 24 | 24 | < 18 | 18 | < 21 | 21 | < 18 | 18 | < 25 | 25 |
| Acrylonitrile | | | < 9.7 | 9.7 | < 17 | 17 | < 20 | 20 | < 21 | 21 | < 17 | 17 | < 1600 | 1,600 | < 21 | 21 | < 12 | 12 | < 18 | 18 | < 21 | 21 | < 18 | 18 | < 25 | 25 |
| Benzene | 60 | 4,800 | **0.78** | 4.8 | **0.44** | 4.3 | **160** | 350 | < 5.2 | 5.2 | **0.73** | 4.3 | **890** | 400 | **0.77** | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | **0.69** | 5.3 | < 4.6 | 4.6 | **0.73** | 6.2 |
| Bromobenzene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Bromochloromethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Bromodichloromethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Bromoform | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Bromomethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Carbon Disulfide | | | < 4.8 | 4.8 | < 4.3 | 4.3 | **3.4** | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | **1.1** | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | **2.4** | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Carbon tetrachloride | 760 | 2,400 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Chlorobenzene | 1,100 | 100,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Chloroethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Chloroform | 370 | 49,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 250 | 250 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Chloromethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| cis-1,2-Dichloroethene | 250 | 100,000 | **3.7** | 4.8 | **1.6** | 4.3 | **50** | 250 | **0.92** | 5.2 | **160** | 250 | **8,700** | 400 | **3.1** | 5.3 | **2.5** | 6.0 | **37** | 4.5 | **170** | 250 | < 4.6 | 4.6 | **16** | 6.2 |
| cis-1,3-Dichloropropene | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Dibromochloromethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Dibromomethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Dichlorodifluoromethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Ethylbenzene | 1,000 | 41,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | **0.96** | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | **280** | 400 | **1.9** | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Hexachlorobutadiene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Isopropylbenzene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | **43** | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| m&p-Xylenes | 260 | 100,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | **77** | 350 | < 5.2 | 5.2 | < 4.3 | 4.3 | **270** | 400 | **7.5** | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | **1.1** | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Methyl Ethyl Ketone (2-Butanone) | 120 | 100,000 | < 29 | 29 | < 26 | 26 | < 30 | 30 | < 31 | 31 | < 26 | 26 | < 2400 | 2,400 | < 32 | 32 | < 36 | 36 | < 27 | 27 | < 32 | 32 | < 27 | 27 | < 37 | 37 |
| Methyl t-butyl ether (MTBE) | 930 | 100,000 | < 9.7 | 9.7 | < 8.6 | 8.6 | < 10 | 10 | < 10 | 10 | < 8.6 | 8.6 | < 800 | 800 | < 11 | 11 | < 12 | 12 | < 9.0 | 9.0 | < 11 | 11 | < 9.1 | 9.1 | < 12 | 12 |
| Methylene chloride | 50 | 100,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | **570** | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Naphthalene | 12,000 | 100,000 | **210** | 230 | **50** | 250 | **1,100** | 350 | **140** | 270 | **5.2** | 8.0 | **2,700** | 400 | **260** | 400 | < 6.0 | 6.0 | < 4.5 | 4.5 | **2.6** | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| n-Butylbenzene | 12,000 | 100,000 | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | **63** | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| n-Propylbenzene | 3,900 | 100,000 | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| o-Xylene | 260 | 100,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | **130** | 400 | **2.5** | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| p-Isopropyltoluene | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | **170** | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| sec-Butylbenzene | 11,000 | 100,000 | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Styrene | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Tert-butyl alcohol | | | < 230 | 230 | < 250 | 250 | < 5.0 | 5.0 | < 270 | 270 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| tert-Butylbenzene | 5,900 | 100,000 | < 97 | 97 | < 86 | 86 | < 100 | 100 | < 100 | 100 | < 86 | 86 | < 8000 | 8,000 | < 110 | 110 | < 120 | 120 | < 90 | 90 | < 110 | 110 | < 91 | 91 | < 120 | 120 |
| Tetrachloroethene | 1,300 | 19,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Tetrahydrofuran (THF) | | | < 9.7 | 9.7 | < 8.6 | 8.6 | < 10 | 10 | < 10 | 10 | < 8.6 | 8.6 | < 800 | 800 | < 11 | 11 | < 12 | 12 | < 9.0 | 9.0 | < 11 | 11 | < 9.1 | 9.1 | < 12 | 12 |
| Toluene | 700 | 100,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | **0.51** | 5.0 | **0.64** | 5.2 | < 4.3 | 4.3 | **150** | 400 | **110** | 400 | < 6.0 | 6.0 | < 4.5 | 4.5 | **2.1** | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| trans-1,2-Dichloroethene | 190 | 100,000 | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | **0.47** | 4.3 | **94** | 150 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | **0.84** | 5.3 | < 4.6 | 4.6 | **0.97** | 6.2 |
| trans-1,3-Dichloropropene | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| trabs-1,4-dichloro-2-butene | | | < 470 | 470 | < 490 | 490 | < 10 | 10 | < 540 | 540 | < 8.6 | 8.6 | < 800 | 800 | < 11 | 11 | < 12 | 12 | < 9.0 | 9.0 | < 11 | 11 | < 9.1 | 9.1 | < 12 | 12 |
| Trichloroethene | 470 | 21,000 | **56** | 230 | **51** | 250 | **2.4** | 5.0 | **32** | 270 | **63** | 290 | **14,000** | 400 | **100** | 400 | **2.3** | 6.0 | **23** | 4.5 | **250** | 260 | **3.2** | 4.6 | **2** | 6.2 |
| Trichlorofluoromethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Trichlorotrifluoroethane | | | < 4.8 | 4.8 | < 4.3 | 4.3 | < 5.0 | 5.0 | < 5.2 | 5.2 | < 4.3 | 4.3 | < 400 | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | < 5.3 | 5.3 | < 4.6 | 4.6 | < 6.2 | 6.2 |
| Vinyl Chloride | 20 | 900 | < 4.8 | 4.8 | **0.48** | 4.3 | **2.2** | 5.0 | < 5.2 | 5.2 | **7.6** | 4.3 | **1,100** | 400 | < 5.3 | 5.3 | < 6.0 | 6.0 | < 4.5 | 4.5 | **0.58** | 5.3 | < 4.6 | 4.6 | **0.72** | 6.2 |
| **Total BTEX Concentration** | | | **0.78** | | **0.44** | | **238.47** | | **0.64** | | **0.73** | | **1720** | | **122.67** | | **0** | | **0** | | **3.89** | | **0** | | **0.73** | |
| **Total VOCs Concentration** | | | **281.48** | | **109.92** | | **1405.17** | | **181.16** | | **237** | | **29357** | | **498.87** | | **4.8** | | **60** | | **450.31** | | **3.2** | | **20.42** | |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 4
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Semi-Volatile Organic Compounds

| COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B1 | | | | 14B2 | | | | | | 14B3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (0-5') 8/25/2015 mg/Kg | | (10-15') 8/25/2015 mg/Kg | | (0-5') 8/25/2015 mg/Kg | | (10-15') 8/25/2015 mg/Kg | | (20-25') 8/25/2015 mg/Kg | | (0-5') 8/25/2015 mg/Kg | | (10-15') 8/25/2015 mg/Kg | | (15-18') 8/25/2015 mg/Kg | |
| | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| 1,2,4,5-Tetrachlorobenzene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 1,2,4-Trichlorobenzene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 1,2-Dichlorobenzene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 1,2-Diphenylhydrazine | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 1,3-Dichlorobenzene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 1,4-Dichlorobenzene | | | **500** | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2,4,5-Trichlorophenol | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2,4,6-Trichlorophenol | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2,4-Dichlorophenol | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2,4-Dimethylphenol | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2,4-Dinitrophenol | | | < 730 | 730 | < 7300 | 7,300 | < 740 | 740 | < 770 | 770 | < 780 | 780 | < 710 | 710 | < 730 | 730 | < 8300 | 8,300 |
| 2,4-Dinitrotoluene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2,6-Dinitrotoluene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2-Chloronaphthalene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2-Chlorophenol | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2-Methylnaphthalene | | | < 250 | 250 | **2,300** | 2,600 | **130** | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | **19,000** | 2,900 |
| 2-Methylphenol (o-cresol) | 330 | 100,000 | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 2-Nitroaniline | | | < 730 | 730 | < 7300 | 7,300 | < 740 | 740 | < 770 | 770 | < 780 | 780 | < 710 | 710 | < 730 | 730 | < 8300 | 8,300 |
| 2-Nitrophenol | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 3&4-Methylphenol (m&p-cresol) | 330 | 100,000 | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 3,3'-Dichlorobenzidine | | | < 730 | 730 | < 7300 | 7,300 | < 740 | 740 | < 770 | 770 | < 780 | 780 | < 710 | 710 | < 730 | 730 | < 8300 | 8,300 |
| 3-Nitroaniline | | | < 730 | 730 | < 7300 | 7,300 | < 740 | 740 | < 770 | 770 | < 780 | 780 | < 710 | 710 | < 730 | 730 | < 8300 | 8,300 |
| 4,6-Dinitro-2-methylphenol | | | < 1800 | 1,800 | < 18000 | 18,000 | < 1800 | 1,800 | < 1900 | 1,900 | < 1900 | 1,900 | < 1800 | 1,800 | < 1800 | 1,800 | < 21000 | 21,000 |
| 4-Bromophenyl phenyl ether | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 4-Chloro-3-methylphenol | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 4-Chloroaniline | | | < 290 | 290 | < 2900 | 2,900 | < 300 | 300 | < 310 | 310 | < 310 | 310 | < 290 | 290 | < 290 | 290 | < 3300 | 3,300 |
| 4-Chlorophenyl phenyl ether | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| 4-Nitroaniline | | | < 730 | 730 | < 7300 | 7,300 | < 740 | 740 | < 770 | 770 | < 780 | 780 | < 710 | 710 | < 730 | 730 | < 8300 | 8,300 |
| 4-Nitrophenol | | | < 360 | 360 | < 3700 | 3,700 | < 370 | 370 | < 380 | 380 | < 390 | 390 | < 360 | 360 | < 370 | 370 | < 4100 | 4,100 |
| Acenaphthene | 20,000 | 100,000 | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | **2,900** | 2,900 |
| Acenaphthylene | 100,000 | 100,000 | **110** | 250 | < 2600 | 2,600 | **120** | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | **8,400** | 2,900 |
| Acetophenone | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Aniline | | | < 290 | 290 | < 2900 | 2,900 | < 300 | 300 | < 310 | 310 | < 310 | 310 | < 290 | 290 | < 290 | 290 | < 3300 | 3,300 |
| Anthracene | 100,000 | 100,000 | **860** | 250 | **15,000** | 2,600 | **300** | 260 | < 270 | 270 | < 270 | 270 | **150** | 250 | < 260 | 260 | **16,000** | 2,900 |
| Benz(a)anthracene | 1,000 | 1,000 | **3,500** | 250 | **16,000** | 2,600 | **820** | 260 | < 270 | 270 | < 270 | 270 | **750** | 250 | **490** | 260 | **14,000** | 2,900 |
| Benzidine | | | < 730 | 730 | < 7300 | 7,300 | < 740 | 740 | < 770 | 770 | < 780 | 780 | < 710 | 710 | < 730 | 730 | < 8300 | 8,300 |
| Benzo(a)pyrene | 1,000 | 1,000 | **3,200** | 250 | **13,000** | 2,600 | **810** | 260 | < 270 | 270 | < 270 | 270 | **1,000** | 250 | **700** | 260 | **13,000** | 2,900 |
| Benzo(b)fluoranthene | 1,000 | 1,000 | **4,500** | 250 | **11,000** | 2,600 | **750** | 260 | < 270 | 270 | < 270 | 270 | **660** | 250 | **510** | 260 | **9,900** | 2,900 |
| Benzo(ghi)perylene | 100,000 | 100,000 | **3,000** | 250 | **6,200** | 2,600 | **500** | 260 | < 270 | 270 | < 270 | 270 | **530** | 250 | **370** | 260 | **5,000** | 2,900 |
| Benzo(k)fluoranthene | 800 | 3,900 | **3,400** | 250 | **10,000** | 2,600 | **620** | 260 | < 270 | 270 | < 270 | 270 | **850** | 250 | **520** | 260 | **10,000** | 2,900 |
| Benzoic acid | | | < 1800 | 1,800 | < 18000 | 18,000 | < 1800 | 1,800 | < 1900 | 1,900 | < 1900 | 1,900 | < 1800 | 1,800 | < 1800 | 1,800 | < 21000 | 21,000 |
| Benzyl butyl phthalate | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Bis(2-chloroethoxy)methane | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Bis(2-chloroethyl)ether | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Bis(2-chloroisopropyl)ether | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Bis(2-ethylhexyl)phthalate | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Carbazole | | | **350** | 1,800 | **7,300** | 18,000 | < 1800 | 1,800 | < 1900 | 1,900 | < 1900 | 1,900 | < 1800 | 1,800 | < 1800 | 1,800 | **5,700** | 21,000 |
| Chrysene | 1,000 | 3,900 | **3,300** | 250 | **16,000** | 2,600 | **820** | 260 | < 270 | 270 | < 270 | 270 | **690** | 250 | **470** | 260 | **13,000** | 2,900 |
| Dibenz(a,h)anthracene | 330 | 330 | **1,400** | 250 | **1,300** | 2,600 | **170** | 260 | < 270 | 270 | < 270 | 270 | **180** | 250 | < 260 | 260 | **2,000** | 2,900 |
| Dibenzofuran | 7,000 | 59,000 | **240** | 250 | **6,300** | 2,600 | **140** | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | **12,000** | 2,900 |
| Diethyl phthalate | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Dimethylphthalate | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Di-n-butylphthalate | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Di-n-octylphthalate | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Fluoranthene | 100,000 | 100,000 | **4,300** | 250 | **47,000** | 2,600 | **1,300** | 260 | < 270 | 270 | < 270 | 270 | **860** | 250 | **570** | 260 | **25,000** | 2,900 |
| Fluorene | 30,000 | 100,000 | **230** | 250 | **7,500** | 2,600 | **150** | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | **18,000** | 2,900 |
| Hexachlorobenzene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Hexachlorobutadiene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Hexachlorocyclopentadiene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Hexachloroethane | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Indeno(1,2,3-cd)pyrene | 500 | 500 | **3,900** | 250 | **7,200** | 2,600 | **570** | 260 | < 270 | 270 | < 270 | 270 | **600** | 250 | **410** | 260 | **6,400** | 2,900 |
| Isophorone | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Naphthalene | 12,000 | 100,000 | **240** | 250 | **5,000** | 2,600 | **230** | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | **43,000** | 2,900 |
| Nitrobenzene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| N-Nitrosodimethylamine | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| N-Nitrosodi-n-propylamine | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| N-Nitrosodiphenylamine | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Pentachloronitrobenzene | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Pentachlorophenol | 800 | 6,700 | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Phenanthrene | 100,000 | 100,000 | **2,500** | 250 | **66,000** | 2,600 | **1,100** | 260 | < 270 | 270 | < 270 | 270 | **440** | 250 | **360** | 260 | **45,000** | 2,900 |
| Phenol | 330 | 100,000 | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |
| Pyrene | 100,000 | 100,000 | **4,100** | 250 | **41,000** | 2,600 | **1,200** | 260 | < 270 | 270 | < 270 | 270 | **780** | 250 | **540** | 260 | **20,000** | 2,900 |
| Pyridine | | | < 250 | 250 | < 2600 | 2,600 | < 260 | 260 | < 270 | 270 | < 270 | 270 | < 250 | 250 | < 260 | 260 | < 2900 | 2,900 |

**Notes:**
* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives
RL - Reporting Limit
**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**
**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 4
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Semi-Volatile Organic Compounds

| COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B4 | | | | | | 14B5 | | | | | | 14B6 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (20-21') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (15-19.5') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (15-17') 8/25/2015 | |
| | | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | |
| | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| 1,2,4,5-Tetrachlorobenzene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 1,2,4-Trichlorobenzene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 1,2-Dichlorobenzene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 1,2-Diphenylhydrazine | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 1,3-Dichlorobenzene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 1,4-Dichlorobenzene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2,4,5-Trichlorophenol | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2,4,6-Trichlorophenol | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2,4-Dichlorophenol | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2,4-Dimethylphenol | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2,4-Dinitrophenol | | | < 700 | 700 | < 790 | 790 | < 8200 | 8,200 | < 720 | 720 | < 730 | 730 | < 840 | 840 | < 700 | 700 | < 760 | 760 | < 900 | 900 |
| 2,4-Dinitrotoluene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2,6-Dinitrotoluene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2-Chloronaphthalene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2-Chlorophenol | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2-Methylnaphthalene | | | < 240 | 240 | < 280 | 280 | **74,000** | 2,900 | < 250 | 250 | **110** | 260 | **470** | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2-Methylphenol (o-cresol) | 330 | 100,000 | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 2-Nitroaniline | | | < 700 | 700 | < 790 | 790 | < 8200 | 8,200 | < 720 | 720 | < 730 | 730 | < 840 | 840 | < 700 | 700 | < 760 | 760 | < 900 | 900 |
| 2-Nitrophenol | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 3&4-Methylphenol (m&p-cresol) | 330 | 100,000 | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 3,3'-Dichlorobenzidine | | | < 700 | 700 | < 790 | 790 | < 8200 | 8,200 | < 720 | 720 | < 730 | 730 | < 840 | 840 | < 700 | 700 | < 760 | 760 | < 900 | 900 |
| 3-Nitroaniline | | | < 700 | 700 | < 790 | 790 | < 8200 | 8,200 | < 720 | 720 | < 730 | 730 | < 840 | 840 | < 700 | 700 | < 760 | 760 | < 900 | 900 |
| 4,6-Dinitro-2-methylphenol | | | < 1700 | 1,700 | < 2000 | 2,000 | < 21000 | 21,000 | < 1800 | 1,800 | < 1800 | 1,800 | < 2100 | 2,100 | < 1800 | 1,800 | < 1900 | 1,900 | < 2200 | 2,200 |
| 4-Bromophenyl phenyl ether | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 4-Chloro-3-methylphenol | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 4-Chloroaniline | | | < 280 | 280 | < 320 | 320 | < 3300 | 3,300 | < 290 | 290 | < 290 | 290 | < 340 | 340 | < 280 | 280 | < 310 | 310 | < 360 | 360 |
| 4-Chlorophenyl phenyl ether | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| 4-Nitroaniline | | | < 700 | 700 | < 790 | 790 | < 8200 | 8,200 | < 720 | 720 | < 730 | 730 | < 840 | 840 | < 700 | 700 | < 760 | 760 | < 900 | 900 |
| 4-Nitrophenol | | | < 350 | 350 | < 400 | 400 | < 4100 | 4,100 | < 360 | 360 | < 360 | 360 | < 420 | 420 | < 350 | 350 | < 380 | 380 | < 450 | 450 |
| Acenaphthene | 20,000 | 100,000 | < 240 | 240 | **190** | 280 | **12,000** | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | **330** | 310 |
| Acenaphthylene | 100,000 | 100,000 | < 240 | 240 | < 280 | 280 | **20,000** | 2,900 | **120** | 250 | **460** | 260 | **330** | 290 | < 250 | 250 | < 270 | 270 | **620** | 310 |
| Acetophenone | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Aniline | | | < 280 | 280 | < 320 | 320 | < 3300 | 3,300 | < 290 | 290 | < 290 | 290 | < 340 | 340 | < 280 | 280 | < 310 | 310 | < 360 | 360 |
| Anthracene | 100,000 | 100,000 | **120** | 240 | **240** | 280 | **50,000** | 2,900 | **210** | 250 | **1,400** | 260 | **2,700** | 290 | < 250 | 250 | < 270 | 270 | **3,900** | 310 |
| Benz(a)anthracene | 1,000 | 1,000 | **480** | 240 | **1,800** | 280 | **41,000** | 2,900 | **850** | 250 | **2,700** | 260 | **8,000** | 1,500 | **170** | 250 | **170** | 270 | **6,300** | 310 |
| Benzidine | | | < 700 | 700 | < 790 | 790 | < 8200 | 8,200 | < 720 | 720 | < 730 | 730 | < 840 | 840 | < 700 | 700 | < 760 | 760 | < 900 | 900 |
| Benzo(a)pyrene | 1,000 | 1,000 | **600** | 240 | **3,600** | 280 | **28,000** | 2,900 | **1,000** | 250 | **3,000** | 260 | **14,000** | 1,500 | **170** | 250 | **390** | 270 | **2,100** | 310 |
| Benzo(b)fluoranthene | 1,000 | 1,000 | **420** | 240 | **2,300** | 280 | **21,000** | 2,900 | **980** | 250 | **2,200** | 260 | **9,700** | 1,500 | **160** | 250 | **250** | 270 | **8,800** | 310 |
| Benzo(ghi)perylene | 100,000 | 100,000 | **430** | 240 | **2,900** | 280 | **9,700** | 2,900 | **660** | 250 | **1,300** | 260 | **6,200** | 1,500 | **150** | 250 | **290** | 270 | **5,100** | 310 |
| Benzo(k)fluoranthene | 800 | 3,900 | **490** | 240 | **2,900** | 280 | **26,000** | 2,900 | **870** | 250 | **2,700** | 260 | **6,500** | 290 | **160** | 250 | **270** | 270 | **4,600** | 310 |
| Benzoic acid | | | < 1700 | 1,700 | < 2000 | 2,000 | < 21000 | 21,000 | < 1800 | 1,800 | < 1800 | 1,800 | < 2100 | 2,100 | < 1800 | 1,800 | < 1900 | 1,900 | < 2200 | 2,200 |
| Benzyl butyl phthalate | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Bis(2-chloroethoxy)methane | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Bis(2-chloroethyl)ether | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Bis(2-chloroisopropyl)ether | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Bis(2-ethylhexyl)phthalate | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | **140** | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Carbazole | | | < 1700 | 1,700 | < 2000 | 2,000 | **20,000** | 21,000 | < 1800 | 1,800 | **280** | 1,800 | **2,500** | 2,100 | < 1800 | 1,800 | < 1900 | 1,900 | **1,700** | 2,200 |
| Chrysene | 1,000 | 3,900 | **510** | 240 | **1,800** | 280 | **38,000** | 2,900 | **910** | 250 | **2,600** | 260 | **8,200** | 1,500 | **180** | 250 | **170** | 270 | **6,100** | 310 |
| Dibenz(a,h)anthracene | 330 | 330 | **150** | 240 | **500** | 280 | **3,800** | 2,900 | **250** | 250 | **440** | 260 | **4,200** | 290 | < 250 | 250 | < 270 | 270 | **1,900** | 310 |
| Dibenzofuran | 7,000 | 59,000 | < 240 | 240 | < 280 | 280 | **43,000** | 2,900 | < 250 | 250 | **470** | 260 | **1,300** | 290 | < 250 | 250 | < 270 | 270 | **3,200** | 310 |
| Diethyl phthalate | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Dimethylphthalate | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Di-n-butylphthalate | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Di-n-octylphthalate | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Fluoranthene | 100,000 | 100,000 | **770** | 240 | **1,300** | 280 | **70,000** | 14,000 | **1,300** | 250 | **4,100** | 260 | **8,500** | 1,500 | **340** | 250 | **240** | 270 | **8,800** | 310 |
| Fluorene | 30,000 | 100,000 | < 240 | 240 | < 280 | 280 | **66,000** | 2,900 | < 250 | 250 | **950** | 260 | **2,300** | 290 | < 250 | 250 | < 270 | 270 | **3,700** | 310 |
| Hexachlorobenzene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Hexachlorobutadiene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Hexachlorocyclopentadiene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Hexachloroethane | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Indeno(1,2,3-cd)pyrene | 500 | 500 | **500** | 240 | **3,400** | 280 | **11,000** | 2,900 | **710** | 250 | **1,600** | 260 | **7,400** | 1,500 | **180** | 250 | **340** | 270 | **6,200** | 310 |
| Isophorone | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Naphthalene | 12,000 | 100,000 | < 240 | 240 | **410** | 280 | **190,000** | 14,000 | < 250 | 250 | **230** | 260 | **2,300** | 290 | < 250 | 250 | < 270 | 270 | **4,300** | 310 |
| Nitrobenzene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| N-Nitrosodimethylamine | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| N-Nitrosodi-n-propylamine | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| N-Nitrosodiphenylamine | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Pentachloronitrobenzene | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Pentachlorophenol | 800 | 6,700 | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Phenanthrene | 100,000 | 100,000 | **470** | 240 | **700** | 280 | **140,000** | 14,000 | **750** | 250 | **4,200** | 260 | **5,200** | 290 | **150** | 250 | **110** | 270 | **8,100** | 310 |
| Phenol | 330 | 100,000 | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |
| Pyrene | 100,000 | 100,000 | **690** | 240 | **1,100** | 280 | **73,000** | 2,900 | **1,100** | 250 | **3,500** | 260 | **8,100** | 1,500 | **300** | 250 | **220** | 270 | **7,200** | 310 |
| Pyridine | | | < 240 | 240 | < 280 | 280 | < 2900 | 2,900 | < 250 | 250 | < 260 | 260 | < 290 | 290 | < 250 | 250 | < 270 | 270 | < 310 | 310 |

**Notes:**
* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives
RL - Reporting Limit
**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**
**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 4
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Semi-Volatile Organic Compounds

| COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B7 | | | | | | 14B8 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (15-20') 8/25/2015 | | (0-5') 8/25/2015 | | (10-15') 8/25/2015 | | (20-25') 8/25/2015 | |
| | | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | | mg/Kg | |
| | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| 1,2,4,5-Tetrachlorobenzene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 1,2,4-Trichlorobenzene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 1,2-Dichlorobenzene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 1,2-Diphenylhydrazine | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 1,3-Dichlorobenzene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 1,4-Dichlorobenzene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2,4,5-Trichlorophenol | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2,4,6-Trichlorophenol | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2,4-Dichlorophenol | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2,4-Dimethylphenol | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2,4-Dinitrophenol | | | < 820 | 820 | < 730 | 730 | < 810 | 810 | < 730 | 730 | < 800 | 800 | < 840 | 840 |
| 2,4-Dinitrotoluene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2,6-Dinitrotoluene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2-Chloronaphthalene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2-Chlorophenol | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2-Methylnaphthalene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2-Methylphenol (o-cresol) | 330 | 100,000 | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 2-Nitroaniline | | | < 820 | 820 | < 730 | 730 | < 810 | 810 | < 730 | 730 | < 800 | 800 | < 840 | 840 |
| 2-Nitrophenol | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 3&4-Methylphenol (m&p-cresol) | 330 | 100,000 | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 3,3'-Dichlorobenzidine | | | < 820 | 820 | < 730 | 730 | < 810 | 810 | < 730 | 730 | < 800 | 800 | < 840 | 840 |
| 3-Nitroaniline | | | < 820 | 820 | < 730 | 730 | < 810 | 810 | < 730 | 730 | < 800 | 800 | < 840 | 840 |
| 4,6-Dinitro-2-methylphenol | | | < 2000 | 2,000 | < 1800 | 1,800 | < 2000 | 2,000 | < 1800 | 1,800 | < 2000 | 2,000 | < 2100 | 2,100 |
| 4-Bromophenyl phenyl ether | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 4-Chloro-3-methylphenol | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 4-Chloroaniline | | | < 330 | 330 | < 290 | 290 | < 320 | 320 | < 290 | 290 | < 320 | 320 | < 340 | 340 |
| 4-Chlorophenyl phenyl ether | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| 4-Nitroaniline | | | < 820 | 820 | < 730 | 730 | < 810 | 810 | < 730 | 730 | < 800 | 800 | < 840 | 840 |
| 4-Nitrophenol | | | < 410 | 410 | < 370 | 370 | < 410 | 410 | < 360 | 360 | < 400 | 400 | < 420 | 420 |
| Acenaphthene | 20,000 | 100,000 | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Acenaphthylene | 100,000 | 100,000 | < 290 | 290 | < 260 | 260 | < 280 | 280 | **130** | 260 | < 280 | 280 | < 290 | 290 |
| Acetophenone | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Aniline | | | < 330 | 330 | < 290 | 290 | < 320 | 320 | < 290 | 290 | < 320 | 320 | < 340 | 340 |
| Anthracene | 100,000 | 100,000 | **260** | 290 | < 260 | 260 | < 280 | 280 | **200** | 260 | < 280 | 280 | < 290 | 290 |
| Benz(a)anthracene | 1,000 | 1,000 | **1,200** | 290 | < 260 | 260 | **140** | 280 | **1,100** | 260 | < 280 | 280 | < 290 | 290 |
| Benzidine | | | < 820 | 820 | < 730 | 730 | < 810 | 810 | < 730 | 730 | < 800 | 800 | < 840 | 840 |
| Benzo(a)pyrene | 1,000 | 1,000 | **940** | 290 | < 260 | 260 | **920** | 280 | **970** | 260 | < 280 | 280 | < 290 | 290 |
| Benzo(b)fluoranthene | 1,000 | 1,000 | **1,100** | 290 | < 260 | 260 | **560** | 280 | **820** | 260 | < 280 | 280 | < 290 | 290 |
| Benzo(ghi)perylene | 100,000 | 100,000 | **640** | 290 | < 260 | 260 | **340** | 280 | **620** | 260 | < 280 | 280 | < 290 | 290 |
| Benzo(k)fluoranthene | 800 | 3,900 | **960** | 290 | < 260 | 260 | **680** | 280 | **980** | 260 | < 280 | 280 | < 290 | 290 |
| Benzoic acid | | | < 2000 | 2,000 | < 1800 | 1,800 | < 2000 | 2,000 | < 1800 | 1,800 | < 2000 | 2,000 | < 2100 | 2,100 |
| Benzyl butyl phthalate | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Bis(2-chloroethoxy)methane | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Bis(2-chloroethyl)ether | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Bis(2-chloroisopropyl)ether | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Bis(2-ethylhexyl)phthalate | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Carbazole | | | < 2000 | 2,000 | < 1800 | 1,800 | < 2000 | 2,000 | < 1800 | 1,800 | < 2000 | 2,000 | < 2100 | 2,100 |
| Chrysene | 1,000 | 3,900 | **1,400** | 290 | < 260 | 260 | **150** | 280 | **1,100** | 260 | < 280 | 280 | < 290 | 290 |
| Dibenz(a,h)anthracene | 330 | 330 | **160** | 290 | < 260 | 260 | < 280 | 280 | **200** | 260 | < 280 | 280 | < 290 | 290 |
| Dibenzofuran | 7,000 | 59,000 | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Diethyl phthalate | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Dimethylphthalate | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Di-n-butylphthalate | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Di-n-octylphthalate | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Fluoranthene | 100,000 | 100,000 | **2,800** | 290 | < 260 | 260 | < 280 | 280 | **1,800** | 260 | < 280 | 280 | < 290 | 290 |
| Fluorene | 30,000 | 100,000 | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Hexachlorobenzene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Hexachlorobutadiene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Hexachlorocyclopentadiene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Hexachloroethane | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Indeno(1,2,3-cd)pyrene | 500 | 500 | **720** | 290 | < 260 | 260 | **410** | 280 | **680** | 260 | **150** | 280 | < 290 | 290 |
| Isophorone | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Naphthalene | 12,000 | 100,000 | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Nitrobenzene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| N-Nitrosodimethylamine | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| N-Nitrosodi-n-propylamine | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| N-Nitrosodiphenylamine | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Pentachloronitrobenzene | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Pentachlorophenol | 800 | 6,700 | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Phenanthrene | 100,000 | 100,000 | **1,700** | 290 | < 260 | 260 | < 280 | 280 | **730** | 260 | < 280 | 280 | < 290 | 290 |
| Phenol | 330 | 100,000 | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |
| Pyrene | 100,000 | 100,000 | **2,200** | 290 | < 260 | 260 | < 280 | 280 | **1,500** | 260 | < 280 | 280 | < 290 | 290 |
| Pyridine | | | < 290 | 290 | < 260 | 260 | < 280 | 280 | < 260 | 260 | < 280 | 280 | < 290 | 290 |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 5
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Pesticides PCBs

| | COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B1 (0-5') 8/25/2015 mg/Kg | | 14B2 (0-5') 8/25/2015 mg/Kg | | 14B2 (20-25') 8/25/2015 mg/Kg | | 14B3 (0-5') 8/25/2015 mg/Kg | | 14B3 (15-18') 8/25/2015 mg/Kg | | 14B4 (0-5') 8/25/2015 mg/Kg | | 14B4 (20-21') 8/25/2015 mg/Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| Pesticides | 4,4' -DDD | 3.3 | 13,000 | < 9.1 | 9.1 | < 5.0 | 5.0 | < 2.3 | 2.3 | < 60 | 60 | < 20 | 20 | **4.3** | 3.3 | < 60 | 60 |
| | 4,4' -DDE | 3.3 | 8,900 | < 9.1 | 9.1 | **8.1** | 2.2 | < 2.3 | 2.3 | < 11 | 11 | < 20 | 20 | **4** | 2.1 | < 40 | 40 |
| | 4,4' -DDT | 3.3 | 7,900 | < 9.1 | 9.1 | **7.1** | 2.2 | < 2.3 | 2.3 | < 11 | 11 | < 25 | 25 | < 2.1 | 2.1 | < 30 | 30 |
| | a-BHC | 20 | 480 | < 18 | 18 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 41 | 41 | < 6.9 | 6.9 | < 41 | 41 |
| | a-Chlordane | 94 | 4,200 | **68** | 18 | **110** | 3.7 | < 3.9 | 3.9 | **130** | 18 | < 41 | 41 | **22** | 3.4 | **170** | 41 |
| | Aldrin | 5 | 97 | < 5.5 | 5.5 | < 3.7 | 3.7 | < 3.9 | 3.9 | < 18 | 18 | < 12 | 12 | < 3.4 | 3.4 | < 12 | 12 |
| | b-BHC | 36 | 360 | < 18 | 18 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 41 | 41 | < 6.9 | 6.9 | < 41 | 41 |
| | Chlordane | 94 | 4,200 | **510** | 180 | **970** | 180 | < 39 | 39 | **1,300** | 180 | < 410 | 410 | **120** | 34 | **650** | 410 |
| | d-BHC | 40 | 100,000 | < 37 | 37 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 41 | 41 | < 6.9 | 6.9 | < 41 | 41 |
| | Dieldrin | 5 | 200 | < 5.5 | 5.5 | **9.4** | 3.7 | < 3.9 | 3.9 | < 18 | 18 | < 12 | 12 | < 3.4 | 3.4 | < 12 | 12 |
| | Endosulfan I | 2,400 | 24,000 | < 37 | 37 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 82 | 82 | < 6.9 | 6.9 | < 82 | 82 |
| | Endosulfan II | 2,400 | 24,000 | < 37 | 37 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 20 | 20 | < 6.9 | 6.9 | < 82 | 82 |
| | Endosulfan sulfate | 2,400 | 24,000 | < 37 | 37 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 82 | 82 | < 6.9 | 6.9 | < 82 | 82 |
| | Endrin | 14 | 11,000 | < 18 | 18 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 41 | 41 | < 6.9 | 6.9 | < 41 | 41 |
| | Endrin aldehyde | | | < 37 | 37 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 82 | 82 | < 6.9 | 6.9 | < 82 | 82 |
| | Endrin ketone | | | < 37 | 37 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 82 | 82 | < 6.9 | 6.9 | < 82 | 82 |
| | g-BHC | | | < 7.3 | 7.3 | < 2.0 | 2.0 | < 1.5 | 1.5 | < 7.2 | 7.2 | < 16 | 16 | < 1.4 | 1.4 | < 30 | 30 |
| | g-Chlordane | | | **52** | 18 | **130** | 3.7 | < 3.9 | 3.9 | **160** | 18 | < 41 | 41 | **19** | 3.4 | **99** | 41 |
| | Heptachlor | 42 | 2,100 | < 37 | 37 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 41 | 41 | < 6.9 | 6.9 | < 41 | 41 |
| | Heptachlor epoxide | | | < 37 | 37 | < 7.4 | 7.4 | < 7.7 | 7.7 | < 36 | 36 | < 41 | 41 | < 6.9 | 6.9 | < 82 | 82 |
| | Methoxychlor | | | < 180 | 180 | < 37 | 37 | < 39 | 39 | < 180 | 180 | < 410 | 410 | < 34 | 34 | < 410 | 410 |
| | Toxaphene | | | < 730 | 730 | < 150 | 150 | < 150 | 150 | < 720 | 720 | < 1600 | 1,600 | < 140 | 140 | < 1600 | 1,600 |
| PCBs | PCB-1016 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |
| | PCB-1221 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |
| | PCB-1232 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |
| | PCB-1242 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |
| | PCB-1248 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |
| | PCB-1254 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |
| | PCB-1260 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |
| | PCB-1262 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |
| | PCB-1268 | 100 | 1,000 | < 37 | 37 | < 180 | 180 | < 39 | 39 | < 36 | 36 | < 41 | 41 | < 34 | 34 | < 41 | 41 |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL- Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 5
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Pesticides PCBs

| | COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B5 (0-5') 8/25/2015 mg/Kg | | 14B5 (15-19.5') 8/25/2015 mg/Kg | | 14B6 (0-5') 8/25/2015 mg/Kg | | 14B6 (15-17') 8/25/2015 mg/Kg | | 14B7 (0-5') 8/25/2015 mg/Kg | | 14B7 (15-20') 8/25/2015 mg/Kg | | 14B8 (0-5') 8/25/2015 mg/Kg | | 14B8 (20-25') 8/25/2015 mg/Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| Pesticides | 4,4' -DDD | 3.3 | 13,000 | < 21 | 21 | < 25 | 25 | < 2.1 | 2.1 | < 27 | 27 | < 10 | 10 | < 2.4 | 2.4 | < 15 | 15 | < 2.6 | 2.6 |
| | 4,4' -DDE | 3.3 | 8,900 | < 21 | 21 | < 25 | 25 | < 2.1 | 2.1 | < 27 | 27 | < 10 | 10 | < 2.4 | 2.4 | < 9.2 | 9.2 | < 2.6 | 2.6 |
| | 4,4' -DDT | 3.3 | 7,900 | < 21 | 21 | < 25 | 25 | < 2.1 | 2.1 | < 27 | 27 | < 10 | 10 | < 2.4 | 2.4 | < 9.2 | 9.2 | < 2.6 | 2.6 |
| | a-BHC | 20 | 480 | < 35 | 35 | < 42 | 42 | < 7.0 | 7.0 | < 44 | 44 | < 21 | 21 | < 8.0 | 8.0 | < 18 | 18 | < 8.6 | 8.6 |
| | a-Chlordane | 94 | 4,200 | < 35 | 35 | < 42 | 42 | < 3.5 | 3.5 | < 44 | 44 | **56** | 21 | < 4.0 | 4.0 | **50** | 18 | < 4.3 | 4.3 |
| | Aldrin | 5 | 97 | < 11 | 11 | < 12 | 12 | < 3.5 | 3.5 | < 13 | 13 | < 6.2 | 6.2 | < 4.0 | 4.0 | < 5.5 | 5.5 | < 4.3 | 4.3 |
| | b-BHC | 36 | 360 | < 35 | 35 | < 42 | 42 | < 7.0 | 7.0 | < 44 | 44 | < 21 | 21 | < 8.0 | 8.0 | < 18 | 18 | < 8.6 | 8.6 |
| | Chlordane | 94 | 4,200 | < 350 | 350 | < 420 | 420 | < 35 | 35 | < 440 | 440 | **320** | 210 | < 40 | 40 | **220** | 180 | < 43 | 43 |
| | d-BHC | 40 | 100,000 | < 35 | 35 | < 42 | 42 | < 7.0 | 7.0 | < 44 | 44 | < 21 | 21 | < 8.0 | 8.0 | < 37 | 37 | < 8.6 | 8.6 |
| | Dieldrin | 5 | 200 | < 11 | 11 | < 15 | 15 | < 3.5 | 3.5 | < 44 | 44 | **13** | 6.2 | < 4.0 | 4.0 | < 5.5 | 5.5 | < 4.3 | 4.3 |
| | Endosulfan I | 2,400 | 24,000 | < 70 | 70 | < 83 | 83 | < 7.0 | 7.0 | < 89 | 89 | < 41 | 41 | < 8.0 | 8.0 | < 37 | 37 | < 8.6 | 8.6 |
| | Endosulfan II | 2,400 | 24,000 | < 70 | 70 | < 83 | 83 | < 7.0 | 7.0 | < 89 | 89 | < 41 | 41 | < 8.0 | 8.0 | < 37 | 37 | < 8.6 | 8.6 |
| | Endosulfan sulfate | 2,400 | 24,000 | < 70 | 70 | < 83 | 83 | < 7.0 | 7.0 | < 89 | 89 | < 41 | 41 | < 8.0 | 8.0 | < 37 | 37 | < 8.6 | 8.6 |
| | Endrin | 14 | 11,000 | < 35 | 35 | < 42 | 42 | < 7.0 | 7.0 | < 89 | 89 | < 21 | 21 | < 8.0 | 8.0 | < 18 | 18 | < 8.6 | 8.6 |
| | Endrin aldehyde | | | < 70 | 70 | < 120 | 120 | < 7.0 | 7.0 | < 89 | 89 | < 50 | 50 | < 8.0 | 8.0 | < 37 | 37 | < 8.6 | 8.6 |
| | Endrin ketone | | | < 70 | 70 | < 83 | 83 | < 7.0 | 7.0 | < 89 | 89 | < 41 | 41 | < 8.0 | 8.0 | < 37 | 37 | < 8.6 | 8.6 |
| | g-BHC | | | < 14 | 14 | < 40 | 40 | < 8.0 | 8.0 | < 30 | 30 | < 8.2 | 8.2 | < 1.6 | 1.6 | < 7.3 | 7.3 | < 1.7 | 1.7 |
| | g-Chlordane | | | < 35 | 35 | < 180 | 180 | < 3.5 | 3.5 | < 44 | 44 | **66** | 21 | < 4.0 | 4.0 | **39** | 18 | < 4.3 | 4.3 |
| | Heptachlor | 42 | 2,100 | < 35 | 35 | < 42 | 42 | < 7.0 | 7.0 | < 44 | 44 | < 41 | 41 | < 8.0 | 8.0 | < 37 | 37 | < 8.6 | 8.6 |
| | Heptachlor epoxide | | | < 70 | 70 | < 83 | 83 | < 7.0 | 7.0 | < 89 | 89 | < 41 | 41 | < 8.0 | 8.0 | < 37 | 37 | < 8.6 | 8.6 |
| | Methoxychlor | | | < 350 | 350 | < 420 | 420 | < 35 | 35 | < 440 | 440 | < 210 | 210 | < 40 | 40 | < 180 | 180 | < 43 | 43 |
| | Toxaphene | | | < 1400 | 1,400 | < 1700 | 1,700 | < 140 | 140 | < 1800 | 1,800 | < 820 | 820 | < 160 | 160 | < 730 | 730 | < 170 | 170 |
| PCBs | PCB-1016 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |
| | PCB-1221 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |
| | PCB-1232 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |
| | PCB-1242 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |
| | PCB-1248 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |
| | PCB-1254 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |
| | PCB-1260 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |
| | PCB-1262 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |
| | PCB-1268 | 100 | 1,000 | < 35 | 35 | < 42 | 42 | < 35 | 35 | < 44 | 44 | < 41 | 41 | < 40 | 40 | < 37 | 37 | < 43 | 43 |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL- Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 6
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Metals

| COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B1 (0-5') 8/25/2015 mg/Kg | | 14B2 (0-5') 8/25/2015 mg/Kg | | 14B2 (20-25') 8/25/2015 mg/Kg | | 14B3 (0-5') 8/25/2015 mg/Kg | | 14B3 (15-18') 8/25/2015 mg/Kg | | 14B4 (0-5') 8/25/2015 mg/Kg | | 14B4 (20-21') 8/25/2015 mg/Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| Aluminum | | | **8,460** | 33 | **8,770** | 33 | **9,510** | 37 | **8,780** | 34 | **7,200** | 42 | **8,810** | 33 | **9,810** | 40 |
| Antimony | | | < 1.7 | 1.7 | < 1.6 | 1.6 | < 1.9 | 1.9 | < 1.7 | 1.7 | < 2.1 | 2.1 | < 1.7 | 1.7 | < 2.0 | 2.0 |
| Arsenic | 13 | 16 | **3.6** | 0.7 | **3.7** | 0.7 | **1.5** | 0.7 | **2.4** | 0.7 | **2.8** | 0.8 | **2.6** | 0.7 | **3.3** | 0.8 |
| Barium | 350 | 350 | **72** | 0.7 | **63.8** | 0.7 | **81.4** | 0.7 | **54.2** | 0.7 | **72** | 0.8 | **80.9** | 0.7 | **69.7** | 0.8 |
| Beryllium | 7.2 | 14 | **0.45** | 0.26 | **0.4** | 0.26 | **0.61** | 0.30 | **0.39** | 0.27 | **0.44** | 0.33 | **0.35** | 0.27 | **0.49** | 0.32 |
| Cadmium | 2.5 | 2.5 | **0.59** | 0.33 | < 0.33 | 0.33 | < 0.37 | 0.37 | < 0.34 | 0.34 | **0.21** | 0.42 | < 0.33 | 0.33 | < 0.40 | 0.40 |
| Calcium | | | **5,560** | 3.3 | **4,670** | 3.3 | **2,210** | 3.7 | **3,950** | 3.4 | **27,000** | 42 | **5,440** | 3.3 | **11,300** | 4.0 |
| Chromium | 30 | 180 | **31.3** | 0.33 | **17.4** | 0.33 | **22.7** | 0.37 | **17.5** | 0.34 | **14.1** | 0.42 | **17.1** | 0.33 | **15.7** | 0.40 |
| Cobalt | | | **8.27** | 0.33 | **7.04** | 0.33 | **10.3** | 0.37 | **6.29** | 0.34 | **6.86** | 0.42 | **6.24** | 0.33 | **5.4** | 0.40 |
| Copper | 50 | 270 | **25.1** | 0.33 | **20.6** | 0.33 | **21.5** | 0.37 | **21.5** | 0.34 | **20.5** | 0.42 | **22.2** | 0.33 | **15.7** | 0.40 |
| Iron | | | **17,900** | 33 | **15,800** | 33 | **24,100** | 37 | **13,900** | 34 | **19,600** | 42 | **15,000** | 33 | **16,700** | 40 |
| Lead | 63 | 400 | **102** | 0.7 | **56.1** | 0.7 | **7.2** | 0.7 | **29.9** | 0.7 | **121** | 0.8 | **79.2** | 0.7 | **50.8** | 0.8 |
| Magnesium | | | **2,530** | 3.3 | **2,410** | 3.3 | **4,020** | 3.7 | **2,230** | 3.4 | **3,490** | 4.2 | **3,210** | 3.3 | **10,100** | 40 |
| Manganese | 1,600 | 2,000 | **356** | 3.3 | **334** | 3.3 | **367** | 3.7 | **252** | 3.4 | **521** | 4.2 | **266** | 3.3 | **649** | 4.0 |
| Mercury | 0.18 | 0.81 | **0.58** | 0.03 | **0.19** | 0.03 | < 0.03 | 0.03 | **0.09** | 0.03 | **0.41** | 0.03 | **0.05** | 0.03 | **0.06** | 0.03 |
| Nickel | 30 | 140 | **36.3** | 0.33 | **19.4** | 0.33 | **17.5** | 0.37 | **17.3** | 0.34 | **14.1** | 0.42 | **17** | 0.33 | **11.9** | 0.40 |
| Potassium | | | **1,420** | 7 | **1,220** | 7 | **2,830** | 7 | **1,120** | 7 | **1,670** | 8 | **1,310** | 7 | **1,150** | 8 |
| Selenium | 3.9 | 36 | < 1.3 | 1.3 | < 1.3 | 1.3 | < 1.5 | 1.5 | < 1.4 | 1.4 | < 1.7 | 1.7 | < 1.3 | 1.3 | < 1.6 | 1.6 |
| Silver | 2 | 36 | < 0.33 | 0.33 | < 0.33 | 0.33 | < 0.37 | 0.37 | < 0.34 | 0.34 | < 0.42 | 0.42 | < 0.33 | 0.33 | < 0.40 | 0.40 |
| Sodium | | | **290** | 7 | **248** | 7 | **368** | 7 | **157** | 7 | **548** | 8 | **374** | 7 | **1,100** | 8 |
| Thallium | | | < 1.3 | 1.3 | < 1.3 | 1.3 | < 1.5 | 1.5 | < 1.4 | 1.4 | < 1.7 | 1.7 | < 1.3 | 1.3 | < 1.6 | 1.6 |
| Vanadium | | | **25** | 0.3 | **26.2** | 0.3 | **34.7** | 0.4 | **23.9** | 0.3 | **24.3** | 0.4 | **29.5** | 0.3 | **30.3** | 0.4 |
| Zinc | 109 | 2,200 | **88.5** | 0.7 | **66.3** | 0.7 | **47.3** | 0.7 | **41.7** | 0.7 | **51.4** | 0.8 | **56.7** | 0.7 | **28.4** | 0.8 |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL- Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 6
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Soil Analytical Results
Metals

| COMPOUND | NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives* | NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives* | 14B5 (0-5') 8/25/2015 mg/Kg | | 14B5 (15-19.5') 8/25/2015 mg/Kg | | 14B6 (0-5') 8/25/2015 mg/Kg | | 14B6 (15-17') 8/25/2015 mg/Kg | | 14B7 (0-5') 8/25/2015 mg/Kg | | 14B7 (15-20') 8/25/2015 mg/Kg | | 14B8 (0-5') 8/25/2015 mg/Kg | | 14B8 (20-25') 8/25/2015 mg/Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| Aluminum | | | **9,240** | 32 | **11,800** | 39 | **7,140** | 32 | **8,350** | 43 | **6,730** | 42 | **11,000** | 37 | **8,600** | 34 | **12,800** | 41 |
| Antimony | | | < 1.6 | 1.6 | < 1.9 | 1.9 | < 1.6 | 1.6 | < 2.2 | 2.2 | < 2.1 | 2.1 | < 1.8 | 1.8 | < 1.7 | 1.7 | < 2.1 | 2.1 |
| Arsenic | 13 | 16 | **3.4** | 0.6 | **4.5** | 0.8 | **2** | 0.6 | **8.2** | 0.9 | **2.8** | 0.8 | **1.5** | 0.7 | **2.3** | 0.7 | **1.9** | 0.8 |
| Barium | 350 | 350 | **70.1** | 0.6 | **77.7** | 0.8 | **48.8** | 0.6 | **65.4** | 0.9 | **55.5** | 0.8 | **55.3** | 0.7 | **58** | 0.7 | **80** | 0.8 |
| Beryllium | 7.2 | 14 | **0.41** | 0.26 | **0.48** | 0.31 | **0.28** | 0.26 | **0.53** | 0.35 | **0.32** | 0.33 | **0.64** | 0.29 | **0.39** | 0.27 | **0.69** | 0.33 |
| Cadmium | 2.5 | 2.5 | < 0.32 | 0.32 | < 0.39 | 0.39 | < 0.32 | 0.32 | < 0.43 | 0.43 | < 0.42 | 0.42 | < 0.37 | 0.37 | < 0.34 | 0.34 | < 0.41 | 0.41 |
| Calcium | | | **14,300** | 32 | **6,810** | 3.9 | **3,090** | 3.2 | **8,210** | 4.3 | **5,910** | 4.2 | **1,260** | 3.7 | **6,250** | 3.4 | **2,370** | 4.1 |
| Chromium | 30 | 180 | **19.2** | 0.32 | **25.3** | 0.39 | **14** | 0.32 | **14.2** | 0.43 | **15** | 0.42 | **21.1** | 0.37 | **16.3** | 0.34 | **29.9** | 0.41 |
| Cobalt | | | **6.94** | 0.32 | **8.21** | 0.39 | **4.6** | 0.32 | **5.73** | 0.43 | **5.05** | 0.42 | **10.1** | 0.37 | **6.26** | 0.34 | **12.5** | 0.41 |
| Copper | 50 | 270 | **26** | 0.32 | **24.5** | 0.39 | **14.4** | 0.32 | **15.4** | 0.43 | **21.3** | 0.42 | **17.2** | 0.37 | **16.5** | 0.34 | **22.4** | 0.41 |
| Iron | | | **14,900** | 32 | **18,200** | 39 | **10,500** | 32 | **14,400** | 43 | **12,500** | 42 | **23,900** | 37 | **15,100** | 34 | **27,100** | 41 |
| Lead | 63 | 400 | **55.5** | 0.6 | **52.8** | 0.8 | **46.4** | 0.6 | **107** | 0.9 | **47.2** | 0.8 | **5.9** | 0.7 | **38.9** | 0.7 | **8.3** | 0.8 |
| Magnesium | | | **5,620** | 32 | **3,070** | 3.9 | **1,960** | 3.2 | **2,680** | 4.3 | **3,000** | 4.2 | **3,500** | 3.7 | **3,670** | 3.4 | **5,160** | 4.1 |
| Manganese | 1,600 | 2,000 | **294** | 3.2 | **406** | 3.9 | **184** | 3.2 | **235** | 4.3 | **230** | 4.2 | **420** | 3.7 | **337** | 3.4 | **589** | 4.1 |
| Mercury | 0.18 | 0.81 | **0.23** | 0.03 | **0.1** | 0.03 | **0.08** | 0.03 | **0.18** | 0.03 | **0.07** | 0.03 | < 0.03 | 0.03 | **0.14** | 0.03 | < 0.03 | 0.03 |
| Nickel | 30 | 140 | **16.1** | 0.32 | **20.3** | 0.39 | **12.3** | 0.32 | **16.5** | 0.43 | **13.2** | 0.42 | **16.2** | 0.37 | **13.9** | 0.34 | **21.6** | 0.41 |
| Potassium | | | **1,940** | 6 | **1,420** | 8 | **790** | 6 | **1,060** | 9 | **984** | 8 | **2,170** | 7 | **1,160** | 7 | **3,690** | 8 |
| Selenium | 3.9 | 36 | < 1.3 | 1.3 | < 1.5 | 1.5 | < 1.3 | 1.3 | < 1.7 | 1.7 | < 1.7 | 1.7 | < 1.5 | 1.5 | < 1.4 | 1.4 | < 1.6 | 1.6 |
| Silver | 2 | 36 | < 0.32 | 0.32 | < 0.39 | 0.39 | < 0.32 | 0.32 | < 0.43 | 0.43 | < 0.42 | 0.42 | < 0.37 | 0.37 | < 0.34 | 0.34 | < 0.41 | 0.41 |
| Sodium | | | **321** | 6 | **206** | 8 | **164** | 6 | **1,110** | 9 | **176** | 8 | **290** | 7 | **134** | 7 | **249** | 8 |
| Thallium | | | < 1.3 | 1.3 | < 1.5 | 1.5 | < 1.3 | 1.3 | < 1.7 | 1.7 | < 1.7 | 1.7 | < 1.5 | 1.5 | < 1.4 | 1.4 | < 1.6 | 1.6 |
| Vanadium | | | **29.7** | 0.3 | **30.2** | 0.4 | **19.9** | 0.3 | **24.7** | 0.4 | **26.5** | 0.4 | **31.4** | 0.4 | **27.6** | 0.3 | **37.8** | 0.4 |
| Zinc | 109 | 2,200 | **63.9** | 0.6 | **67.6** | 0.8 | **56.6** | 0.6 | **26.5** | 0.9 | **52.1** | 0.8 | **33.9** | 0.7 | **44.8** | 0.7 | **49.8** | 0.8 |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL- Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 7
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Parameters Detected Above Track 1 Soil Cleanup Objectives

| COMPOUND | Range in Exceedances | Frequency of Detection | 14B1 | | 14B2 | 14B3 | | | 14B4 | | | 14B5 | | | 14B6 | 14B7 | 14B8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (0-5') 8/25/2015 | (10-15') 8/25/2015 | (0-5') 8/25/2015 | (0-5') 8/25/2015 | (10-15') 8/25/2015 | (15-18') 8/25/2015 | (0-5') 8/25/2015 | (10-15') 8/25/2015 | (20-21') 8/25/2015 | (0-5') 8/25/2015 | (10-15') 8/25/2015 | (15-19.5') 8/25/2015 | (15-17') 8/25/2015 | (0-5') 8/25/2015 | (0-5') 8/25/2015 |
| *Sample Results in ug/kg* | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 14,000-27,000 | 2 | - | - | - | - | **14,000** | - | - | - | **27,000** | - | - | - | - | - | - |
| 1,3,5-Trimethylbenzene | 9,600-16,000 | 2 | - | - | - | - | **9,600** | - | - | - | **16,000** | - | - | - | - | - | - |
| Benzene | 160-8,600 | 5 | - | - | - | - | **4,100** | **2,800** | - | - | **8,600** | - | - | **160** | **890** | - | - |
| cis-1,2-Dichloroethene | 570-8,700 | 5 | - | - | - | - | **870** | **7,600** | - | **570** | **730** | - | - | - | **8,700** | - | - |
| Ethylbenzene | 7,000-21,000 | 2 | - | - | - | - | **7,000** | - | - | - | **21,000** | - | - | - | - | - | - |
| m&p-Xylenes | 270-62,000 | 4 | - | - | - | - | **17,000** | **820** | - | - | **62,000** | - | - | - | **270** | - | - |
| Methylene chloride | 570 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | **570** | - | - |
| Naphthalene | 300,000-620,000 | 2 | - | - | - | - | **300,000** | - | - | - | **620,000** | - | - | - | - | - | - |
| o-Xylene | 9,200-21,000 | 2 | - | - | - | - | **9,200** | - | - | - | **21,000** | - | - | - | - | - | - |
| Toluene | 8,600-22,000 | 2 | - | - | - | - | **8,600** | - | - | - | **22,000** | - | - | - | - | - | - |
| Trichloroethene | 3,300-14,000 | 3 | - | - | - | - | **3,300** | **3,700** | - | - | - | - | - | - | **14,000** | - | - |
| Vinyl Chloride | 290-2,600 | 3 | - | - | - | - | **290** | **2,600** | - | - | - | - | - | - | **1,100** | - | - |
| *Sample Results in ug/kg* | | | | | | | | | | | | | | | | | |
| Benz(a)anthracene | 1,100-41,000 | 10 | **3,500** | **16,000** | - | - | - | **14,000** | - | **1,800** | **41,000** | - | **2,700** | **8,000** | **6,300** | **1,200** | **1,100** |
| Benzo(a)pyrene | 2,100-28,000 | 8 | **3,200** | **13,000** | - | - | - | **13,000** | - | **3,600** | **28,000** | - | **3,000** | **14,000** | **2,100** | - | - |
| Benzo(b)fluoranthene | 1,100-21,000 | 9 | **4,500** | **11,000** | - | - | - | **9,900** | - | **2,300** | **21,000** | - | **2,200** | **9,700** | **8,800** | **1,100** | - |
| Benzo(k)fluoranthene | 850-26,000 | 12 | **3,400** | **10,000** | - | **850** | - | **10,000** | - | **2,900** | **26,000** | **870** | **2,700** | **6,500** | **4,600** | **960** | **980** |
| Chrysene | 1,100-38,000 | 10 | **3,300** | **16,000** | - | - | - | **13,000** | - | **1,800** | **38,000** | - | **2,600** | **8,200** | **6,100** | **1,400** | **1,100** |
| Dibenz(a,h)anthracene | 440-3,800 | 8 | **1,400** | **1,300** | - | - | - | **2,000** | - | **500** | **3,800** | - | **440** | **4,200** | **1,900** | - | - |
| Dibenzofuran | 12,000-43,000 | 2 | - | - | - | - | - | **12,000** | - | - | **43,000** | - | - | - | - | - | - |
| Fluorene | 66,000 | 1 | - | - | - | - | - | - | - | - | **66,000** | - | - | - | - | - | - |
| Indeno(1,2,3-cd)pyrene | 570-11,000 | 13 | **3,900** | **7,200** | **570** | **600** | - | **6,400** | - | **3,400** | **11,000** | **710** | **1,600** | **7,400** | **6,200** | **720** | **680** |
| Naphthalene | 43,000-190,000 | 2 | - | - | - | - | - | **43,000** | - | - | **190,000** | - | - | - | - | - | - |
| Phenanthrene | 140,000 | 1 | - | - | - | - | - | - | - | - | **140,000** | - | - | - | - | - | - |
| *Sample Results in ug/kg* | | | | | | | | | | | | | | | | | |
| 4,4' -DDD | 4.3 | 1 | - | - | - | - | - | - | **4.3** | - | - | - | - | - | - | - | - |
| 4,4' -DDE | 4-8.1 | 2 | - | - | **8.1** | - | - | - | **4** | - | - | - | - | - | - | - | - |
| 4,4' -DDT | 7.1 | 1 | - | - | **7.1** | - | - | - | - | - | - | - | - | - | - | - | - |
| a-Chlordane | 110-170 | 3 | - | - | **110** | **130** | - | - | - | - | **170** | - | - | - | - | - | - |
| Chlordane | 120-1,300 | 7 | **510** | - | **970** | **1,300** | - | - | **120** | - | **650** | - | - | - | - | **320** | **220** |
| Dieldrin | 9.4-13 | 2 | - | - | **9.4** | - | - | - | - | - | - | - | - | - | - | **13** | - |
| *Sample Results in ug/mg* | | | | | | | | | | | | | | | | | |
| Chromium | 31.3 | 1 | **31.3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Lead | 79.2-121 | 4 | **102** | - | - | - | - | **121** | **79.2** | - | - | - | - | - | **107** | - | - |
| Mercury | 0.19-0.58 | 4 | **0.58** | - | **0.19** | - | - | **0.41** | - | - | - | **0.23** | - | - | - | - | - |
| Nickel | 36.3 | 1 | **36.3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Laboratory Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

**Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value**

TABLE 8
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Ground Water Analytical Results
Volatile Organic Compounds

| Compound | NYSDEC Groundwater Quality Standards | 14MW1 9/9/2015 | | 14MW3 9/9/2015 | | 14MW4 9/9/2015 | | 14MW5 9/8/2015 | | 14MW6 9/8/2015 | | 14MW7 9/8/2015 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | |
| | µg/L | Results | RL | Results | RL | Results | RL | Results | RL | Results | RL | Results | RL |
| 1,1,1,2-Tetrachlorothane | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,1,1-Trichloroethane | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 1,1,2,2-Tetrachloroethane | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,1,2-Trichloroethane | 1 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,1-Dichloroethane | 5 | **0.67** | 5.0 | **0.85** | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 1,1-Dichloroethene | 5 | **0.29** | 1.0 | **5.8** | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,1-Dichloropropene | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2,3-Trichlorobenzene | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2,3-Trichloropropane | 0.04 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2,4-Trichlorobenzene | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2,4-Trimethylbenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2-Dibromo-3-chloropropane | 0.04 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2-Dibromoethane | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2-Dichlorobenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2-Dichloroethane | 0.6 | < 0.60 | 0.60 | < 0.60 | 0.60 | < 0.60 | 0.60 | < 0.60 | 0.60 | < 0.60 | 0.60 | < 0.60 | 0.60 |
| 1,2-Dichloropropane | 0.94 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,3,5-Trimethylbenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,3-Dichlorobenzene | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,3-Dichloropropane | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,4-Dichlorobenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2,2-Dichloropropane | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2-Chlorotoluene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2-Hexanone (Methyl Butyl Ketone) | | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 |
| 2-Isopropyltoluene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 4-Chlorotoluene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 4-Methyl-2-Pentanone | | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 |
| Acetone | | **6.8** | 5.0 | **3.4** | 5.0 | < 5.0 | 5.0 | **2.7** | 5.0 | **5.1** | 5.0 | **3.9** | 5.0 |
| Acrolein | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Acrylonitrile | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Benzene | 1 | **18** | 0.70 | **23** | 0.70 | **0.33** | 0.70 | < 0.70 | 0.70 | **2.1** | 0.70 | **0.28** | 0.70 |
| Bromobenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Bromochloromethane | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Bromodichloromethane | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Bromoform | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Bromomethane | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Carbon Disulfide | 60 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Carbon tetrachloride | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Chlorobenzene | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Chloroethane | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | **0.31** | 5.0 | < 5.0 | 5.0 |
| Chloroform | 7 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Chloromethane | 60 | **0.74** | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | **0.76** | 5.0 | **0.63** | 5.0 | **1.1** | 5.0 |
| cis-1,2-Dichloroethene | 5 | **70** | 5.0 | **1,200** | 100 | **51** | 5.0 | **8.4** | 1.0 | **16** | 1.0 | **14** | 1.0 |
| cis-1,3-Dichloropropene | | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 |
| Dibromochloromethane | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Dibromomethane | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Dichlorodifluoromethane | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Ethylbenzene | 5 | < 1.0 | 1.0 | **0.66** | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Hexachlorobutadiene | 0.5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 0.5 | 0.5 | < 0.5 | 0.5 | < 0.5 | 0.5 |
| Isopropylbenzene | 5 | **0.26** | 1.0 | **0.35** | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| m&p-Xylenes | 5 | < 1.0 | 1.0 | **0.63** | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Methyl Ethyl Ketone (2-Butanone) | | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 |
| Methyl t-butyl ether (MTBE) | 10 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Methylene chloride | 5 | < 3.0 | 3.0 | < 3.0 | 3.0 | < 3.0 | 3.0 | < 3.0 | 3.0 | < 3.0 | 3.0 | < 3.0 | 3.0 |
| Naphthalene | 10 | < 1.0 | 1.0 | **3.4** | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| n-Butylbenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| n-Propylbenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| o-Xylene | 5 | < 1.0 | 1.0 | **0.67** | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| p-Isopropyltoluene | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| sec-Butylbenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Styrene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| tert-Butylbenzene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Tetrachloroethene | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Tetrahydrofuran (THF) | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Toluene | 5 | < 1.0 | 1.0 | **1.5** | 1.0 | **2.1** | 1.0 | **0.56** | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| trans-1,2-Dichloroethene | 5 | **6.3** | 5.0 | **12** | 5.0 | **0.82** | 5.0 | < 5.0 | 5.0 | **0.4** | 5.0 | **0.67** | 5.0 |
| trans-1,3-Dichloropropene | 0.4 | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 |
| trans-1,4-dichloro-2-butene | 5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 | < 2.5 | 2.5 |
| Trichloroethene | 5 | **6.3** | 1.0 | **12** | 1.0 | **2.4** | 1.0 | **4** | 1.0 | **1.4** | 1.0 | **2.6** | 1.0 |
| Trichlorofluoromethane | 5 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Trichlorotrifluoroethane | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Vinyl Chloride | 2 | **36** | 5.0 | **470** | 100 | **0.75** | 1.0 | **0.96** | 1.0 | **0.28** | 1.0 | **0.63** | 1.0 |

**Notes:**
RL- Reporting Limit
**Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard**

TABLE 9
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Ground Water Analytical Results
Semi-Volatile Organic Compounds

| Compound | NYSDEC Groundwater Quality | 14MW1 | | 14MW3 | | 14MW4 | | 14MW5 | | 14MW6 | | 14MW7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 9/9/2015 | | 9/9/2015 | | 9/9/2015 | | 9/8/2015 | | 9/8/2015 | | 9/8/2015 | |
| | µg/L | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | |
| | | Results | RL | Results | RL | Results | RL | Results | RL | Results | RL | Results | RL |
| 1,2,4,5-Tetrachlorobenzene | | - | - | - | - | - | - | < 0.50 | 0.50 | < 0.50 | 0.50 | < 0.50 | 0.50 |
| 1,2,4-Trichlorobenzene | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 1,2-Dichlorobenzene | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,2-Diphenylhydrazine | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 1,3-Dichlorobenzene | 3 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 1,4-Dichlorobenzene | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2,4,5-Trichlorophenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2,4,6-Trichlorophenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2,4-Dichlorophenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2,4-Dimethylphenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2,4-Dinitrophenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2,4-Dinitrotoluene | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 2,6-Dinitrotoluene | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 2-Chloronaphthalene | 10 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 2-Chlorophenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2-Methylnaphthalene | | < 0.05 | 0.05 | **0.12** | 0.05 | < 0.05 | 0.05 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 2-Methylphenol (o-cresol) | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 2-Nitroaniline | 5 | < 20 | 20 | < 20 | 20 | < 20 | 20 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 2-Nitrophenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 3&4-Methylphenol (m&p-cresol) | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 3,3'-Dichlorobenzidine | 5 | < 20 | 20 | < 20 | 20 | < 20 | 20 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 3-Nitroaniline | 5 | < 20 | 20 | < 20 | 20 | < 20 | 20 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 4,6-Dinitro-2-methylphenol | | | | | | | | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 4-Bromophenyl phenyl ether | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 4-Chloro-3-methylphenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| 4-Chloroaniline | 5 | < 20 | 20 | < 20 | 20 | < 20 | 20 | < 3.5 | 3.5 | < 3.5 | 3.5 | < 3.5 | 3.5 |
| 4-Chlorophenyl phenyl ether | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 4-Nitroaniline | 5 | < 20 | 20 | < 20 | 20 | < 20 | 20 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| 4-Nitrophenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Acetophenone | | - | - | - | - | - | - | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Aniline | | - | - | - | - | - | - | < 3.5 | 3.5 | < 3.5 | 3.5 | < 3.5 | 3.5 |
| Anthracene | 50 | **0.65** | 0.05 | **2.3** | 0.05 | **0.1** | 0.05 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Benzidine | 5 | < 18 | 18 | < 18 | 18 | < 18 | 18 | < 4.5 | 4.5 | < 4.5 | 4.5 | < 4.5 | 4.5 |
| Benzoic acid | | < 20 | 20 | < 20 | 20 | < 20 | 20 | < 25 | 25 | < 25 | 25 | < 25 | 25 |
| Benzyl Alcohol | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | - | - | - | - | - | - |
| Benzyl butyl phthalate | 50 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Bis(2-chloroethoxy)methane | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Bis(2-chloroethyl)ether | 1 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Bis(2-chloroisopropyl)ether | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Carbazole | | - | - | - | - | - | - | < 25 | 25 | < 25 | 25 | < 25 | 25 |
| Dibenzofuran | | **4.1** | 5.0 | **7.6** | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Diethyl phthalate | 50 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Dimethylphthalate | 50 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Di-n-butylphthalate | 50 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Di-n-octylphthalate | 50 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Fluoranthene | 50 | **0.35** | 0.05 | **2.2** | 0.05 | < 0.05 | 0.05 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Fluorene | 50 | **1.5** | 0.05 | **1.3** | 0.05 | < 0.05 | 0.05 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Hexachlorobutadiene | 0.5 | < 0.05 | 0.05 | < 0.05 | 0.05 | < 0.05 | 0.05 | < 0.40 | 0.40 | < 0.40 | 0.40 | < 0.40 | 0.40 |
| Hexachlorocyclopentadiene | 5 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Isophorone | 50 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Naphthalene | 10 | < 0.05 | 0.05 | **1.9** | 0.05 | **0.27** | 0.05 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Nitrobenzene | 0.4 | < 0.05 | 0.05 | < 0.05 | 0.05 | < 0.05 | 0.05 | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 |
| N-Nitrosodimethylamine | | < 0.05 | 0.05 | < 0.05 | 0.05 | < 0.05 | 0.05 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| N-Nitrosodi-n-propylamine | | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| N-Nitrosodiphenylamine | 50 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Phenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Pyrene | 50 | **0.27** | 0.05 | **1.5** | 0.05 | **0.05** | 0.05 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Pyridine | | - | - | - | - | - | - | < 10 | 10 | < 10 | 10 | < 10 | 10 |
| Acenaphthene | 20 | **6** | 0.05 | **3.8** | 0.05 | < 0.05 | 0.05 | < 5.0 | 5.0 | < 5.0 | 5.0 | < 5.0 | 5.0 |
| Acenaphthylene | | **1.8** | 0.05 | **4.3** | 0.05 | < 0.05 | 0.05 | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 |
| Benz(a)anthracene | 0.002 | **0.06** | 0.05 | **0.35** | 0.05 | < 0.05 | 0.05 | **0.03** | 0.02 | < 0.02 | 0.02 | **0.02** | 0.02 |
| Benzo(a)pyrene | | < 0.02 | 0.02 | **0.29** | 0.02 | < 0.02 | 0.02 | **0.02** | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 |
| Benzo(b)fluoranthene | 0.002 | < 0.05 | 0.05 | **0.2** | 0.05 | < 0.05 | 0.05 | **0.02** | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 |
| Benzo(ghi)perylene | | < 0.05 | 0.05 | **0.2** | 0.05 | < 0.05 | 0.05 | < 0.02 | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 |
| Benzo(k)fluoranthene | 0.002 | < 0.05 | 0.05 | **0.27** | 0.05 | < 0.05 | 0.05 | < 0.02 | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 |
| Bis(2-ethylhexyl)phthalate | 5 | **0.11** | 0.05 | **0.12** | 0.05 | **0.11** | 0.05 | < 1.0 | 1.0 | < 1.0 | 1.0 | < 1.0 | 1.0 |
| Chrysene | 0.002 | < 0.05 | 0.05 | **0.31** | 0.05 | < 0.05 | 0.05 | **0.02** | 0.02 | < 0.02 | 0.02 | **0.02** | 0.02 |
| Dibenz(a,h)anthracene | | < 0.05 | 0.05 | **0.07** | 0.05 | < 0.05 | 0.05 | < 0.02 | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 |
| Hexachlorobenzene | 0.04 | < 0.02 | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 |
| Hexachloroethane | 5 | < 0.05 | 0.05 | < 0.05 | 0.05 | < 0.05 | 0.05 | < 0.50 | 0.50 | < 0.50 | 0.50 | < 0.50 | 0.50 |
| Indeno(1,2,3-cd)pyrene | 0.002 | < 0.05 | 0.05 | **0.18** | 0.05 | < 0.05 | 0.05 | < 0.02 | 0.02 | < 0.02 | 0.02 | < 0.02 | 0.02 |
| Phenanthrene | 50 | **0.13** | 0.05 | **0.95** | 0.05 | < 0.05 | 0.05 | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 |
| Pentachloronitrobenzene | | - | - | - | - | - | - | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 |
| Pentachlorophenol | | - | - | - | - | - | - | < 1.0 | 1.0 | < 0.80 | 0.80 | < 0.80 | 0.80 |

**Notes:**
RL- Reporting Limit
**Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard**

TABLE 10
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Ground Water Analytical Results
Pesticides PCBs

| Compound | NYSDEC Groundwater Quality Standards | 14MW1 9/9/2015 | | 14MW3 9/9/2015 | | 14MW4 9/9/2015 | | 14MW5 9/8/2015 | | 14MW6 9/8/2015 | | 14MW7 9/8/2015 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | µg/L | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | |
| | | Results | RL | Results | RL | Results | RL | Results | RL | Results | RL | Results | RL |
| **PCB-1016** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **PCB-1221** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **PCB-1232** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **PCB-1242** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **PCB-1248** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **PCB-1254** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **PCB-1260** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **PCB-1262** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **PCB-1268** | **0.09** | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 | < 0.050 | 0.050 |
| **4,4-DDD** | **0.3** | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.020 | 0.020 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **4,4-DDE** | **0.2** | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **4,4-DDT** | **0.11** | < 0.010 | 0.010 | < 0.015 | 0.015 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **a-BHC** | **0.94** | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 |
| **a-Chlordane** | | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **Alachlor** | | < 0.075 | 0.075 | < 0.075 | 0.075 | < 0.075 | 0.075 | < 0.075 | 0.075 | < 0.075 | 0.075 | < 0.075 | 0.075 |
| **Aldrin** | | < 0.003 | 0.003 | < 0.005 | 0.005 | < 0.002 | 0.002 | < 0.003 | 0.003 | < 0.003 | 0.003 | < 0.003 | 0.003 |
| **b-BHC** | **0.04** | < 0.015 | 0.015 | < 0.015 | 0.015 | < 0.015 | 0.015 | < 0.015 | 0.015 | < 0.015 | 0.015 | < 0.015 | 0.015 |
| **Chlordane** | **0.05** | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.05 | 0.05 | < 0.05 | 0.05 | < 0.05 | 0.05 |
| **d-BHC** | **0.04** | < 0.005 | 0.005 | < 0.020 | 0.020 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 |
| **Dieldrin** | **0.004** | < 0.015 | 0.015 | < 0.015 | 0.015 | < 0.008 | 0.008 | < 0.004 | 0.004 | < 0.004 | 0.004 | < 0.004 | 0.004 |
| **Endosulfan I** | | < 0.080 | 0.080 | < 0.015 | 0.015 | < 0.015 | 0.015 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **Endosulfan II** | | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **Endosulfan Sulfate** | | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.015 | 0.015 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **Endrin** | | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **Endrin aldehyde** | **5** | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **Endrin ketone** | | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **gamma-BHC** | **0.05** | < 0.016 | 0.016 | < 0.005 | 0.005 | < 0.010 | 0.010 | < 0.011 | 0.011 | < 0.011 | 0.011 | < 0.011 | 0.011 |
| **g-Chlordane** | | < 0.010 | 0.010 | < 0.015 | 0.015 | < 0.015 | 0.015 | < 0.016 | 0.016 | < 0.016 | 0.016 | < 0.016 | 0.016 |
| **Heptachlor** | **0.04** | < 0.010 | 0.010 | < 0.060 | 0.060 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **Heptachlor epoxide** | **0.03** | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 | < 0.010 | 0.010 |
| **Methoxychlor** | **35** | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 | < 0.10 | 0.10 |
| **Toxaphene** | | < 0.25 | 0.25 | < 0.25 | 0.25 | < 0.25 | 0.25 | < 0.25 | 0.25 | < 0.25 | 0.25 | < 0.25 | 0.25 |

**Notes:**
RL- Reporting limit
ND - Non-detect
ND* - Due to matrix interference from non target compounds in the sample an elevated RL was reported.
**Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard**

TABLE 11
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Ground Water Analytical Results
Total Metals

| Compound | NYSDEC Groundwater Quality Standards | 14MW1 9/9/2015 | | 14MW3 9/9/2015 | | 14MW4 9/9/2015 | | 14MW5 9/8/2015 | | 14MW6 9/8/2015 | | 14MW7 9/8/2015 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mg/L | mg/L | | mg/L | | mg/L | | mg/L | | mg/L | | mg/L | |
| | | Results | RL | Results | RL | Results | RL | Results | RL | Results | RL | Results | RL |
| **Aluminum** | **NS** | **0.048** | 0.010 | **1.5** | 0.010 | **0.492** | 0.010 | **1.65** | 0.010 | **9.02** | 0.010 | **1.84** | 0.010 |
| **Antimony** | **0.003** | < 0.002 | 0.002 | < 0.002 | 0.002 | < 0.002 | 0.002 | < 0.002 | 0.002 | < 0.002 | 0.002 | < 0.002 | 0.002 |
| **Arsenic** | **0.025** | **0.01** | 0.004 | **0.005** | 0.004 | **0.003** | 0.004 | **0.004** | 0.004 | **0.007** | 0.004 | **0.001** | 0.004 |
| **Barium** | **1** | **0.087** | 0.010 | **0.084** | 0.010 | **0.021** | 0.010 | **0.02** | 0.010 | **0.071** | 0.010 | **0.025** | 0.010 |
| **Beryllium** | **0.003** | < 0.001 | 0.001 | < 0.001 | 0.001 | < 0.001 | 0.001 | < 0.001 | 0.001 | < 0.001 | 0.001 | < 0.001 | 0.001 |
| **Cadmium** | **0.005** | < 0.004 | 0.004 | < 0.004 | 0.004 | < 0.004 | 0.004 | < 0.004 | 0.004 | < 0.004 | 0.004 | < 0.004 | 0.004 |
| **Calcium** | **NS** | **80.3** | 0.010 | **65** | 0.010 | **28** | 0.010 | **26.6** | 0.010 | **6.49** | 0.010 | **12.2** | 0.010 |
| **Chromium** | **0.05** | **0.004** | 0.001 | **0.003** | 0.001 | < 0.001 | 0.001 | **0.005** | 0.001 | **0.021** | 0.001 | **0.004** | 0.001 |
| **Cobalt** | **NS** | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | **0.006** | 0.005 | **0.002** | 0.005 |
| **Copper** | **0.2** | < 0.005 | 0.005 | **0.003** | 0.005 | **0.002** | 0.005 | **0.006** | 0.005 | **0.017** | 0.005 | **0.003** | 0.005 |
| **Iron** | **0.5** | **2.38** | 0.01 | **2.4** | 0.01 | **0.4** | 0.01 | **2.75** | 0.01 | **12.4** | 0.01 | **2.11** | 0.01 |
| **Lead** | **0.025** | **0.002** | 0.002 | **0.012** | 0.002 | **0.004** | 0.002 | **0.006** | 0.002 | **0.006** | 0.002 | < 0.002 | 0.002 |
| **Magnesium** | **35** | **18.8** | 0.01 | **22** | 0.01 | **6.05** | 0.01 | **2.03** | 0.01 | **5.69** | 0.01 | **6.26** | 0.01 |
| **Manganese** | **0.3** | **0.38** | 0.005 | **0.285** | 0.005 | **0.152** | 0.005 | **0.358** | 0.005 | **0.468** | 0.005 | **0.496** | 0.005 |
| **Mercury** | **0.0007** | < 0.0002 | 0.0002 | < 0.0002 | 0.0002 | < 0.0002 | 0.0002 | < 0.0002 | 0.0002 | < 0.0002 | 0.0002 | < 0.0002 | 0.0002 |
| **Nickel** | **0.1** | **0.002** | 0.004 | **0.003** | 0.004 | **0.003** | 0.004 | **0.006** | 0.004 | **0.017** | 0.004 | **0.005** | 0.004 |
| **Potassium** | **NS** | **10.9** | 0.1 | **11.1** | 0.1 | **6.1** | 0.1 | **3.5** | 0.1 | **6.7** | 0.1 | **8.1** | 0.1 |
| **Selenium** | **0.01** | < 0.002 | 0.002 | < 0.002 | 0.002 | < 0.002 | 0.002 | < 0.002 | 0.002 | < 0.002 | 0.002 | < 0.002 | 0.002 |
| **Silver** | **0.05** | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 |
| **Sodium** | **2** | **110** | 1.0 | **84.1** | 1.0 | **58.7** | 1.0 | **9.2** | 0.1 | **75.5** | 1.0 | **68.6** | 1.0 |
| **Thallium** | **0.0005** | < 0.001 | 0.001 | < 0.001 | 0.001 | < 0.001 | 0.001 | < 0.0005 | 0.0005 | < 0.0005 | 0.0005 | < 0.0005 | 0.0005 |
| **Vanadium** | **NS** | < 0.010 | 0.010 | **0.003** | 0.010 | **0.008** | 0.010 | **0.005** | 0.010 | **0.022** | 0.010 | **0.006** | 0.010 |
| **Zinc** | **2** | < 0.010 | 0.010 | **0.006** | 0.010 | < 0.010 | 0.010 | **0.006** | 0.010 | **0.025** | 0.010 | **0.003** | 0.010 |

**Notes:**
RL- Reporting limit
NS - No Standard
**Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard**

TABLE 12
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Ground Water Analytical Results
Dissolved Metals

| Compound | NYSDEC Groundwater Quality Standards mg/L | 14MW1 9/9/2015 mg/L | | 14MW3 9/9/2015 mg/L | | 14MW4 9/9/2015 mg/L | |
|---|---|---|---|---|---|---|---|
| | | Results | RL | Results | RL | Results | RL |
| **Aluminum** | **NS** | < 0.011 | 0.011 | **0.007** | 0.011 | **0.14** | 0.011 |
| **Antimony** | **0.003** | < 0.003 | 0.003 | < 0.003 | 0.003 | < 0.003 | 0.003 |
| **Arsenic** | **0.025** | **0.004** | 0.003 | < 0.003 | 0.003 | < 0.003 | 0.003 |
| **Barium** | **1** | **0.07** | 0.011 | **0.064** | 0.011 | **0.016** | 0.011 |
| **Beryllium** | **0.003** | < 0.001 | 0.001 | < 0.001 | 0.001 | < 0.001 | 0.001 |
| **Cadmium** | **0.005** | < 0.004 | 0.004 | < 0.004 | 0.004 | < 0.004 | 0.004 |
| **Calcium** | **NS** | **72.4** | 0.01 | **56** | 0.01 | **25.4** | 0.01 |
| **Chromium** | **0.05** | **0.001** | 0.001 | < 0.001 | 0.001 | < 0.001 | 0.001 |
| **Cobalt** | **NS** | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 |
| **Copper** | **0.2** | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 |
| **Iron** | **0.5** | **0.04** | 0.01 | **0.05** | 0.01 | **0.02** | 0.01 |
| **Lead** | **0.025** | **0.003** | 0.002 | **0.002** | 0.002 | **0.001** | 0.002 |
| **Magnesium** | **35** | **16.8** | 0.01 | **19** | 0.01 | **5.37** | 0.01 |
| **Manganese** | **0.3** | **0.349** | 0.005 | **0.23** | 0.005 | **0.112** | 0.005 |
| **Mercury** | **0.0007** | **0.0002** | 0.0002 | < 0.0002 | 0.0002 | < 0.0002 | 0.0002 |
| **Nickel** | **0.1** | < 0.004 | 0.004 | < 0.004 | 0.004 | < 0.004 | 0.004 |
| **Potassium** | **NS** | **10.7** | 0.1 | **11.5** | 0.1 | **6** | 0.1 |
| **Selenium** | **0.01** | < 0.004 | 0.004 | < 0.004 | 0.004 | < 0.004 | 0.004 |
| **Silver** | **0.05** | < 0.005 | 0.005 | < 0.005 | 0.005 | < 0.005 | 0.005 |
| **Sodium** | **2** | **103** | 1.1 | **76.5** | 1.1 | **55.4** | 1.1 |
| **Thallium** | **0.0005** | < 0.001 | 0.001 | < 0.001 | 0.001 | < 0.001 | 0.001 |
| **Vanadium** | **NS** | < 0.011 | 0.011 | < 0.011 | 0.011 | **0.005** | 0.011 |
| **Zinc** | **2** | < 0.011 | 0.011 | < 0.011 | 0.011 | < 0.011 | 0.011 |

**Notes:**
RL- Reporting limit
NS - No Standard
**Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard**

TABLE 13
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Parameters Detected Above Ambient Groundwater Standards

| COMPOUND | Range in Exceedances | Frequency of Detection | 14MW1 9/29/2015 | 14MW3 9/30/2015 | 14MW4 9/30/2015 | 14MW5 9/8/2015 | 14MW6 9/8/2015 | 14MW7 9/8/2015 |
|---|---|---|---|---|---|---|---|---|
| *Sample Results in ug/kL* | | | | | | | | |
| 1,1-Dichloroethene | 5.8 | 1 | - | **5.8** | - | - | - | - |
| Benzene | 2.1 - 23 | 3 | **18** | **23** | - | - | **2.1** | - |
| cis-1,2-Dichloroethene | 8.4 - 1,200 | 7 | **70** | **1,200** | **51** | **8.4** | **16** | **14** |
| trans-1,2-Dichloroethene | 6.3 - 12 | 2 | **6.3** | **12** | - | - | - | - |
| Trichloroethene | 6.3 - 12 | 2 | **6.3** | **12** | - | - | - | - |
| Vinyl Chloride | 36 - 470 | 2 | **36** | **470** | - | - | - | - |
| *Sample Results in ug/L* | | | | | | | | |
| Benz(a)anthracene | 0.02 - 0.35 | 3 | - | **0.35** | - | **0.03** | - | **0.02** |
| Benzo(a)pyrene | 0.02 | 1 | - | - | - | **0.02** | - | - |
| Benzo(b)fluoranthene | 0.02 - 0.2 | 2 | - | **0.2** | - | **0.02** | - | - |
| Benzo(k)fluoranthene | 0.27 | 1 | - | **0.27** | - | - | - | - |
| Chrysene | 0.02 - 0.31 | 4 | - | **0.31** | - | **0.02** | - | **0.02** |
| Indeno(1,2,3-cd)pyrene | 0.18 | 1 | - | **0.18** | - | - | - | - |
| *Sample Results in mg/L* | | | | | | | | |
| Iron | 0.75 - 12.4 | 6 | **2.38** | **2.4** | - | **2.75** | **12.4** | **2.11** |
| Manganese | 0.315 - 0.496 | 5 | **0.38** | - | - | **0.358** | **0.468** | **0.496** |
| Sodium | 58.7 - 110 | 5 | **110** | **84.1** | **58.7** | - | **75.5** | **68.6** |
| Manganese (dissolved) | 0.349 | 1 | **0.349** | - | - | - | - | - |
| Sodium (dissolved) | 55.4-110 | 3 | **110** | **76.5** | **55.4** | - | - | - |

