

**3140 CONEY ISLAND AVENUE  
BROOKLYN, NEW YORK**

## **INTERIM REMEDIAL MEASURE REVISION 5**

**SUBMITTED TO:**



New York State Department of Environmental Conservation  
Division of Environmental Remediation  
Remedial Bureau A, Section C  
625 Broadway  
Albany, New York 12233

**PREPARED FOR:**

3140 Coney Island, LLC  
3061 Brighton 6<sup>th</sup> Street  
Brooklyn, New York 11235

**PREPARED BY:**



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**JUNE 22, 2012**

P.W. GROSSER CONSULTING PC  
PROJECT No. CIR1101

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**DRAFT INTERIM REMEDIAL MEASURE WORK PLAN  
3140 CONEY ISLAND AVENUE  
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## CERTIFICATION

I Paul K. Boyce certify that I am currently a [NYS registered professional engineer or Qualified Environmental Professional as defined in 6 NYCRR Part 375] and that this Report [Remedial Design, 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).

Paul K. Boyce, P.E.

Name

074604

NYS PE License Number

*Paul K. Boyce*

Signature

06.20.12

Date



## **1.0 INTRODUCTION**

P.W. Grosser Consulting Engineer & Hydrogeologist, PC (PWGC) has prepared the following Interim Remedial Measure (IRM)) for the property located at 3140 Coney Island Avenue in Brooklyn, New York. The proposed scope of work is based upon a Remedial Investigation (RI) Report (February 2010), and Supplemental RI Report (September 2011) for the site prepared by Associated Environmental Services, Ltd. (AES).

### **1.1 Project Background**

The subject site is located at 1340 Coney Island Avenue in Brooklyn, New York and is currently a vacant lot enclosed with a plywood construction fence. The site is situated on the west side of Coney Island Avenue, between Ocean View Avenue and Brighton Beach Avenue. The property is identified as Block: 8678 Lot: 64 by the New York City Department of Assessment. The site is approximately 4,000 square feet (0.1 acre) and is currently vacant and unoccupied.

The subject site was recently purchased by 3140 Coney Island LLC with plans for redevelopment consisting of a 2,672 square foot (footprint) 6 story building to be used for medical offices with three accessory parking spots in the rear.

The site has been accepted into New York State's Brownfield Clean-up Program (BCP), and a Brownfield Clean-up Agreement (BCA) has been executed between NYSDEC and the property owner. BCP number C224157 has been assigned to the site.

A Vicinity Map is included as **Figure 1**; a Site Plan is included as **Figure 2**.

### **1.2 Site History**

The site was formerly improved with a one-story commercial building with a basement, which was demolished in 2009. The building was used as a dry cleaning facility run by Brighton Cleaners. Sanborn maps show operations within the building as cleaning and dyeing from 1950 to 2003. A 1930 Sanborn map shows the building use as a market and according to historic Sanborn maps it was likely a residential or undeveloped area prior to the market.

### **1.3 Previous Investigations**

#### **1.3.1 Phase II ESA (2007)**

A Phase II Environmental Site Assessment (ESA) was reportedly performed at the site in September 2007. Documentation of the Phase II ESA is unavailable, however, the findings of the ESA are summarized in the September 2009 RI Work Plan prepared by Associated Environmental Services, Ltd. (AES). The Phase II ESA reportedly consisted of the collection and analysis of soil and groundwater samples from seven locations throughout the site to assess potential impact related to a dry cleaning operation.

Soil samples collected in the vicinity of an on-site underground storage tank (UST) exhibited evidence of potential petroleum impact (e.g., odors, staining, PID response), and soil sample analysis identified elevated concentration

of semi-volatile organic compounds (SVOCs). Elevated concentrations of volatile organic compounds (VOCs) were detected in each of the groundwater samples collected from beneath the site.

Based on the findings of the Phase II ESA, NYSDEC Spill Number 07-10622 was assigned to the site.

### 1.3.2 Remedial Investigation (2010)

A Remedial Investigation (RI) was performed at the site in 2009 by AES. The scope of work for the RI was detailed in a RI Work Plan dated September 21, 2009, and a RI Work Plan Addendum dated December 10, 2009. Field work for the RI was completed in January 2010, and is documented in a RI Report dated February 12, 2010. The scope of work for the RI consisted of:

- Installation of nine soil borings.
- Installation of eleven groundwater sampling points.
- Collection and analysis of one soil sample from the interval exhibiting the most evidence of impact at each soil boring location.
- Collection and analysis of four groundwater samples from each temporary groundwater sampling point. Groundwater samples were collected from four discreet intervals: 10 to 14 feet below grade, 21 to 25 feet below grade, 33 to 37 feet below grade, and 48 to 52 feet below grade.