**Notes:**

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Laboratory Reporting Limit

**Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value**

TABLE 14
Former Sterling Transformer
510 Driggs Avenue, Brooklyn, New York
Ground Water Analytical Results
Soil Gas - Volatile Organic Compounds

| COMPOUNDS | NYSDOH Maximum Sub-Slab Value ($\mu g/m^3$) [(a)] | NYSDOH Soil Outdoor Background Levels ($\mu g/m^3$) [(b)] | 14SG1 9/8/2015 | | 14SG2 9/8/2015 | | 14SG3 9/8/2015 | | 14SG4 9/8/2015 | | 14SG5 9/8/2015 | | 14SG6 9/8/2015 | | 14SG7 9/8/2015 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (µg/m3) | | (µg/m3) | | (µg/m3) | | (µg/m3) | | (µg/m3) | | (µg/m3) | | (µg/m3) | |
| | | | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL | Result | RL |
| 1,1,1,2-Tetrachloroethane | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,1,1-Trichloroethane | 100 | <2.0 - 2.8 | **13.8** | 1.00 | **86.2** | 1.00 | **7.36** | 1.00 | **1.07** | 1.00 | **2.02** | 1.00 | **2.74** | 1.00 | **2.21** | 1.00 |
| 1,1,2,2-Tetrachloroethane | | <1.5 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,1,2-Trichloroethane | | <1.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,1-Dichloroethane | | <1.0 | < 1.00 | 1.00 | **4.77** | 1.00 | **2.51** | 1.00 | **58.2** | 1.00 | **54.6** | 1.00 | < 1.00 | 1.00 | **25.2** | 1.00 |
| 1,1-Dichloroethene | | <1.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | **44.4** | 1.00 | **1,100** | 74.9 | < 1.00 | 1.00 | **586** | 74.9 |
| 1,2,4-Trichlorobenzene | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,2,4-Trimethylbenzene | | <1.0 | **2.05** | 1.00 | **2.67** | 1.00 | **2.52** | 1.00 | **1.46** | 1.00 | **1.72** | 1.00 | **2.23** | 1.00 | **1.89** | 1.00 |
| 1,2-Dibromoethane | | <1.5 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,2-Dichlorobenzene | | <2.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,2-Dichloroethane | | <1.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,2-Dichloropropane | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,2-Dichlorotetrafluoroethane | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,3,5-Trimethylbenzene | | <1.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,3-Butadiene | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,3-Dichlorobenzene | | <2.0 | **9.31** | 1.00 | **11** | 1.00 | **16.6** | 1.00 | **9.01** | 1.00 | **5.62** | 1.00 | **7.93** | 1.00 | **5.57** | 1.00 |
| 1,4-Dichlorobenzene | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 1,4-Dioxane | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 2-Hexanone | | | **113** | 1.00 | **148** | 40.0 | **102** | 1.00 | **107** | 1.00 | < 1.00 | 1.00 | **80.2** | 1.00 | **67.5** | 1.00 |
| 4-Ethyltoluene | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 4-Isopropyltoluene | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| 4-Methyl-2-pentanone | | | **10.4** | 1.00 | **10.4** | 1.00 | **9.13** | 1.00 | **6.1** | 1.00 | < 1.00 | 1.00 | **13.8** | 1.00 | **9.62** | 1.00 |
| Acetone | | NA | **1,550** | 39.9 | **2,920** | 39.9 | **1,580** | 39.9 | **1,370** | 29.9 | **1,410** | 75.0 | **1,650** | 32.0 | **1,510** | 75.0 |
| Acrylonitrile | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Benzene | | <1.6 - 4.7 | **2.93** | 1.00 | **6.93** | 1.00 | **2.26** | 1.00 | **79.5** | 1.00 | **1,240** | 75.0 | **6.61** | 1.00 | **390** | 75.0 |
| Benzyl Chloride | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Bromodichloromethane | | <5.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Bromoform | | <1.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Bromomethane | | <1.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Carbon Disulfide | | NA | **1.02** | 1.00 | **1.75** | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | **1.1** | 1.00 | < 1.00 | 1.00 |
| Carbon Tetrachloride | 5 | <3.1 | **0.33** | 0.25 | **0.35** | 0.25 | **0.57** | 0.25 | < 0.25 | 0.25 | < 0.25 | 0.25 | **0.26** | 0.25 | < 0.25 | 0.25 |
| Chlorobenzene | | <2.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Chloroethane | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | **245** | 74.9 | < 1.00 | 1.00 | **33.2** | 1.00 |
| Chloroform | | <2.4 | **84.4** | 1.00 | **165** | 1.00 | **10.3** | 1.00 | **2.53** | 1.00 | < 1.00 | 1.00 | **8.44** | 1.00 | **1.73** | 1.00 |
| Chloromethane | | <1.0 - 1.4 | < 1.00 | 1.00 | **2.33** | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | **1.4** | 1.00 |
| cis-1,2-Dichloroethene | | <1.0 | **5.43** | 1.00 | **452** | 40.0 | **31.7** | 1.00 | **3,140** | 30.0 | **44,400** | 1,500 | **5.27** | 1.00 | **4,200** | 74.9 |
| cis-1,3-Dichloropropene | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Cyclohexane | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | **8.6** | 1.00 | **396** | 75.0 | < 1.00 | 1.00 | **172** | 75.0 |
| Dibromochloromethane | | <5.0 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Dichlorodifluromethane | | NA | **75.1** | 1.00 | **32.8** | 1.00 | **152** | 1.00 | **140** | 1.00 | **90.9** | 1.00 | **25.8** | 1.00 | **47** | 1.00 |
| Ethanol | | | **138** | 1.00 | **215** | 1.00 | **169** | 1.00 | **104** | 1.00 | **97.9** | 1.00 | **178** | 1.00 | **84** | 1.00 |
| Ethyl Acetate | | NA | **2.3** | 1.00 | **7.02** | 1.00 | **1.82** | 1.00 | < 1.00 | 1.00 | **2.36** | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Ethylbenzene | | <4.3 | **4.69** | 1.00 | **5.12** | 1.00 | **5.08** | 1.00 | **2.84** | 1.00 | **4.86** | 1.00 | **5.82** | 1.00 | **4.34** | 1.00 |
| Heptane | | NA | **5.98** | 1.00 | **13.9** | 1.00 | **4.26** | 1.00 | **7.09** | 1.00 | **9.71** | 1.00 | **7.04** | 1.00 | < 1.00 | 1.00 |
| Hexachlorobutadiene | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Hexane | | <1.5 | **4.97** | 1.00 | **11.9** | 1.00 | **3.8** | 1.00 | **12.2** | 1.00 | **722** | 75.0 | **6.52** | 1.00 | **262** | 75.0 |
| Isopropylalcohol | | NA | **28.7** | 1.00 | **75.4** | 1.00 | **27** | 1.00 | **35.9** | 1.00 | **19.6** | 1.00 | **36.8** | 1.00 | **20.9** | 1.00 |
| Isopropylbenzene | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | **2.36** | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Xylene (m&p) | | <4.3 | **17** | 1.00 | **18.3** | 1.00 | **19.4** | 1.00 | **10.1** | 1.00 | **16.4** | 1.00 | **21.2** | 1.00 | **11.5** | 1.00 |
| Methyl Ethyl Ketone | | | **327** | 40.1 | **796** | 40.1 | **318** | 40.1 | **304** | 30.1 | < 1.00 | 1.00 | **469** | 32.1 | **162** | 74.9 |
| MTBE | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Methylene Chloride | | <3.4 | **1.19** | 1.00 | **4.3** | 1.00 | < 1.00 | 1.00 | **1.82** | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | **20** | 1.00 |
| n-Butylbenzene | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Xylene (o) | | <4.3 | **7.51** | 1.00 | **7.68** | 1.00 | **8.42** | 1.00 | **5.21** | 1.00 | **10.2** | 1.00 | **8.46** | 1.00 | **6.94** | 1.00 |
| Propylene | | NA | **71.9** | 40.1 | **104** | 40.1 | **83.8** | 40.1 | **390** | 29.9 | **3,780** | 75.0 | **79.8** | 32.0 | **5,610** | 150 |
| sec-Butylbenzene | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Styrene | | <1.0 | < 1.00 | 1.00 | **1.08** | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Tetrachloroethene | 100 | | **30** | 0.25 | **113** | 0.25 | **25.6** | 0.25 | **7.25** | 0.25 | **8.74** | 0.25 | **4.74** | 0.25 | **23.4** | 0.25 |
| Tetrahydrofuran | | NA | < 1.00 | 1.00 | **1.69** | 1.00 | **4.13** | 1.00 | **2.63** | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Toluene | | 1.0 - 6.1 | **7.34** | 1.00 | **17.6** | 1.00 | **6.36** | 1.00 | **5.27** | 1.00 | **30.5** | 1.00 | **7.76** | 1.00 | **11.3** | 1.00 |
| trans-1,2-Dichloroethene | | NA | < 1.00 | 1.00 | **13.7** | 1.00 | **3.48** | 1.00 | **64.6** | 1.00 | **1,380** | 74.9 | < 1.00 | 1.00 | **128** | 1.00 |
| trans-1,3-Dichloropropene | | NA | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Trichloroethene | 5 | <1.7 | **2,910** | 9.99 | **16,900** | 25.0 | **1,840** | 9.99 | **1,330** | 7.52 | **5,690** | 18.7 | **763** | 8.00 | **6,120** | 18.7 |
| Trichlorofluoromethane | | NA | **249** | 40.0 | **62.9** | 1.00 | **691** | 40.0 | **14.4** | 1.00 | **19.9** | 1.00 | **183** | 1.00 | **14.1** | 1.00 |
| Trichlorotrifluoroethane | | | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 | < 1.00 | 1.00 |
| Vinyl Chloride | | <1.0 | **0.82** | 0.25 | < 0.25 | 0.25 | < 0.25 | 0.25 | **3,240** | 18.8 | **116,000** | 376 | < 0.25 | 0.25 | **10,800** | 37.6 |
| **BTEX** | | | **39.47** | | **55.63** | | **41.52** | | **102.92** | | **1301.96** | | **49.85** | | **424.08** | |
| **Total VOCs** | | | **2552.24** | | **21583.86** | | **4982.46** | | **3839.75** | | **13160.07** | | **2724.05** | | **8194.56** | |

Notes:
NA No guidance value or standard available
(a) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October 2006. New York State Department of Health.
(b) NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, February 2005, Summary of Background Levels for Selected Compounds

**TABLE 15**

Project Permit Listing

To Be Updated as Project Progresses

| *Permit* | *Permit Number* | *Originating Agency* | *Pursuant to* | *Issued* | *Expires* | *Contact Phone* |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| NO PERMITS ISSUED AT THIS TIME - TO BE ADDED | | | | | | |
| | | | | | | |
| | | | | | | |
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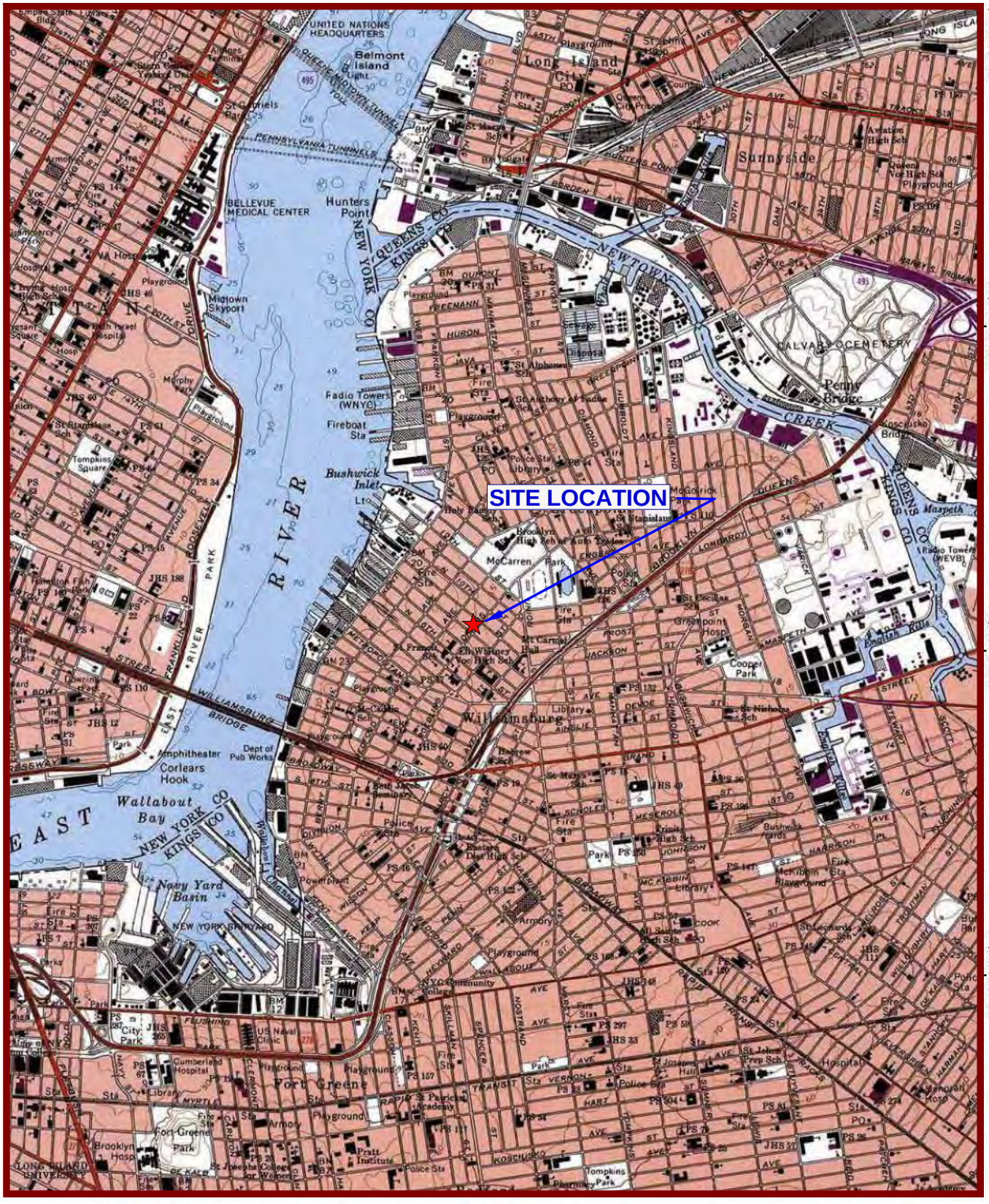
**Table 16**
**Emergency Contact List**

| | | |
|---|---|---|
| General Emergencies | | 911 |
| NYC Police | | 911 |
| NYC Fire Department | | 911 |
| Woodhul Medical Center | | (718) 963-8000 |
| NYSDEC Spills Hotline | | 1-800-457-7362 |
| NYSDEC Project Manager | | (518) 402-9621 |
| NYC Department of Health | | (212) 676-2400 |
| National Response Center | | 1-800-424-8802 |
| Poison Control | | 1-800-222-1222 |
| EBC Project Manager | Robert Bennett | (631) 504-6000 |
| EBC BCP Program Manager | Charles Sosik | (631) 504-6000 |
| EBC Site Safety Officer | Kevin Waters | (631) 504-6000 |
| Remedial Engineer | Ariel Czemerinski | (516) 987-1662 |
| Construction Manager | Zev Steinmetz | (718) 907-9315 |

# ***FIGURES***

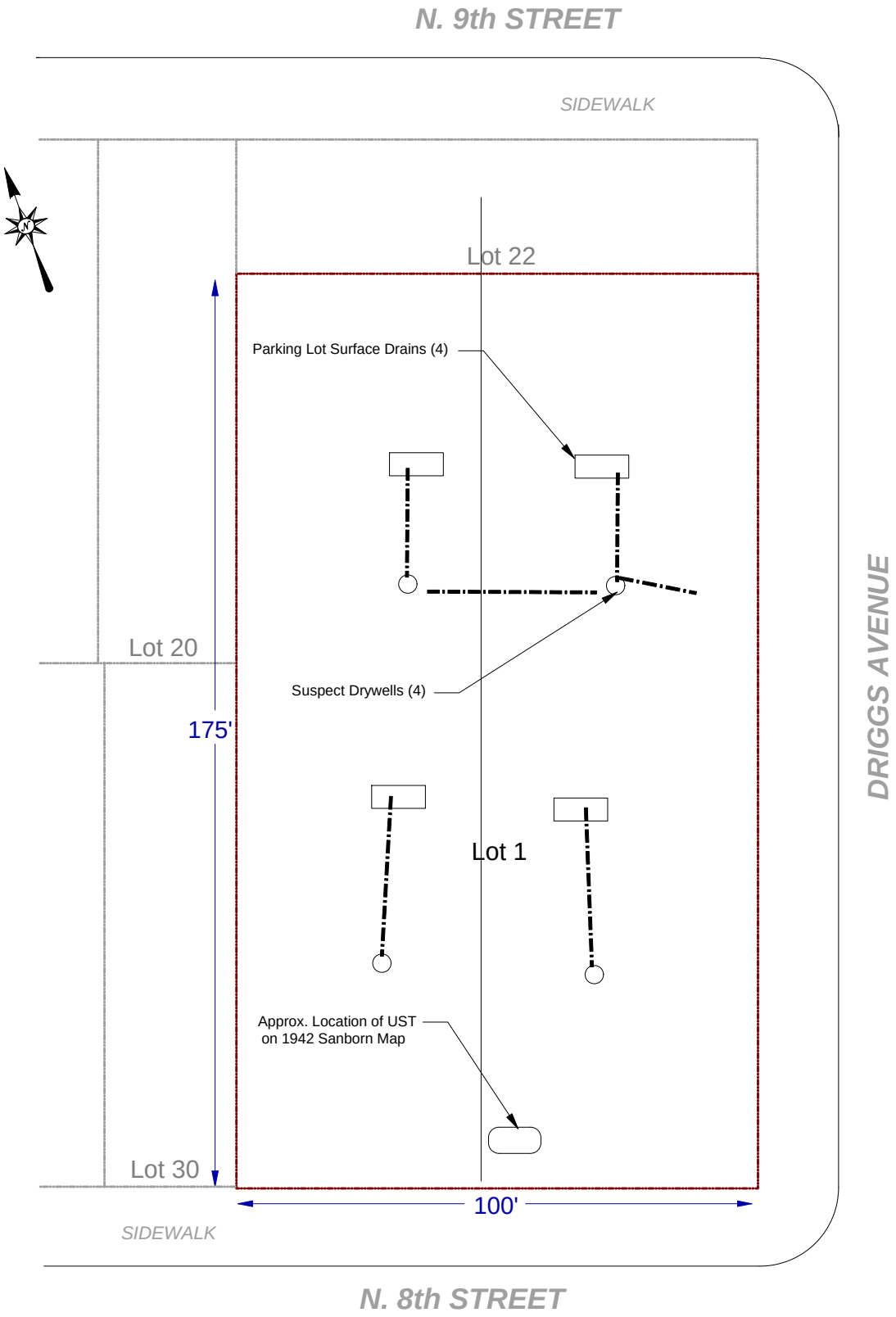



USGS Brooklyn Quadrangle 1995, Contour Interval = 10 feet

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER STERLING TRANSFORMER CORP.
510 DRIGGS AVENUE, BROOKLYN, NY

**FIGURE 1** SITE LOCATION MAP




**KEY:**

BCP Property Boundary

**SCALE:**

0 15 30

Scale: 1 inch = 30 feet

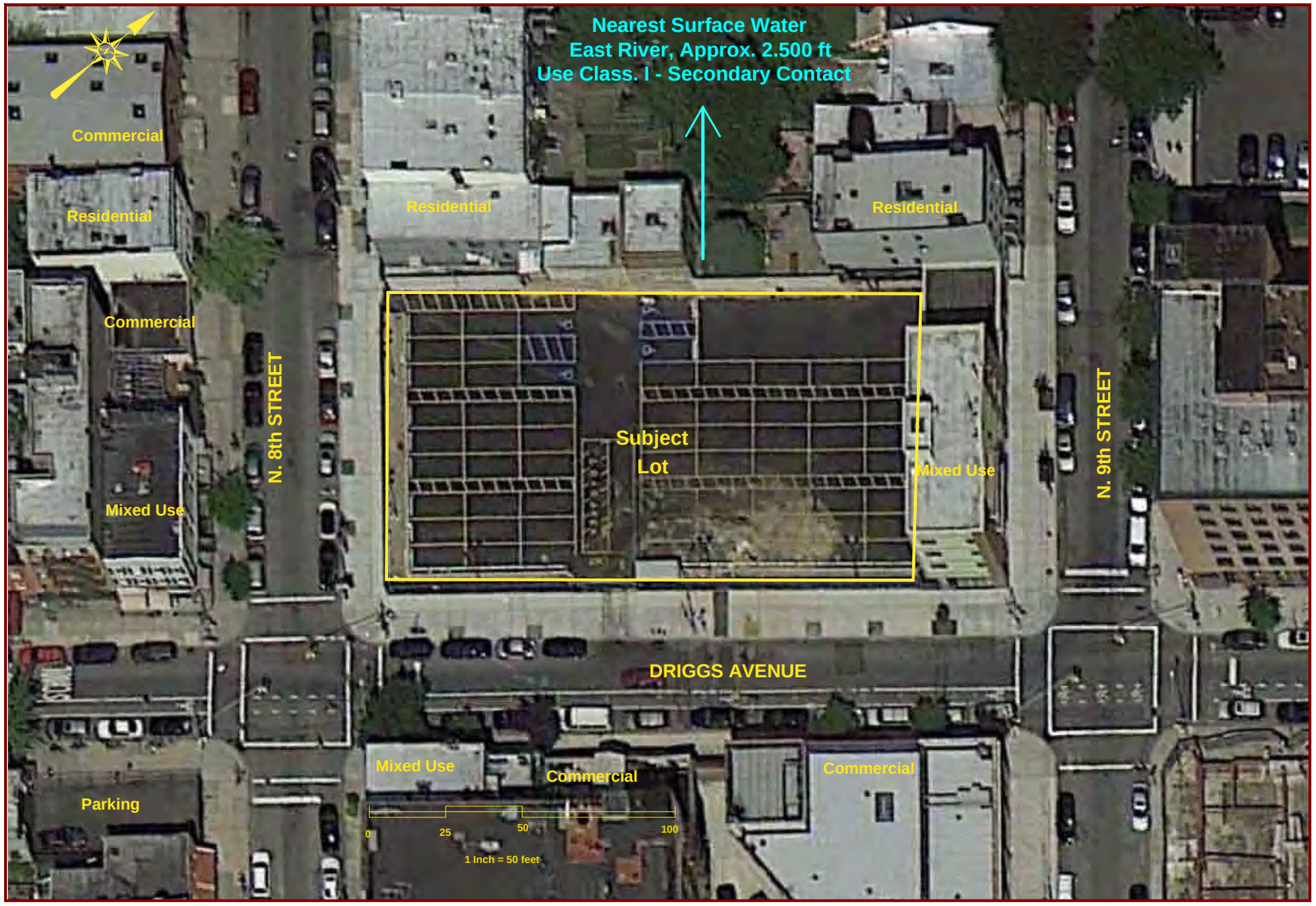
EBC
Environmental Business Consultants
Phone 631.504.6000
Fax 631. 924 .2870

Figure No. 2

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: SITE PLAN

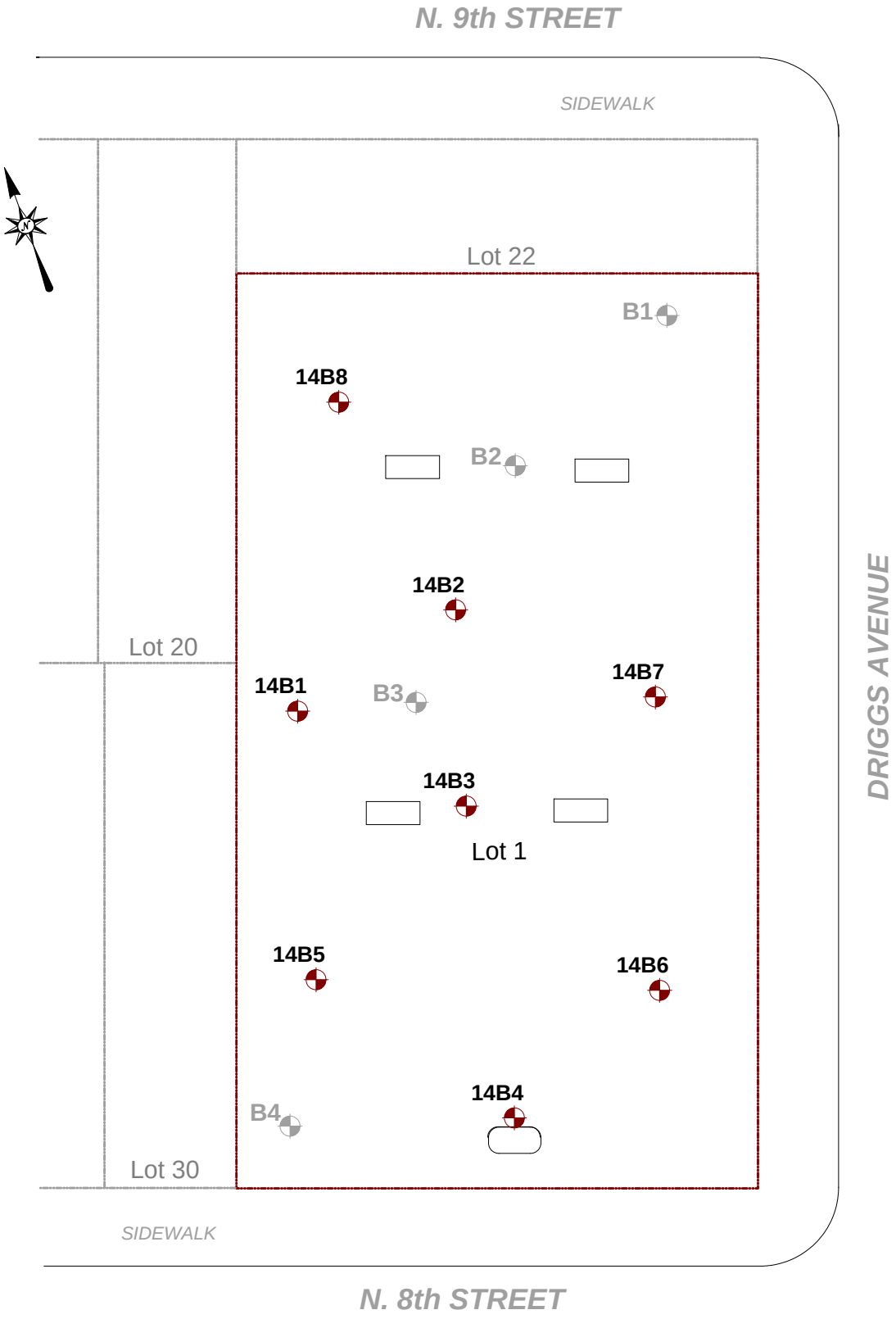



Note: No sensitive receptors (i.e. nusrsing homes, day care centers, etc.) have been identified downgradient of the Site.

EBC
Environmental Business Consultants
1808 Middle Country Road. Ridge. NY 11961
Phone: 631.504.6000
Fax: 631.924.2780

FORMER STERLING TRANSFORMER CORP.
510 Driggs Avenue Brooklyn, NY

FIGURE 3 Adjacent Properties




**KEY:**

- BCP Property Boundary
- Bx — Sept 2014 Phase II Boring Location
- 14Bx — Aug2015 Boring Location

**SCALE:**

0 15 30

Scale: 1 inch = 30 feet

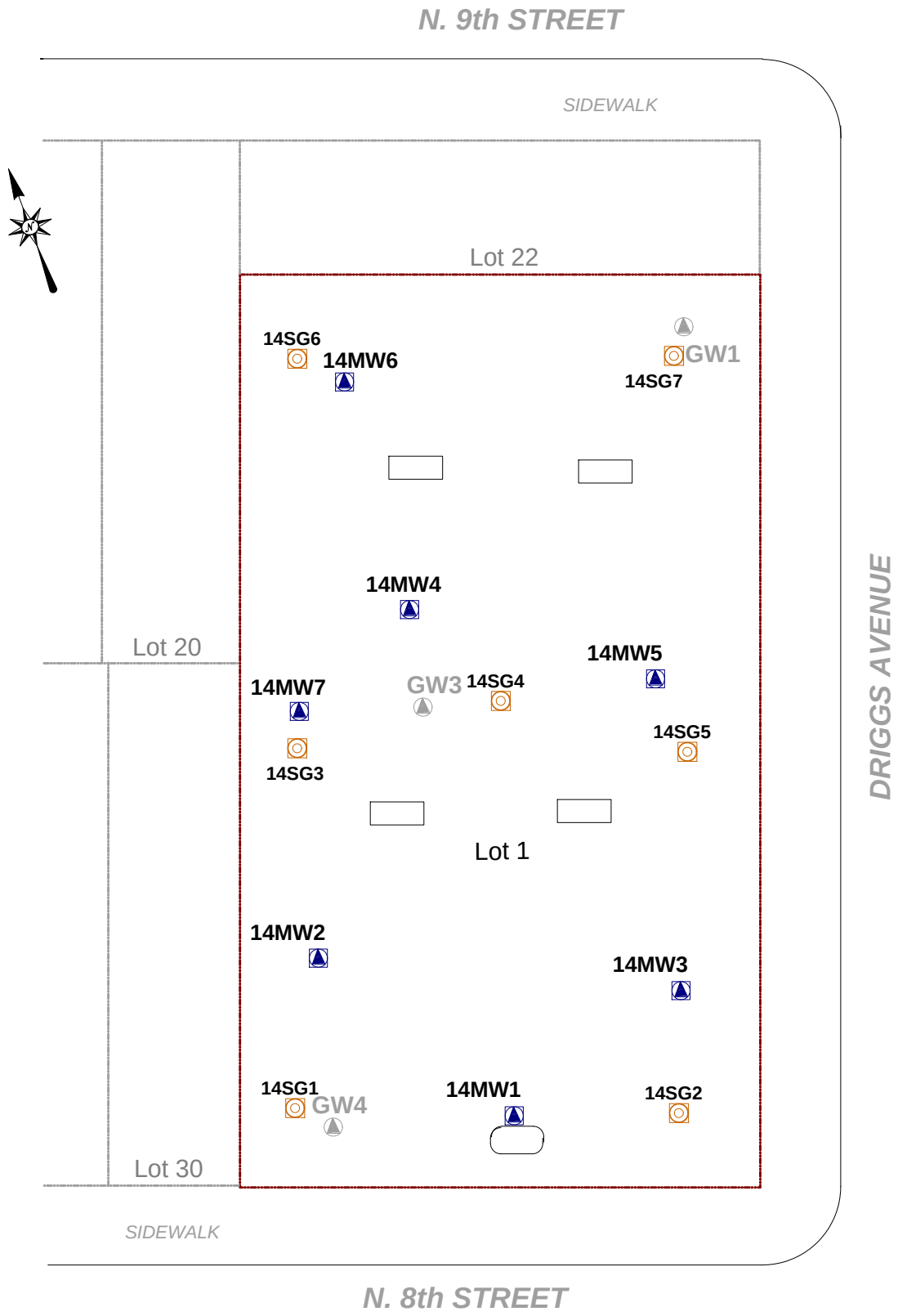
EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

Figure No. 4

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: SOIL BORING LOCATIONS




**KEY:**

- BCP Property Boundary
- GWx — Sept 2014 Phase II GW Sampling Location
- 14MWx — Aug2015 MW Location
- 14SGx — Soil Gas Location

**SCALE:**

0 15 30

Scale: 1 inch = 30 feet

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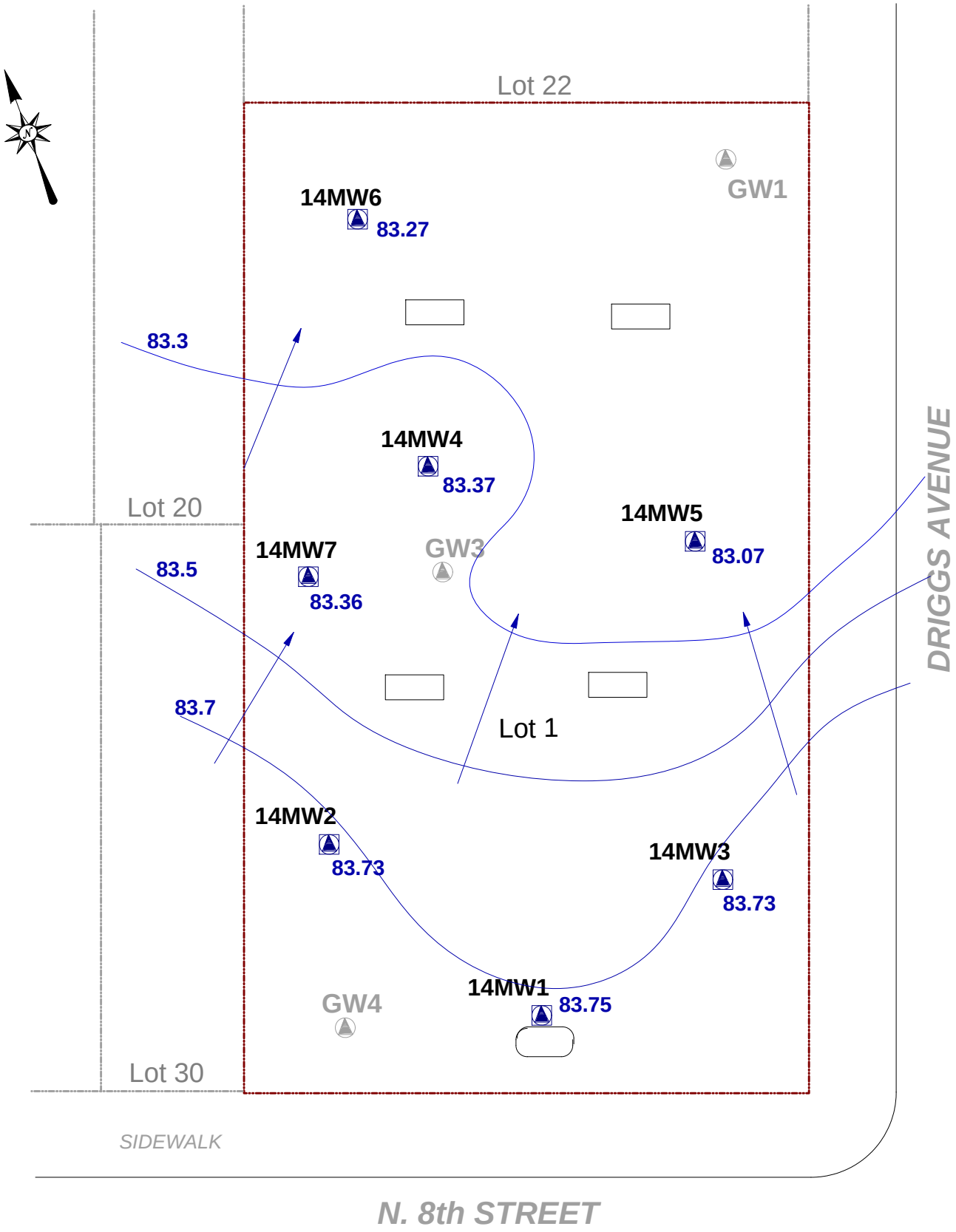
Figure No. 5

Site Name: FORMER STERLING TRANSFORMER CORP.
Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY
Drawing Title: MONITORING WELL AND SOIL GAS LOCATIONS




**KEY:**

- BCP Property Boundary
- GWx — Sept 2014 Phase II GW Sampling Location
- 14MWx — Proposed RI MW Location

**SCALE:**

0 15 25

Scale: 1 inch = 25 feet

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Figure No. 6

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: GROUND WATER ELEVATION MAP

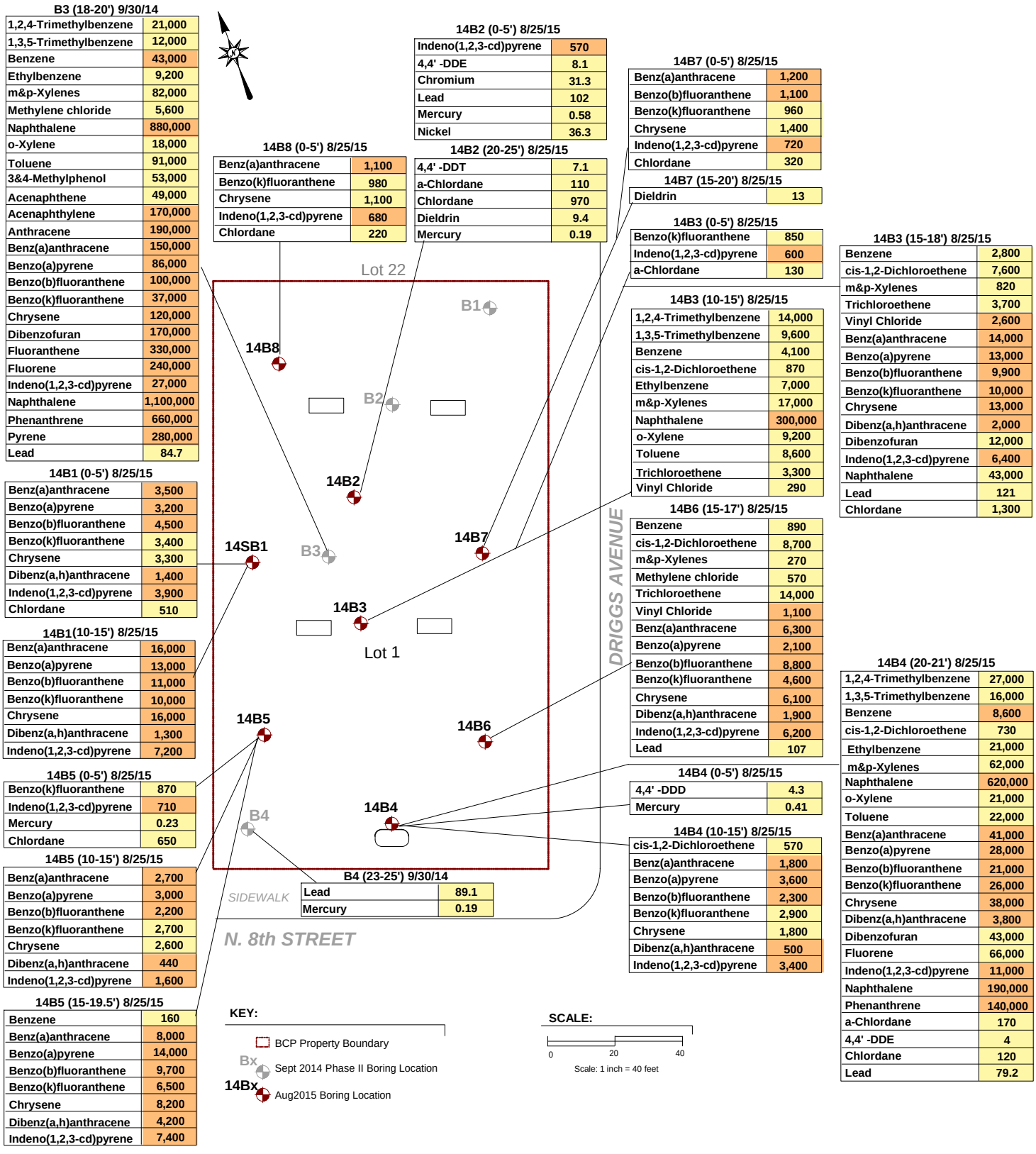


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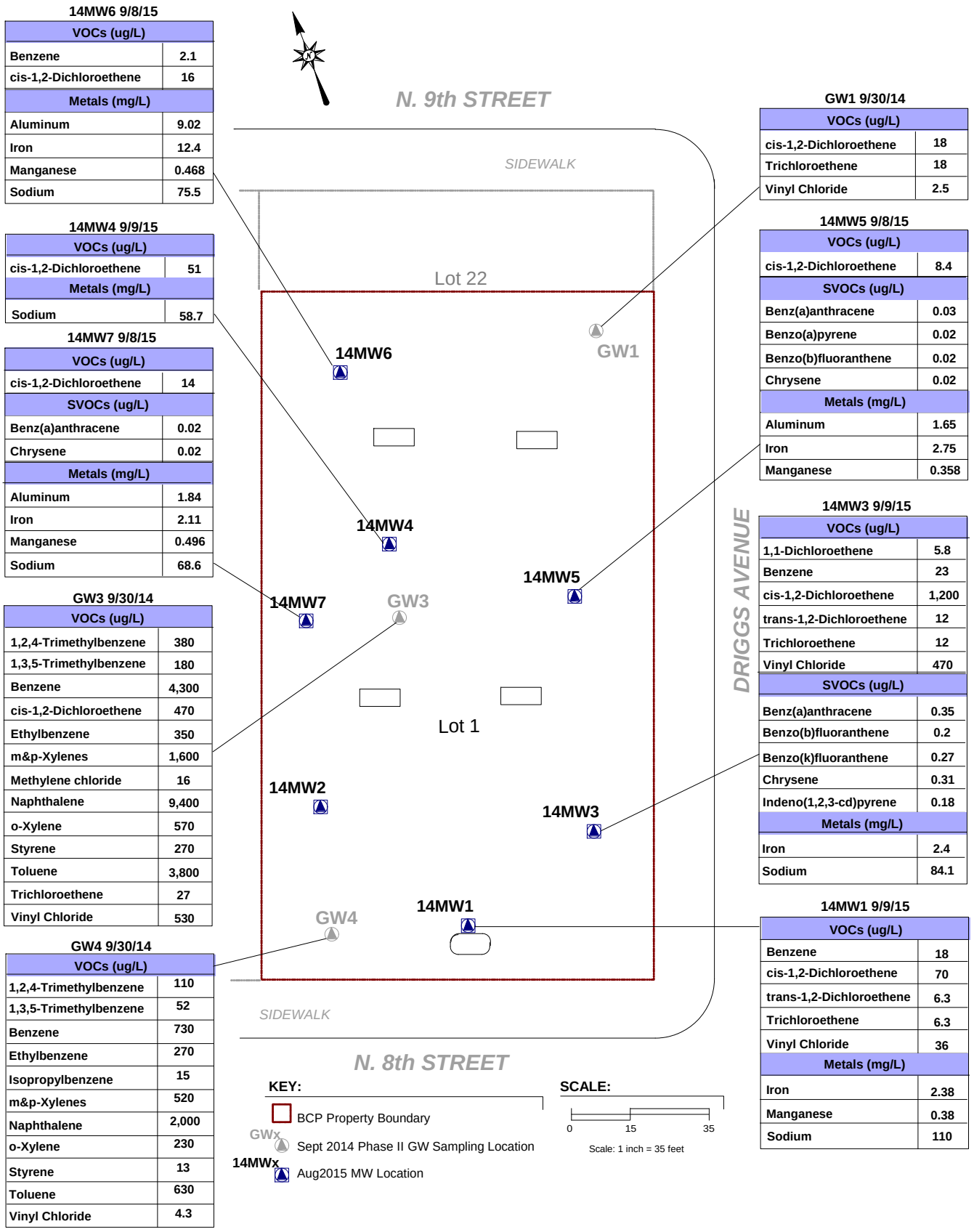
Figure No. 7

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: SOIL EXCEEDENCES




**14MW6 9/8/15**

| VOCs (ug/L) | |
|---|---|
| Benzene | 2.1 |
| cis-1,2-Dichloroethene | 16 |
| **Metals (mg/L)** | |
| Aluminum | 9.02 |
| Iron | 12.4 |
| Manganese | 0.468 |
| Sodium | 75.5 |

**14MW4 9/9/15**

| VOCs (ug/L) | |
|---|---|
| cis-1,2-Dichloroethene | 51 |
| **Metals (mg/L)** | |
| Sodium | 58.7 |

**14MW7 9/8/15**

| VOCs (ug/L) | |
|---|---|
| cis-1,2-Dichloroethene | 14 |
| **SVOCs (ug/L)** | |
| Benz(a)anthracene | 0.02 |
| Chrysene | 0.02 |
| **Metals (mg/L)** | |
| Aluminum | 1.84 |
| Iron | 2.11 |
| Manganese | 0.496 |
| Sodium | 68.6 |

**GW3 9/30/14**

| VOCs (ug/L) | |
|---|---|
| 1,2,4-Trimethylbenzene | 380 |
| 1,3,5-Trimethylbenzene | 180 |
| Benzene | 4,300 |
| cis-1,2-Dichloroethene | 470 |
| Ethylbenzene | 350 |
| m&p-Xylenes | 1,600 |
| Methylene chloride | 16 |
| Naphthalene | 9,400 |
| o-Xylene | 570 |
| Styrene | 270 |
| Toluene | 3,800 |
| Trichloroethene | 27 |
| Vinyl Chloride | 530 |

**GW4 9/30/14**

| VOCs (ug/L) | |
|---|---|
| 1,2,4-Trimethylbenzene | 110 |
| 1,3,5-Trimethylbenzene | 52 |
| Benzene | 730 |
| Ethylbenzene | 270 |
| Isopropylbenzene | 15 |
| m&p-Xylenes | 520 |
| Naphthalene | 2,000 |
| o-Xylene | 230 |
| Styrene | 13 |
| Toluene | 630 |
| Vinyl Chloride | 4.3 |

**GW1 9/30/14**

| VOCs (ug/L) | |
|---|---|
| cis-1,2-Dichloroethene | 18 |
| Trichloroethene | 18 |
| Vinyl Chloride | 2.5 |

**14MW5 9/8/15**

| VOCs (ug/L) | |
|---|---|
| cis-1,2-Dichloroethene | 8.4 |
| **SVOCs (ug/L)** | |
| Benz(a)anthracene | 0.03 |
| Benzo(a)pyrene | 0.02 |
| Benzo(b)fluoranthene | 0.02 |
| Chrysene | 0.02 |
| **Metals (mg/L)** | |
| Aluminum | 1.65 |
| Iron | 2.75 |
| Manganese | 0.358 |

**14MW3 9/9/15**

| VOCs (ug/L) | |
|---|---|
| 1,1-Dichloroethene | 5.8 |
| Benzene | 23 |
| cis-1,2-Dichloroethene | 1,200 |
| trans-1,2-Dichloroethene | 12 |
| Trichloroethene | 12 |
| Vinyl Chloride | 470 |
| **SVOCs (ug/L)** | |
| Benz(a)anthracene | 0.35 |
| Benzo(b)fluoranthene | 0.2 |
| Benzo(k)fluoranthene | 0.27 |
| Chrysene | 0.31 |
| Indeno(1,2,3-cd)pyrene | 0.18 |
| **Metals (mg/L)** | |
| Iron | 2.4 |
| Sodium | 84.1 |

**14MW1 9/9/15**

| VOCs (ug/L) | |
|---|---|
| Benzene | 18 |
| cis-1,2-Dichloroethene | 70 |
| trans-1,2-Dichloroethene | 6.3 |
| Trichloroethene | 6.3 |
| Vinyl Chloride | 36 |
| **Metals (mg/L)** | |
| Iron | 2.38 |
| Manganese | 0.38 |
| Sodium | 110 |

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Figure No. 8

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: GROUNDWATER EXCEEDENCES

### 14SG4

| | |
|---|---|
| 1,1,1-Trichloroethane | 1.07 |
| 1,1-Dichloroethane | 58.2 |
| 1,1-Dichloroethene | 44.4 |
| 1,2,4-Trimethylbenzene | 1.46 |
| 1,3-Dichlorobenzene | 9.01 |
| 2-Hexanone | 107 |
| 4-Methyl-2-pentanone | 6.1 |
| Acetone | 1,370 |
| Benzene | 79.5 |
| Chloroform | 2.53 |
| cis-1,2-Dichloroethene | 3,140 |
| Cyclohexane | 8.6 |
| Dichlorodifluromethane | 140 |
| Ethanol | 104 |
| Ethylbenzene | 2.84 |
| Heptane | 7.09 |
| Hexane | 12.2 |
| Isopropylalcohol | 35.9 |
| Xylene (m&p) | 10.1 |
| Methyl Ethyl Ketone | 304 |
| Methylene Chloride | 1.82 |
| Xylene (o) | 5.21 |
| Propylene | 390 |
| Tetrachloroethene | 7.25 |
| Tetrahydrofuran | 2.63 |
| Toluene | 5.27 |
| trans-1,2-Dichloroethene | 64.6 |
| Trichloroethene | 1,330 |
| Trichlorofluoromethane | 14.4 |
| Vinyl Chloride | 3,240 |

### 14SG6

| | |
|---|---|
| 1,1,1-Trichloroethane | 2.74 |
| 1,2,4-Trimethylbenzene | 2.23 |
| 1,3-Dichlorobenzene | 7.93 |
| 2-Hexanone | 80.2 |
| 4-Methyl-2-pentanone | 13.8 |
| Acetone | 1,650 |
| Benzene | 6.61 |
| Carbon Disulfide | 1.1 |
| Carbon Tetrachloride | 0.26 |
| Chloroform | 8.44 |
| cis-1,2-Dichloroethene | 5.27 |
| Dichlorodifluromethane | 25.8 |
| Ethanol | 178 |
| Ethylbenzene | 5.82 |
| Heptane | 7.04 |
| Hexane | 6.52 |
| Isopropylalcohol | 36.8 |
| Xylene (m&p) | 21.2 |
| Methyl Ethyl Ketone | 469 |
| Xylene (o) | 8.46 |
| Propylene | 79.8 |
| Tetrachloroethene | 4.74 |
| Toluene | 7.76 |
| Trichloroethene | 763 |
| Trichlorofluoromethane | 183 |

### 14SG7

| | |
|---|---|
| 1,1,1-Trichloroethane | 2.21 |
| 1,1-Dichloroethane | 25.2 |
| 1,1-Dichloroethene | 586 |
| 1,2,4-Trimethylbenzene | 1.89 |
| 1,3-Dichlorobenzene | 5.57 |
| 2-Hexanone | 67.5 |
| 4-Methyl-2-pentanone | 9.62 |
| Acetone | 1,510 |
| Benzene | 390 |
| Chloroethane | 33.2 |
| Chloroform | 1.73 |
| Chloromethane | 1.4 |
| cis-1,2-Dichloroethene | 4,200 |
| Cyclohexane | 172 |
| Dichlorodifluromethane | 47 |
| Ethanol | 84 |
| Ethylbenzene | 4.34 |
| Hexane | 262 |
| Isopropylalcohol | 20.9 |
| Xylene (m&p) | 11.5 |
| Methyl Ethyl Ketone | 162 |
| Methylene Chloride | 20 |
| Xylene (o) | 6.94 |
| Propylene | 5,610 |
| Tetrachloroethene | 23.4 |
| Toluene | 11.3 |
| trans-1,2-Dichloroethene | 128 |
| Trichloroethene | 6,120 |
| Trichlorofluoromethane | 14.1 |
| Vinyl Chloride | 10,800 |

### 14SG5

| | |
|---|---|
| 1,1,1-Trichloroethane | 2.02 |
| 1,1-Dichloroethane | 54.6 |
| 1,1-Dichloroethene | 1,100 |
| 1,2,4-Trimethylbenzene | 1.72 |
| 1,3-Dichlorobenzene | 5.62 |
| Acetone | 1,410 |
| Benzene | 1,240 |
| Chloroethane | 245 |
| cis-1,2-Dichloroethene | 44,400 |
| Cyclohexane | 396 |
| Dichlorodifluromethane | 90.9 |
| Ethanol | 97.9 |
| Ethyl Acetate | 2.36 |
| Ethylbenzene | 4.86 |
| Heptane | 9.71 |
| Hexane | 722 |
| Isopropylalcohol | 19.6 |
| Isopropylbenzene | 2.36 |
| Xylene (m&p) | 16.4 |
| Xylene (o) | 10.2 |
| Propylene | 3,780 |
| Tetrachloroethene | 8.74 |
| Toluene | 30.5 |
| trans-1,2-Dichloroethene | 1,380 |
| Trichloroethene | 5,690 |
| Trichlorofluoromethane | 19.9 |
| Vinyl Chloride | 116,000 |

### 14SG3

| | |
|---|---|
| 1,1,1-Trichloroethane | 7.36 |
| 1,1-Dichloroethane | 2.51 |
| 1,2,4-Trimethylbenzene | 2.52 |
| 1,3-Dichlorobenzene | 16.6 |
| 2-Hexanone | 102 |
| 4-Methyl-2-pentanone | 9.13 |
| Acetone | 1,580 |
| Benzene | 2.26 |
| Carbon Tetrachloride | 0.57 |
| Chloroform | 10.3 |
| cis-1,2-Dichloroethene | 31.7 |
| Dichlorodifluromethane | 152 |
| Ethanol | 169 |
| Ethyl Acetate | 1.82 |
| Ethylbenzene | 5.08 |
| Heptane | 4.26 |
| Hexane | 3.8 |
| Isopropylalcohol | 27 |
| Xylene (m&p) | 19.4 |
| Methyl Ethyl Ketone | 318 |
| Xylene (o) | 8.42 |
| Propylene | 83.8 |
| Tetrachloroethene | 25.6 |
| Tetrahydrofuran | 4.13 |
| Toluene | 6.36 |
| trans-1,2-Dichloroethene | 3.48 |
| Trichloroethene | 1,840 |
| Trichlorofluoromethane | 691 |

### 14SG1

| | |
|---|---|
| 1,1,1-Trichloroethane | 13.8 |
| 1,2,4-Trimethylbenzene | 2.05 |
| 1,3-Dichlorobenzene | 9.31 |
| 2-Hexanone | 113 |
| 4-Methyl-2-pentanone | 10.4 |
| Acetone | 1,550 |
| Benzene | 2.93 |
| Carbon Disulfide | 1.02 |
| Carbon Tetrachloride | 0.33 |
| Chloroform | 84.4 |
| cis-1,2-Dichloroethene | 5.43 |
| Dichlorodifluromethane | 75.1 |
| Ethanol | 138 |
| Ethyl Acetate | 2.3 |
| Ethylbenzene | 4.69 |
| Heptane | 5.98 |
| Hexane | 4.97 |
| Isopropylalcohol | 28.7 |
| Xylene (m&p) | 17 |
| Methyl Ethyl Ketone | 327 |
| Methylene Chloride | 1.19 |
| Xylene (o) | 7.51 |
| Propylene | 71.9 |
| Tetrachloroethene | 30 |
| Toluene | 7.34 |
| Trichloroethene | 2,910 |
| Trichlorofluoromethane | 249 |
| Vinyl Chloride | 0.82 |

### 14SG2

| | |
|---|---|
| 1,1,1-Trichloroethane | 86.2 |
| 1,1-Dichloroethane | 4.77 |
| 1,2,4-Trimethylbenzene | 2.67 |
| 1,3-Dichlorobenzene | 11 |
| 2-Hexanone | 148 |
| 4-Methyl-2-pentanone | 10.4 |
| Acetone | 2,920 |
| Benzene | 6.93 |
| Carbon Disulfide | 1.75 |
| Carbon Tetrachloride | 0.35 |
| Chloroform | 165 |
| Chloromethane | 2.33 |
| cis-1,2-Dichloroethene | 452 |
| Dichlorodifluromethane | 32.8 |
| Ethanol | 215 |
| Ethyl Acetate | 7.02 |
| Ethylbenzene | 5.12 |
| Heptane | 13.9 |
| Hexane | 11.9 |
| Isopropylalcohol | 75.4 |
| Xylene (m&p) | 18.3 |
| Methyl Ethyl Ketone | 796 |
| Methylene Chloride | 4.3 |
| Xylene (o) | 7.68 |
| Propylene | 104 |
| Styrene | 1.08 |
| Tetrachloroethene | 113 |
| Tetrahydrofuran | 1.69 |
| Toluene | 17.6 |
| trans-1,2-Dichloroethene | 13.7 |
| Trichloroethene | 16,900 |
| Trichlorofluoromethane | 62.9 |

**KEY:**

BCP Property Boundary

14SGx Soil Gas Location

*All Results in (ug/m$^3$)*

**SCALE:**

0 15 30

Scale: 1 inch = 30 feet

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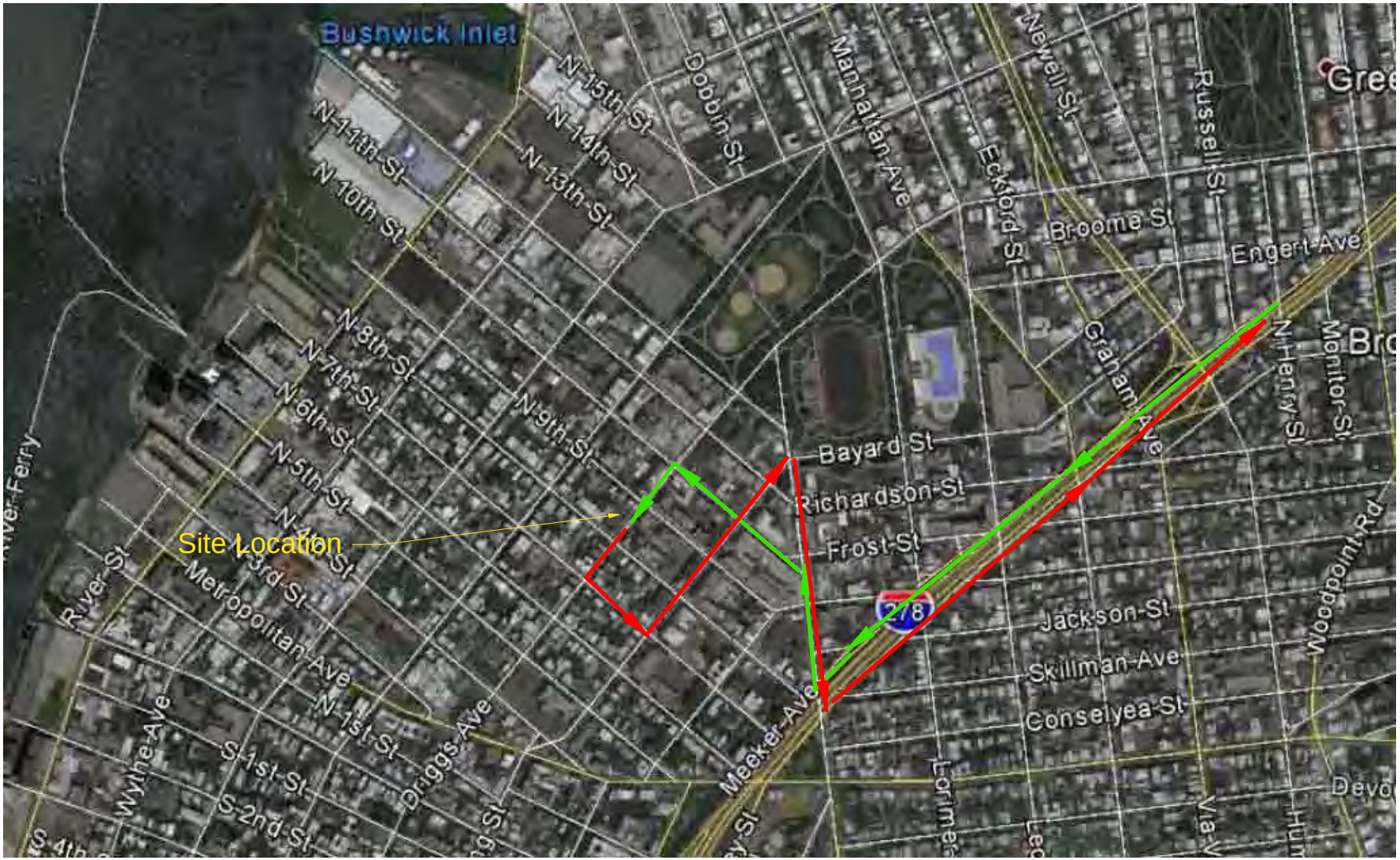
Figure No. 9

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: SOIL GAS DETECTIONS




Inbound Truck Route

Outbound Truck Route

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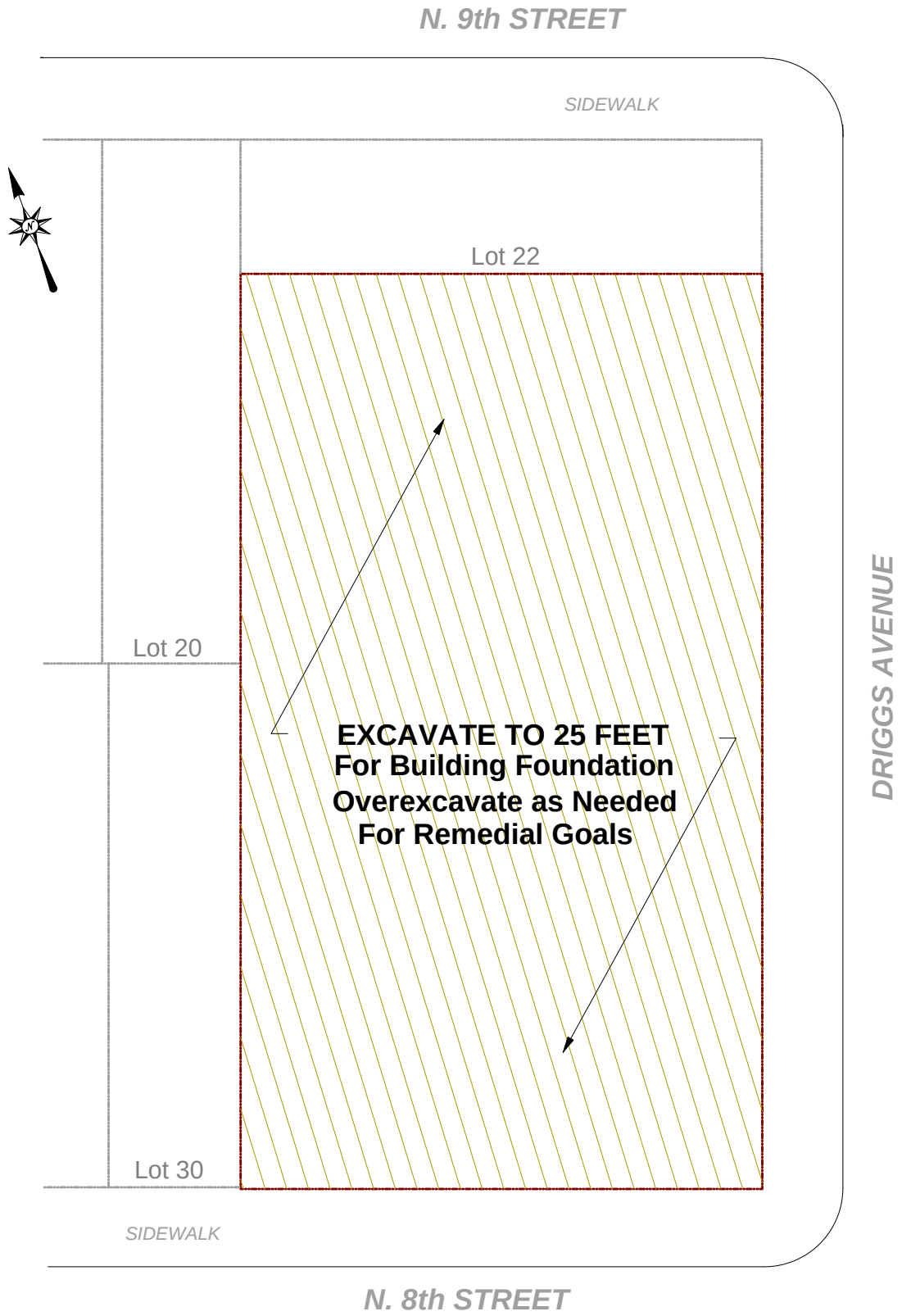
Figure No. 10

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: TRUCK ROUTES




**KEY:**

BCP Property Boundary

Note: Remedial Goals require excavation to 15ft site-wide w/ excavation to 25 ft or more in petroleum hotspot areas.

**SCALE:**

0 15 30

Scale: 1 inch = 30 feet

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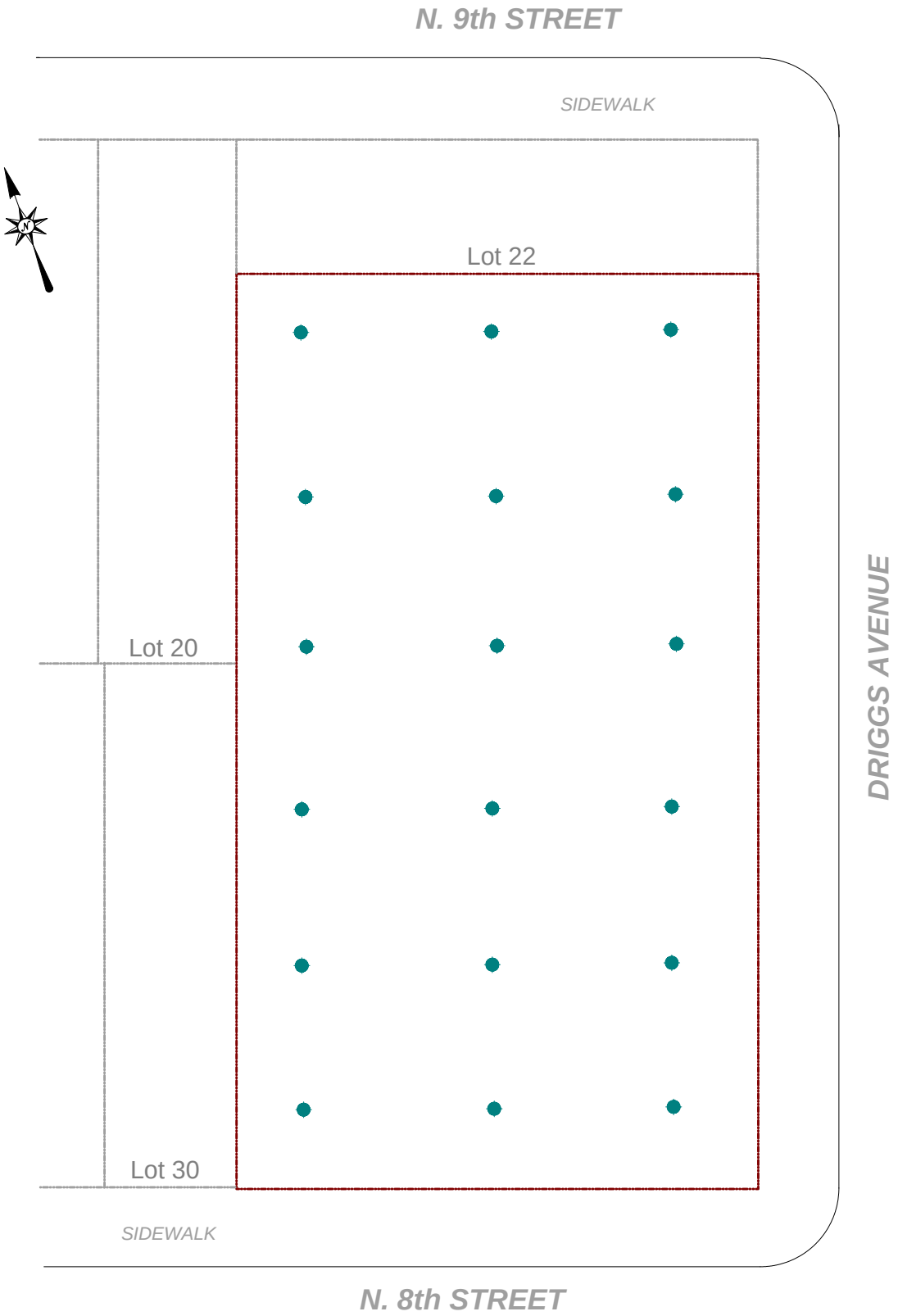
Figure No. 11

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: EXCAVATION PLAN




**KEY:**

- BCP Property Boundary
- Endpoint Sampling Location

**SCALE:**

0 15 30

Scale: 1 inch = 30 feet

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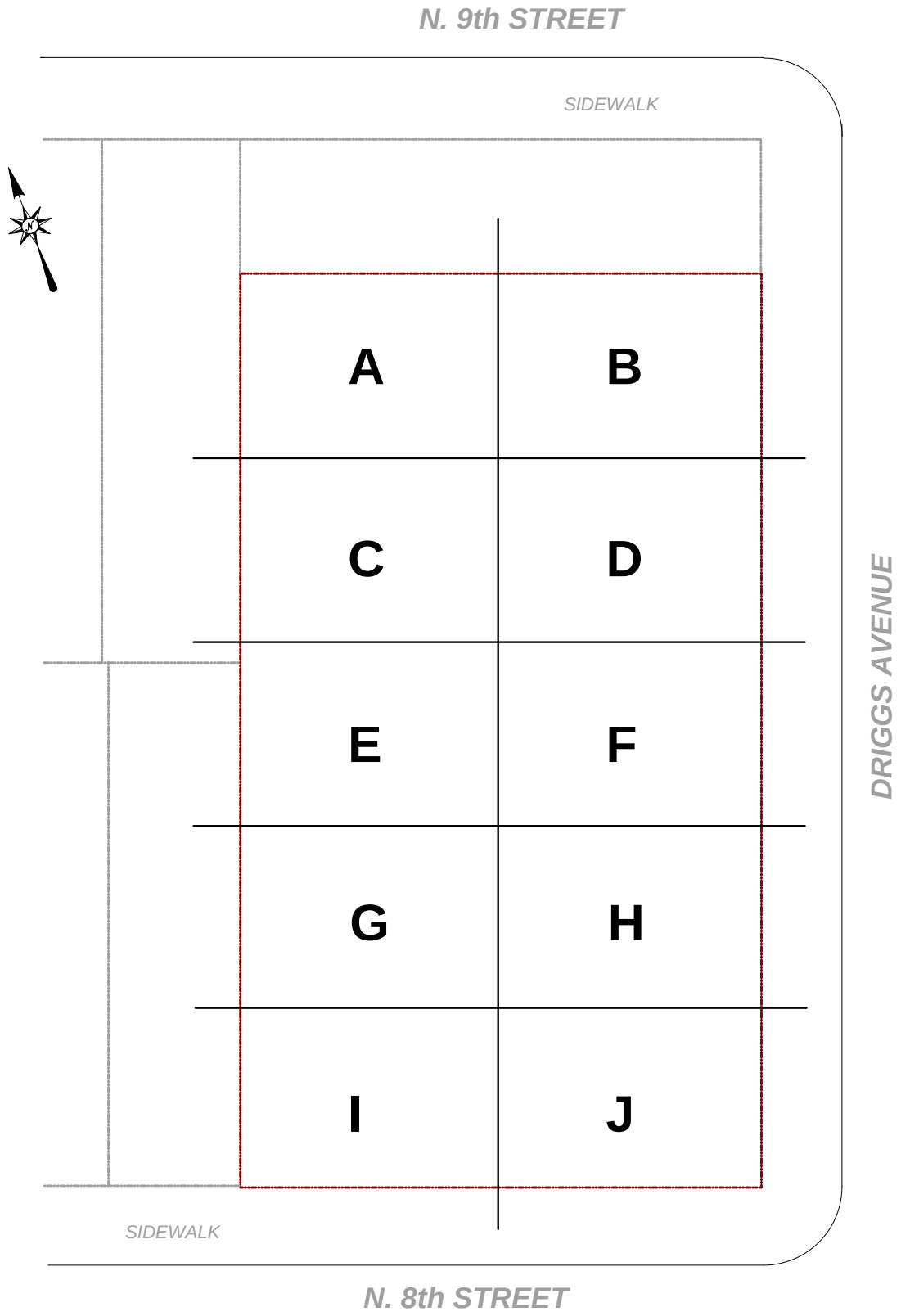
Figure No. 12

Site Name: FORMER STERLING TRANSFORMER CORP.
Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY
Drawing Title: ENDPOINT SAMPLING PLAN




**KEY:**

- BCP Property Boundary
- Endpoint Sampling Location

**SCALE:**

0 15 30

Scale: 1 inch = 30 feet

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Figure No. 13

Site Name: FORMER STERLING TRANSFORMER CORP.

Site Address: 510 DRIGGS AVENUE, BROOKLYN, NY

Drawing Title: GRID MAP

# ***ATTACHMENT A***
# *Metes and Bounds Description of Property*

# METES AND BOUNDS DESCRIPTION

*BEGINNING at the comer formed by the intersection of the northeasterly side of North 8th Street with the northwesterly side of Driggs Avenue (formerly 5th Street);*

*THENCE northwesterly along the northeasterly side of North 8th Street, 100 feet;*

*THENCE northeasterly parallel with said Driggs Avenue (formerly 5th Street), 175 feet;*

*THENCE southeasterly parallel with said North 8th Street, 100 feet to the northwesterly side of Driggs Avenue (formerly 5th Street);*

*THENCE southwesterly along the northwesterly side of Driggs Avenue (formerly 5th Street), 175 feet to the point or place of BEGINNING.*

# ***ATTACHMENT B***
# *Health and Safety Plan*

# FORMER STERLING TRANSFORMER CORP.

**510 DRIGGS AVENUE**
**BROOKLYN, NEW YORK**
**Block 2312 Lot 23**
**SITE No. C224203**

---

# CONSTRUCTION HEALTH AND SAFETY PLAN

FEBRUARY 2016

*Prepared for:*
187 North 8 Street Owner LLC
266 Broadway Suite 501
Brooklyn, NY 11211

*Prepared by:*

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 Middle Country Road
Ridge, NY 11961

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# CONSTRUCTION HEALTH AND SAFETY PLAN
# Former Universal Transformer Site
# 510 Driggs Avenue, Brooklyn, New York

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**510 Driggs Avenue, Brooklyn, New York**



## *FIGURES*



## *APPENDICES*

# STATEMENT OF COMMITMENT

This Construction Health and Safety Plan (CHASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Actions at 510 Driggs Avenue, Brooklyn, NY

This CHASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This CHASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees.

# 1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for the planned Remedial Action at 510 Driggs Avenue, Brooklyn, New York to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during remedial activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards related to excavation, loading and other soil disturbance activities and is based on the best information available. The CHASP may be revised by EBC at the request of the owner and/or a regulatory agency upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's project manager, site safety officer and/or the EBC health and safety consultant.

Work performed under the remedial action will not involve confined space entry since the excavations will be large and sloped back in accordance with NYCDOB shoring requirements and will not have a limited or restricted means for entry or exit.

## 1.1 Training Requirements

Personnel entering the exclusion zone or decontamination zone are required to be certified in health and safety practices for hazardous waste site operations as specified in the Federal OSHA Regulations CFR 1910.120e (revised 3/6/90).

Paragraph (e - 3) of the above referenced regulations requires that all on-site management personnel directly responsible for or who supervise employees engaged in hazardous waste operations, must initially receive 8 hours of supervisor training related to managing hazardous waste work.

Paragraph (e - 8) of the above referenced regulations requires that workers and supervisors receive 8 hours of refresher training annually on the items specified in Paragraph (e-1) and/or (e-3).

Additionally all on-site personnel must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.


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- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

Health and Safety meetings will be conducted on a daily basis and will cover protective clothing and other equipment to be used that day, potential and chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

## 1.2 Medical Monitoring Requirements

Field personnel and visitors entering the exclusion zone or decontamination zone must have completed appropriate medical monitoring required under OSHA 29 CFR 1910.120(f) if respirators or other breathing related PPE is needed. Medical monitoring enables a physician to monitor each employee's health, physical condition, and his fitness to wear respiratory protective equipment and carry out on-site tasks.

## 1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel (EBC employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Appendix A**.

Site conditions may warrant an amendment to the CHASP. Amendments to the CHASP are acknowledged by completing forms included in **Appendix B**.

## 1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Health and Safety Plan are:

| Name | Title | Address | Contact Numbers |
|---|---|---|---|
| Mr. Robert Bennett | EBC – Project Manager | 1808 Middle Country Rd Ridge, NY 11961 | (631) 504-6000 |
| Ms. Chawinie Miller | Health & Safety Manager | 1808 Middle Country Rd Ridge, NY 11961 | (631) 504-6000 |
| Mr. Kevin Waters | Site Safety Officer | 1808 Middle Country Rd Ridge, NY 11961 | (631) 504-6000 |

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this CHASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this CHASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.

3. Designating exclusion, decontamination and support zones on a daily basis.

4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this CHASP.

5. Maintaining the work zone entry/exit log and site entry/exit log.

6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.


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## 2.0 SITE BACKGROUND AND SCOPE OF WORK

The street address for the Site is 510 Driggs Avenue, Brooklyn, NY. The Site is located in the City of New York and Borough of Brooklyn. The Site has approximately 175 ft of street frontage on Driggs Avenue and 100 feet of street frontage on N. 8th Street. Currently the property is an asphalt paved vacant lot surrounded by an 8 foot high chain link fence. The Site was previously used as a warehouse, transformer manufacturer, a chair manufacturer and a garage with underground tanks.

### 2.1 Previous Investigations

*2.1.1 February 2014 – Phase I Environmental Site Assessment Screening (EBC)*
DPV concluded that "Based on the results of the site inspection, records review and interviews, it was determined that there were several RECs identified with regard to the subject site. RECs are those conditions which could adversely affect the environmental integrity of the property."

DPV identified the following RECs:

- The 1942 Sanborn map depicts the presence of a gasoline tank at the south-central portion of the site. No information regarding the current status of this tank and/or soil quality in its vicinity was available for review. As such, there is a potential for spills or release from the tank to have impacted the subsurface.

- The Sanborn maps indicated that portions of the subject property were historically occupied by a garage, chair manufacturer and a transformer manufacturer. As such, there is a potential for historic site operations to have impacted soil, groundwater and/or soil vapor quality beneath the subject property. Further, the subject property was identified as a New York City Department of City Planning (NYCDCP) Environmental "E" declaration site due to its historic use and the presence of the UST.

Based upon its findings, DPV recommended the following:

- A geophysical survey (e.g., magnetometer and/or ground penetrating radar surveys) should be conducted on the southern portion of the property to evaluate the presence of the suspected underground storage tank (UST), as well as the configurations of existing underground utilities in advance of a soil boring program. It is important to note that clearing of all vehicles or other obstructions in the vicinity of the suspected USTs would be necessary to facilitate the geophysical survey and any subsequent sampling.

- If present, any historic USTs should be removed in accordance with New York State Department of Environmental Conservation (NYSDEC) and New York City Fire Department (FDNY) regulations. Any identified geophysical anomalies should be further investigated through the excavation of test pits, with soil samples collected for laboratory analysis as warranted. It is important to note that excavation areas may be necessary to facilitate the geophysical survey and any subsequent sampling.


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- To evaluate potential impacts related to historic usage of the subject property and to satisfy the NYCDCP and New York City Office of Environmental Remediation (NYCOER) requirements related to the site's listing as an "E"-designated property, a subsurface investigation should be performed. At a minimum, the investigation should include the installation of soil borings with the collection of representative soil, groundwater and/or soil vapor samples for laboratory analysis to document subsurface conditions and determine the nature and extent of contamination (if present).

### *2.1.2 March 2014 - Limited Phase II Investigation Data Summary (EBC)*

The field work portion of the Phase II was performed on September 30, 2014 and included the installation of three soil borings and three groundwater samples. Shallow soil samples were analyzed for RCRA metals, TCLP lead and PCBs. Deep samples, from the water table interface, could only be obtained from two borings and were analyzed for VOCs by USEPA 8260 and SVOCs by USEPA 8270. Groundwater samples were analyzed for VOCs only. Laboratory services were provided by Phoenix Environmental Laboratories of Manchester, CT 06040, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11301).

The depth to groundwater at the site is approximately 12 feet below grade. Soil at the site is described as historic fill materials to a depth of approximately 15 feet below the surface followed by native brown fine sand with silt and some clay.

Laboratory results identified petroleum VOCs including benzene above Restricted Residential Soil Cleanup Objectives (SCOs) and trimethylbenzene, ethylbenzene, toluene and xylene above unrestricted and groundwater protection SCOs. The concentration of total VOCs (when including naphthalene) were reported as high as 1,173,800 ug/kg. SVOCs including chysene, fluoranthene, fluorine, ideno(1,2,3-cd)pyrene, naphthalene, phrenanthene and pyrene were all reported above Restricted Residential SCOs. Total SVOCs were reported at 4,358,000 ug/kg at the B3 location.

VOCs were reported in all three groundwater samples above water quality standards and included both petroleum and chlorinated solvent compounds. Total petroleum VOCs were reported to 20,850 ug/L with chlorinated VOCs to 1,027 ug/L.

## 2.2 Redevelopment Plans

The redevelopment project consists of the construction of a new 6 story mixed-use commercial-residential building which will cover the entire Site. Plans include a full height basement level requiring excavation of the entire Site to a depth of 25 ft below grade. With groundwater present at 12 feet below grade, extensive dewatering will be required during construction of the building's foundation.

The project includes 51,000 sf of of commercial / retail space and 18,000 sf of residential apartments. The basement level will be used for parking, meter rooms, residential storage space and bicycle racks.

## 2.3 Description of Remedial Action

Site activities included within the Remedial Action that are included within the scope of this


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HASP include the following:

1. Excavation of soil/fill exceeding Track 1 unrestricted use SCOs as listed in **Table 1** to depths as great as 15 feet below grade site-wide and to 25 ft within the petroleum / CVOC impacted areas;
2. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
3. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 1 SCOs;
4. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
5. Dewatering and treatment of VOC impacted groundwater before discharging to the NYC sewer system under a NYCDEP sewer discharge permit.
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in **Table 1**, (2) all Federal, State and local rules and regulations for handling and transport of material.

## 3.0 HAZARD ASSESSMENT

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

### 3.1 Physical Hazards

#### *3.1.1 Tripping Hazards*

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

#### *3.1.2 Climbing Hazards*

During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform with any applicable NIOSH and OSHA requirements or climbing activities.

#### *3.1.3 Cuts and Lacerations*

Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

#### *3.1.4 Lifting Hazards*

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field


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crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

### *3.1.5 Utility Hazards*

Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

### *3.1.6 Traffic Hazards*

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

## 3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

### *3.2.1 Heat Stress*

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

1. Prevention
    a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
    b. Work in Pairs. Individuals should avoid undertaking any activity alone.
    c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
    d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment
    a Heat Rash (or prickly heat):
        Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.
        Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.
        Treatment: Remove source or irritation and cool skin with water or wet cloths.

    b. Heat Cramps (or heat prostration)
        Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.


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Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.

Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.

c. Heat Stroke

Cause: Same as heat exhaustion. This is also an extremely serious condition.

Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.

Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

### *3.2.2 Cold Exposure*

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as:

- Shivering;
- reduced blood pressure;
- reduced coordination;
- drowsiness;
- impaired judgment;
- fatigue;
- pupils dilated but reactive to light; and,
- numbing of the toes and fingers.

## 3.3 Chemical Hazards

"Urban fill" materials, present throughout the New York City area typically contain elevated levels of semi-volatile organic compounds and metals. These "contaminants" are not related to a chemical release occurring on the site, but are inherent in the reworked fill material in the area which contains ash and bits of tar and asphalt. Considering the previous sampling results and the past and present use of the site, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyl's (PCBs), and heavy metals such as arsenic, chromium, lead and mercury.


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Based on the findings of the Remedial Investigation and the inherent properties of urban fill, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and heavy metals.

Volatile organic compounds reported to be present in soil, soil gas and/or groundwater include the following:

| | | | |
|---|---|---|---|
| 1,2,4-trimethylbenzene | 1,3,5-trimethylbenzene | ethylbenzene | isopropylbenzene |
| napthalene | n-propylbenzene | xylenes | benzene |
| Cis-1,2-dichloroethene | trichloroethene | Vinyl chloride | |

Semi-Volatile organic compounds reported to be present in soil and / or fill materials include the following:

| | | | |
|---|---|---|---|
| Benzo(a)anthracene | Benzo(b)fluoranthene | Benzo(a)pyrene | Chrysene |
| Benzo(k)fluoranthene | Dibenzo(a,h)anthracene | Ideno(1,2,3-cd) pyrene | Napthalene |
| Dibenzofuran | Fluorene | Phenanthrene | |

Pesticides reported to be present in soil and / or fill materials include the following:

| | | | | | |
|---|---|---|---|---|---|
| 4'-4'-DDD | 4'-4'-DDE | 4'-4'-DDT | Chlordane | a-Chlordane | Dieldrin |

Metals reported to be present in fill materials include the following:

| | | | |
|---|---|---|---|
| Chromium | Lead | Mercury | Nickel |

The primary routes of exposure to these contaminants are inhalation, ingestion and absorption. **Appendix C** includes information sheets for suspected chemicals that may be encountered at the site.

### *3.3.1 Respirable Dust*

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 µg/m3 over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

### *3.3.2 Dust Control and Monitoring During Earthwork*

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently over 150


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$\mu g/m^3$ over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

### *3.3.3 Organic Vapors*

Elevated levels of chlorinated VOCs were detected in soil, soil gas and groundwater samples collected during previous investigations at the site. Therefore, excavation activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.



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## 4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

### 4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work uniform, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

### 4.2 Level C

Level C PPE shall be donned when the concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), but are less than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.


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- chemical resistant coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves;
- disposable outer gloves;
- hard hat; and,
- ankles/wrists taped.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

## 4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of drilling locations, active venting, etc.) will be implemented before requiring the use of respiratory protection.


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## 5.0 AIR MONITORING AND ACTION LEVELS

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

### 5.1 Air Monitoring Requirements

If excavation work is performed, air will be monitored for VOCs with a portable ION Science 3000EX photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

### 5.2 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

1 The SSO will be consulted immediately
2 All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
3 Monitoring will be continued until intrusive work resumes.

### 5.3 Action Levels During Excavation Activities

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

| Organic Vapors (PID) | LEL % | Responses |
|---|---|---|
| 0-1 ppm above background | 0% | • Continue excavating<br>• Level D protection<br>• Continue monitoring every 10 minutes |


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| | | |
|---|---|---|
| 1-5 ppm Above Background, Sustained Reading | 1-10% | • Continue excavating<br>• Go to Level C protection or employ engineering controls<br>• Continue monitoring every 10 minutes |
| 5-25 ppm Above Background, Sustained Reading | 10-20% | • Discontinue excavating, unless PID is only action level exceeded.<br>• Level C protection or employ engineering controls<br>• Continue monitoring for organic vapors 200 ft downwind<br>• Continuous monitoring for LEL at excavation pit |
| >25 ppm Above Background, Sustained Reading | >20% | • Discontinue excavating<br>• Withdraw from area, shut off all engine ignition sources.<br>• Allow pit to vent<br>• Continuous monitoring for organic vapors 200 ft downwind. |

Notes: Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less then 5 ppm (see Community Air Monitoring Plan).


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# 6.0 SITE CONTROL

## 6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book. **It is expected that the entire fenced in area of the Site will be the exclusion zone, with the decontamination zone the Site entrance.** The support zone will be the office trailer.

Tasks requiring OSHA 40-hour Hazardous Waste Operations and Emergency Response Operations training are carried out in the exclusion zone. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

## 6.2 General Site Work

An excavation contractor with appropriate experience, personnel and training (40 hr OSHA Hazardous Waste Operations and Emergency Response Operations - HAZWOPER) is required to perform the removal of the CVOC and naphthalene impacted soil. After this material is removed the contractor will remove historic fill and uncontaminated soil. The excavation contractor’s on-site personnel engaged in historic fill and native soil removal will have a minimum of 24 hour HAZWOPER training.