Nine soil borings were installed at the site; six in the vicinity of a former metal shed, two in the vicinity of a fuel oil UST, and one in the vicinity of a former dry cleaning machine. Soil sample results identified elevated concentrations of the dry cleaning fluid tetrachloroethene (PCE) at concentrations exceeding its NYSDEC Unrestricted Use Soil Cleanup Objective (UUSCO) of 1,300 parts per billion (ppb) in samples collected from five boring locations. Additional VOCs, including degradation products of PCE such as trichloroethene (TCE) and dichloroethene (DCE), were also detected in these soil boring locations. The highest PCE concentration detected was 3,200,000 ppb; PCE concentrations were highest near the rear of the property (western property boundary).

A total of eleven temporary groundwater sampling points were installed; six on-site, three at the adjacent property to the south, and two approximately 600 feet south of the site along Brighton Beach Avenue. PCE was detected at concentrations exceeding its NYSDEC Ambient Water Quality Standard (AWQS) of 5 ppb in the shallow sampling interval at five of the six on-site groundwater sampling points. PCE was also detected at concentrations exceeding its NYSDEC AWQS in each of the three deeper sampling intervals at three of the on-site groundwater sampling points. PCE concentrations were measured as high as 20,000 ppb in shallow groundwater samples, and 220 ppb in deep groundwater samples.

With the exception of one location, PCE and its degradation products were not detected above their respective NYSDEC AWQS in off-site groundwater samples. At one location, an elevated concentration of vinyl chloride was detected in the shallow sampling interval.

The RI concluded that contaminant impacts in both soil and groundwater appeared to be focused around the

former location of a metal storage shed in the southwestern portion of the site, extending northward toward the UST location. Groundwater impact appeared to be limited to the subject site with minimal exceedances detected off-site.

### 1.3.3 *Supplemental Remedial Investigation (2011)*

A Supplemental RI was performed at the site in 2011 by AES. The scope of work for the Supplemental RI was detailed in a Supplemental RI Work Plan Addendum dated October 30, 2010. Field work for the Supplemental RI was completed in April 2011, and is documented in a Supplemental RI Report dated September 14, 2011. The scope of work for the Supplemental RI consisted of:

- Installation of three monitoring wells.
- Installation of two soil borings.
- Collection of soil and groundwater samples from each boring location.
- Collection of groundwater samples from each monitoring well.

Three monitoring wells were installed at the subject property in the former area of a metal shed, adjacent to the out of service UST, and on the southeastern portion of the property. Groundwater was measured at approximately 10 feet below grade. Well screens were set with two feet of screen above the water table and eight (8) feet of screen below the water table. Water level measurements and well survey data indicated a site specific groundwater flow to the east-northeast. This flow direction does not match regional groundwater flow patterns. Groundwater elevation in this area may be tidally influenced.

Groundwater samples collected from the monitoring wells were impacted with PCE and its degradation products at concentrations exceeding their respective NYSDEC AWQS. PCE concentrations ranged from 320 ppb to 42,000 ppb, with the highest concentrations detected in the vicinity of the former metal shed.

Two borings were installed on an angle to the west to a depth of twelve feet below grade at the western property boundary to assess potential migration of contaminants; one soil sample was collected from each boring. PCE and/or its degradation products were detected at concentrations exceeding UUSCOs in each soil sample.

Groundwater samples were also collected at the two soil boring locations at depths of 10 to 12 feet below grade, 23 to 25 feet below grade, 35 to 37 feet below grade, and 50 to 52 feet below grade at each boring location. PCE and/or its degradation products were detected in the 10 to 12 foot and 23 to 25 foot intervals in samples collected from the boring located at the southwestern corner of the property (OSB-1); and in each of the four sample intervals at the boring location located near the central portion of the western property boundary (OSB-2).

## 2.0 **DESCRIPTION OF INTERIM REMEDIAL ACTION**

Based on the findings of the RI Report (February 2010) and Supplemental RI Report (September 2011) AES recommended that soil and groundwater remediation be performed at the site. PWGC recommends that soil

and groundwater impact be addressed by an IRM consisting of:

- Removal of the out-of-service UST, and
- Remediation of VOC impacted soils from the western portion of the property, including dewatering when needed.