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## 7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

### 7.1 Emergency Equipment On-site

| | |
|---|---|
| Private telephones: | Site personnel. |
| Two-way radios: | Site personnel where necessary. |
| Emergency Alarms: | On-site vehicle horns*. |
| First aid kits: | On-site, in vehicles or office. |
| Fire extinguisher: | On-site, in office or on equipment. |

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

### 7.2 Emergency Telephone Numbers

| | |
|---|---|
| General Emergencies | 911 |
| New York City Police | 911 |
| Woodhull Medical Center | 1-718-963-8000 |
| NYSDEC Spills Division | 1-800-457-7362 |
| NYSDEC Division of Env. Remediation | 1-718-482-4900 |
| NYCDEP | 1-718-699-9811 |
| NYC Department of Health | 1-212-788-4711 |
| NYC Fire Department | 911 |
| National Response Center | 1-800-424-8802 |
| Poison Control | 1-212-340-4494 |
| Site Safety Officer | 1-631-504-6000 |
| Alternate Site Safety Officer | 1-631-504-6000 |

### 7.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager's on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;

- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;

- Determine the cause of incidents and make recommendations to prevent recurrence; and,

- Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

- Project Manager — Mr. Robert Bennett (631) 504-6000
- Construction Superintendent — Mr. Zev Steinmetz (718) 807-8315
- Site Safety Officer — Mr. Kevin Waters (631) 504-6000

### 7.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (**Appendix D**).and information on the chemical(s) to which they may have been exposed (**Appendix C**).

### 7.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use fire fighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

### 7.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these

instructions:

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.
- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

### 7.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

### 7.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.
- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

# *APPENDIX A*

# *SITE SAFETY ACKNOWLEDGEMENT FORM*

## DAILY BREIFING SIGN-IN SHEET

Date:_____ Person Conducting Briefing:_____

Project Name and Location:_____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc…):

_____

_____

_____

_____

2. OTHER ISSUES (HASP changes, attendee comments, etc…):

_____

_____

_____

3. ATTENDEES (Print Name):

| | |
|---|---|
| 1. | 11. |
| 2. | 12. |
| 3. | 13. |
| 4. | 14. |
| 5. | 15. |
| 6. | 16. |
| 7. | 17. |
| 8. | 18. |
| 9. | 19. |
| 10. | 20. |

# *APPENDIX B*

# *SITE SAFETY PLAN AMENDMENTS*

## SITE SAFETY PLAN AMENDMENT FORM

**Site Safety Plan Amendment #:** _____

**Site Name:** _____

**Reason for Amendment:** _____

_____

_____

_____

**Alternative Procedures:** _____

_____

_____

_____

**Required Changes in PPE:** _____

_____

_____

_____

_____ _____

**Project Superintendent (signature)** **Date**

_____ _____

**Health and Safety Consultant (signature)** **Date**

_____ _____

**Site Safety Officer (signature)** **Date**

# *APPENDIX C*

# *CHEMICAL HAZARDS*

## CHEMICAL HAZARDS

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.

# International Chemical Safety Cards

## 1,2,4-TRIMETHYLBENZENE

**ICSC: 1433**

Pseudocumene

$C_9H_{12}$

Molecular mass: 120,2

ICSC # 1433
CAS # 95-63-6
RTECS # DC3325000
UN # 1993
EC # 601-043-00-3
March 06, 2002 Peer reviewed


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Flammable. | NO open flames, NO sparks, and NO smoking. | Alcohol-resistant foam, dry powder, carbon dioxide. |
| **EXPLOSION** | Above 44°C explosive vapour/air mixtures may be formed. | Above 44°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding). | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | PREVENT GENERATION OF MISTS! | |
| **•INHALATION** | Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | Redness. Dry skin. | Protective gloves. | Rinse skin with plenty of water or shower. |
| **•EYES** | Redness. Pain. | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | (See Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours. | Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room. | Xn symbol<br>N symbol<br>R: 10-20-36/37/38-51/53<br>S: 2-26-61<br>UN Hazard Class: 3<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1433**

# International Chemical Safety Cards

## 1,2,4-TRIMETHYLBENZENE

**ICSC: 1433**

| | | |
|---|---|---|
| **IMPORTANT DATA** | **PHYSICAL STATE; APPEARANCE:**<br>COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.<br><br>**PHYSICAL DANGERS:**<br><br>**CHEMICAL DANGERS:**<br>The substance decomposes on burning producing toxic and irritating fumes Reacts violently with strong oxidants causing fire and explosion hazard.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV: (as mixed isomers) 25 ppm as TWA (ACGIH 2004).<br>MAK: (as mixed isomers) 20 ppm 100 mg/m³<br>Peak limitation category: II(2) Pregnancy risk group: C (DFG 2004).<br>OSHA PEL†: none<br>NIOSH REL: TWA 25 ppm (125 mg/m$^3$)<br>NIOSH IDLH: N.D. See: IDLH INDEX | **ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation.<br><br>**INHALATION RISK:**<br>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure , resulting in chronic bronchitis The substance may have effects on the central nervous system blood See Notes. |
| **PHYSICAL PROPERTIES** | Boiling point: 169°C<br>Melting point: -44°C<br>Relative density (water = 1): 0.88<br>Solubility in water:<br>very poor<br>Relative vapour density (air = 1): 4.1 | Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01<br>Flash point: 44°C c.c.<br>Auto-ignition temperature: 500°C<br>Explosive limits, vol% in air: 0.9-6.4<br>Octanol/water partition coefficient as log Pow: 3.8 |
| **ENVIRONMENTAL DATA** | The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.  | |

**N O T E S**

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. See also ICSC 1155 1,3,5-Trimethylbenzene (Mesitylene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethyl benzene (mixed isomers). 1,3,5-Trimethylbenzene (Mesitylene) is classified as a marine pollutant.

Transport Emergency Card: TEC (R)-30GF1-III
NFPA Code: H0; F2; R0;

**ADDITIONAL INFORMATION**

# International Chemical Safety Cards

## 1,3,5-TRIMETHYLBENZENE

**ICSC: 1155**

Mesitylene
$C_9H_{12}$
Molecular mass: 120.2

ICSC # 1155
CAS # 108-67-8
RTECS # OX6825000
UN # 2325
EC # 601-025-00-5
March 06, 2002 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Flammable. | NO open flames, NO sparks, and NO smoking. | Alcohol-resistant foam, dry powder, carbon dioxide. |
| **EXPLOSION** | Above 50°C explosive vapour/air mixtures may be formed. | Above 50°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding). | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | PREVENT GENERATION OF MISTS! | |
| •**INHALATION** | Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| •**SKIN** | Redness. Dry skin. | Protective gloves. | Remove contaminated clothes. Rinse skin with plenty of water or shower. |
| •**EYES** | Redness. Pain. | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| •**INGESTION** | (See Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.) | Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room. | Marine pollutant.<br>Xi symbol<br>N symbol<br>R: 10-37-51/53<br>S: 2-61<br>UN Hazard Class: 3<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## 1,3,5-TRIMETHYLBENZENE

**ICSC: 1155**

| | |
|---|---|
| **IMPORTANT DATA** | **PHYSICAL STATE; APPEARANCE:**<br>COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.<br><br>**PHYSICAL DANGERS:**<br><br>**CHEMICAL DANGERS:**<br>The substance decomposes on burning producing toxic and irritating fumes. Reacts violently with strong oxidants causing fire and explosion hazard.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV (as mixed isomers): 25 ppm; (ACGIH 2001).<br>MAK (all isomers): 20 ppm; 100 mg/m$^3$; class II 1 © (2001)<br>OSHA PEL†: none<br>NIOSH REL: TWA 25 ppm (125 mg/m$^3$)<br>NIOSH IDLH: N.D. See: IDLH INDEX<br><br>**ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation.<br><br>**INHALATION RISK:**<br>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure, resulting in chronic bronchitis. The substance may have effects on the central nervous system blood See Notes. |
| **PHYSICAL PROPERTIES** | Boiling point: 165°C<br>Melting point: -45°C<br>Relative density (water = 1): 0.86<br>Solubility in water:<br>very poor<br>Vapour pressure, kPa at 20°C: 0.25<br>Relative vapour density (air = 1): 4.1<br>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01<br>Flash point: 50°C (c.c.)<br>Auto-ignition temperature: 550°C<br>Octanol/water partition coefficient as log Pow: 3.42 |
| **ENVIRONMENTAL DATA** | The substance is harmful to aquatic organisms. Bioaccumulation of this chemical may occur in fish.  |

**NOTES**

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. See ICSC 1433 1,2,4-Trimethylbenzene (Pseudocumene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethyl benzene (mixed isomers).

Transport Emergency Card: TEC (R)-30S2325
NFPA Code: H0; F2; R0

**ADDITIONAL INFORMATION**

# International Chemical Safety Cards

## BENZENE

**ICSC: 0015**

Cyclohexatriene
Benzol
$C_6H_6$
Molecular mass: 78.1

ICSC # 0015
CAS # 71-43-2
RTECS # CY1400000
UN # 1114
EC # 601-020-00-8
May 06, 2003 Peer reviewed


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Highly flammable. | NO open flames, NO sparks, and NO smoking. | Powder, AFFF, foam, carbon dioxide. |
| **EXPLOSION** | Vapour/air mixtures are explosive. Risk of fire and explosion: see Chemical Dangers. | Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools. Prevent build-up of electrostatic charges (e.g., by grounding). | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | AVOID ALL CONTACT! | |
| •**INHALATION** | Dizziness. Drowsiness. Headache. Nausea. Shortness of breath. Convulsions. Unconsciousness. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| •**SKIN** | MAY BE ABSORBED! Dry skin. Redness. Pain. (Further see Inhalation). | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention. |
| •**EYES** | Redness. Pain. | Face shield, or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| •**INGESTION** | Abdominal pain. Sore throat. Vomiting. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus. | Fireproof. Separated from food and feedstuffs oxidants halogens | Do not transport with food and feedstuffs.<br>Note: E<br>F symbol<br>T symbol<br>R: 45-46-11-36/38-48/23/24/25-65<br>S: 53-45<br>UN Hazard Class: 3<br>UN Packing Group: II |

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## BENZENE

**ICSC: 0015**

**IMPORTANT DATA**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.

**CHEMICAL DANGERS:**
Reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Attacks plastic and rubber.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.5 ppm as TWA 2.5 ppm as STEL (skin) A1 BEI (ACGIH 2004).
MAK: H
Carcinogen category: 1 Germ cell mutagen group: 3A (DFG 2004).
OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm See Appendix F
NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A
NIOSH IDLH: Ca 500 ppm See: 71432

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation through the skin and by ingestion

**INHALATION RISK:**
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in lowering of consciousness Exposure far above the occupational exposure limit value may result in unconsciousness death

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The liquid defats the skin. The substance may have effects on the bone marrow immune system , resulting in a decrease of blood cells. This substance is carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 80°C
Melting point: 6°C
Relative density (water = 1): 0.88
Solubility in water, g/100 ml at 25°C: 0.18
Vapour pressure, kPa at 20°C: 10
Relative vapour density (air = 1): 2.7
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2
Flash point:
-11°C c.c.
Auto-ignition temperature: 498°C
Explosive limits, vol% in air: 1.2-8.0
Octanol/water partition coefficient as log Pow: 2.13

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms.

**NOTES**

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1114 / 30GF1-II
NFPA Code: H2; F3; R0

**ADDITIONAL INFORMATION**

**ICSC: 0015** **BENZENE**



**IMPORTANT LEGAL NOTICE:**

# Material Safety Data Sheet

cis-1,2-Dichloroethylene, 97%

ACC# 97773

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** cis-1,2-Dichloroethylene, 97%
**Catalog Numbers:** AC113380000, AC113380025, AC113380100
**Synonyms:** cis-Acetylene dichloride.
**Company Identification:**

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

**For information in North America, call:** 800-ACROS-01
**For emergencies in the US, call CHEMTREC:** 800-424-9300

## Section 2 - Composition, Information on Ingredients

| CAS# | Chemical Name | Percent | EINECS/ELINCS |
|---|---|---|---|
| 156-59-2 | cis-1,2-Dichloroethylene | 97 | 205-859-7 |

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.
**Warning! Flammable liquid and vapor.** Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.
**Target Organs:** Central nervous system, respiratory system, eyes, skin.

### Potential Health Effects

**Eye:** Causes moderate eye irritation.
**Skin:** Causes moderate skin irritation. May cause dermatitis.
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.
**Inhalation:** May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at 2200 ppm.
**Chronic:** Not available. Some German investigators reported fatty degeneration of the liver upon repeated narcotic doses in rats and

## Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
**Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.
**Extinguishing Media:** Use water fog, dry chemical, carbon dioxide, or regular foam.
**Flash Point:** 6 deg C ( 42.80 deg F)
**Autoignition Temperature:** 440 deg C ( 824.00 deg F)
**Explosion Limits, Lower:**9.70 vol %
**Upper:** 12.80 vol %
**NFPA Rating:** (estimated) Health: 2; Flammability: 3; Instability: 2

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.
**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.
**Storage:** Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
**Exposure Limits**

| Chemical Name | ACGIH | NIOSH | OSHA - Final PELs |
|---|---|---|---|
| cis-1,2-Dichloroethylene | 200 ppm TWA | none listed | none listed |

**OSHA Vacated PELs:** cis-1,2-Dichloroethylene: No OSHA Vacated PELs are listed for this chemical.
**Personal Protective Equipment**
**Eyes:** Wear chemical splash goggles.
**Skin:** Wear appropriate protective gloves to prevent skin exposure.
**Clothing:** Wear appropriate protective clothing to prevent skin exposure.
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid
**Appearance:** Clear
**Odor:** Pleasant odor
**pH:** Not available.
**Vapor Pressure:** 201 mm Hg @ 25 deg C
**Vapor Density:** 3.34 (air=1)
**Evaporation Rate:**Not available.
**Viscosity:** Not available.
**Boiling Point:** 60 deg C @ 760 mm Hg
**Freezing/Melting Point:**-80 deg C
**Decomposition Temperature:**Not available.
**Solubility:** Insoluble.
**Specific Gravity/Density:**1.2800
**Molecular Formula:**C2H2Cl2
**Molecular Weight:**96.94

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.
**Conditions to Avoid:** Light, ignition sources, exposure to air, excess heat.
**Incompatibilities with Other Materials:** Strong oxidizing agents, strong bases, copper.
**Hazardous Decomposition Products:** Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
**Hazardous Polymerization:** May occur.

## Section 11 - Toxicological Information

**RTECS#:**
**CAS#** 156-59-2: KV9420000
**LD50/LC50:**
CAS# 156-59-2:
Inhalation, rat: LC50 = 13700 ppm;
.

**Carcinogenicity:**
CAS# 156-59-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No data available.
**Teratogenicity:** No data available.
**Reproductive Effects:** No data available.
**Mutagenicity:** No data available.
**Neurotoxicity:** No data available.
**Other Studies:**

## Section 12 - Ecological Information

No information available.

## Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

## Section 14 - Transport Information

| | US DOT | Canada TDG |
|---|---|---|
| **Shipping Name:** | DOT regulated - small quantity provisions apply (see 49CFR173.4) | 1,2-DICHLOROETHYLENE |
| **Hazard Class:** | | 3 |
| **UN Number:** | | UN1150 |
| **Packing Group:** | | II |

## Section 15 - Regulatory Information

### US FEDERAL

**TSCA**
CAS# 156-59-2 is listed on the TSCA inventory.
**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.
**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.
**Section 12b**
None of the chemicals are listed under TSCA Section 12b.
**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.
**CERCLA Hazardous Substances and corresponding RQs**
None of the chemicals in this material have an RQ.
**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.
**Section 313** No chemicals are reportable under Section 313.
**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.
**STATE**
CAS# 156-59-2 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

### European / International Regulations
**European Labeling in Accordance with EC Directives**
**Hazard Symbols:**
XN F
**Risk Phrases:**

R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 7 Keep container tightly closed.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

**WGK (Water Danger/Protection)**

CAS# 156-59-2: No information available.

**Canada - DSL/NDSL**

CAS# 156-59-2 is listed on Canada's NDSL List.

**Canada - WHMIS**

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

## Section 16 - Additional Information

**MSDS Creation Date:** 2/09/1998
**Revision #5 Date:** 3/16/2007

# International Chemical Safety Cards

## ETHYLBENZENE

**ICSC: 0268**

Ethylbenzol
Phenylethane
EB
$C_8H_{10}$ / $C_6H_5C_2H_5$
Molecular mass: 106.2

ICSC # 0268
CAS # 100-41-4
RTECS # DA0700000
UN # 1175
EC # 601-023-00-4
March 13, 1995 Validated


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Highly flammable. | NO open flames, NO sparks, and NO smoking. | Powder, AFFF, foam, carbon dioxide. |
| **EXPLOSION** | Vapour/air mixtures are explosive. | Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | PREVENT GENERATION OF MISTS! | |
| •**INHALATION** | Cough. Dizziness. Drowsiness. Headache. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| •**SKIN** | Dry skin. Redness. | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| •**EYES** | Redness. Pain. Blurred vision. | Face shield or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| •**INGESTION** | (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Ventilation. Collect leaking liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: A filter respirator for organic gases and vapours. | Fireproof. Separated from strong oxidants. | F symbol<br>Xn symbol<br>R: 11-20<br>S: 2-16-24/25-29<br>UN Hazard Class: 3<br>UN Packing Group: II |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0268**

# International Chemical Safety Cards

## ETHYLBENZENE

**ICSC: 0268**

| | | |
|---|---|---|
| **IMPORTANT DATA** | **PHYSICAL STATE; APPEARANCE:**<br>COLOURLESS LIQUID , WITH AROMATIC ODOUR.<br><br>**PHYSICAL DANGERS:**<br>The vapour mixes well with air, explosive mixtures are easily formed.<br><br>**CHEMICAL DANGERS:**<br>Reacts with strong oxidants. Attacks plastic and rubber.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV: 100 ppm as TWA 125 ppm as STEL A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2005).<br>MAK: skin absorption (H);<br>Carcinogen category: 3A;<br>(DFG 2004).<br>OSHA PEL†: TWA 100 ppm (435 mg/m$^3$)<br>NIOSH REL: TWA 100 ppm (435 mg/m$^3$) ST 125 ppm (545 mg/m$^3$)<br>NIOSH IDLH: 800 ppm 10%LEL See: 100414 | **ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.<br><br>**INHALATION RISK:**<br>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system Exposure far above the OEL could cause lowering of consciousness.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>Repeated or prolonged contact with skin may cause dermatitis. |
| **PHYSICAL PROPERTIES** | Boiling point: 136°C<br>Melting point: -95°C<br>Relative density (water = 1): 0.9<br>Solubility in water, g/100 ml at 20°C: 0.015<br>Vapour pressure, kPa at 20°C: 0.9<br>Relative vapour density (air = 1): 3.7 | Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02<br>Flash point: 18°C c.c.<br>Auto-ignition temperature: 432°C<br>Explosive limits, vol% in air: 1.0-6.7<br>Octanol/water partition coefficient as log Pow: 3.2 |
| **ENVIRONMENTAL DATA** | The substance is harmful to aquatic organisms.  | |

**N O T E S**

The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1175 or 30GF1-I+II
NFPA Code: H2; F3; R0

**ADDITIONAL INFORMATION**





| | |
|---|---|
| **IMPORTANT LEGAL NOTICE:** | Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |

# International Chemical Safety Cards

## CUMENE

**ICSC: 0170**

(1-Methylethyl)benzene
2-Phenylpropane
Isopropylbenzene
$C_9H_{12}$ / $C_6H_5CH(CH_3)_2$
Molecular mass: 120.2

ICSC # 0170
CAS # 98-82-8
RTECS # GR8575000
UN # 1918
EC # 601-024-00-X
April 13, 2000 Peer reviewed


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Flammable. | NO open flames, NO sparks, and NO smoking. | Powder, AFFF, foam, carbon dioxide. |
| **EXPLOSION** | Above 31°C explosive vapour/air mixtures may be formed. | Above 31°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding). | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | PREVENT GENERATION OF MISTS! | |
| **•INHALATION** | Dizziness. Ataxia. Drowsiness. Headache. Unconsciousness. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | Dry skin. | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. Pain. | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | (See Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours. | Fireproof. Separated from strong oxidants, acids. Cool. Keep in the dark. Store only if stabilized. | Marine pollutant.<br>Note: C<br>Xn symbol<br>N symbol<br>R: 10-37-51/53-65<br>S: 2-24-37-61-62<br>UN Hazard Class: 3<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0170**

# International Chemical Safety Cards

## CUMENE

**ICSC: 0170**

| | |
|---|---|
| **IMPORTANT DATA** | **PHYSICAL STATE; APPEARANCE:**<br>COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.<br><br>**PHYSICAL DANGERS:**<br>As a result of flow, agitation, etc., electrostatic charges can be generated.<br><br>**CHEMICAL DANGERS:**<br>Reacts violently with acids and strong oxidants causing fire and explosion hazard. The substance can form explosive peroxides.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV: 50 ppm as TWA (ACGIH 2004).<br>MAK: 50 ppm 250 mg/m³<br>Peak limitation category: II(4);<br>skin absorption (H);<br>Pregnancy risk group: C;<br>(DFG 2004).<br>OSHA PEL: TWA 50 ppm (245 mg/m$^3$) skin<br>NIOSH REL: TWA 50 ppm (245 mg/m$^3$) skin<br>NIOSH IDLH: 900 ppm 10%LEL See: 98828<br><br>**ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation and through the skin.<br><br>**INHALATION RISK:**<br>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>The substance is irritating to the eyes and the skin Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system Exposure far above the OEL may result in unconsciousness.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>Repeated or prolonged contact with skin may cause dermatitis. |
| **PHYSICAL PROPERTIES** | Boiling point: 152°C<br>Melting point: -96°C<br>Relative density (water = 1): 0.90<br>Solubility in water:<br>none<br>Vapour pressure, Pa at 20°C: 427<br>Relative vapour density (air = 1): 4.2<br><br>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01<br>Flash point:<br>31°C c.c.<br>Auto-ignition temperature: 420°C<br>Explosive limits, vol% in air: 0.9-6.5<br>Octanol/water partition coefficient as log Pow: 3.66 |
| **ENVIRONMENTAL DATA** | The substance is toxic to aquatic organisms.  |

**N O T E S**

Check for peroxides prior to distillation; eliminate if found.

Transport Emergency Card: TEC (R)-30S1918 or 30GF1-III
NFPA Code: H2; F3; R1

**ADDITIONAL INFORMATION**

**ICSC: 0170** **CUMENE**

# International Chemical Safety Cards

## NAPHTHALENE

**ICSC: 0667**

Naphthene
$C_{10}H_8$
Molecular mass: 128.18

ICSC # 0667
CAS # 91-20-3
RTECS # QJ0525000
UN # 1334 (solid); 2304 (molten)
EC # 601-052-00-2
April 21, 2005 Validated


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. | NO open flames. | Powder, water spray, foam, carbon dioxide. |
| **EXPLOSION** | Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! | |
| **•INHALATION** | Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine. | Ventilation (not if powder), local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | MAY BE ABSORBED! (Further see Inhalation). | Protective gloves. | Rinse skin with plenty of water or shower. |
| **•EYES** | | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation). | Do not eat, drink, or smoke during work. Wash hands before eating. | Rest. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. | Separated from strong oxidants, food and feedstuffs . Store in an area without drain or sewer access. | Do not transport with food and feedstuffs.<br>Marine pollutant.<br>Xn symbol<br>N symbol<br>R: 22-40-50/53<br>S: 2-36/37-46-60-61<br>UN Hazard Class: 4.1<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0667**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## NAPHTHALENE

**ICSC: 0667**

**IMPORTANT DATA**

**PHYSICAL STATE; APPEARANCE:**
WHITE SOLID IN VARIOUS FORMS , WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
On combustion, forms irritating and toxic gases. Reacts with strong oxidants .

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 10 ppm as TWA; 15 ppm as STEL; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2005).
MAK: skin absorption (H);
Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004).
OSHA PEL†: TWA 10 ppm (50 mg/m$^3$)
NIOSH REL: TWA 10 ppm (50 mg/m$^3$) ST 15 ppm (75 mg/m$^3$)
NIOSH IDLH: 250 ppm See: 91203

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.

**EFFECTS OF SHORT-TERM EXPOSURE:**
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.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the blood , resulting in chronic haemolytic anaemia. The substance may have effects on the eyes , resulting in the development of cataract. This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 218°C

Sublimation slowly at room temperature
Melting point: 80°C
Density: 1.16
g/cm³
Solubility in water, g/100 ml at 25°C:
none

Vapour pressure, Pa at 25°C: 11
Relative vapour density (air = 1): 4.42
Flash point:
80°C c.c.
Auto-ignition temperature: 540°C
Explosive limits, vol% in air: 0.9-5.9
Octanol/water partition coefficient as log Pow: 3.3

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

**NOTES**

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF1-II+III (solid); 41S2304 (molten)

NFPA Code: H2; F2; R0;

**ADDITIONAL INFORMATION**

**ICSC: 0667** **NAPHTHALENE**



**IMPORTANT LEGAL NOTICE:**

# Material Safety Data Sheet

Version 4.0
Revision Date 07/28/2010
Print Date 12/07/2011

## 1. PRODUCT AND COMPANY IDENTIFICATION

| | | |
|---|---|---|
| Product name | : | Propylbenzene |
| Product Number | : | P52407 |
| Brand | : | Aldrich |
| Company | : | Sigma-Aldrich<br>3050 Spruce Street<br>SAINT LOUIS MO 63103<br>USA |
| Telephone | : | +1 800-325-5832 |
| Fax | : | +1 800-325-5052 |
| Emergency Phone # | : | (314) 776-6555 |

## 2. HAZARDS IDENTIFICATION

### Emergency Overview

**OSHA Hazards**
Combustible Liquid

**Target Organs**

Lungs, Eyes, Kidney

**GHS Label elements, including precautionary statements**

Pictogram

Signal word Danger

Hazard statement(s)

| | |
|---|---|
| H226 | Flammable liquid and vapour. |
| H304 | May be fatal if swallowed and enters airways. |
| H335 | May cause respiratory irritation. |
| H401 | Toxic to aquatic life. |

Precautionary statement(s)

| | |
|---|---|
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P301 + P310 | IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. |
| P331 | Do NOT induce vomiting. |

**HMIS Classification**

| | |
|---|---|
| **Health hazard**: | 0 |
| **Chronic Health Hazard**: | * |
| **Flammability**: | 2 |
| **Physical hazards**: | 0 |

**NFPA Rating**

| | |
|---|---|
| **Health hazard**: | 1 |
| **Fire**: | 2 |
| **Reactivity Hazard**: | 0 |

**Potential Health Effects**

| | |
|---|---|
| **Inhalation** | May be harmful if inhaled. May cause respiratory tract irritation. |
| **Skin** | May be harmful if absorbed through skin. May cause skin irritation. |
| **Eyes** | May cause eye irritation. |

**Ingestion** Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1-Phenylpropane

Formula : $C_9H_{12}$
Molecular Weight : 120.19 g/mol

| CAS-No. | EC-No. | Index-No. | Concentration |
|---|---|---|---|
| **Propylbenzene** | | | |
| 103-65-1 | 203-132-9 | 601-024-00-X | - |

## 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

## 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

**Further information**
Use water spray to cool unopened containers.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
For prolonged or repeated contact use protective gloves.

**Eye protection**
Face shield and safety glasses

**Skin and body protection**
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

| | |
|---|---|
| Form | liquid, clear |
| Colour | colourless |

**Safety data**

| | |
|---|---|
| pH | no data available |
| Melting point | -99 °C (-146 °F) - lit. |
| Boiling point | 159 °C (318 °F) - lit. |
| Flash point | 42.0 °C (107.6 °F) - closed cup |
| Ignition temperature | 450 °C (842 °F) |
| Lower explosion limit | 0.8 %(V) |
| Upper explosion limit | 6 %(V) |
| Density | 0.862 g/cm3 at 25 °C (77 °F) |
| Water solubility | slightly soluble |

## 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of hazardous reactions**
Vapours may form explosive mixture with air.

**Conditions to avoid**
Heat, flames and sparks.

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

## 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**
LD50 Oral - rat - 6,040 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity).

LC50 Inhalation - rat - 2 h - 65000 ppm

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
no data available

**Germ cell mutagenicity**
no data available

**Carcinogenicity**

| | |
|---|---|
| IARC: | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| ACGIH: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |

**Reproductive toxicity**
no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
no data available

**Aspiration hazard**
May be fatal if swallowed and enters airways.

**Potential health effects**

| | |
|---|---|
| **Inhalation** | May be harmful if inhaled. May cause respiratory tract irritation. |
| **Ingestion** | Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed. |
| **Skin** | May be harmful if absorbed through skin. May cause skin irritation. |
| **Eyes** | May cause eye irritation. |

**Signs and Symptoms of Exposure**
Damage to the lungs., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Additional Information**
RTECS: DA8750000

## 12. ECOLOGICAL INFORMATION

**Toxicity**

| | |
|---|---|
| Toxicity to fish | LC50 - Oncorhynchus mykiss (rainbow trout) - 1.55 mg/l - 96.0 h |

| | |
|---|---|
| Toxicity to daphnia and other aquatic invertebrates. | Immobilization EC50 - Daphnia magna (Water flea) - 2 mg/l - 24 h |

**Persistence and degradability**
no data available

**Bioaccumulative potential**
no data available

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Avoid release to the environment.

## 13. DISPOSAL CONSIDERATIONS

**Product**
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN-Number: 2364 Class: 3 Packing group: III
Proper shipping name: n-Propyl benzene
Marine pollutant: No
Poison Inhalation Hazard: No

**IMDG**
UN-Number: 2364 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: PROPYLBENZENE
Marine pollutant: No

**IATA**
UN-Number: 2364 Class: 3 Packing group: III
Proper shipping name: n-Propylbenzene

## 15. REGULATORY INFORMATION

**OSHA Hazards**
Combustible Liquid

**DSL Status**
All components of this product are on the Canadian DSL list.

**SARA 302 Components**
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
Fire Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Propylbenzene | 103-65-1 | 2007-03-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Propylbenzene | 103-65-1 | 2007-03-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Propylbenzene | 103-65-1 | 2007-03-01 |

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## 16. OTHER INFORMATION

**Further information**


The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

# International Chemical Safety Cards

## o-XYLENE

**ICSC: 0084**

ortho-Xylene
1,2-Dimethylbenzene
o-Xylol
$C_6H_4(CH_3)_2$ / $C_8H_{10}$
Molecular mass: 106.2

ICSC # 0084
CAS # 95-47-6
RTECS # ZE2450000
UN # 1307
EC # 601-022-00-9
August 03, 2002 Validated


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Flammable. | NO open flames, NO sparks, and NO smoking. | Powder, water spray, foam, carbon dioxide. |
| **EXPLOSION** | Above 32°C explosive vapour/air mixtures may be formed. | Above 32°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding). | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! | |
| **•INHALATION** | Dizziness. Drowsiness. Headache. Nausea. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | Dry skin. Redness. | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. Pain. | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Burning sensation. Abdominal pain. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.) | Fireproof. Separated from strong oxidants strong acids | Note: C<br>Xn symbol<br>R: 10-20/21-38<br>S: 2-25<br>UN Hazard Class: 3<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0084**

# International Chemical Safety Cards

## o-XYLENE

**ICSC: 0084**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
As a result of flow, agitation, etc., electrostatic charges can be generated.

**CHEMICAL DANGERS:**
Reacts with strong acids strong oxidants

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001).
MAK: 100 ppm 440 mg/m³
Peak limitation category: II(2)
skin absorption (H);
Pregnancy risk group: D
(DFG 2005).
EU OEL: 50 ppm as TWA 100 ppm as STEL
(skin)
(EU 2000).
OSHA PEL†: TWA 100 ppm (435 mg/m$^3$)
NIOSH REL: TWA 100 ppm (435 mg/m$^3$) ST 150 ppm (655 mg/m$^3$)
NIOSH IDLH: 900 ppm See: 95476

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

**PHYSICAL PROPERTIES**

Boiling point: 144°C
Melting point: -25°C
Relative density (water = 1): 0.88
Solubility in water:
none
Vapour pressure, kPa at 20°C: 0.7

Relative vapour density (air = 1): 3.7
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02
Flash point: 32°C c.c.
Auto-ignition temperature: 463°C
Explosive limits, vol% in air: 0.9-6.7
Octanol/water partition coefficient as log Pow: 3.12

**ENVIRONMENTAL DATA**

The substance is toxic to aquatic organisms.

**N O T E S**

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0086 p-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III
NFPA Code: H 2; F 3; R 0;

**ADDITIONAL INFORMATION**

# International Chemical Safety Cards

## p-XYLENE

**ICSC: 0086**

para-Xylene
1,4-Dimethylbenzene
p-Xylol
$C_6H_4(CH_3)_2$ / $C_8H_{10}$
Molecular mass: 106.2

ICSC # 0086
CAS # 106-42-3
RTECS # ZE2625000
UN # 1307
EC # 601-022-00-9
August 03, 2002 Validated


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Flammable. | NO open flames, NO sparks, and NO smoking. | Powder, water spray, foam, carbon dioxide. |
| **EXPLOSION** | Above 27°C explosive vapour/air mixtures may be formed. | Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding). | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! | |
| **•INHALATION** | Dizziness. Drowsiness. Headache. Nausea. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | Dry skin. Redness. | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. Pain. | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Burning sensation. Abdominal pain. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.) | Fireproof. Separated from strong oxidants, strong acids | Note: C<br>Xn symbol<br>R: 10-20/21-38<br>S: 2-25<br>UN Hazard Class: 3<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0086**

# International Chemical Safety Cards

## p-XYLENE

**ICSC: 0086**

| | |
|---|---|
| **I M P O R T A N T D A T A** | **PHYSICAL STATE; APPEARANCE:**<br>COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.<br><br>**PHYSICAL DANGERS:**<br>As a result of flow, agitation, etc., electrostatic charges can be generated.<br><br>**CHEMICAL DANGERS:**<br>Reacts with strong acids strong oxidants<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001).<br>MAK: 100 ppm 440 mg/m³<br>Peak limitation category: II(2)<br>skin absorption (H);<br>Pregnancy risk group: D<br>(DFG 2005).<br>EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000).<br>OSHA PEL†: TWA 100 ppm (435 mg/m$^3$)<br>NIOSH REL: TWA 100 ppm (435 mg/m$^3$) ST 150 ppm (655 mg/m$^3$)<br>NIOSH IDLH: 900 ppm See: 95476<br><br>**ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation, through the skin and by ingestion.<br><br>**INHALATION RISK:**<br>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>The liquid defats the skin. The substance may have effects on the central nervous system. Animal tests show that this substance possibly causes toxicity to human reproduction or development. |
| **PHYSICAL PROPERTIES** | Boiling point: 138°C<br>Melting point: 13°C<br>Relative density (water = 1): 0.86<br>Solubility in water:<br>none<br>Vapour pressure, kPa at 20°C: 0.9<br><br>Relative vapour density (air = 1): 3.7<br>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02<br>Flash point: 27°C c.c.<br>Auto-ignition temperature: 528°C<br>Explosive limits, vol% in air: 1.1-7.0<br>Octanol/water partition coefficient as log Pow: 3.15 |
| **ENVIRONMENTAL DATA** | The substance is toxic to aquatic organisms.  |

**N O T E S**

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III
NFPA Code: H 2; F 3; R 0;

**ADDITIONAL INFORMATION**

**ICSC: 0086** **p-XYLENE**

# International Chemical Safety Cards

## m-XYLENE

**ICSC: 0085**

meta-Xylene
1,3-Dimethylbenzene
m-Xylol
$C_6H_4(CH_3)_2$ / $C_8H_{10}$
Molecular mass: 106.2

ICSC # 0085
CAS # 108-38-3
RTECS # ZE2275000
UN # 1307
EC # 601-022-00-9
August 03, 2002 Validated


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Flammable. | NO open flames, NO sparks, and NO smoking. | Powder, water spray, foam, carbon dioxide. |
| **EXPLOSION** | Above 27°C explosive vapour/air mixtures may be formed. | Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding). | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | STRICT HYGIENE! | |
| **•INHALATION** | Dizziness. Drowsiness. Headache. Nausea. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | Dry skin. Redness. | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. Pain. | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Burning sensation. Abdominal pain. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.) | Fireproof. Separated from strong oxidants strong acids | Note: C<br>Xn symbol<br>R: 10-20/21-38<br>S: 2-25<br>UN Hazard Class: 3<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0085**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## m-XYLENE

**ICSC: 0085**

| | |
|---|---|
| **IMPORTANT DATA** | **PHYSICAL STATE; APPEARANCE:**<br>COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.<br><br>**PHYSICAL DANGERS:**<br>As a result of flow, agitation, etc., electrostatic charges can be generated.<br><br>**CHEMICAL DANGERS:**<br>Reacts with strong acids strong oxidants<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001).<br>MAK: 100 ppm 440 mg/m³<br>Peak limitation category: II(2)<br>skin absorption (H);<br>Pregnancy risk group: D<br>(DFG 2005).<br>EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000).<br>OSHA PEL†: TWA 100 ppm (435 mg/m$^3$)<br>NIOSH REL: TWA 100 ppm (435 mg/m$^3$) ST 150 ppm (655 mg/m$^3$)<br>NIOSH IDLH: 900 ppm See: 95476<br><br>**ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation, through the skin and by ingestion.<br><br>**INHALATION RISK:**<br>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>The liquid defats the skin. The substance may have effects on the central nervous system Animal tests show that this substance possibly causes toxicity to human reproduction or development. |
| **PHYSICAL PROPERTIES** | Boiling point: 139°C<br>Melting point: -48°C<br>Relative density (water = 1): 0.86<br>Solubility in water:<br>none<br>Vapour pressure, kPa at 20°C: 0.8<br><br>Relative vapour density (air = 1): 3.7<br>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02<br>Flash point: 27°C c.c.<br>Auto-ignition temperature: 527°C<br>Explosive limits, vol% in air: 1.1-7.0<br>Octanol/water partition coefficient as log Pow: 3.20 |
| **ENVIRONMENTAL DATA** | The substance is toxic to aquatic organisms.  |

**N O T E S**

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0086 p-Xylene.

NFPA Code: H 2; F 3; R 0;
Transport Emergency Card: TEC (R)-30S1307-III

**ADDITIONAL INFORMATION**

**ICSC: 0085** **m-XYLENE**

# International Chemical Safety Cards

## VINYL CHLORIDE

**ICSC: 0082**

Chloroethene
Chloroethylene
VCM
$C_2H_3Cl$ / $H_2C=CHCl$
Molecular mass: 62.5
(cylinder)

ICSC # 0082
CAS # 75-01-4
RTECS # KU9625000
UN # 1086 (stabilized)
EC # 602-023-00-7
April 13, 2000 Validated


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire. | NO open flames, NO sparks, and NO smoking. | Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide. |
| **EXPLOSION** | Gas/air mixtures are explosive. | Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools. | In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position. |
| **EXPOSURE** | | AVOID ALL CONTACT! | IN ALL CASES CONSULT A DOCTOR! |
| **•INHALATION** | Dizziness. Drowsiness. Headache. Unconsciousness. | Ventilation, local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | ON CONTACT WITH LIQUID: FROSTBITE. | Protective gloves. Cold-insulating gloves. Protective clothing. | ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. |
| **•EYES** | Redness. Pain. | Safety goggles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Personal protection: complete protective clothing including self-contained breathing apparatus. | Fireproof. Separated from incompatible materials .( See Chemical Dangers. ) Cool. Store only if stabilized. | Note: D<br>F+ symbol<br>T symbol<br>R: 45-12<br>S: 53-45<br>UN Hazard Class: 2.1 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0082**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## VINYL CHLORIDE

**ICSC: 0082**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The gas is heavier than air, and may travel along the ground; distant ignition possible. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.

**CHEMICAL DANGERS:**
The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes ( hydrogen chloride , phosgene ). Attacks iron and steel in the presence of moisture.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 1 ppm as TWA; A1 (confirmed human carcinogen); (ACGIH 2004).
MAK:
Carcinogen category: 1;
(DFG 2004).
OSHA PEL: 1910.1017 TWA 1 ppm C 5 ppm 15-minute
NIOSH REL: Ca See Appendix A
NIOSH IDLH: Ca N.D. See: IDLH INDEX

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation.

**INHALATION RISK:**
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes . The liquid may cause frostbite. The substance may cause effects on the central nervous system . Exposure could cause lowering of consciousness. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the liver, spleen, blood andperipheral blood vessels, and tissue and bones of the fingers. This substance is carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: -13°C
Melting point: -154°C
Relative density (water = 1): 0.9 (liquid)
Density: 8 (vapour) at 15°C
g/l
Solubility in water:
none

Relative vapour density (air = 1): 2.2
Flash point:
-78°C c.c.
Auto-ignition temperature: 472°C
Explosive limits, vol% in air: 3.6-33
Octanol/water partition coefficient as log Pow: 0.6

**ENVIRONMENTAL DATA**

This substance may be hazardous to the environment; special attention should be given to ground water contamination.

**N O T E S**

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-20S1086

NFPA Code: H 2; F 4; R 2;

**ADDITIONAL INFORMATION**

# International Chemical Safety Cards

## BENZ(a)ANTHRACENE

**ICSC: 0385**

1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 0385
CAS # 56-55-3
RTECS # CV9275000
EC # 601-033-00-9
October 23, 1995 Validated

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. | | Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | | AVOID ALL CONTACT! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety goggles face shield or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. Wash hands before eating. | Rinse mouth. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus. | Well closed. | T symbol<br>N symbol<br>R: 45-50/53<br>S: 53-45-60-61 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0385**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**ICSC: 0385**

# BENZ(a)ANTHRACENE

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: A2 (suspected human carcinogen); (ACGIH 2004).
MAK:
Carcinogen category: 2 (as pyrolysis product of organic materials)
(DFG 2005).

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
This substance is probably carcinogenic to humans.

**PHYSICAL PROPERTIES**

Sublimation point: 435°C
Melting point: 162°C
Relative density (water = 1): 1.274
Solubility in water:
none

Vapour pressure, Pa at 20°C: 292
Octanol/water partition coefficient as log Pow: 5.61

**ENVIRONMENTAL DATA**

Bioaccumulation of this chemical may occur in seafood.

**N O T E S**

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.

**ADDITIONAL INFORMATION**

**ICSC: 0385** **BENZ(a)ANTHRACENE**

# International Chemical Safety Cards

## BENZO(a)PYRENE

**ICSC: 0104**

Benz(a)pyrene
3,4-Benzopyrene
Benzo(d,e,f)chrysene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0104
CAS # 50-32-8
RTECS # DJ3675000
EC # 601-032-00-3
October 17, 2005 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. | NO open flames. | Water spray, foam, powder, carbon dioxide. |
| **EXPLOSION** | | | |
| **EXPOSURE** | See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE. | AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | MAY BE ABSORBED! | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety goggles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. | Separated from strong oxidants. | T symbol<br>N symbol<br>R: 45-46-60-61-43-50/53<br>S: 53-45-60-61 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0104**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

# BENZO(a)PYRENE

**ICSC: 0104**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
PALE-YELLOW CRYSTALS

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Reacts with strong oxidants causing fire and explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005).
MAK:
Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

**PHYSICAL PROPERTIES**

Boiling point: 496°C
Melting point: 178.1°C
Density: 1.4
g/cm³

Solubility in water: none (<0.1 g/100 ml)
Vapour pressure :
negligible
Octanol/water partition coefficient as log Pow: 6.04

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.

**N O T E S**

Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

**ADDITIONAL INFORMATION**

# International Chemical Safety Cards

## BENZO(b)FLUORANTHENE

**ICSC: 0720**

Benz(e)acephenanthrylene
2,3-Benzofluoroanthene
Benzo(e)fluoranthene
3,4-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0720
CAS # 205-99-2
RTECS # CU1400000
EC # 601-034-00-4
March 25, 1999 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | | | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | AVOID ALL CONTACT! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety spectacles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Rinse mouth. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. | Provision to contain effluent from fire extinguishing. Well closed. | T symbol<br>N symbol<br>R: 45-50/53<br>S: 53-45-60-61 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0720**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## BENZO(b)FLUORANTHENE

**ICSC: 0720**

| | | |
|---|---|---|
| **I** | **PHYSICAL STATE; APPEARANCE:**<br>COLOURLESS CRYSTALS | **ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation |

**IMPORTANT DATA**

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Upon heating, toxic fumes are formed.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: A2 (suspected human carcinogen); (ACGIH 2004).
MAK:
Carcinogen category: 2;
(DFG 2004).

of its aerosol and through the skin.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
This substance is possibly carcinogenic to humans. May cause genetic damage in humans.