## **2.1 Removal of UST**

One 550-gallon UST is present beneath the northwestern portion of the property (see **Figure 3**). The UST reportedly stored fuel oil. In 2009, when the previously existing one story building was demolished, the UST was placed out-of-service. The UST will be removed in conjunction with removal of impacted soils. UST removal activities will be conducted in accordance with section 5.5 of the Division of Environmental Remediation's *Draft DER-10 – Technical Guidance for Site Investigation and Remediation* (December 2002).

Prior to UST removal, sheeting/shoring will be installed along the property boundary in the western portion of the site in accordance with previously obtained permits and as detailed in Section 3.1.2. After the shoring is in place overburden soils will be removed to expose the top of the UST and the concrete encasement (if present). If the encasement exists then a hydraulic hammer will be used to break away the concrete. A vacuum truck will be used to remove any residual liquids from within the tank. The tank and its associated piping will be removed from the excavation and placed on polyethylene sheeting. The tank will be ventilated to render it vapor free and then cut open for access and to make the tank unusable. Petroleum residue present inside the tank will be cleaned. The tank will be inspected for signs of corrosion, pitting, cracks, or holes. The concrete encasement (if present), and soils removed to expose the tank will be removed and placed on and covered with polyethylene sheeting. The UST and associated piping will be removed and transported for disposal as scrap metal at an appropriate facility. Copies of the disposal tickets for the scrap steel will be retained and submitted to the NYSDEC.

The UST excavation will not be backfilled until the additional soil remediation (see Section 2.2) is completed. In the event that a significant stoppage will occur between UST removal and soil remediation, the sidewalls of the UST excavation will be sloped at 1.5:1 for safety.

Due to planned soil excavation to address VOC impact (see Section 2.2) which will encompass the UST location, no endpoint samples will be collected during this remedial phase.

## **2.2 Remediation of VOC Impacted Soil**

Prior investigations identified VOCs, primarily PCE and its degradation products, as impacting surface soils and groundwater in the western portion of the property. Impacted soils from this portion of the site will be excavated, removed from the site, and properly disposed of.

The area to be excavated for off-site disposal is estimated to be approximately 36 feet long by 24 feet wide by 12 feet deep on average, for an estimated soil volume of 380 cubic yards (yds<sup>3</sup>). The results of an upcoming supplemental remedial investigation will assist in confirming the final excavation limit. To allow for an excavation



of this depth adjacent to the property boundary, without undercutting the neighboring grade, a sheeting/shoring plan has been prepared and is detailed in Section 3.1.2. The proposed excavation boundaries will be to the timber sheeting on three sides of the excavation and to about 24 feet to the east of the west boundary on the east side of the excavation. The excavation will be sloped at a ratio of 2:1 on the eastern boundary to allow safe entry and egress to the excavation. If, the depth or width of the excavation requires to be increased as the result of confirming significant contamination in those areas, the timber sheeting system may be modified or added onto to allow for a larger excavation. Modifications or additions to the sheeting/shoring plan will be made by a professional engineer and approved by New York City Department of Building in advance.

Soils will be excavated from the proposed excavation area utilizing an excavating machine. Soils will be screened during excavation and stockpiled on the eastern portion of the site. Soils will be screened utilizing a photoionization detector (PID) capable of detecting the presence of VOCs. Soils exhibiting significantly elevated PID responses or odors may be segregated and stockpiled from other soils being excavated. Soil stockpile will be constructed and maintained in accordance with section 3.1.3. Soils will be characterized in-situ prior to excavation to allow for a "load and go" excavation and eliminating the need for onsite stockpiling of soils to be disposed of.

The final limit of the excavation will be determined in the field based upon soil screening, analytical results from an upcoming supplemental remedial investigation and in consultation with NYSDEC. The proposed excavation area is illustrated in **Figure 3**. Final excavation depth will be provided in the IRM report.

### **2.3 Dewatering During Excavation**

Groundwater at the site has been measured at approximately 10 feet bls. It is anticipated that during the soil excavation process dewatering activities may be required if the excavation continues past the water table interface. The volume and rate of water to be removed and treated from the site will be determined based upon the duration and depth of the excavation into the water table. Dewatering of the excavation will be conducted on an as needed basis during excavation activities into the water table interface over a duration of several days. Standing liquids will be removed utilizing vacuum trucks or portable pumps and liquid waste tanker trucks, rather than a utilizing a semi-permanent dewatering and treatment system which would discharge into a local storm water system.

The containerized liquids will then be transported to an approved waste water treatment facility for acceptance. Anticipated waste water treatment facilities include:

- Coney Island Wastewater Treatment Plant,
- Owls Head Wastewater Treatment Plant,
- Advanced Wastewater Treatment Plant (or equivalent)

Based upon correspondence with NYSDEC Division of Solid and Hazardous Materials, investigation and remedial derived wastes will be disposed of as hazardous or non-hazardous waste based upon their characteristic

qualities. Non-hazardous waste streams will be approved by NYSDEC in advance.

### **3.0 ENGINEERING SPECIFICATIONS AND CONTROLS**

#### **3.1 Engineering Specifications**

##### *3.1.1 Mobilization, Site Security*

Mobilization will include the delivery of construction equipment and materials to the site. Site workers will receive site orientation and training in accordance with the site specific Health and Safety Plan (HASP), Community Air Monitoring Plan (CAMP) and established policies and procedures to be followed during the implementation of the IRM. The remediation contractor and all associated subcontractors will each receive a copy of the IRM Work Plan, HASP and CAMP and will be briefed on their contents.

Site security will be maintained by utilizing and maintaining the existing eight foot high plywood construction fence surrounding the property. The fence will be maintained throughout the project and the vehicle access gate on the east side leading to Coney Island Avenue will be kept closed during daily operations and closed and locked at all other times.

##### *3.1.2 Sheeting/Shoring Plan*

Sheeting/shoring will be installed and maintained in accordance with the site specific sheeting plan which has been previously submitted and approved by NYCDOB. The timber sheeting system will consist of vertical steel soldier piles to be driven to a depth of at least 20 feet bls spanned by three inch thick treated timber planks. The sheeting system will be installed prior to excavating soils below 5 feet of grade when proper sloping cannot be achieved. The timber sheeting system will be installed on the west side of the site and along the western portion of the north and south sides. Modifications or additions to the sheeting/shoring plan will be made by a professional engineer and approved by New York City Department of Building in advance. The sheeting/shoring plan is currently being modified to allow for an excavation down to approximately 15 feet bg.

Sheeting/shoring will be performed in accordance with the Shoring Plan and Detail (**Appendix A**).

##### *3.1.3 Soil Stockpile Area Construction and Maintenance*

Excavated soils stockpiled on-site prior to disposal will be confined to the northwest corner of the site within the fence line. The preferred method for storing soils on-site will be in roll-off containers, covered with polyethylene sheeting. Should it be necessary to stockpile soils on the ground, the stockpile area will be lined with 20-mil polyethylene sheeting. Stockpiled material will be covered with 20-mil polyethylene sheeting, secured and maintained until removed from the site.

##### *3.1.4 Soil Disposal*

Excavated soils stockpiles will be sampled in accordance with the procedures described under Section 4.3 of this document to meet the waste acceptance criteria of the disposal facility. Impacted soil to be removed from the

site will be loaded into roll-off containers and/or dump trucks provided by a licensed waste transport company. Loading will be performed with a back-hoe, excavator, or equivalent. Loaded containers will be covered with a tarp.

Based upon correspondence with NYSDEC Division of Solid and Hazardous Materials, investigation and remedial derived wastes will be disposed of as hazardous or non-hazardous waste based upon their characteristic qualities. Non-hazardous waste streams will be approved by NYSDEC in advance.

#### 3.1.5 Backfill and Site Restoration

Following removal of impacted soils, excavated areas will be partially backfilled for future construction needs, with clean fill. Clean fill, as defined by 6NYCRR Part 360, may be brought in from off-site to backfill the excavations and will be in compliance with section 5.4(e) of the Division of Environmental Remediation's *Draft DER-10 – Technical Guidance for Site Investigation and Remediation* (December 2002). The NYSDEC will be consulted, and must approve in advance, the return of excavated soil and the use of off-site fill.

#### 3.1.6 Demobilization

Following the completion of interim remedial activities at the site, equipment and remedial structures will be dismantled and removed from the site. Solid wastes generated during IRM activities (i.e., polyethylene sheeting) will be properly disposed of.

### 3.2 Engineering Controls

#### 3.2.1 Dust Suppression

Dust generation from excavation activities and stockpiled soils will be monitored as described under Section 7.0. If dust generation approaches action levels, suppression will be accomplished by:

- Covering/capping exposed soil area with mulch, rubber mats, etc.
- Wetting equipment and excavation faces;
- Water spray dust suppression;
- Hauling materials in properly covered containers; and,
- Restricting vehicle speeds to 10 mph.