**PHYSICAL PROPERTIES**

Boiling point: 481°C
Melting point: 168°C
Solubility in water:
none

Octanol/water partition coefficient as log Pow: 6.12

**ENVIRONMENTAL DATA**

This substance may be hazardous to the environment; special attention should be given to air quality and water quality.

**NOTES**

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m$^3$. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0720** **BENZO(b)FLUORANTHENE**

# International Chemical Safety Cards

## BENZO(k)FLUORANTHENE

**ICSC: 0721**

Dibenzo(b,jk)fluorene
8,9-Benzofluoranthene
11,12-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0721
CAS # 207-08-9
RTECS # DF6350000
EC # 601-036-00-5
March 25, 1999 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | | | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | AVOID ALL CONTACT! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety spectacles or eye protection in combination with breathing protection if powder. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Rinse mouth. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. | Provision to contain effluent from fire extinguishing. Well closed. | T symbol<br>N symbol<br>R: 45-50/53<br>S: 53-45-60-61 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0721**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## BENZO(k)FLUORANTHENE

**ICSC: 0721**

| | | |
|---|---|---|
| **I**<br><br>**M** | **PHYSICAL STATE; APPEARANCE:**<br>YELLOW CRYSTALS | **ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation of its aerosol and through the skin. |

| | |
|---|---|
| **P O R T A N T D A T A** | **PHYSICAL DANGERS:**<br><br>**CHEMICAL DANGERS:**<br>Upon heating, toxic fumes are formed.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV not established.<br>MAK:<br>Carcinogen category: 2;<br>(DFG 2004).<br><br>**INHALATION RISK:**<br>Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>This substance is possibly carcinogenic to humans. |
| **PHYSICAL PROPERTIES** | Boiling point: 480°C<br>Melting point: 217°C<br>Solubility in water:<br>none<br><br>Octanol/water partition coefficient as log Pow: 6.84 |
| **ENVIRONMENTAL DATA** | This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in crustacea and in fish.  |

**N O T E S**

Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m$^3$. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0721** **BENZO(k)FLUORANTHENE**

# International Chemical Safety Cards

## CHRYSENE

**ICSC: 1672**

Benzoaphenanthrene
1,2-Benzophenanthrene
1,2,5,6-Dibenzonaphthalene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 1672
CAS # 218-01-9
RTECS # GC0700000
UN # 3077
EC # 601-048-00-0
October 12, 2006 Validated

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. | NO open flames. | Water spray. Dry powder. Foam. Carbon dioxide. |
| **EXPLOSION** | Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE. | AVOID ALL CONTACT! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety goggles | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Rinse mouth. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. | Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access. | T symbol<br>N symbol<br>R: 45-68-50/53<br>S: 53-45-60-61<br>UN Hazard Class: 9<br>UN Packing Group: III<br>Signal: Warning<br>Aqua-Cancer<br>Suspected of causing cancer<br>Very toxic to aquatic life with long lasting effects<br>Very toxic to aquatic life |

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European

# International Chemical Safety Cards

## CHRYSENE

ICSC: 1672

**IMPORTANT DATA**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS TO BEIGE CRYSTALS OR POWDER

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006).
MAK not established.

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

**INHALATION RISK:**
A harmful concentration of airborne particles can be reached quickly when dispersed

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 448°C
Melting point: 254 - 256°C
Density: 1.3 g/cm³

Solubility in water:
very poor
Octanol/water partition coefficient as log Pow: 5.9

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.

Transport Emergency Card: TEC (R)-90GM7-III

**ADDITIONAL INFORMATION**

# International Chemical Safety Cards

## DIBENZO(a,h)ANTHRACENE

**ICSC: 0431**

1,25,6-Dibenzanthracene
$C_{22}H_{14}$
Molecular mass: 278.4

ICSC # 0431
CAS # 53-70-3
RTECS # HN2625000
EC # 601-041-00-2
October 23, 1995 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. | NO open flames. | Water spray, powder. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | AVOID ALL CONTACT! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | Redness. Swelling. Itching. | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. | Face shield or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. Wash hands before eating. | Rinse mouth. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles. | Well closed. | T symbol<br>N symbol<br>R: 45-50/53<br>S: 53-45-60-61 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0431**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## DIBENZO(a,h)ANTHRACENE

**ICSC: 0431**

**I**

**M**

**P**

**O**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS CRYSTALLINE POWDER.

**PHYSICAL DANGERS:**

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration

| | | |
|---|---|---|
| **R T A N T D A T A** | **CHEMICAL DANGERS:**<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV not established. | of airborne particles can, however, be reached quickly.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>The substance may have effects on the skin , resulting in photosensitization. This substance is probably carcinogenic to humans. |
| **PHYSICAL PROPERTIES** | Boiling point: 524°C<br>Melting point: 267°C<br>Relative density (water = 1): 1.28 | Solubility in water:<br>none<br>Octanol/water partition coefficient as log Pow: 6.5 |
| **ENVIRONMENTAL DATA** | Bioaccumulation of this chemical may occur in seafood.  | |

**N O T E S**

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).

**ADDITIONAL INFORMATION**

**ICSC: 0431** **DIBENZO(a,h)ANTHRACENE**

# Material Safety Data Sheet

Version 3.1
Revision Date 03/22/2010
Print Date 12/09/2011

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Dibenzofuran

Product Number : 236373
Brand : Aldrich

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555

## 2. HAZARDS IDENTIFICATION

### Emergency Overview

**OSHA Hazards**
Toxic by ingestion

**HMIS Classification**
**Health hazard**: 2
**Flammability**: 1
**Physical hazards**: 0

**NFPA Rating**
**Health hazard**: 2
**Fire**: 1
**Reactivity Hazard**: 0

### Potential Health Effects

**Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.
**Skin** May be harmful if absorbed through skin. May cause skin irritation.
**Eyes** May cause eye irritation.
**Ingestion** Toxic if swallowed.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Diphenylene oxide

Formula : $C_{12}H_8O$
Molecular Weight : 168.19 g/mol

| CAS-No. | EC-No. | Index-No. | Concentration |
|---|---|---|---|
| **Dibenzofuran** | | | |
| 132-64-9 | 205-071-3 | - | - |

## 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

## 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves.

**Eye protection**
Face shield and safety glasses

**Skin and body protection**
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

| | |
|---|---|
| Form | crystalline |
| Colour | white, beige |

**Safety data**

| | |
|---|---|
| pH | no data available |
| Melting point | 80 - 82 °C (176 - 180 °F) - lit. |
| Boiling point | 154 - 155 °C (309 - 311 °F) at 27 hPa (20 mmHg) - lit. |
| Flash point | 130.0 °C (266.0 °F) - closed cup |
| Ignition temperature | no data available |
| Lower explosion limit | no data available |
| Upper explosion limit | no data available |
| Water solubility | no data available |
| Partition coefficient: n-octanol/water | log Pow: 3.77 |

## 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Conditions to avoid**
no data available

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

## 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**
no data available

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
no data available

**Germ cell mutagenicity**
no data available

**Carcinogenicity**

| | |
|---|---|
| IARC: | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| ACGIH: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |

**Reproductive toxicity**
no data available

**Specific target organ toxicity - single exposure (GHS)**
no data available

**Specific target organ toxicity - repeated exposure (GHS)**
no data available

**Aspiration hazard**
no data available

**Potential health effects**

| | |
|---|---|
| **Inhalation** | May be harmful if inhaled. May cause respiratory tract irritation. |
| **Ingestion** | Toxic if swallowed. |
| **Skin** | May be harmful if absorbed through skin. May cause skin irritation. |
| **Eyes** | May cause eye irritation. |

**Signs and Symptoms of Exposure**
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Additional Information**
RTECS: HP4430000

## 12. ECOLOGICAL INFORMATION

**Toxicity**

| | |
|---|---|
| Toxicity to fish | NOEC - Cyprinodon variegatus (sheepshead minnow) - 1 mg/l - 96.0 h |
| | LC50 - Pimephales promelas (fathead minnow) - 1.05 mg/l - 96.0 h |

**Persistence and degradability**
no data available

**Bioaccumulative potential**
no data available

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## 13. DISPOSAL CONSIDERATIONS

**Product**
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Dibenzofuran)
Reportable Quantity (RQ): 100 lbs
Marine pollutant: Marine pollutant
Poison Inhalation Hazard: No

**IMDG**

UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Dibenzofuran)
Marine pollutant: Marine pollutant

**IATA**
UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenzofuran)

## 15. REGULATORY INFORMATION

**OSHA Hazards**
Toxic by ingestion

**DSL Status**
All components of this product are on the Canadian DSL list.

**SARA 302 Components**
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Dibenzofuran | 132-64-9 | 2007-07-01 |

**SARA 311/312 Hazards**
Acute Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Dibenzofuran | 132-64-9 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Dibenzofuran | 132-64-9 | 2007-07-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Dibenzofuran | 132-64-9 | 2007-07-01 |

**California Prop. 65 Components**
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## 16. OTHER INFORMATION

**Further information**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

# Material Safety Data Sheet

Version 3.1
Revision Date 10/15/2010
Print Date 12/09/2011

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Fluorene

Product Number : 46880
Brand : Aldrich
Product Use : For laboratory research purposes.

Supplier : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Manufacturer : Sigma-Aldrich Corporation
3050 Spruce St.
St. Louis, Missouri 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

## 2. HAZARDS IDENTIFICATION

### Emergency Overview

**OSHA Hazards**
No known OSHA hazards

**GHS Classification**
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

**GHS Label elements, including precautionary statements**

Pictogram

Signal word Warning

Hazard statement(s)
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/ container to an approved waste disposal plant.

**HMIS Classification**
**Health hazard**: 1
**Flammability**: 1
**Physical hazards**: 0

**NFPA Rating**
**Health hazard**: 1
**Fire**: 1
**Reactivity Hazard**: 0

**Potential Health Effects**

**Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.
**Skin** May be harmful if absorbed through skin. May cause skin irritation.

| | |
|---|---|
| **Eyes** | May cause eye irritation. |
| **Ingestion** | May be harmful if swallowed. |

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{13}H_{10}$
Molecular Weight : 166.22 g/mol

| CAS-No. | EC-No. | Index-No. | Concentration |
|---|---|---|---|
| **Fluorene** | | | |
| 86-73-7 | 201-695-5 | - | - |

## 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

## 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

| | |
|---|---|
| Form | crystalline |
| Colour | white |

**Safety data**

| | |
|---|---|
| pH | no data available |
| Melting/freezing point | Melting point/range: 113 - 115 °C (235 - 239 °F) |
| | Melting point/range: 111 - 114 °C (232 - 237 °F) - lit. |
| Boiling point | 298 °C (568 °F) - lit. |
| Flash point | 151.0 °C (303.8 °F) - closed cup |
| Ignition temperature | no data available |
| Autoignition temperature | no data available |
| Lower explosion limit | no data available |
| Upper explosion limit | no data available |
| Vapour pressure | no data available |
| Density | no data available |
| Water solubility | no data available |
| Partition coefficient: n-octanol/water | no data available |
| Relative vapour density | no data available |
| Odour | no data available |

| | |
|---|---|
| Odour Threshold | no data available |
| Evaporation rate | no data available |

## 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of hazardous reactions**
no data available

**Conditions to avoid**
no data available

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

## 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**

**Oral LD50**
**Inhalation LC50**
no data available

**Dermal LD50**
no data available

**Other information on acute toxicity**
LD50 Intraperitoneal - mouse - > 2.0 mg/kg

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
no data available

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

| | |
|---|---|
| IARC: | 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Fluorene) |
| ACGIH: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |

**Reproductive toxicity**

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
no data available

**Aspiration hazard**
no data available

**Potential health effects**

| | |
|---|---|
| **Inhalation** | May be harmful if inhaled. May cause respiratory tract irritation. |
| **Ingestion** | May be harmful if swallowed. |
| **Skin** | May be harmful if absorbed through skin. May cause skin irritation. |
| **Eyes** | May cause eye irritation. |

**Signs and Symptoms of Exposure**
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**
no data available

**Additional Information**
RTECS: LL5670000

## 12. ECOLOGICAL INFORMATION

**Toxicity**

| | |
|---|---|
| Toxicity to fish | LC50 - Fish - 0.82 mg/l - 96 h |
| Toxicity to daphnia and other aquatic invertebrates. | Remarks: no data available |
| Toxicity to algae | EC50 - Algae - 3.4 mg/l - 96 h |

**Persistence and degradability**

**Bioaccumulative potential**

| | |
|---|---|
| Bioaccumulation | Oncorhynchus mykiss (rainbow trout) - 24 h<br>Bioconcentration factor (BCF): 512 |

**Mobility in soil**
Adsorbs on soil.

**PBT and vPvB assessment**
no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

no data available

## 13. DISPOSAL CONSIDERATIONS

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
Not dangerous goods

**IMDG**
UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Fluorene)
Marine pollutant: Marine pollutant

**IATA**
UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Fluorene)

**Further information**
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**OSHA Hazards**
No known OSHA hazards

**DSL Status**
All components of this product are on the Canadian DSL list.

**SARA 302 Components**
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
No SARA Hazards

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Fluorene | 86-73-7 | 2007-03-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Fluorene | 86-73-7 | 2007-03-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Fluorene | 86-73-7 | 2007-03-01 |

**California Prop. 65 Components**
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## 16. OTHER INFORMATION

**Further information**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

# International Chemical Safety Cards

## INDENO(1,2,3-cd)PYRENE

**ICSC: 0730**

o-Phenylenepyrene
2,3-Phenylenepyrene
$C_{22}H_{12}$
Molecular mass: 276.3

ICSC # 0730
CAS # 193-39-5
RTECS # NK9300000
March 25, 1999 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | | | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | AVOID ALL CONTACT! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety spectacles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Rinse mouth. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. | Provision to contain effluent from fire extinguishing. Well closed. | R:<br>S: |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0730**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## INDENO(1,2,3-cd)PYRENE

**ICSC: 0730**

| | | |
|---|---|---|
| **I**<br>**M**<br>**P** | **PHYSICAL STATE; APPEARANCE:**<br>YELLOW CRYSTALS<br><br>**PHYSICAL DANGERS:** | **ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation of its aerosol and through the skin.<br><br>**INHALATION RISK:** |

| | | |
|---|---|---|
| **O R T A N T D A T A** | **CHEMICAL DANGERS:**<br>Upon heating, toxic fumes are formed.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV not established.<br>MAK:<br>Carcinogen category: 2;<br>(DFG 2004). | Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>This substance is possibly carcinogenic to humans. |
| **PHYSICAL PROPERTIES** | Boiling point: 536°C<br>Melting point: 164°C<br>Solubility in water:<br>none | Octanol/water partition coefficient as log Pow: 6.58 |
| **ENVIRONMENTAL DATA** | This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish.  | |

**N O T E S**

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m$^3$. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0730** **INDENO(1,2,3-cd)PYRENE**

# International Chemical Safety Cards

## NAPHTHALENE

**ICSC: 0667**

Naphthene
$C_{10}H_8$
Molecular mass: 128.18

ICSC # 0667
CAS # 91-20-3
RTECS # QJ0525000
UN # 1334 (solid); 2304 (molten)
EC # 601-052-00-2
April 21, 2005 Peer reviewed


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. | NO open flames. | Powder, water spray, foam, carbon dioxide. |
| **EXPLOSION** | Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! | |
| **•INHALATION** | Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine. | Ventilation (not if powder), local exhaust, or breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | MAY BE ABSORBED! (Further see Inhalation). | Protective gloves. | Rinse skin with plenty of water or shower. |
| **•EYES** | | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation). | Do not eat, drink, or smoke during work. Wash hands before eating. | Rest. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. | Separated from strong oxidants, food and feedstuffs Store in an area without drain or sewer access. | Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 22-40-50/53 S: 2-36/37-46-60-61 UN Hazard Class: 4.1 UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0667**

# International Chemical Safety Cards

## NAPHTHALENE

**ICSC: 0667**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
WHITE SOLID IN VARIOUS FORMS , WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
On combustion, forms irritating and toxic gases. Reacts with strong oxidants

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 10 ppm as TWA 15 ppm as STEL (skin) A4 (not classifiable as a human carcinogen); (ACGIH 2005).
MAK: skin absorption (H);
Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004).
OSHA PEL†: TWA 10 ppm (50 mg/m$^3$)
NIOSH REL: TWA 10 ppm (50 mg/m$^3$) ST 15 ppm (75 mg/m$^3$)
NIOSH IDLH: 250 ppm See: 91203

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.

**EFFECTS OF SHORT-TERM EXPOSURE:**
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.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the blood , resulting in chronic haemolytic anaemia. The substance may have effects on the eyes , resulting in the development of cataract. This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 218°C
Sublimation slowly at room temperature
Melting point: 80°C
Density: 1.16
g/cm3
Solubility in water, g/100 ml at 25°C:
none

Vapour pressure, Pa at 25°C: 11
Relative vapour density (air = 1): 4.42
Flash point:
80°C c.c.
Auto-ignition temperature: 540°C
Explosive limits, vol% in air: 0.9-5.9
Octanol/water partition coefficient as log Pow: 3.3

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

**N O T E S**

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF1-II+III (solid); 41S2304 (molten)
NFPA Code: H2; F2; R0;

**ADDITIONAL INFORMATION**

# Material Safety Data Sheet

Version 4.0
Revision Date 07/24/2010
Print Date 12/09/2011

## 1. PRODUCT AND COMPANY IDENTIFICATION

| | | |
|---|---|---|
| Product name | : | Phenanthrene |
| Product Number | : | 695114 |
| Brand | : | Aldrich |
| Company | : | Sigma-Aldrich<br>3050 Spruce Street<br>SAINT LOUIS MO 63103<br>USA |
| Telephone | : | +1 800-325-5832 |
| Fax | : | +1 800-325-5052 |
| Emergency Phone # | : | (314) 776-6555 |

## 2. HAZARDS IDENTIFICATION

### Emergency Overview

**OSHA Hazards**
Harmful by ingestion., Irritant

**Other hazards which do not result in classification**
Photosensitizer.

**GHS Label elements, including precautionary statements**

Pictogram

Signal word Warning

Hazard statement(s)

| | |
|---|---|
| H302 | Harmful if swallowed. |
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |
| H335 | May cause respiratory irritation. |
| H400 | Very toxic to aquatic life. |
| H413 | May cause long lasting harmful effects to aquatic life. |

Precautionary statement(s)

| | |
|---|---|
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P273 | Avoid release to the environment. |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |

**HMIS Classification**

| | |
|---|---|
| **Health hazard**: | 2 |
| **Flammability**: | 0 |
| **Physical hazards**: | 0 |

**NFPA Rating**

| | |
|---|---|
| **Health hazard**: | 2 |
| **Fire**: | 0 |
| **Reactivity Hazard**: | 0 |

**Potential Health Effects**

| | |
|---|---|
| **Inhalation** | May be harmful if inhaled. Causes respiratory tract irritation. |
| **Skin** | May be harmful if absorbed through skin. Causes skin irritation. |

| | |
|---|---|
| **Eyes** | Causes eye irritation. |
| **Ingestion** | Harmful if swallowed. |

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{14}H_{10}$
Molecular Weight : 178.23 g/mol

| CAS-No. | EC-No. | Index-No. | Concentration |
|---|---|---|---|
| **Phenanthrene** | | | |
| 85-01-8 | 201-581-5 | - | - |

## 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

## 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

Handle and store under inert gas.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

| Components | CAS-No. | Value | Control | Update | Basis |
|---|---|---|---|---|---|

| | | | parameters | | |
|---|---|---|---|---|---|
| Phenanthrene | 85-01-8 | TWA | 0.2 mg/m3 | 1993-06-30 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | TWA | 0.2 mg/m3 | 1989-03-01 | USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000 |

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves.

**Eye protection**
Safety glasses with side-shields conforming to EN166

**Skin and body protection**
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

| | |
|---|---|
| Form | solid |

**Safety data**

| | |
|---|---|
| pH | no data available |
| Melting point | 98 - 100 °C (208 - 212 °F) |
| Boiling point | 340 °C (644 °F) |
| Flash point | no data available |
| Ignition temperature | no data available |
| Lower explosion limit | no data available |
| Upper explosion limit | no data available |
| Density | 1.063 g/mL at 25 °C (77 °F) |
| Water solubility | no data available |
| Partition coefficient: n-octanol/water | log Pow: 4.57 |

## 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Conditions to avoid**
no data available

**Materials to avoid**
Oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

## 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**
LD50 Oral - mouse - 700.0 mg/kg

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
Causes photosensitivity. Exposure to light can result in allergic reactions resulting in dermatologic lesions, which can vary from sunburnlike responses to edematous, vesiculated lesions, or bullae

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

| | |
|---|---|
| IARC: | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| IARC: | 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Phenanthrene) |
| ACGIH: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |

**Reproductive toxicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
Inhalation - May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
no data available

**Aspiration hazard**
no data available

**Potential health effects**

| | |
|---|---|
| **Inhalation** | May be harmful if inhaled. Causes respiratory tract irritation. |
| **Ingestion** | Harmful if swallowed. |
| **Skin** | May be harmful if absorbed through skin. Causes skin irritation. |
| **Eyes** | Causes eye irritation. |

**Signs and Symptoms of Exposure**
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Additional Information**

## 12. ECOLOGICAL INFORMATION

**Toxicity**

| | |
|---|---|
| Toxicity to fish | LC50 - Oncorhynchus mykiss (rainbow trout) - 3.2 mg/l - 96.0 h |
| | LC100 - other fish - 1.5 mg/l - 1.0 h |
| Toxicity to daphnia | EC50 - Daphnia magna (Water flea) - 0.86 mg/l - 24 h |

and other aquatic invertebrates.

EC50 - Daphnia magna (Water flea) - 0.38 mg/l - 48 h

Toxicity to algae EC50 - Chlorella vulgaris (Fresh water algae) - 1.20 mg/l - 3 h

**Persistence and degradability**

Biodegradability Result: 55 - 95 % - Partially biodegradable.

**Bioaccumulative potential**

Bioaccumulation Pimephales promelas (fathead minnow) - 28 d
Bioconcentration factor (BCF): 5,100

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms.

## 13. DISPOSAL CONSIDERATIONS

**Product**

Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**

UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Phenanthrene)
Reportable Quantity (RQ): 5000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

**IMDG**

UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Phenanthrene)
Marine pollutant: No

**IATA**

UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Phenanthrene)

**Further information**

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**OSHA Hazards**

Harmful by ingestion., Irritant

**DSL Status**

All components of this product are on the Canadian DSL list.

**SARA 302 Components**
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Phenanthrene | 85-01-8 | 2007-07-01 |

**SARA 311/312 Hazards**
Acute Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Phenanthrene | 85-01-8 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Phenanthrene | 85-01-8 | 2007-07-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Phenanthrene | 85-01-8 | 2007-07-01 |

**California Prop. 65 Components**

| WARNING! This product contains a chemical known to the State of California to cause cancer. | CAS-No. | Revision Date |
|---|---|---|
| Phenanthrene | 85-01-8 | 1990-01-01 |

## 16. OTHER INFORMATION

**Further information**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

# Material Safety Data Sheet

Version 4.0
Revision Date 03/12/2010
Print Date 12/09/2011

## 1. PRODUCT AND COMPANY IDENTIFICATION

| | | |
|---|---|---|
| Product name | : | 4,4'-DDD PESTANAL,250 MG (2,2-BIS(4-CHL& |
| Product Number | : | 35486 |
| Brand | : | Fluka |
| Company | : | Sigma-Aldrich<br>3050 Spruce Street<br>SAINT LOUIS MO 63103<br>USA |
| Telephone | : | +1 800-325-5832 |
| Fax | : | +1 800-325-5052 |
| Emergency Phone # | : | (314) 776-6555 |

## 2. HAZARDS IDENTIFICATION

### Emergency Overview

**OSHA Hazards**
Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

**GHS Label elements, including precautionary statements**

Pictogram

Signal word Danger

Hazard statement(s)

| | |
|---|---|
| H301 | Toxic if swallowed. |
| H312 | Harmful in contact with skin. |
| H351 | Suspected of causing cancer. |
| H400 | Very toxic to aquatic life. |
| H413 | May cause long lasting harmful effects to aquatic life. |

Precautionary statement(s)

| | |
|---|---|
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/protective clothing. |
| P301 + P310 | IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. |

**HMIS Classification**

| | |
|---|---|
| **Health hazard**: | 2 |
| **Chronic Health Hazard**: | * |
| **Flammability**: | 0 |
| **Physical hazards**: | 0 |

**NFPA Rating**

| | |
|---|---|
| **Health hazard**: | 2 |
| **Fire**: | 0 |
| **Reactivity Hazard**: | 0 |

**Potential Health Effects**

| | |
|---|---|
| **Inhalation** | May be harmful if inhaled. May cause respiratory tract irritation. |
| **Skin** | Harmful if absorbed through skin. May cause skin irritation. |
| **Eyes** | May cause eye irritation. |
| **Ingestion** | Toxic if swallowed. |

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane
4,4′-DDD
TDE

Formula : $C_{14}H_{10}Cl_4$
Molecular Weight : 320.04 g/mol

| CAS-No. | EC-No. | Index-No. | Concentration |
|---|---|---|---|
| **2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane** | | | |
| 72-54-8 | 200-783-0 | - | - |

## 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

## 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves.

**Eye protection**
Face shield and safety glasses

**Skin and body protection**
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

| | |
|---|---|
| Form | solid |

**Safety data**

| | |
|---|---|
| pH | no data available |
| Melting point | 94.0 - 96.0 °C (201.2 - 204.8 °F) |
| Boiling point | 193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg) |
| Flash point | no data available |
| Ignition temperature | no data available |
| Lower explosion limit | no data available |
| Upper explosion limit | no data available |
| Vapour pressure | < 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F) |
| Density | 1.38 g/cm3 |
| Water solubility | no data available |
| Partition coefficient: n-octanol/water | log Pow: 6.02 |

## 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Conditions to avoid**
no data available

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

## 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**
LD50 Oral - Hamster - > 5,000 mg/kg

TDLo Oral - Human - 428.5 mg/kg
Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg
Remarks: Cardiac:Other changes. Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli.

TDLo Oral - rat - 14 mg/kg
Remarks: Liver:Changes in liver weight. Endocrine:Estrogenic. Musculoskeletal:Other changes.

TDLo Oral - rat - 2,100 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex).

LD50 Dermal - rabbit - 1,200 mg/kg
Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
no data available

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

| | |
|---|---|
| IARC: | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| ACGIH: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |

**Reproductive toxicity**

no data available

**Specific target organ toxicity - single exposure (GHS)**
no data available

**Specific target organ toxicity - repeated exposure (GHS)**
no data available

**Aspiration hazard**
no data available

**Potential health effects**

| | |
|---|---|
| **Inhalation** | May be harmful if inhaled. May cause respiratory tract irritation. |
| **Ingestion** | Toxic if swallowed. |
| **Skin** | Harmful if absorbed through skin. May cause skin irritation. |

**Eyes** May cause eye irritation.

**Signs and Symptoms of Exposure**
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Additional Information**
RTECS: KI0700000

## 12. ECOLOGICAL INFORMATION

**Toxicity**

| | |
|---|---|
| Toxicity to fish | LC50 - other fish - 1.18 - 9 mg/l - 96.0 h |
| | LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h |
| | LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h |
| | LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h |
| Toxicity to daphnia and other aquatic invertebrates. | EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h |

**Persistence and degradability**
no data available

**Bioaccumulative potential**
Indication of bioaccumulation.

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## 13. DISPOSAL CONSIDERATIONS

**Product**
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

**IMDG**
UN-Number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Marine pollutant: No

**IATA**
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)

## 15. REGULATORY INFORMATION

**OSHA Hazards**
Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

**DSL Status**
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

| | CAS-No. |
|---|---|
| 2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane | 72-54-8 |

**SARA 302 Components**
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
Acute Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane | 72-54-8 | |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane | 72-54-8 | |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane | 72-54-8 | |

**California Prop. 65 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| WARNING! This product contains a chemical known to the State of California to cause cancer.<br>2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane | 72-54-8 | |

## 16. OTHER INFORMATION

**Further information**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MSDS : 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%
CAS : 72-55-9
SYNONYMS : p,p'-DDE ; ethylene,1,1-dichloro-2,2-bis-(p-chlorophenyl)- ; DDT dehydrochloride ; DDE; 1-1'-(Dichloroethenylidene)bis(4-chlorobenzene)



Catalog of Chemical Suppliers, Buyers, Custom Synthesis Companies And Equipment Manufacturers
[ 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99% 72-55-9 ]

Suppliers:

Not Available

Buyers:

Not Available



**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

| CAS# | Chemical Name | % | EINECS# |
|---|---|---|---|
| 72-55-9 | 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene | 99 | 200-784-6 |

Hazard Symbols: XN
Risk Phrases: 22 33

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
Harmful if swallowed. Danger of cumulative effects.Cancer suspect agent.Possible risks of irreversible effects.

Potential Health Effects
Eye:
May cause eye irritation.
Skin:
May cause skin irritation.
Ingestion:
May cause irritation of the digestive tract. May be harmful if swallowed. Ingestion of large amounts may cause liver and/or kidney damage.
Inhalation:
May cause respiratory tract irritation.
Chronic:
May cause cancer according to animal studies. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:
Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire.
Extinguishing Media:
For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Do not ingest or inhale. Use with adequate ventilation.
Storage:
Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits
CAS# 72-55-9:

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin:
Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Crystals
Color: white
Odor: None reported.
pH: Not available.
Vapor Pressure: 6.5106 mm Hg @ 20 C
Viscosity: Not available.
Boiling Point: 336 deg C
Freezing/Melting Point: 88.00 - 90.00 deg C
Autoignition Temperature: Not available.
Flash Point: Not available.
Explosion Limits, lower: Not available.
Explosion Limits, upper: Not available.
Decomposition Temperature:
Solubility in water: 0.010 ppm
Specific Gravity/Density:
Molecular Formula: C14H8Cl4
Molecular Weight: 318.02

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, dust generation, strong oxidants.
Incompatibilities with Other Materials:
Strong oxidizing agents - strong bases.
Hazardous Decomposition Products:
Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 72-55-9: KV9450000
LD50/LC50:
CAS# 72-55-9: Oral, mouse: LD50 = 700 mg/kg; Oral, rat: LD50 = 880 mg/kg.
Carcinogenicity:
2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene -
California: carcinogen, initial date 1/1/89

Other:
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Estimated BCF value = 8,300 based on water solubility. Estimated Koc value = 8,300. There was no movement of DDE reported in soil column mobility experiments.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

IATA
Not regulated as a hazardous material.
IMO
Not regulated as a hazardous material.
RID/ADR
Not regulated as a hazardous material.
USA RQ: CAS# 72-55-9: 1 lb final RQ; 0.454 kg final RQ

**** SECTION 15 - REGULATORY INFORMATION ****

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 22 Harmful if swallowed.
R 33 Danger of cumulative effects.
Safety Phrases:
S 24/25 Avoid contact with skin and eyes.
WGK (Water Danger/Protection)
CAS# 72-55-9: 3
Canada
None of the chemicals in this product are listed on the DSL/NDSL list.
CAS# 72-55-9 is listed on Canada's Ingredient Disclosure List.
US FEDERAL
TSCA
CAS# 72-55-9 is not listed on the TSCA inventory.
It is for research and development use only.

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/28/1998 Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

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| | |
|---|---|
| 4-Cyano-4-Phenylpiperidine Hydrochloride, 99% (TLC) | 51304-58-6 |
| Methanesulfonamide | 3144-09-0 |
| gamma-Octanoic lactone, 98% | 104-50-7 |
| Cis,cis,cis,cis-1,2,3,4-cyclopentane- tetracarboxylic dianhydride, | 4802-47-5 |
| Tetrachloroethylene Carbonate, 98+% | 22432-68-4 |
| Oxamic Acid, 98% | 471-47-6 |
| 1O,11-Dihydro-5H-Dibenzo(A,D)-Cycloheptene, 98% | 833-48-7 |
| Thallium (I) Sulfate, 99.9+% | 7446-18-6 |
| N-(2,6-Dimethylphenylcarbamoyl-Methyl)-Iminodiacetic Acid, 99% | 59160-29-1 |
| P-(Dimethylamino)cinnamic Acid, 99% | 1552-96-1 |
| Biebrich Scarlet, 99% (UV-VIS) | 4196-99-0 |
| 4-Chlorobenzenediazonium hexafluoro- phosphate | 1582-27-0 |
| Ammonium hexachloroiridate(IV), 99.99% | 16940-92-4 |
| Methylamine-d2 deuteriochloride, 98+ atom % D | 593-51-1 |
| 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99% | 72-55-9 |
| Nitro red | 56431-61-9 |
| Methyl 2,3-dichlorobenzoate, 98+% | 2905-54-6 |
| Isopropyl Bromoacetate, 98% (GC) | 29921-57-1 |
| 1-Iodo-4-Nitrobenzene, 99% | 636-98-6 |
| 4-Ethylcyclohexanol, 99% cis/trans mixture | 4534-74-1 |
| Fluorescamine | 38183-12-9 |
| Tris(2,2,6,6-Tetramethyl-3,5-Heptanedionato)Dysprosium(III), 99+% | 15522-69-7 |
| 3-Amino-2,2,5,5-Tetramethyl-1-Pyrrolidinyloxy, 99% (Titr.) | 34272-83-8 |
| 3,4-Dihydroxyphenylacetic Acid,98% | 102-32-9 |

# International Chemical Safety Cards

## DDT

**ICSC: 0034**

Dichlorodiphenyltrichloroethane
1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane
1,1'-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)
p,p'-DDT
$C_{14}H_9Cl_5$
Molecular mass: 354.5

ICSC # 0034
CAS # 50-29-3
RTECS # KJ3325000
UN # 2761
EC # 602-045-00-7
April 20, 2004 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire. | NO open flames. | Powder, water spray, foam, carbon dioxide. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! | |
| **•INHALATION** | Cough. | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. | Safety goggles, or eye protection in combination with breathing protection if powder. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Tremors. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Paresthesias. Hyperexcitability. Convulsions. | Do not eat, drink, or smoke during work. Wash hands before eating. | Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles. | Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs See Chemical Dangers. | Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## DDT

**ICSC: 0034**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS CRYSTALS WHITE POWDER.
TECHNICAL PRODUCT IS WAXY SOLID.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
On combustion, forms toxic and corrosive fumesincludinghydrogen chloride. Reacts with aluminium and iron.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 1 mg/m³ as TWA A3 (ACGIH 2004).
MAK: 1 mg/m³ H
Peak limitation category: II(8)
(DFG 2003).
OSHA PEL: TWA 1 mg/$m^3$ skin
NIOSH REL: Ca TWA 0.5 mg/$m^3$ See Appendix A
NIOSH IDLH: Ca 500 mg/$m^3$ See: 50293

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.

**EFFECTS OF SHORT-TERM EXPOSURE:**
May cause mechanical irritation. The substance may cause effects on the central nervous system , resulting in convulsions and respiratory depression Exposure at high levels may result in death. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

**PHYSICAL PROPERTIES**

Boiling point: 260°C
Melting point: 109°C
Density: 1.6
g/cm3

Solubility in water: poor
Octanol/water partition coefficient as log Pow: 6.36

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

**N O T E S**

Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Consult national legislation. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotane, Zeidane, Dicophane, Neocid are trade names.

Transport Emergency Card: TEC (R)-61GT7-III

**ADDITIONAL INFORMATION**

**ICSC: 0034** **DDT**

# Material Safety Data Sheet

Version 4.2
Revision Date 01/18/2011
Print Date 12/09/2011

## 1. PRODUCT AND COMPANY IDENTIFICATION

| | | |
|---|---|---|
| Product name | : | α-Chlordane |
| Product Number | : | 442449 |
| Brand | : | Supelco |
| Product Use | : | For laboratory research purposes. |

| | | | | |
|---|---|---|---|---|
| Supplier | : | Sigma-Aldrich<br>3050 Spruce Street<br>SAINT LOUIS MO 63103<br>USA | Manufacturer | : Sigma-Aldrich Corporation<br>3050 Spruce St.<br>St. Louis, Missouri 63103<br>USA |
| Telephone | : | +1 800-325-5832 | | |
| Fax | : | +1 800-325-5052 | | |
| Emergency Phone # (For both supplier and manufacturer) | : | (314) 776-6555 | | |
| Preparation Information | : | Sigma-Aldrich Corporation<br>Product Safety - Americas Region<br>1-800-521-8956 | | |

## 2. HAZARDS IDENTIFICATION

### Emergency Overview

**OSHA Hazards**
Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

**GHS Classification**
Acute toxicity, Inhalation (Category 4)
Acute toxicity, Oral (Category 4)
Acute toxicity, Dermal (Category 3)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 3)
Acute aquatic toxicity (Category 1)

**GHS Label elements, including precautionary statements**

Pictogram

Signal word: Danger

Hazard statement(s)

| | |
|---|---|
| H302 + H332 | Harmful if swallowed or if inhaled. |
| H311 | Toxic in contact with skin. |
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |
| H335 | May cause respiratory irritation. |
| H400 | Very toxic to aquatic life. |

Precautionary statement(s)

| | |
|---|---|
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ protective clothing. |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |

P312 Call a POISON CENTER or doctor/ physician if you feel unwell.

**HMIS Classification**

**Health hazard**: 2
**Flammability**: 0
**Physical hazards**: 0

**NFPA Rating**

**Health hazard**: 2
**Fire**: 0
**Reactivity Hazard**: 0

**Potential Health Effects**

**Inhalation** Toxic if inhaled. Causes respiratory tract irritation.
**Skin** Toxic if absorbed through skin. Causes skin irritation.
**Eyes** Causes eye irritation.
**Ingestion** Toxic if swallowed.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Molecular Weight : 208.29 g/mol

| CAS-No. | EC-No. | Index-No. | Concentration |
|---|---|---|---|
| **Chlordane** | | | |
| 5103-71-9 | 225-825-5 | - | - |

## 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

## 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

| | |
|---|---|
| Form | crystalline |
| Colour | colourless |

**Safety data**

| | |
|---|---|
| pH | no data available |
| Melting/freezing point | 93.0 - 94.0 °C (199.4 - 201.2 °F) |
| Boiling point | no data available |
| Flash point | no data available |
| Ignition temperature | no data available |
| Autoignition temperature | no data available |
| Lower explosion limit | no data available |
| Upper explosion limit | no data available |
| Vapour pressure | no data available |

| | |
|---|---|
| Density | no data available |
| Water solubility | no data available |
| Partition coefficient: n-octanol/water | no data available |
| Relative vapour density | no data available |
| Odour | no data available |
| Odour Threshold | no data available |
| Evaporation rate | no data available |

## 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of hazardous reactions**
no data available

**Conditions to avoid**
no data available

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

## 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**

**Oral LD50**
LD50 Oral - rat - 500.0 mg/kg

**Inhalation LC50**
**Dermal LD50**
**Other information on acute toxicity**
no data available

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
no data available

**Germ cell mutagenicity**
no data available

**Carcinogenicity**

| | |
|---|---|
| IARC: | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| ACGIH: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |

**Reproductive toxicity**

no data available

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
no data available

**Aspiration hazard**
no data available

**Potential health effects**

| | |
|---|---|
| **Inhalation** | Toxic if inhaled. Causes respiratory tract irritation. |
| **Ingestion** | Toxic if swallowed. |
| **Skin** | Toxic if absorbed through skin. Causes skin irritation. |
| **Eyes** | Causes eye irritation. |

**Synergistic effects**
no data available

**Additional Information**
RTECS: Not available

## 12. ECOLOGICAL INFORMATION

**Toxicity**

| | |
|---|---|
| Toxicity to fish | LC50 - Lepomis macrochirus (Bluegill) - 0.0074 mg/l - 96 h |

**Persistence and degradability**
no data available

**Bioaccumulative potential**

| | |
|---|---|
| Bioaccumulation | Lepomis macrochirus (Bluegill) - 24 h<br>Bioconcentration factor (BCF): 322 |

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

no data available

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

## 13. DISPOSAL CONSIDERATIONS

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chlordane)
Marine pollutant:
Poison Inhalation Hazard: No

**IMDG**
UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chlordane)
Marine pollutant: Marine pollutant

**IATA**
UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chlordane)

**Further information**
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**OSHA Hazards**
Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

**DSL Status**
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

| | CAS-No. |
|---|---|
| Chlordane | 5103-71-9 |

**SARA 302 Components**
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
Acute Health Hazard

**Massachusetts Right To Know Components**
No components are subject to the Massachusetts Right to Know Act.

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Chlordane | 5103-71-9 | |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Chlordane | 5103-71-9 | |

**California Prop. 65 Components**
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## 16. OTHER INFORMATION

**Further information**

# International Chemical Safety Cards

## CHLORDANE (TECHNICAL PRODUCT)

**ICSC: 0740**

1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene
1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene
$C_{10}H_6Cl_8$
Molecular mass: 409.8

ICSC # 0740
CAS # 57-74-9
RTECS #
UN # 2996
EC # 602-047-00-8
March 26, 1998 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire. | NO open flames. | Alcohol-resistant foam, powder, carbon dioxide. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN! | IN ALL CASES CONSULT A DOCTOR! |
| **•INHALATION** | (See Ingestion). | Breathing protection. | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | MAY BE ABSORBED! | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | Redness. Pain. | Safety goggles face shield or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Confusion. Convulsions. Nausea. Vomiting. | Do not eat, drink, or smoke during work. Wash hands before eating. | Rest. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: chemical protection suit including self-contained breathing apparatus. | Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs bases and incompatible materials See Chemical Dangers. Well closed. Keep in a well-ventilated room. | Do not transport with food and feedstuffs. Severe marine pollutant. Xn symbol N symbol R: 21/22-40-50/53 S: 2-36/37-60-61 UN Hazard Class: 6.1 UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## CHLORDANE (TECHNICAL PRODUCT)

**ICSC: 0740**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
TECHNICAL: LIGHT YELLOW TO AMBER VISCOUS LIQUID

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on burning, on contact with bases producing toxic fumes including phosgene hydrogen chloride Attacks iron, zinc, plastic, rubber and coatings.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.5 mg/m³ as TWA (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
MAK: (Inhalable fraction) 0.5 mg/m³
Peak limitation category: II(8);
skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL: TWA 0.5 mg/m$^3$ skin
NIOSH REL: Ca TWA 0.5 mg/m$^3$ skin See Appendix A
NIOSH IDLH: Ca 100 mg/m$^3$ See: 57749

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.

**EFFECTS OF SHORT-TERM EXPOSURE:**
Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the liver immune system , resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point at 0.27kPa: 175°C
Relative density (water = 1): 1.59-1.63
Solubility in water:
none

Vapour pressure, Pa at 25°C: 0.0013
Octanol/water partition coefficient as log Pow: 2.78

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to soil organisms, honey bees. It is strongly advised that this substance does not enter the environment. The substance may cause long-term effects in the aquatic environment.

**N O T E S**

If the substance is formulated with solvents also consult the ICSCs of these materials. Carrier solvents used in commercial formulations may change physical and toxicological properties. Belt, Chlor Kil, Chlortox, Corodan, Gold Crest, Intox, Kypchlor, Niran, Octachlor, Sydane, Synklor, Termi-Ded, Topiclor, and Toxichlor are trade names. Also consult ICSC 0743 Heptachlor.

Transport Emergency Card: TEC (R)-61GT6-III

**ADDITIONAL INFORMATION**

**ICSC: 0740** **CHLORDANE (TECHNICAL PRODUCT)**



**IMPORTANT LEGAL NOTICE:**

# International Chemical Safety Cards

## DIELDRIN

**ICSC: 0787**

1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo-1,4-exo- 5,8-dimethanonaphthalene
3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2ß,2aalpha,3ß,6ß,6aalpha,7ß,7aalpha)-2,73,6-dimethanonaphth(2,3-b)oxirene
HEOD
$C_{12}H_8Cl_6O$
Molecular mass: 380.9

ICSC # 0787
CAS # 60-57-1
RTECS # IO1750000
UN # 2761
EC # 602-049-00-9
March 26, 1998 Validated


| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire. | | In case of fire in the surroundings: all extinguishing agents allowed. |
| **EXPLOSION** | | | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN! | |
| **•INHALATION** | (See Ingestion). | Ventilation (not if powder). | Fresh air, rest. Refer for medical attention. |
| **•SKIN** | MAY BE ABSORBED! See Ingestion. | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. |
| **•EYES** | | Safety goggles, or face shield. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Convulsions. Dizziness. Headache. Nausea. Vomiting. Muscle twitching. | Do not eat, drink, or smoke during work. Wash hands before eating. | Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Rest. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus). | Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access. | Do not transport with food and feedstuffs.<br>Severe marine pollutant.<br>T+ symbol<br>N symbol<br>R: 25-27-40-48/25-50/53<br>S: 1/2-22-36/37-45-60-61<br>UN Hazard Class: 6.1<br>UN Packing Group: II |

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## DIELDRIN

**ICSC: 0787**

**IMPORTANT DATA**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS CRYSTALS

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on heating producing toxic fumes including hydrogen chloride. Reacts with oxidants and acids. Attacks metal due to the slow formation of hydrogen chloride in storage.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV (as TWA): 0.25 mg/m³, A4 (skin) (ACGIH 1997).
MAK: (Inhalable fraction) 0.25 mg/m³ :
Peak limitation category: II(8)
skin absorption (H); (DFG 2007).
OSHA PEL: TWA 0.25 mg/m$^3$ skin
NIOSH REL: Ca TWA 0.25 mg/m$^3$ skin See Appendix A
NIOSH IDLH: Ca 50 mg/m$^3$ See: 60571

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body through the skin and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance may cause effects on the central nervous system , resulting in convulsions. Medical observation is indicated.

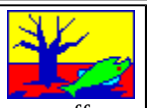
**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.

**PHYSICAL PROPERTIES**

Melting point: 175-176°C
Density: 1.7 g/cm³
Solubility in water: none

Vapour pressure, Pa at 20°C: 0.0004
Octanol/water partition coefficient as log Pow: 6.2

**ENVIRONMENTAL DATA**



The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees, birds. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.

**NOTES**

Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Alvit, Dieldrex, Dieldrite, Illoxol, Octalox, Panoram, and Quintox are trade names. Also consult ICSC #0774, Aldrin.

Transport Emergency Card: TEC (R)-61G41b.
Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

# International Chemical Safety Cards

## CHROMIUM

**ICSC: 0029**

Chrome
Cr
Atomic mass: 52.0
(powder)

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000
October 27, 2004 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Combustible under specific conditions. | No open flames if in powder form. | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! | |
| **•INHALATION** | Cough. | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. | Remove contaminated clothes. Rinse skin with plenty of water or shower. |
| **•EYES** | Redness. | Safety goggles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Rinse mouth. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles. | | R:<br>S: |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0029**



# International Chemical Safety Cards

## CHROMIUM

**ICSC: 0029**

| | | |
|---|---|---|
| **I**<br>**M**<br>**P** | **PHYSICAL STATE; APPEARANCE:**<br>GREY POWDER<br><br>**PHYSICAL DANGERS:**<br>Dust explosion possible if in powder or granular form, mixed with air. | **ROUTES OF EXPOSURE:**<br><br>**INHALATION RISK:**<br>A harmful concentration of airborne particles can be reached quickly when dispersed. |

| | |
|---|---|
| **O R T A N T D A T A** | **CHEMICAL DANGERS:**<br>Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004).<br>MAK not established.<br>OSHA PEL*: TWA 1 mg/m$^3$ See Appendix C *Note: The PEL also applies to insoluble chromium salts.<br>NIOSH REL: TWA 0.5 mg/m$^3$ See Appendix C<br>NIOSH IDLH: 250 mg/m$^3$ (as Cr) See: 7440473<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>May cause mechanical irritation tothe eyesandthe respiratory tract.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** |
| **PHYSICAL PROPERTIES** | Boiling point: 2642°C<br>Melting point: 1900°C<br>Density: 7.15 g/cm³<br><br>Solubility in water:<br>none |
| **ENVIRONMENTAL DATA** | |

**N O T E S**

The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.

**ADDITIONAL INFORMATION**

| | |
|---|---|
| | |

**ICSC: 0029** **CHROMIUM**



| | |
|---|---|
| **IMPORTANT LEGAL NOTICE:** | Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |

# International Chemical Safety Cards

## LEAD

**ICSC: 0052**

Lead metal
Plumbum
Pb
Atomic mass: 207.2
(powder)

ICSC # 0052
CAS # 7439-92-1
RTECS # OF7525000
October 08, 2002 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Not combustible. Gives off irritating or toxic fumes (or gases) in a fire. | | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE. | PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN! | |
| **•INHALATION** | | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | Abdominal pain. Nausea. Vomiting. | Do not eat, drink, or smoke during work. Wash hands before eating. | Rinse mouth. Give plenty of water to drink. Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles. | Separated from food and feedstuffs incompatible materials See Chemical Dangers. | R:<br>S: |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0052**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

# LEAD

**ICSC: 0052**

**I M P O R T A N T D A T A**

**PHYSICAL STATE; APPEARANCE:**
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.05 mg/m³ A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/m³ (EU 2002).
OSHA PEL*: 1910.1025 TWA 0.050 mg/m$^3$ See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH REL*: TWA 0.050 mg/m$^3$ See Appendix C *Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH IDLH: 100 mg/m$^3$ (as Pb) See: 7439921

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation and by ingestion.

**INHALATION RISK:**
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

| | | |
|---|---|---|
| **PHYSICAL PROPERTIES** | Boiling point: 1740°C<br>Melting point: 327.5°C | Density: 11.34 g/cm3<br>Solubility in water: none |
| **ENVIRONMENTAL DATA** | Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.  | |

**N O T E S**

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-51S1872

**ADDITIONAL INFORMATION**

**ICSC: 0052** **LEAD**

# International Chemical Safety Cards

## MERCURY

**ICSC: 0056**

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

ICSC # 0056
CAS # 7439-97-6
RTECS # OV4550000
UN # 2809
EC # 080-001-00-0
April 22, 2004 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Not combustible. Gives off irritating or toxic fumes (or gases) in a fire. | | In case of fire in the surroundings: use appropriate extinguishing media. |
| **EXPLOSION** | Risk of fire and explosion. | | In case of fire: keep drums, etc., cool by spraying with water. |
| **EXPOSURE** | | STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN! | IN ALL CASES CONSULT A DOCTOR! |
| **•INHALATION** | Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature. | Local exhaust or breathing protection. | Fresh air, rest. Artificial respiration if indicated. Refer for medical attention. |
| **•SKIN** | MAY BE ABSORBED! Redness. | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. |
| **•EYES** | | Face shield, or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. Wash hands before eating. | Refer for medical attention. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus. | Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed. | Special material. Do not transport with food and feedstuffs.<br>T symbol<br>N symbol<br>R: 23-33-50/53<br>S: 1/2-7-45-60-61<br>UN Hazard Class: 8<br>UN Packing Group: III |

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## MERCURY

**ICSC: 0056**

| | |
|---|---|
| **IMPORTANT DATA** | **PHYSICAL STATE; APPEARANCE:**<br>ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.<br><br>**PHYSICAL DANGERS:**<br><br>**CHEMICAL DANGERS:**<br>Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV: 0.025 mg/m³ as TWA (skin) A4 BEI issued (ACGIH 2004).<br>MAK: 0.1 mg/m³ Sh<br>Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003).<br>OSHA PEL†: C 0.1 mg/m$^3$<br>NIOSH REL: Hg Vapor: TWA 0.05 mg/m$^3$ skin<br>Other: C 0.1 mg/m$^3$ skin<br>NIOSH IDLH: 10 mg/m$^3$ (as Hg) See: 7439976<br><br>**ROUTES OF EXPOSURE:**<br>The substance can be absorbed into the body by inhalation of its vapour and through the skin , also as a vapour!<br><br>**INHALATION RISK:**<br>A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous systemandkidneys. The effects may be delayed. Medical observation is indicated.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>The substance may have effects on the central nervous system kidneys , resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction. |
| **PHYSICAL PROPERTIES** | Boiling point: 357°C<br>Melting point: -39°C<br>Relative density (water = 1): 13.5<br>Solubility in water:<br>none<br><br>Vapour pressure, Pa at 20°C: 0.26<br>Relative vapour density (air = 1): 6.93<br>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009 |
| **ENVIRONMENTAL DATA** | The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.  |

**N O T E S**

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

**ADDITIONAL INFORMATION**

**ICSC: 0056** **MERCURY**

# International Chemical Safety Cards

## NICKEL

**ICSC: 0062**

Ni
Atomic mass: 58.7
(powder)

ICSC # 0062
CAS # 7440-02-0
RTECS # QR5950000
EC # 028-002-00-7
October 17, 2001 Peer reviewed

| TYPES OF HAZARD/ EXPOSURE | ACUTE HAZARDS/ SYMPTOMS | PREVENTION | FIRST AID/ FIRE FIGHTING |
|---|---|---|---|
| **FIRE** | Flammable as dust. Toxic fumes may be released in a fire. | | Dry sand. NO carbon dioxide. NO water. |
| **EXPLOSION** | Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. | |
| **EXPOSURE** | | PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! | |
| **•INHALATION** | Cough. Shortness of breath. | Local exhaust or breathing protection. | Fresh air, rest. |
| **•SKIN** | | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **•EYES** | | Safety spectacles, or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| **•INGESTION** | | Do not eat, drink, or smoke during work. | Rinse mouth. |

| SPILLAGE DISPOSAL | STORAGE | PACKAGING & LABELLING |
|---|---|---|
| Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles. | Separated from strong acids. | Xn symbol<br>R: 40-43<br>S: 2-22-36 |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0062**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## NICKEL

**ICSC: 0062**

**I**

**PHYSICAL STATE; APPEARANCE:**
SILVERY METALLIC SOLID IN VARIOUS FORMS.

**PHYSICAL DANGERS:**

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation of the dust.

| | |
|---|---|
| **IMPORTANT DATA** | Dust explosion possible if in powder or granular form, mixed with air.<br><br>**CHEMICAL DANGERS:**<br>Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel.<br><br>**OCCUPATIONAL EXPOSURE LIMITS:**<br>TLV:<br>(Inhalable fraction)<br>1.5 mg/m³ as TWA A5 (not suspected as a human carcinogen); (ACGIH 2004).<br>MAK: (Inhalable fraction) sensitization of respiratory tract and skin (Sah);<br>Carcinogen category: 1;<br>(DFG 2004).<br>OSHA PEL*†: TWA 1 mg/m$^3$ *Note: The PEL does not apply to Nickel carbonyl.<br>NIOSH REL*: Ca TWA 0.015 mg/m$^3$ See Appendix A<br>*Note: The REL does not apply to Nickel carbonyl.<br>NIOSH IDLH: Ca 10 mg/m$^3$ (as Ni) See: 7440020<br><br>**INHALATION RISK:**<br>Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.<br><br>**EFFECTS OF SHORT-TERM EXPOSURE:**<br>May cause mechanical irritation. Inhalation of fumes may cause pneumonitis.<br><br>**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**<br>Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans. |
| **PHYSICAL PROPERTIES** | Boiling point: 2730°C<br>Melting point: 1455°C<br>Density: 8.9<br>g/cm3<br><br>Solubility in water:<br>none |
| **ENVIRONMENTAL DATA** | |

**N O T E S**

At high temperatures, nickel oxide fumes will be formed. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

**ADDITIONAL INFORMATION**

**ICSC: 0062** **NICKEL**

# *APPENDIX D*

# *HOSPITAL INFORMATION AND MAP*

# *FIELD ACCIDENT REPORT*

# FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME _____ PROJECT. NO._____

Date of Accident _____ Time _____ Report By _____

Type of Accident (Check One):

( ) Vehicular ( ) Personal ( ) Property

Name of Injured _____ DOB or Age _____

How Long Employed _____

Names of Witnesses _____

_____

Description of Accident _____

_____

_____

Action Taken _____

_____

_____

Did the Injured Lose Any Time? _____ How Much (Days/Hrs.)? _____

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? _____

_____

(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

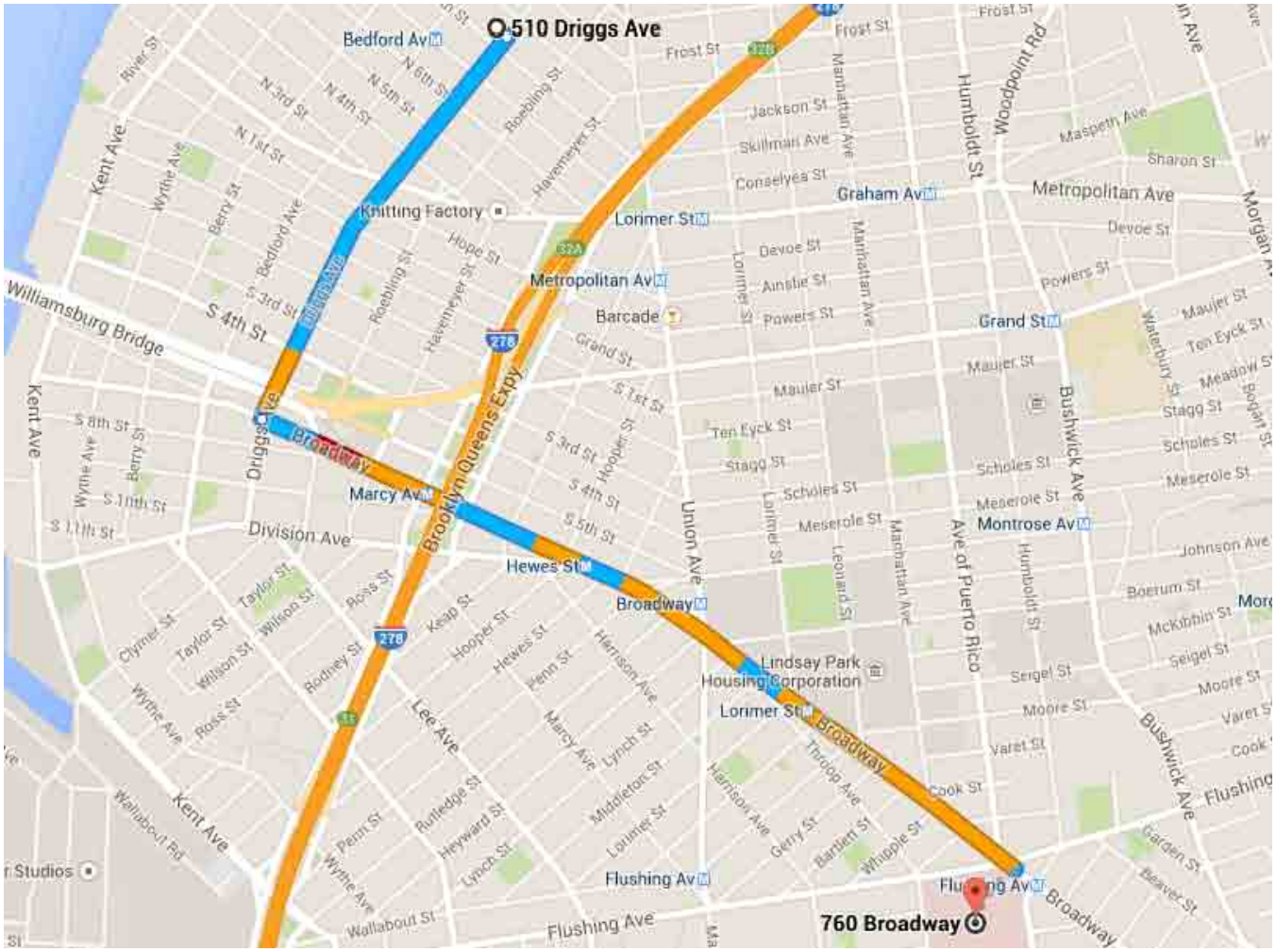
INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

## HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

**WOODHUL MEDICAL CENTER**
760 Broadway, Brooklyn, New York 11206
718-963-8000
1.9 Miles – About 7 Minutes

510 Driggs Ave. Brooklyn, NY 11211
Head southwest on Driggs Ave toward N 8th St
0.7 mi
Turn left onto Broadway
**Destination will be on the right**
1.3 mi
760 Broadway, Brooklyn, NY 11206



# ***ATTACHMENT C***
# *Quality Assurance Project Plan*

# QUALITY ASSURANCE PROJECT PLAN
# FORMER UNIVERSAL TRANSFORMER SITE
# 510 Driggs Avenue, Brooklyn, NY

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**Prepared on behalf of:**

187 North 8 Street Owner LLC
266 Broadway Suite 501
Brooklyn, NY 11211

**Prepared by:**

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
RIDGE, NY 11961

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## QUALITY ASSURANCE PROJECT PLAN
FORMER UNIVERSAL TRANSFORMER SITE
510 Driggs Avenue, Brooklyn, NY



***TABLES***

# 1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared in accordance with DER-10 to detail procedures to be followed during the course of the sampling and analytical portion of the project, as required by the approved work plan.

To ensure the successful completion of the project each individual responsible for a given component of the project must be aware of the quality assurance objectives of his / her particular work and of the overall project. The EBC Project Director, Charles Sosik will be directly responsible to the client for the overall project conduct and quality assurance/quality control (QA/QC) for the project. The Project Director will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities. As Project Director Mr. Sosik will also serve as the Quality Assurance Officer (QAO) and in this role may conduct:

- conduct periodic field and sampling audits;
- interface with the analytical laboratory to resolve problems; and
- interface with the data validator and/or the preparer of the DUSR to resolve problems.

Robert Bennett will serve as the Project Manager and will be responsible for implementation of the IRM and coordination with field sampling crews and subcontractors. Reporting directly to the Project Manager will be the Field Operations Officer, Kevin Waters; who will serve as the on-Site qualified environmental professional who will record observations, direct the field crew and be responsible for the collection and handling of all samples.

## 1.1 Organization

Project QA will be maintained under the direction of the Project Manager, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations listed below, under the direction and coordination of the Project Manager

.

| GENERAL RESPONSIBILITY | SCOPE OF WORK | RESPONSIBILITY OF QUALITY CONTROL |
|---|---|---|
| Field Operations | Supervision of Field Crew, sample collection and handling | K. Waters, EBC |
| Project Manager | Implementation of the RI according to the RIWP. | R. Bennett, EBC |
| Laboratory Analysis | Analysis of soil samples by NYSDEC ASP methods Laboratory | NYSDOH-Certified Laboratory |
| Data review | Review for completeness and compliance | 3rd party validation |


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# 2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

## 2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative Statements that specify the quality of the data required to support decisions; DQOs, as described in this section, are based on the end uses of the data as described in the work plan.

In this plan, Quality Assurance and Quality Control are defined as follows:

- Quality Assurance - The overall integrated program for assuring reliability of monitoring and measurement data.

- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

## 2.2 QA / QC Requirements for Analytical Laboratory

Samples will be analyzed by a New York State Department of Health (NYSDOH) certified laboratory that is certified in the appropriate categories. Data generated from the laboratory will be used to evaluate contaminants such as chlorinated and other volatile organic compounds (VOCs) in soil, soil gas and groundwater. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve required quantification limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 07/2005) and useful for comparison with clean-up objectives. The analytical results meeting the required quantification limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

### *2.2.1 Instrument Calibration*

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of NYSDEC ASP 07/2005).

### *2.2.2 Continuing Instrument Calibration*

The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

### *2.2.3 Method Blanks*

Method blank or preparation blank is prepared from an analyte·free matrix which includes the same reagents, internal standards and surrogate standards as me related samples. II is carried through the


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entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than two (2) times the CRQL of methylene chloride, acetone and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 percent of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

*2.2.4 Trip Blanks.*

Trip blanks consist of a single set of sample containers filled at the laboratory with deionized. laboratory-grade water. The water used will be from the same source as that used for the laboratory method blank. The containers will be carried into the field and handled and transported in the same way as the samples collected that day. Analysis of the trip blank for VOCs is used to identify contamination from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks will be not opened during this procedure.) A complete set of trip blanks will be provided with each shipment of samples to the certified laboratory.

*2.2.5 Surrogate Spike Analysis*

For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NY5DEC ASP protocols for samples falling within the quantification limits without dilution.

*2.2.6 Matrix Spike / Matrix Spike Duplicate / Matrix Spike Blank (MS/MSDIMSB) Analysis*

MS, MSD and MSB analyses will be performed to evaluate the matrix effect of the sample upon the analytical methodology along with the precision of the instrument by measuring recoveries. The MS / MSD / MSB samples will be analyzed for each group of samples of a similar matrix at a rate of 5% (one for every 20 field samples). The RPD will be calculated from the difference between the MS and MSD. Matrix spike blank analysis will be performed to indicate the appropriateness of the spiking solution(s) used for the MS/MSD. 10% of the samples of each matrix should be sampled and anlayzed as Duplicates.

## 2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%REC = \frac{SSR - SR}{SA} \times 100$$

Where:
SSR = spike sample results
SR = sample results
SA = spike added from spiking mix


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## 2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without a Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses.

Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$RPD = \frac{D^1 - D^2}{(D^1 + D^2)/2} \times 100$$

Where:
RPD = relative percent difference
$D^1$ = first sample value
$D^2$ = second sample value (duplicate)

## 2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project.

## 2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the Remedial Investigation Work Plan.

## 2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers, and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP Category B reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.
4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).
6. Matrix spike/matrix spike duplicate/matrix spike blank results.
7. QC check sample and standard recovery results
8. Blank results (field, trip, and method).
9. Internal standard area and RT summary.


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## 2.8 Laboratory Custody Procedures

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into the field logbook. A chain-of-custody form, initiated at the analytical laboratory will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first received blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures

## 2.9 Sample Handling and Decontamination Procedures

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of 4$^{o}$C.

Dedicated disposable sampling materials will be used for both soil and groundwater samples (if collected), eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. No field filtering will be conducted; any required filtration will be completed by the laboratory.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil;
- Rinse with tap water;
- Wash with alconox® detergent solution and scrub ;
- Rinse with tap water;
- Rinse with distilled or deionized water.

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory and duplicate samples will be collected at a rate of one per ten samples submitted to the laboratory.


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# 3.0 ANALYTICAL PROCEDURES

## 3.1 Laboratory Analysis

Samples will be analyzed by the NYSDOH ELAP laboratory for one or more of the following parameters: VOCs + TICs in soil / groundwater by USEPA Method 8260C, SVOCs + TICs in soil / groundwater by USEPA Method 8270D, Target Analyte List (TAL) Metals 6010 in soil and groundwater, pesticides / PCBs by USEPA Method 8081B/8082A and VOCs in air by USEPA Method TO15 (Table 2). If any modifications or additions to the standard procedures are anticipated and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by EBC's PM will be necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).



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# 4.0 DATA REDUCTION, REVIEW, AND REPORTING

## 4.1 Overview

The process of data reduction, review, and reporting ensures the assessments or a conclusion based on the final data accurately reflects actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

## 4.2 Data Reduction

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Analytical results shall be presented on standard NYSDEC ASP-B forms or equivalents, and include the dates the samples were received and analyzed, and the actual methodology used. Note that if waste characterization samples are analyzed they will be in results only format and will not be evaluated in the DUSR.

Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data. Specifics on internal laboratory data reduction protocols are identified in the laboratory's SOPs.

Following receipt of the laboratory analytical results by EBC, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

## 4.3 Laboratory Data Reporting

All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the NYSDEC ASP (7/2005), Category B data deliverable requirements as applicable to the method utilized. All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Note that waste characterization samples, if analyzed, will be in results only format and will not be evaluated in the DUSR.


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## 5.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the EBC PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the field investigation, all changes to the sampling program will be documented in field logs/sheets and the EBC PM advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PM shall be responsible for controlling, tracking, implementing and distributing identified changes.


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**TABLE 1**
**SUMMARY OF**
**SAMPLING PROGRAM RATIONALE AND ANALYSIS**

| Matrix | Location | Approximate Number of Samples | Frequency | Rationale for Sampling | Laboratory Analysis | Duplicates | Matrix Spikes | Spike Duplicates | Trip Blanks |
|---|---|---|---|---|---|---|---|---|---|
| Soil | Site Wide Excavation | 20 | 1 per 900 square feet of excavation base | Endpoint Verification of footing excavations | VOCs EPA Method 8260B, pesticides, SVOCs EPA Method 8270, Pesticides / PCBs by EPA 8081/8082, and TAL Metals EPA 6010 | 1 per day | 1 per 20 samples | 1 per 20 samples | 1 per trip |
| | Excavated Petroleum / CVOC Impacted Soil | 4 | 1 per 800 cy | Waste Characterization for disposal if not stockpiled on site | VOCs EPA Method 8260B, PAHs EPA Method 8270, RCRA metals, pesticides and PCBs by EPA 8081/8082, other as per disposal facility | 0 | 0 | 0 | 0 |
| Soil | Excavated Historic Fill Material | 11 | 1 per 800 cy | Waste Characterization for disposal if not stockpiled on site | VOCs EPA Method 8260B, PAHs EPA Method 8270, RCRA metals, pesticides and PCBs by EPA 8081/8082, other as per disposal facility | 0 | 0 | 0 | 0 |
| | Excavated Uncontaminated Native Soil | 15 | 7 Grabs for 1st 1,000 cy, 2 for each additional 1,000 cy As per CP51 | Clean Verification for disposal if not stockpiled. | VOCs EPA Method 8260B | 0 | 0 | 0 | 0 |
| Soil | Excavated Uncontaminated Native Soil | 6 | 2 Composites for 1st 1,000 cy, 1 for each additional 1,000 cy As per CP51 | Clean Verification for disposal if not stockpiled. | SVOCs, pesticides/and PCBs by EPA 8081/8082, and RCRA metals. | 0 | 0 | 0 | 0 |

## TABLE 2
## SAMPLE COLLECTION AND ANALYSIS PROTOCOLS

| Sample Type | Matrix | Sampling Device | Parameter | Sample Container | Sample Preservation | Analytical Method# | CRQL / MDLH | Holding Time |
|---|---|---|---|---|---|---|---|---|
| Soil | Soil | Scoop Direct into Jar | VOCs | (1) 2 oz Jar | Cool to 4° C HCL | EPA Method 8260 | Compound specific (1-5 ug/kg) | 14 days |
| Soil | Soil | Scoop Direct into Jar | SVOCs | (1) 8 oz jar | Cool to 4° C | EPA Method 8270 BN | Compound specific (1-5 ug/kg) | 14 day ext/40 days |
| Soil | Soil | Scoop Direct into Jar | Pest/PCBs | from 8oz jar above | Cool to 4° C | EPA Method 8081/8082 | Compound specific (1-5 ug/kg) | 14 day ext/40 days |
| Soil | Soil | Scoop Direct into Jar | Metals | from 8oz jar above | Cool to 4° C | TAL Metals | Compound specific (01-1 mg/kg) | 6 months |
| Groundwater | Water | Pump tubing | VOCs | (3) 40 ml vials | Cool to 4° C | EPA Method 8260 | Compound specific (1-5 ug/L) | 14 days |
| Groundwater | Water | Pump tubing | SVOCs | (1) 1 Liter Amber Bottle | Cool to 4° C | EPA Method 8270 BN | Compound specific (1-5 ug/L) | 14 days |
| Groundwater | Water | Pump tubing | Pesticides and PCBs | (2) 1 Liter Amber Bottle | Cool to 4° C | EPA Method 8081 / 8082 | Compound specific (1-5 ug/L) | 14 days |
| Groundwater | water | Pump tubing | Total Metals | (1) 100 ml | HNO3 | TAL Metals | Compound specific (1-5 mg/L) | 6 months |
| Groundwater | water | Pump tubing | Dissolved Metals | (1) 100 ml | None | TAL Metals | Compound specific (1-5 mg/L) | 6 months |

*Notes*:
All holding times listed are from Verified Time of Sample Receipt (VTSR) unless noted otherwise. * Holding time listed is from time of sample collection.
The number in parentheses in the "Sample Container" column denotes the number of containers needed.
Triple volume required when collected MS/MSD samples
The number of trip blanks are estimated.
CRQL / MDL = Contract Required Quantitation Limit / Method Detection Limit.
MCAWW = Methods for Chemical Analysis of Water and Wastes.
NA = Not available or not applicable.

# ***ATTACHMENT D***
# *Community Air Monitoring Plan*

# COMMUNITY AIR MONITORING PLAN

FORMER UNIVERSAL TRANSFORMER SITE
510 DRIGGS AVENUE
BROOKLYN, NY

FEBRUARY - 2016

**COMMUNITY AIR MONITORING PLAN**
**TABLE OF CONTENTS**
**510 Driggs Avenue, Brooklyn, NY**

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## *APPENDICES*

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## 1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been prepared for the excavation and construction activities to be performed under a Remedial Action Work Plan (RAWP) at 510 Driggs Avenue, in Brooklyn, NY. The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the investigation activities) from potential airborne contaminant releases resulting from excavation activities at the site.

Compliance with this CAMP is required during all activities associated with soil disturbance activities that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). These activities include excavation and loading of affected soil. This CAMP has been prepared to ensure that remedial activities do not adversely affect passersby, residents, or workers in the area immediately surrounding the Site and to preclude or minimize airborne migration of site-related contaminants to off-site areas.

### 1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan as presented in DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC May 3, 2010). This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air.

## 2.0 AIR MONITORING

Petroleum volatile organic compounds (VOCs), chlorinated VOCs, semi-volatile organic compounds (SVOCs), metals and pesticides are the constituents of concern at the Site. The appropriate method to monitor air for these constituents during remediation activities is through real-time VOC and air particulate (dust) monitoring.

### 2.1 Meteorological Data

At a minimum, wind direction will be evaluated at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to position the monitoring equipment in appropriate upwind and downwind locations.

### 2.2 Community Air Monitoring Requirements

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before activities begin. These points will be monitored periodically in series during the site work. When the excavation area is within 20 feet of potentially exposed populations or occupied structures, the perimeter monitoring points will be located to represent the nearest potentially exposed individuals at the downwind location and will take into account the locations of ventilation system intakes of nearby structures.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor (or equivalent). Air will be monitored for VOCs with a portable Ionscience 3000 photoionization detector (PID), or equivalent. All air monitoring data will be documented in a site log book by the designated site safety officer. The site safety officer or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is required, the protocols will be developed and appended to this plan

## 3.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present.

The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in Appendix A, will be completed.

### 3.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during remediation activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- limiting the excavation size;
- limiting the drop-height when loading soil into trucks;
- spraying chemical odorants onto the soil;
- covering soil stockpiles with 6-mil plastic sheeting or tarps;
- hauling waste materials in properly tarped containers; and/or
- applying vapor suppressant foam.

## 4.0 PARTICULATE MONITORING

Air monitoring for particulates (i.e., dust) will be performed continuously during excavation and loading activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring equipment capable of measuring particulate matter smaller than 10 microns ($PM_{10}$) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately four to five feet above land surface (i.e., the breathing zone). Monitoring equipment will be MIE Data Ram monitors, or equivalent. The audible alarm on the particulate monitoring device will be set at 90 micrograms per cubic meter ($\mu g/m_3$). This setting will allow proactive evaluation of worksite conditions prior to reaching the action level of 100 $\mu g/m^3$ above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive work activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind PM-10 particulate level is 100 $\mu g/m^3$ greater than background (upwind perimeter) for the 15-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work must be stopped and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in Section 2.3.1 below) and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report as shown in **Appendix A** will be completed.

### 4.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than 100 $\mu g/m^3$ at any time during remediation activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- limiting the excavation size;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with plastic sheeting or tarps;
- Use of gravel paths / roadways;
- hauling waste materials in properly tarped containers; and/or
- limiting vehicle speeds onsite.

Work may continue with dust suppression techniques provided that downwind $PM_{10}$ levels are not more than 150 $\mu g/m^3$ greater than the upwind levels.

There may also be situations where the dust is generated by remediation activities and migrates to downwind locations, but is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed leaving the working area, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below 150 $\mu g/m^3$, or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review.


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# 5.0 DATA QUALITY ASSURANCE

## 5.1 Calibration

Instrument calibration shall be documented on instrument calibration and maintenance sheets or in the designated field logbook. All instruments shall be calibrated as required by the manufacturer. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

## 5.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SSO for reference.

## 5.3 Data Review

The SSO will interpret all monitoring data based the established criteria and his/her professional judgment. The SSO shall review the data with the PM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PM.

## 6.0 RECORDS AND REPORTING

All air readings must be recorded on daily air monitoring log sheets and made available for review by personnel from NYSDEC and NYSDOH.


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# ***APPENDIX A***
# ***ACTION LIMIT REPORT***

**CAMP**
**ACTION LIMIT REPORT**

Project Location: _____

Date: _____ Time: _____

Name: _____

Contaminant: _____ PM-10: _____ VOC: _____

Wind Speed: _____ Wind Direction: _____

Temperature: _____ Barometric Pressure: _____

**DOWNWIND DATA**

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

**UPWIND DATA**

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

**BACKGROUND CORRECTED LEVELS**

Monitor ID #: Location: _____ Level Reported: Level Reported: _____

**ACTIONS TAKEN**

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# ***ATTACHMENT E***
# *Citizen Participation Plan*

New York State Department of Environmental Conservation

## Brownfield Cleanup Program

# Citizen Participation Plan

**for**

# FORMER STERLING TRANSFORMER SITE

**510 Driggs Avenue**
**Brooklyn, NY 11211**

February 2015

# Contents



* * * * *

**Note:** The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **187 N. 8th Street Owner LLC**
Site Name: **Former Sterling Transformer ("Site")**
Site Address: **510 Driggs Avenue**
Site County: **Kings**
Site Number: **C224203**

## 1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants that conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: http://www.dec.ny.gov/chemical/8450.html.

## 2. Citizen Participation Activities

*Why NYSDEC Involves the Public and Why It Is Important*

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision-makers form or adopt final positions.

Involving citizens affected and interest in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment;

- Improving public access to, and understanding of, issues and information related to a particular site and that Site's investigation and cleanup process;

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process;

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community; and

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision-making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the Site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

*Project Contacts*

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the Site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

*Locations of Reports and Information*

The locations of the reports and information related to the Site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC website. If this occurs, NYSDEC will inform the public in fact sheets distributed about the Site and by other means, as appropriate.

*Site Contact List*

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the Site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the Site is located;
- Residents, owners, and occupants of the Site and properties adjacent to the Site;
- The public water supplier which services the area in which the Site is located;
- Any person who has requested to be placed on the site contact list;

- The administrator of any school or day care facility located on or near the Site for purposes of posting and/or dissemination of information at the facility; and
- Location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

*CP Activities*

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the Site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

- **Document repositories** allow the public to access and review project documents including investigation and cleanup work plans and final reports.

The public is encouraged to contact project staff at any time during the Site's investigation and cleanup process with questions, comments, or requests for information. This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

*Technical Assistance Grant*

NYSDEC must determine if the Site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the Site, as described in Section 5.

If the Site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to

interpret and understand existing environmental information about the nature and extent of contamination related to the Site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the Site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the Site.

For more information about TAGs, go online at http://www.dec.ny.gov/regulations/2590.html.

**Note: The table identifying the citizen participation activities related to the Site's investigation and cleanup program follows on the next page:**

| Citizen Participation Requirements (Activities) | Timing of CP Activity(ies) |
|---|---|
| **Application Process:** | |
| • Prepare site contact list<br>• Establish document repositories | At time of preparation of application to participate in the BCP. |
| • Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period<br>• Publish above ENB content in local newspaper<br>• Mail above ENB content to site contact list<br>• Conduct 30-day public comment period | When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time. |
| **After Execution of Brownfield Site Cleanup Agreement:** | |
| • Prepare Citizen Participation (CP) Plan | Before start of Remedial Investigation |
| **Before NYSDEC Approves Remedial Investigation (RI) Work Plan:** | |
| • Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan<br>• Conduct 30-day public comment period | Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet. |
| **After Applicant Completes Remedial Investigation:** | |
| • Distribute fact sheet to site contact list that describes RI results | Before NYSDEC approves RI Report |
| **Before NYSDEC Approves Remedial Work Plan (RWP):** | |
| • Distribute fact sheet to site contact list about proposed RWP and announcing 45-day public comment period<br>• Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager)<br>• Conduct 45-day public comment period | Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period. |
| **Before Applicant Starts Cleanup Action:** | |
| • Distribute fact sheet to site contact list that describes upcoming cleanup action | Before the start of cleanup action. |
| **After Applicant Completes Cleanup Action:** | |
| • Distribute fact sheet to site contact list that announces that cleanup action has been completed and that summarizes the Final Engineering Report<br>• Distribute fact sheet to site contact list announcing issuance of Certificate of Completion (COC) | At the time NYSDEC approves Final Engineering Report. These two fact sheets are combined if possible if there is not a delay in issuing the COC. |

## 3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the Site. Additional major issues of public concern may be identified during the course of the Site's investigation and cleanup process.

The Site is not located in an Environmental Justice Area. Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

The major issues of concern to the public will be potential impacts of nuisance odors and dust during the removal of affected soil at the Site. Another example of a major issue of public concern would be the impact of increased truck traffic on the surrounding neighborhood. Construction safety issues will also be addressed.

This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to monitor the potential for exposure including a Health and Safety Plan (HASP) and a Community Air Monitoring Plan (CAMP) are required components of the remedial program. Implementation of these plans will be under the direct oversight of the NYSDEC and the New York State Department of Health (NYSDOH).

These plans will specify the following worker and community health and safety activities during remedial activity at the Site:

- On-site air monitoring for worker protection;
- Perimeter air monitoring for community protection;
- The use of odor, vapor, and dust controls, such as water or foam sprays, as needed;
- Monitoring and control of soil, sediments, and water generated during remediation; and
- Truck routes which avoid residential streets.

The HASP and the CAMP will be prepared as part of the Remedial Action Work Plan (RAWP) and will be available for public review at the document repository as identified in Appendix A (page 11).

Furthermore, the Applicant has prepared a Scoping Sheet for Major Issues of Public Concern which will assist them in identifying any concerns. Experience from similar projects, 311 complaints and other construction projects in the area will help in identifying such issues.

## 4. Site Information

Appendix C contains a map identifying the location of the Site.

*Site Description*

The street address for the Site is 510 Driggs Avenue, Brooklyn, NY. The Site is located in the Williamsburg neighborhood of Brooklyn and is comprised of a single tax parcel totaling 17,500 square feet (0.40 acres). The Site has approximately 175 ft of street frontage on Driggs Avenue and 100 feet of street frontage on N. 8th Street. Currently the property is a vacant lot surrounded by an 8 foot high chain link fence. The Site was previously used as a warehouse, transformer manufacturer, a chair manufacturer and a garage with underground tanks. The Site is currently owned by 158 North 8 Street Owner LLC.

The area surrounding the Site includes commercial (manufacturing) and a mixed-use (1st floor retail) to the east, mixed use buildings to the north, mixed-use buildings and a parking lot to the south and single family residential homes to the west. There are no schools or daycare centers in the immediate area of the Site, however there are several schools located to the south and southeast within 1,200 ft of the Site.

The elevation of the Site is ranges from 18 to 21 feet above the National Geodetic Vertical Datum (NGVD). The area topography gradually slopes to the north. The depth to groundwater beneath the Site is approximately 12 feet below grade. Based on regional groundwater elevation maps, groundwater flows to the north.

*History of Site Use, Investigation, and Cleanup*

The Site is currently owned by the 187 North 8 Street Owner LLC. The property is a vacant lot and has been so since 2006. The Requestor purchased the property in October 2014.The property was most recently occupied by a parking company.

The Site was originally developed prior to 1887 with three single family residential homes. Between 1905 and 1916, the northern portion of the site was developed with a commercial storage building. By 1942, southern portions of the site were developed with a garage in which underground gasoline tanks were present. Between 1942 and 1951, the garage was converted to an industrial building and occupied by a chair manufacturer. The chair manufacturer was replaced by a transformer manufacturer (Sterling Transformer) circa 1965 and later by a food warehouse circa 1991. Both buildings were demolished in 2006 and replaced with the existing parking lot.

A Phase II investigation performed at the Site in October 2014 identified petroleum contamination associated with underground gasoline tanks. As a result a spill (No. 1407145) was reported to the DEC on October 8, 2014. The field work portion of the Phase II was performed on September 30, 2014 and included the installation of three soil borings and three groundwater samples. Shallow soil samples were analyzed for RCRA metals, TCLP lead and PCBs. Deep samples, from the water table interface, could only be obtained from two borings and were analyzed for VOCs by USEPA 8260 and SVOCs by USEPA 8270. Groundwater samples were analyzed for VOCs only. Laboratory services were provided by Phoenix Environmental Laboratories of Manchester, CT 06040, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11301).

The depth to groundwater at the site is approximately 12 feet below grade. Soil at the site is described as historic fill materials to a depth of approximately 15 feet below the surface followed by native brown fine sand with silt and some clay.

Laboratory results identified petroleum VOCs including benzene above Restricted Residential Soil Cleanup Objectives (SCOs) and trimethylbenzene, ethylbenzene, toluene and xylene above unrestricted and groundwater protection SCOs. The concentration of total VOCs (when including naphthalene) were reported as high as 1,173,800 ug/kg. SVOCs including chysene, fluoranthene, fluorine, ideno(1,2,3-cd)pyrene, naphthalene, phrenanthene and pyrene were all reported above Restricted Residential SCOs. Total SVOCs were reported at 4,358,000 ug/kg at the B3 location.

VOCs were reported in all three groundwater samples above water quality standards and included both petroleum and chlorinated solvent compounds. Total petroleum VOCs were reported to 20,850 ug/L with chlorinated VOCs to 1,027 ug/L.

## 5. Investigation and Cleanup Process

*Application*

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program (BCP) as a Volunteer. This means that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the Site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination on-site, and must conduct a qualitative exposure assessment, a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the Site and to contamination that has migrated from the Site.

The Applicant proposes that the Site will be used for the construction of a new 7-story mixed-use commercial residential building which will cover the entire Site. Plans include a full height basement level requiring excavation of the entire Site to a depth of 14 ft below grade. The basement level will be used for parking with a FRESH program super market occupying the first floor. Floors 2 to 7 will be residential apartments.

To achieve this goal, the Applicant will conduct investigation and cleanup activities at the Site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement (BCA) executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the Site.

*Investigation*

The Applicant completed a partial site investigation before it entered into the BCP. For the partial investigation, NYSDEC will determine if the data are useable.

The site investigation has several goals:

1. Define the nature and extent of contamination in soil, surface water, groundwater and any

other parts of the environment that may be affected;
2. Identify the source(s) of the contamination;
3. Assess the impact of the contamination on public health and the environment; and
4. Provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

When the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the Site poses a significant threat to public health or the environment. If the Site is a significant threat, it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the Site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

*Remedy Selection*

When the investigation of the Site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the Site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a Certificate of Completion (COC) (described below) to the Applicant.

**or**

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a Remedial Work Plan. The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the Site.

When the Applicant submits a proposed Remedial Work Plan for approval, NYSDEC would announce the availability of the proposed plan for public review during a 45-day public comment period.

*Cleanup Action*

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a Final Engineering Report (FER) that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the Site.

*Certificate of Completion*

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the Site, it will approve the FER. NYSDEC then will issue a COC to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the Site after it receives a COC.

*Site Management*

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management may be conducted by the Applicant under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the Site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan (SMP).

An institutional control is a non-physical restriction on use of the Site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the Site suitable for some, but not all uses.

An engineering control is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that is pumping and treating groundwater. Site management continues until NYSDEC determines that it is no longer needed.

# Appendix A
# Project Contacts and Locations of Reports and Information

## Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

**New York State Department of Environmental Conservation (NYSDEC):**

Conor Shea, P.E.
Environmental Engineer I.
New York State Department of
Environmental Conservation
625 Broadway
Albany, New York 12233-7015
Tel: (518) 402-9592
Email: conor.shea@dec.ny.gov

Thomas Panzone
Regional Citizen Participation Specialist
NYSDEC Region 2
Office of Communications Services
47-40 21st Street
Long Island City, NY 11101-5407
Tel: (718) 482-4953
Email: thomas.panzone@dec.ny.gov

**New York State Department of Health (NYSDOH):**

Steven Karpinski
New York State Department of Health
Bureau of Environmental Exposure Investigation
Empire State Plaza – Corning Tower Room 1787
Albany, New York 12237
Tel: (518) 402-7860
Email: steven.karpinski@health.ny.gov

## Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

**Brooklyn Public Library – Leonard Branch**
81 Devoe Street, Brooklyn, NY 11211
(718) 486-3365

Hours: Sunday: Closed
Monday: 10am- 6pm
Tuesday: 1pm- 8pm
Wednesday, Thursday & Friday: 10am- 6pm
Saturday: 10am – 5pm

**Brooklyn Community Board 1**
435 Graham Avenue,
Brooklyn, NY 11211
Phone: 718-389-0009
Fax: 718-389-0098
Email: bk01@cb.nyc.gov
Chair: Dealice Fuller

# Appendix B - Site Contact List

**Local Government Contacts:**

Hon. Bill de Blasio
Mayor of New York City
City Hall
New York, NY 10007

Hon. Eric Adams
Brooklyn Borough President
209 Joralemon Street
New York, NY 11201

Ms. Dealice Fuller
Chair, Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, NY, 11211

Mr. Gerald Esposito
District Manager, Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, NY, 11211

Stephen Levin NYC Council Member
33rd District
410 Atlantic Avenue
Brooklyn, NY 11217

Carl Weisbrod
Commissioner, NYC Dept. of City Planning
22 Reade St.
Third Floor
New York, NY 10007

Keith Bray
New York City Department of Transportation
Brooklyn Borough Commissioner
55 Water Street, 9th Floor
New York, NY 10041

Kings County Clerk's Office
Nancy Sunshine, County Clerk
360 Adams Street, Room 189
Brooklyn, NY 11201

Hon. Letitia James
Public Advocate
1 Centre Street, 15th Floor
New York, NY 10007

Hon. Scott M. Stringer
Office of the Comptroller
1 Centre Street
New York, NY 10007

Hon. Jose Peralta
NYS Senator
32-37 Junction Boulevard
East Elmhurst, NY 11369

Hon. Joan L. Millman
NYS Assembly Member
341 Smith Street
Brooklyn, NY 11231

Hon. Charles Schumer
U.S. Senator
780 Third Avenue, Suite 2301
New York, NY 10017

Hon. Kirsten Gillibrand
U.S. Senator
780 Third Avenue, Suite 2601
New York, NY 10017

Hon. Nydia M. Velazquez
U.S. House of Representatives
266 Broadway, Suite 201
Brooklyn, NY 11211

John Wuthenow
Office of Environmental Planning & Assessment
NYC Dept. of Environmental Protection
96-05 Horace Harding Expressway
Flushing, NY 11373

Nilda Mesa, Director
NYC Office of Environmental Coordination
100 Gold Street– 2nd Floor
New York, NY 10038

Daniel Walsh
NYC Department of Environmental Remediation
100 Gold Street – 2nd Floor
New York, NY 10038

**Adjacent Property Owner Contacts**

Contact information for the identified owners, as listed in the New York City ACRIS Database, are as follows:

*South*

1. 537 DRIGGS AVENUE LLC
   537 DRIGGS AVE.
   BROOKLYN, NY 11211-2909

   OCCUPANT
   537 DRIGGS AVE.
   BROOKLYN, NY 11211-2909

2. NORTHSIDE STUDIOS, I.
   7 HEMLOCK DR.
   GLEN HEAD, NY 11545-3324

   OCCUPANT
   530 DRIGGS AVE.
   BROOKLYN, NY 11211

3. OWNER /OCCUPANT
   188 N. 8TH ST.
   BROOKLYN, NY 11211-2006

*West*

4. OWNER /OCCUPANT
   185 N. 8TH ST.
   BROOKLYN, NY 11211-2005

5. 194 NORTH 9TH PARTNERS, LLC
   450 LEXINGTON AVENUE APT. 31ST FLOOR
   NEW YORK, NY 10017

   OCCUPANT
   194 NORTH 9TH STREET
   BROOKLYN, NY 11211

*North*

6. OWNER /OCCUPANT
   75 BERRY ST.
   BROOKLYN, NY 11249-1917

AGENT
506 DRIGGS ACE.
BROOKLYN, NY 11211

*East*

7. 505 DRIGGS AVENUE LLC
505 DRIGGS AVE.
BROOKLYN, NY 11211-2020

OWNER/OCCUPANT
505 DRIGGS AVE
BROOKLYN, NY 11211-2020

8. OWNER /OCCUPANT
197 N. 8TH ST.
BROOKLYN, NY 11211-2007

**Local News Media**

**The Brooklyn Paper**
One Metrotech Center, Suite 1001
Brooklyn, NY 11201
(718) 260-4504

**New York Daily News**
4 New York Plaza
New York, NY 10004

**New York Times**
620 Eighth Ave.
New York, NY 10018

**New York Post**
1211 Avenue of the Americas
New York, NY 10036-8790

**Public Water Supplier**

Hon. Emily Lloyd, Commissioner
New York City Department of Environmental Protection
59-17 Junction Boulevard
Flushing, NY 11373

**Requested Contacts**

No requests have been made at this time.

**Schools and Daycare Facilities**

1. Williamsburg Northside School
   70 Havemeyer St New York, NY 11211
   (718) 599-7300
   Attn: Gina Farrara

2. Brooklyn Preparatory High School
   257 North 6th Street New York, NY 11211
   (718) 486-2550
   Attn: Noah Lansner

3. Williamsburg High School for Architecture and Design
   257 N 6th St Brooklyn, New York 11211
   (718) 388-1260
   Attn: Gill Cornell

4. Conselyea Preparatory School
   208 N 5th St Brooklyn, New York 11211
   (718) 486-6221
   Attn: Maria Masullo

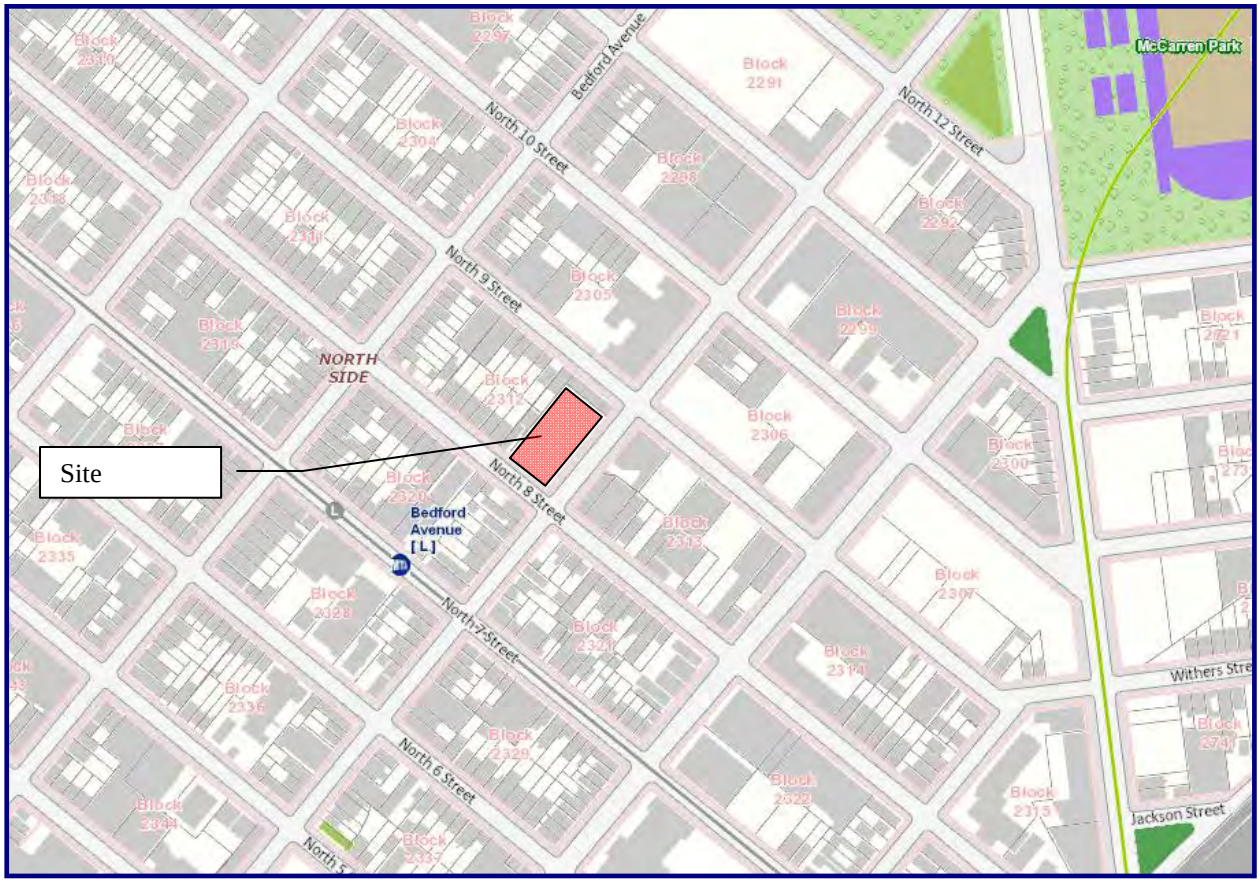
5. P.S. 377 Alejandina B De Gautier
   200 Woodbine Street New York, NY 11221
   718-574-0325
   Attn: Dominic Zagami

6. Chabad of North Brooklyn
   132 North 5th Street Brooklyn, NY 11211
   (718) 388-0748
   Attn: Rabbi Shmuel Lein

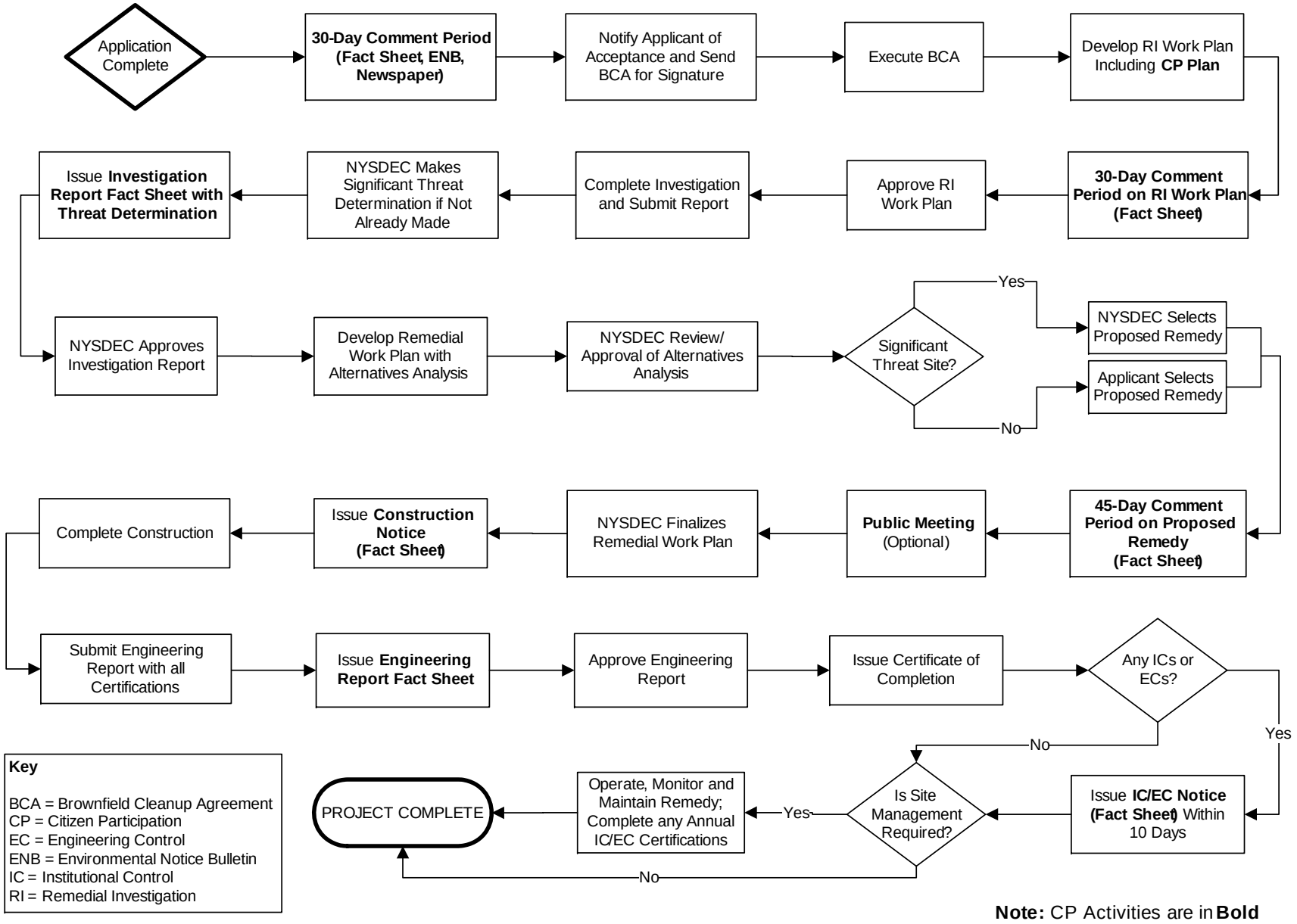
7. North Side Catholic Academy St Vincent
   180 N 7th St Brooklyn, New York 11211
   (718) 384-3496
   Omit - School is Closed

8. Williamsburg Northside Preschool
   152 N. 5$^{th}$ Street, Brooklyn, NY 11211
   (718) 599-7300
   Attn: Gina Farrar

# Appendix C - Site Location Map



# Appendix D– Brownfield Cleanup Program Process




**Note:** CP Activities are in **Bold**

# ***ATTACHMENT F***
# ***Resumes***

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

# Charles B. Sosik, PG, PHG, Principal

## Professional Experience

24 years

## Education

MS, Hydrogeology, Adelphi University, NY
BS, Geology, Northern Arizona University, AZ

## Areas of Expertise

- Brownfields Redevelopment
- Hazardous Waste Site Investigations
- Pre-purchase Site Evaluations and Support
- Regulatory Negotiations
- Remedial Planning and "Cost to Cure" Analysis
- Strategic Planning
- Real Estate Transactions
- NYC "E" Designations

## Professional Certification

- Professional Geologist, NH
- Professional Geologist, Hydrogeologist, WA
- OSHA 40-hr HAZMAT
- OSHA 8-hr. Supervisor

## Professional Affiliation / Committees

- NYS Council of Professional Geologists (NYSCPG)
- Association of Groundwater Scientists & Engineers (AGSE)
- NYS RBCA Advisory Committee
- Massachusetts LSP Association
- New Hampshire Association of Professional Geologists
- Interstate Technology Regulatory Council/MTBE Team
- Environmental Business Association, Brownfields Task Force
- Part 375 Working Group

## PROFILE

Mr. Sosik has 24 years of experience in environmental consulting. He specializes in advising clients on managing environmental compliance with federal, state, and municipal agencies and has successfully directed numerous investigation and remediation projects involving petroleum, pesticides, chlorinated solvents, heavy metals and radiologically activated media. His work included extensive three-dimensional investigations on MTBE, which have been used effectively to help shape public policy. He also has experience in applying models to groundwater related problems and has completed several large-scale projects to determine fate and transport of contaminants, establish spill scenarios, and closure criteria. His experience and expertise in the area of contaminant hydrogeology has resulted in requests from environmental attorneys, property owners and New York State to serve as an expert witness and technical advisor on a variety of legal disputes.

For the past 10 years Mr. Sosik has been primarily engaged in providing environmental consulting to developers responding to the extensive re-zoning of former industrial and commercial properties, which is currently taking place throughout New York City. These services include everything from pre-purchase evaluations and contract negotiations to gaining acceptance in and moving projects through the NYS Brownfields Program. Mr. Sosik has taken a pro-active role in the continued development of the NYS Brownfields Program and related policy, by attending numerous working seminars, active participation in work groups and task forces and by providing commentary to draft versions of new guidance documents. Throughout his professional career, Mr. Sosik has remained committed to developing innovative cost- efficient solutions to environmental issues, specifically tailored to the needs of his clients.

## SELECTED PROJECTS

### Scavenger Waste Treatment Facility (SWTF), Suffolk County, NY

Water Treatment Plant EIS - Focused EIS - In response to requests from the Suffolk County Council on Environmental Quality and the Brookhaven Conservation Advisory Council, Mr. Sosik prepared a focused EIS to evaluate the potential impacts to an important surface water resource from the proposed facility including cumulative and synergistic effects with established contaminant plumes in the area.

### Advanced Residential Communities, Rockville Centre, NY

Brownfield Project – As the senior project manager on this large scale, high profile redevelopment project, Mr. Sosik was asked to develop a plan to accelerate the regulatory process in the face of general community opposition. Through numerous discussions with the BCP management team, He was able to condense the schedule and review period, through the submission of supporting documents (Investigation Report, Remedial Work Plan) with the BCP application package. Community opposition, which focused on the environmental condition of the site as a means to block the project, was used to advantage in expediting approval of the aggressive interim remedial plan. This will allow the developer to begin remedial work approximately 5 months ahead of schedule.

### Former Temco Uniform site, West Haverstraw, NY

Brownfield Project – Mr. Sosik took over management of this project from another consultant following transition of this VCP site to the BCP. Mr. Sosik used the opportunity to renegotiate and revise the scope of work to allow a more cost effective and focused investigation plan without re-writing or resubmitting the RIWP. During the NYSDEC's review of the transition package, he met with and coordinated changes with the NYSDEC Project Manager to gain approval. The result saved the client a significant amount of money, but perhaps more importantly in this case, did so without loss of time.

### Grovick Properties, Jackson Heights, NY

Brownfield Project – This Brownfield property is somewhat unique in that it had been investigated and partially remediated by the NYSDEC through the petroleum spill fund. The client was interested in purchasing the property and redeveloping it as office and retail space. Mr. Sosik reviewed the NYSDEC investigation and developed a

supplemental plan to meet the requirements of an RI under the BCP program. By performing this limited amount of field work "up-front" he was able to complete an RI Report and Remedial Plan and submit both with the BCP application package. The NYSDEC and NYSDOH approved the RI Report and the Remedial Plan with minor changes. This cut 120 days from the review process and allowed the client to arrange financing and move his project forward knowing what the clean-up costs would be at the outset.

Metro Management, Bronx, NY

Brownfield Project – The site of a former gas station, the developer had planned to construct a 12-story affordable housing apartment complex with first floor retail space. Since the site was located in an Environmental zone, potential tax credits of 22% for site development, remediation and tangible property could be realized under the BCP. In a pre-application meeting with the NYSDEC, Mr. Sosik realized that the department did not believe the site was eligible for the BCP, since it had been previously investigated and closed under the spills program.

Mr. Sosik assisted the developer in securing financing, and due to the demands of an aggressive construction schedule developed an Interim Remedial Measure (IRM), based on chemical oxidation treatment. Working closely with the clients environmental counsel, Mr. Sosik was able to get the IRM approved without a public comment period. Implementation of the IRM is currently underway.

The project was awarded the 2009 NYC Brownfield Award for Innovation.

Brandt Airflex, NY

Technical Consulting Services - Mr. Sosik provided senior level technical advice and strategic planning in developing an off-site RI/FS for the site, in negotiating a tax reduction for the property due to the environmental condition and in preparing a cost to cure estimate for settlement between business partners. After achieving a favorable tax consideration and settlement agreement for his client

Allied Aviation Services, Dallas, Fort Worth, Airport, Dallas, TX

Jet Fuel Investigation - Mr. Sosik developed and managed an investigative plan to quickly identify the extent and source of jet fuel which was discharging from the Airport's storm drain system to a creek a mile away. Through the use of a refined conceptual model, accelerated investigative techniques and a flexible work plan, he was able to identify the source of the fuel and the migration route within a single week. He then identifled remedial options and successfully negotiated a risk based plan with the Texas regulatory agency that had issued a notice of enforcement action against the facility.

KeySpan – Former LILCO Facilities, Various NY Locations

Pesticide Impact Evaluation - Mr. Sosik developed, negotiated and implemented a site screening procedure to evaluate impact to public health and the environment as the result of past herbicide use at 211 utility sites. Using an unsaturated zone leaching model (PRZM) on a small subset of the sites, he was able to establish mass loading schedules for the remaining sites. This was combined with public well data in a GIS environment to perform queries with respect to mass loading, time transport and proximity to vunerable public supply wells. Using this approach Mr. Sosik was able to show that there were no concerns for future impact. This effort satisfied the public health and resource concerns of the state environmental agency and county health department in a reasonable amount of time and at a fraction of the cost of a full scale investigation.

Former Computer Circuits (Superfund) Site, Hauppauge, NY

CERCLA RI/FS - As Senior Project Manager for the site, he played a major role in regaining control of the investigation activites for the PRP. This action prevented the USEPA from initiating an extensive investigation at the site using a RAC II contractor allowing the client to perform a more efficient investigation. He was involved in all negotiations with EPA and was the project lead in developing a revised site characterization plan (work plan, field sampling plan, quality assurance plan, etc.). By carefully managing all phases of the investigation and continued interaction with each of the three regulatory agencies involved, Mr. Sosik was able to keep the project focused and incrementally reinforce the clients position. The estimated cost of the revised investigation is expected to save the client 1.5 to 2 million dollars.

Sun Oil, Seaford, NY

Remediation Consuliting Services & Project Management - Under an atmosphere of regulatory distrust, political pressure and mounting public hostility toward the client, Mr. Sosik conducted an off-site 3-D investigation to define the extent of contamination and the potential impact on public health. By designing and implementing an aggressive source area remediation program and personal interaction with the public and regulatory agencies, he was able to successfully negotiate a limited off-site remediation favorable to the client. Source area remediation was completed within 6 months and the project successfully closed without damage to the client's public image or working relationship with the regulatory agencies.

Con Edison, Various Locations, NY

Hydrogeologic Consulting Services - Under a general consulting contract, Mr. Sosik conducted detailed subsurface hydrogeologic investigations at five locations to assist in the development of groundwater contingency planning. He also developed and implemented work plans to investigate and remediate existing petroleum, cable fluid, and PCB releases at many of the generating facilities and substations. An important aspect of his role was in assisting the client in strategic planning and negotiations with the regulatory agency.

Keyspan - Tuthill Substation, Aqueboque, NY

Accelerated Site Characterization - Using accelerated site characterization techniques, Mr. Sosik presented the project as a case study in establishing the transport of an herbacide and its metobolites aplied at utility sites in the 1980's The results were then used to establish a screening method for evaluating 211 similar sites controlled by the client in a reasonable and eficient manner.

NYSDEC Spill, East Moriches, NY

Spill Release Analysis - With recognized expertise in the area of gasoline plume development on Long Island, Mr. Sosik was asked by

# Charles B. Sosik, PG, PHG, Principal

the State to establish the release date (and principal responsible party) of an extensive petroleum spill, which impacted a residential neighborhood. He used multiple lines of evidence, and a new EPA model (HSSM), which he has helped to refine, to reconstruct the release scenario and spill date, in support of the State Attorney General's cost recovery effort from the PRP.

Minmilt Realty, Farmingdale, NY

Fate & Transport Modeling - He completed an RI/FS at this location for a PCE plume that had been in transit for over 30 years. Mr. Sosik applied a conservative model to evaluate time/concentration impacts under a variety of transport scenarios to a municipal wellfield located 13,000 feet away. Through the use of the model and careful interpretation of an extensive data set compiled from several sources, Mr. Sosik was able to propose a plan which was both acceptable to the regulator and favorable to the client.

Sebonack Golf Course Project, Town of Southampton, NY

IPM Pesticide Study - Provided professional hydrogeologic services in support of the EIS prepared for the development of the site. The proposed development included an 18-hole golf course, clubhouse, dormitory facility, cottages, associated structures, and a 6,000 square foot research station for Southampton College. Mr. Sosik performed an extensive evaluation (using a pesticide-leaching model) on the effects of pesticide and nitrogen loading to groundwater as part of the projects commitment to an Integrated Pest Management (IPM) approach.

NYSDEC, Spills Division, Regions 1 – 4

Petroleum Spills Investigation & Remediation - As a prime contractor/consultant for the NYSDEC in Regions 1-4, Mr. Sosik has managed the investigation and remediation of numerous petroleum spills throughout the State. Many of these projects required the development of innovative investigation and remediation techniques to achieve project goals. He was also involved in many pilot projects and research studies to evaluate innovative investigation techniques such as accelerated site characterization, and alternative approaches to remediation such as monitored natural attenuation and risk based corrective action.

Sun Oil, E. Meadow, NY

Exposure Assessment - Performed to seek closure of the spill file, despite the presence of contaminants above standards, Mr. Sosik determined after the extended assessment that the level of remaining contamination would not pose a future threat to human health or the environment. He used multiple lines of evidence, and a fate and transport model to show that degradation processes would achieve standards within a reasonable time.

Sand & Gravel Mine, NY

Property Development - As part of the development of a sand and gravel mine, Mr. Sosik provided environmental consulting services to assist in obtaining a mining permit, which would result in the construction of a 150-acre lake. Specifically, Mr. Sosik investigated if the proposed lake would reduce groundwater quantity to domestic and public well fields, and/or accelerate the migration of potential surface contaminants to the lower part of the aquifer. After assuming the lead role in negotiations with the regulatory agency, Mr. Sosik was able to obtain a permit for the client by adequately addressing water quality and quantity issues, and by preparing a monitoring plan and spill response plan, acceptable to all parties.

NYSDEC, Mamaroneck, NY

Site Characterization / Source Identification - In a complex hydrogeologic setting consisting of contaminant transport through fractured metomorphic bedrock and variable overburden materials, Mr. Sosik was able to develop and implement a sub-surface investigation to differentiate and separate the impact associated with each of two sources. The results of this investigation were successful in encouraging the spiller to accept responsibility for the release.

Riverhead Municipal Water District, NY

Site Characterization / Remedial Planning - Using accelerated characterization techniques, he implemented a 3-D site investigation to identify two service stations 4,000 ft. away as the source of contamination impacting a municipal wellfield. In accordance with the strict time table imposed by the need to return the wellfield to production by early spring, he designed and implemented a multi-point (9 RW, 6 IW) recovery and injection well system using a 3-d numerical flow model, and completed the project on time. Using a contaminant transport model, Mr. Sosik developed clean-up goals which were achieved in 9 months of operation, well below the projected 3 to 5 year project duration.

Montauk Fire Department, NY

Site Assessment - Mr. Sosik performed a limited investigation and used a 2-D flow model to demonstrate that the property could not have been the source of contamination which had impacted an adjacent wellfield as per the results of a previous investigation. This small focused effort successfully reversed a $500,000, and rising, claim against the department by the water district and the NYSDEC.

## PREVIOUS EXPERIENCE

P.W. Grosser Consulting, Bohemia, NY
Senior Project Manager, 1999-2006

Environmental Assessment & Remediation, Patchogue, NY
Senior Project Manager, 1994-1999

Miller Environmental Group, Calverton, NY
Project Manager, 1989-1994

DuPont Biosystems, Aston, PA
Hydrogeologist, 1988-1989

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# Charles B. Sosik, PG, PHG, Principal

## EXPERT WITNESS TESTIMONY AND DEPOSITIONS

Fact Witness -Testimony on relative age of petroleum spill based on nature and extent of residual and dissolved components at the Delta Service Station in Uniondale, NY Fall/1999

Expert Witness / Expert Report for defendant in cost recovery case by NYS Attorney General regarding a Class II Inactive Hazardous Waste (State Superfund) project by the NYSDEC (October 2004 – present, Report: March 2005, Deposition: April 2005)

Expert Witness / Fact Witness for plaintiff seeking compensation for partial expenses incurred during the investigation and remediation of a USEPA CERCLA site due to the release and migration of contaminants from an "upgradient" industrial property. (Deposition May 2005, case settled April 2007).

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Holtzville, NY (Deposition April 2005 - case settled).

Expert Witness – Statement of opinion and expert testimony at trial for plaintiff seeking damages from a major oil corporation for contamination under a prior leasing agreement in Rego Park, NY. Case decided in favor of plaintiff. Trial July 2007, in favor of Plaintiff. Qualified as Expert Witness.

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Lindenhurst, NY (Trial date December 2009, in favor of plaintiff. Qualified as Expert Witness.

Expert Witness / Fact Witness for defendant with respect to cost recovery and third party responsibility for a NYSDEC petroleum spill site. (Expert Statement of Fact – October 2005).

Expert Witness for plaintiff seeking damages related to a petroleum spill from the previous owner/operator of a gas station in College Point, NY. Case settled 2009.

Expert Witness for plaintiff (municipal water supply purveyor) seeking damages from major oil companies and manufacturer of MTBE at various locations in Suffolk County, NY. Expert reports July 2007, August 2007 and October 2007, Case settled August, 2008.

Expert Witness - Deposition for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Sag Harbor, NY. August 2002

Expert Witness - for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Riverhead, NY. Case settled July 2008.

Expert Witness for defendant responding to a claim from adjacent commercial property owner on the origin of chlorinated solvents on plaintiff's property located in Cedarhurst, NY. Expert opinion submitted to lead counsel on March 6, 2009, case settled April 2009.

Expert Report - for Attorney General on modeling performed to determine the spill release scenario at a NYSDEC petroleum spill site in East Moriches, NY. June 2000.

## MODELING EXPERIENCE (PARTIAL LISTING)

| PROJECT | MODEL | APPLICATION |
|---|---|---|
| Riverhead Water District, Riverhead, NY | MODFLOW, MODPATH | Remediation system design to intercept MTBE plume and prevent continued impact to municipal well field. |
| NYSDEC - Region 1, Holbrook, NY | MODFLOW, MODPATH | Simulate transport of MTBE plume to predict future impact. |
| NYSDEC - Region 1, East Moriches, NY | HSSM | Evaluate release scenario and start date of petroleum spill in support of cost recovery by NYS AG office. |
| AMOCO, Deer Park, NY | HSSM | Estimate release amount, start date and spill scenario to evaluate the potential for mass unaccounted for |
| Keyspan Energy, Nassau/Suffolk Counties Substations | PRZM | Estimate mass load of simazine used at 211 electric substations and screen sites according to potential for human health and ecological impacts. |
| Saboneck Golf Club, Southampton NY | PRZM | Estimate mass load of proposed pesticides on new golf course to evaluate acceptability under an IPM program. |
| Suffolk County Department of Public Works (SCDPW) Scavenger Waste Treatment Plant, Yaphank, NY | DYNFLOW, DYNTRAC | Evaluate time-transport and nitrogen impact on local river system. |
| SCDPW SUNY Waste Water Treatment Plant, Stony Brook, NY | DYNFLOW, DYNTRAC | Determine outfall location and time-transport of nitrogen from proposed upgrades to an existing wastewater treatment plant |
| Water Authority of Great Neck North Great Neck, NY | MODFLOW, MODPATH, MT3D | Review of modeling study performed by EPA to evaluate potential future impact to Well field from PCE plume. Identified serious flaws in model construction and implementation, which invalidated conclusions |

## PUBLICATIONS / PROFESSIONAL PAPERS

Smart Pump & Treat Strategy for MTBE Impacting a Public Water Supply (14th Annual Conference on Contaminated Soils Proceedings, 1998)

Transport & Transformation of BTEX & MTBE in a Sand Aquifer (Groundwater Monitoring & Remediation 05/1998)

Characteristics of Gasoline Releases in the Water Table Aquifer of Long Island (Petroleum Hydrocarbons Conference Proceedings, 1999)

Field Applications of the Hydrocarbon Spill Screening Model (HSSM) (USEPA Interactive Modeling Web Course www.epa.gov/athens/software/training/webcourse Authored module on model application and applied use of calculators, 02/2000)

Comparative Evaluation of MTBE Sites on Long Island, US EPA Workshop on MTBE Bioremediation (Cincinnati, 02/2000)

Comparison of Four MTBE Plumes in the Upper Glacial Aquifer of Long Island (American Geophysical Union, San Francisco, 12/1996)

Analysis and Simulation of the Gasoline Spill at East Patchogue, New York (American Geophysical Union, San Francisco, 12/1998)

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## ARIEL CZEMERINSKI, P.E.

Mr. Czemerinski is a New York State Professional Engineer and CEO of AMC Engineering PLLC an EBC affiliate. Mr. Czemerinski has with 16 years of experience in the chemical and environmental areas. Areas of expertise include environmental compliance, permitting, remedial system design, process and plant safety, and management of a production facility. Mr. Czemerinski is a Registered Professional Engineer in NY, IN, IL, and MI.

**Professional Experience**
EBC: January 2007
Prior: 20 years

**Education**
Master of Science in Chemical Engineering, Columbia University, New York, NY, Feb. 1990. Bachelor of Science in Chemical Engineering, University Of Buenos Aires, Buenos Aires, Argentina, May 1987

**Areas of Expertise**

- Vapor Intrusion - Barrier and Sub Slab Venting System Design
- Environmental Assessment Statements and Environmental Impact Assessments under CEQR, ULURP
- Remedial Program Design and Management
- Environmental Compliance, Clean Water Act, Clean Air Act, Hazardous Materials
- Transfer Station Permitting and Compliance
- Chemical Process Design and Optimization
- Wastewater Treatment Systems and Permitting, SPEDES, Air
- Zoning Regulations and Permitting
- Safety and environmental training

**Professional Certification**

- OSHA 40-hr HAZWOPER
- OSHA 8-hr HAZWOPER Supervisor

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# Kevin R. Brussee, Senior Project Manager

**Professional Experience**
EBC: January 2008
Prior: 6 years

**Education**
Bachelor of Science, Environmental Science, Plattsburgh State University, NY
Master of Science, Environmental Studies, University of Massachusetts, Lowell

**Areas of Expertise**
- Management of Site Investigations / Remedial Oversight NYC "E" Designation Sites
- Management of RI Investigations / RAWP Implementation NYS BCP Sites
- NYSDEC Spill Site Investigations
- Phase I / Phase II Property Assessments
- Waste Characterization / Soil Management

**Professional Certification**
- OSHA 40-hr HAZWOPER
- OSHA 8-hr HAZWOPER Supervisor

## PROFILE

Mr. Brussee has 10 years experience as an environmental consultant/contractor and has worked on and managed a wide range of environmental projects. Mr. Brussee has conducted Phase I, II and III Environmental Site Assessments for commercial, industrial, and residential properties in New York, New Jersey, Maryland and Delaware.

Mr. Brussee's field experience includes tank removal and installations, spill management and closure, soil and groundwater sampling, and both the oversight and operation of soil boring and well installation equipment. In addition, Mr. Brussee has performed project research, data reduction and evaluation, and has prepared reports for both regulatory and client use.

## PREVIOUS EXPERIENCE

Eastern Environmental Solutions, Inc., Manorville, NY
Project Manager, 2006-2008

EA Engineering, Science & Technology
Hydrogeologist, 2005-2006

P.W. Grosser Consulting, Bohemia, NY
Field Hydrogeologist, 2002-2003

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# Kevin R. Brussee, Senior Project Manager

## SELECT PROJECT EXPERIENCE

| | |
|---|---|
| Project: | Former Dico G, Autio and Truck Repair Site - Bronx Park Apartments, redevelopment from commercial to mixed use |
| Location: | Bronx, NY, White Plains Road |
| Type: | NYS BCP Site, Former gas station, repair shop & junk yard |
| Contamination: | Petroleum - Gasoline |
| Role: | Project Manager, during Site Management Phase |

| | |
|---|---|
| Project: | Former Uniforms for Industry Site – Richmond Hill Senior Living Residences / Richmond Place |
| Location: | Jamaica Ave, Richmond Hill Queens, NY |
| Type: | NYS BCP, NYC E-Site Hazmat, Noise, Former industrial Laundry |
| Contamination: | Chlorinated Solvents, Historic Fill, Petroleum - Fuel oil/Mop oil |
| Role: | Project Manager, RAWP implementation |

| | |
|---|---|
| Project: | Former Gas Station / car wash to mixed use affordable housing / commercial |
| Location: | Bronx, NY, Southern Boulevard |
| Type: | NYS BCP, NYC E-Site Hazmat, Former gas station / gar wash |
| Contamination: | Petroleum - Gasoline |
| Role: | Project Manager, RAWP implementation |

| | |
|---|---|
| Project: | Redevelopment of former industrial property to residential |
| Location: | Williamsburg section of Brooklyn, NY, Bedford Ave |
| Type: | NYC E-Designation Site, Former dye manufacturing plant |
| Contamination: | Hazardous levels of heavy metals, fuel oil tanks |
| Role: | Project Manager, RAWP implementation |

| | |
|---|---|
| Project: | Former Domsey Fiber Corp Site |
| Location: | Williamsburg section of Brooklyn, NY, Kent Ave |
| Type: | NYC E-Designation Site, Former commercial property |
| Contamination: | Chlorinated solvents, fuel oil and Historic fill |
| Role: | Project Manager, RIWP Development and Implementation, RAWP development and implementation, waste characterization and soil management |

## PUBLICATIONS

Chemical Stress Induced by Copper, Examination of a Biofilm System;
(Water Science Technology, 2006; 54(9): 191-199.)

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# Kristen DiScenza, Project Manager

**Professional Experience**
EBC: February 2013
Prior: 7.5 years

**Education**
Graduate Certificate, Waste Management, Stony Brook University, NY
Bachelor of Science, Environmental Science, SUNY Oneonta, Oneonta, NY

**Areas of Expertise**
- Phase I /Phase II Property Assessments
- NYSDEC Spill Site Investigations
- Management of Site Investigations/Remedial Oversight NYC "E" Designation Sites
- Management of RI Investigations/RAWP Implementation NYS BCP Sites

**Professional Certification**
- OSHA 40-hr HAZWOPER
- OSHA 10-hr Construction Health and Safety
- Lead Awareness

## PROFILE

Ms. DiScenza has 7.5 years experience as an environmental consultant/contractor and has worked on and managed a wide range of environmental projects. Ms. DiScenza has conducted Phase I, Phase II, and Phase III Environmental Site Assessments for commercial, industrial and residential properties in New York.

Ms. DiScenza's field experience includes tank removal and installations, spill management and closure, soil and groundwater sampling, oversight of soil boring and well installation and abandonment activities, UIC structure remediation and abandonment, Enhanced Fluid Recovery oversight and installation and operation of soil vapor extraction/air sparge and oxygen injection remediation systems. Ms. DiScenza has prepared reports for both regulatory and client use.

## PREVIOUS EXPERIENCE

Sovereign Consulting, Inc., Farmingdale, New York
Senior Project Manager, 2006-2013

Tyree Brothers Environmental Services, Farmingdale, New York
Field Technician, 2005-2006

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# Chawinie Miller, Project Manager / Industrial Hygienist

**Professional Experience**
EBC: March 2013
Prior: 7.5 years

**Education**
Bachelor of Science, Environmental Health and Safety, Stony Brook University, NY

**Areas of Expertise**
- Phase I / Property Condition Assessments
- Occupational Health and Safety Sampling
- Indoor Air Quality (IAQ) Investigations
- Mold Investigations and Remediation
- Soil and Ground Water Investigations
- Noise Studies

**Professional Certification**
- OSHA 40-hr HAZWOPER
- NYS Asbestos Inspector
- NYC Asbestos Investigator
- OSHA 10-hr Construction Health and Safety
- Hazard Analysis and Critical Control Point (HACCP) Certified

## PROFILE

Ms. Miller has 7.5 years experience as an environmental consultant/contractor and has worked on and managed a wide range of environmental projects. Ms. Miller has conducted Phase Is and Property Condition Assessments for commercial, industrial, and residential properties in New York, New Jersey and Connecticut. In addition, Ms. Miller has conducted various IAQ, asbestos, mold and occupational health and safety sampling investigations for a variety of city, state, federal and private clients.

## PREVIOUS EXPERIENCE

The Louis Berger Group, New York, New York
Industrial Hygienist, 2008-2013

AEI Consultants, Jersey City, New Jersey
Environmental Scientist, 2005-2008

# ***ATTACHMENT G***
# *BCP Signage Specifications*

# New York State Brownfield Cleanup Program

## FORMER STERLING TRANSFORMER CORP.

BCP Site No. C224203

187 North 8 Street Owner LLC

Governor Andrew M. Cuomo

NYSDEC Acting Commissioner Basil Seggos

Mayor Bill de Blasio

Transform the Past…  Build for the Future.

**Sign Requirements**

**Size:** Horizontal format – 96" wide by 48" high

**Construction Materials:** Aluminum or wood blank sign boards with vinyl sheeting.

**Inserts:** **"**New York State and DEC logo", "Program Name", "Site Name", "Site No.", "Name of Party Performing Remedial Activities or New York State Department of Environmental Conservation", "Governor", "DEC Commissioner", "Municipal Executive", "Transform the Past...Build for the Future".

**Color Scheme:** All body font should be black or green Pantone 350 C or CMYK 80/43/83/42. If blue is desired, use following values: Pantone 288 C or CMYK 100/87/27/19.

New York State and DEC logo: use eps file here (it is high resolution and scalable. If vendor needs a different format, use jpg file here . Both utilize the correct color.

**Text:**

Program Name (choose one):

State Superfund Program
Brownfield Cleanup Program
1996 Clean Water/Clean Air Bond Act – Environmental Restoration Program
Voluntary Cleanup Program
Petroleum Remediation Program

} Green text (PANTONE 350C or CMYK 100/43/83/42

Site Name: Blue text (PANTONE 288C or CMYK 100/87/27/19)

Site Number: Blue text (PANTONE 288C or CMYK 100/87/27/19)

Name of Party Performing Remedial Activities or New York State Department of Environmental Conservation: Green text (PANTONE 350C or CMYK 100/43/ 83/42

Governor: Black text

DEC Commissioner: Black text

Municipal Executive: Black text

Transform the Past....Build for the Future: Blue text (PANTONE 288C or CMYK 100/87/27/19)

**Type Specifications:** All type is Ariel.
Format is: Center each line of copy with initial caps and small Letters.

**Production Notes:** 96” wide x 48” high aluminum blanks will be covered with vinyl sheeting to achieve background color. Copy and logo will be silk screened on this surface.

**See Attached Format:** Next page.

8'

4'

2"


6" **Department of Environmental Conservation**

Logo (Use eps or jpg file)
Green Text (See Key) White Background

2"

# Program Name

4" Green Text (See Key)

2"

## Site Name

4" Blue Text (See Key)

2"

2" **Site No.** BlueText (See Key)

2"

2" **Remedial Party or New York State Department of Environmental Conservation** Green Text (See Key)

2"

2" **Governor** Black Text

2"

2" **Commissioner** Black Text

2"

2" **Municipal Executive** Black Text

2"

**Transform the Past…. Build for the Future** Blue Text (See Key)

4"

2"

Color Key for Text
Green Text = Pantone 350C or CMYK 80/43/83/42
Blue Text = Pantone 288C or CMYK 100/87/27/19

# Project Sign Format

# ***ATTACHMENT H***
# *Estimated Remedial Costs*

**Former Sterling Transformer Site**
**510 Driggs Avenue**
**Brooklyn, NY**

## Summary of Project Costs

| | NYS Brownfields Cleanup Program Costs by Task | |
|---|---|---|
| **TASK - ENVIRONMENTAL REMEDIATION** | **Track 1** | **Track 2** |
| Excavation and Disposal | $ 1,253,055.00 | $ 1,253,055.00 |
| Waste Charaterization | $ 27,200.00 | $ 27,200.00 |
| Endpoint analyis, DUSR, EDDs | $ 23,300.00 | $ 23,300.00 |
| Air Monitoring and Field Oversight | $ 76,500.00 | $ 76,500.00 |
| Project Management | $ 44,675.00 | $ 44,675.00 |
| Dewatering Permits and Treatment System | $ 61,750.00 | $ 61,750.00 |
| Status Reports | $ 4,200.00 | $ 4,200.00 |
| Environmental Easement Package | - | $ 12,500.00 |
| Site Management Plan | - | $ 11,500.00 |
| Final Engineering Report | $ 25,450.00 | $ 25,450.00 |
| *Subtotal* | $ 1,516,130.00 | $ 1,540,130.00 |
| *15% Contigency* | $ 227,419.50 | $ 231,019.50 |
| ***Total*** | **$ 1,743,549.50** | **$ 1,771,149.50** |