When possible, impacted soils will be loaded directly into trucks for immediate off-site disposal.

#### 3.2.2 Odor Control

In the event that odor suppression becomes necessary, techniques to be implemented for control of odors from stockpiled soil or from the open excavation will include one or more of the following:

- Cover with plastic
- Cover with "clean soil"
- Application of hydro-mulch or encapsulating foam
- Limit working hours to favorable wind and temperature conditions

Hydro-mulch or encapsulating foam can be sprayed over open excavation areas, temporary stockpile areas and loaded trucks, as necessary. This is a highly effective method for controlling odors, because the release of odors is sealed immediately at the source.

### **3.2.3 Sediment and Erosion Control**

Erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff will be placed to protect the excavation work and adjacent areas during excavation activities. Storm water control measures, such as straw hay bales or silt fence, may be utilized during excavation activities to prevent storm water runoff from impacting excavation areas and neighboring sites.

## **4.0 MONITORING AND MAINTENANCE**

### **4.1 Construction Phase Monitoring**

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 developed for this project. These plans specify the monitoring procedures, action levels, and contingency measures that are required to protect public health and site workers. Air monitoring will include real-time measurement of volatile emissions and dust levels.

### **4.2 Post-Excavation Monitoring and Verification**

As specified in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, verification sampling will consist of collecting endpoint soil samples from within each excavation area. The sampling frequency will be two samples from the base of the excavation for every 900 square feet of bottom. Sidewall samples will be collected from the north, west, and south sides of the excavation to the extent possible. The collection of sidewall samples may not be feasible in these locations, due to the use of the sheeting system. The eastern slope of the excavation will be sampled at two equidistance locations running along a north to south line at a height of one to two feet above the water table.

End point and sidewall soil samples will be submitted to a NYSDOH ELAP certified laboratory (specific laboratory to be determined). Samples will be analyzed for the presence of VOCs by USEPA Method 8260. Sample analytical results will be compared to NYSDEC soil cleanup objectives.

Soil sampling and equipment decontamination will be performed in accordance with USEPA SOP # 2001 General Field Sampling Guidelines, SOP# 2012 Soil Sampling, and SOP# 2006 Sampling Equipment Decontamination.

In addition, groundwater samples will be collected from the monitoring well network to determine the effectiveness of the remedial effort. Groundwater samples will be collected in pre-cleaned laboratory supplied glassware and placed in a cooler packed with ice for transport to the laboratory. Sample analysis will be provided by Alpha Analytical Laboratories of Westborough, Massachusetts, a New York State certified

environmental laboratory and consist of the following:

- VOCs by EPA Method 8260,

#### **4.3 Waste Characterization**

PWGC will collect In-situ soil samples across the western portion of the site during the remedial investigation in order to determine whether soils generated during the IRM will be disposed as hazardous or non-hazardous wastes prior to mobilization for soil excavation. Nine waste characterization soil borings (WC-01 through WC-09) will be installed through the rear of the property to characterize soils to be excavated. The proposed excavation area was gridded into nine grid boxes for future excavation planning and the proposed soil boring locations are illustrated in **Figure 5**.

Soil borings will be installed utilizing a Geoprobe® direct-push drill rig outfitted with a macro-core sampler and dedicated acetate liners. Soils will be collected continuously from ground surface to approximately 10 feet below grade at locations WC-01 through 06 and five feet below grade at locations WC-07 through WC-09. The shallower sample depths at locations WC-07 through WC-09 are because previous sampling in these areas has indicated that these soils at depths should not need to be removed during the proposed IRM soil excavation. Soils will be field screened for the presence of VOCs using a PID.

A soil sample from the 0-5 feet below and 5-10 feet below grade will be collected for waste characterization analysis at each gridded boring location. In order to satisfy multiple disposal facilities' waste acceptance criteria, soil samples collected for waste acceptance criteria purposes will be analyzed for the following analysis:

- TPH (8015) – one grab sample from each grid and depth (total of 15 samples)
- VOCs (8260) – one grab sample from each grid and depth (total of 15 samples)
- Total Metals (1311/6010) – one composite from shallow grids, one composite from deep grids (total of 2 samples)
- PAHs (8270) - one composite from shallow grids, one composite from deep grids (total of 2 samples)
- Paint Filter (9095) – one composite from each grid and depth (total of 1 sample)
- TCLP VOCs (8260) - one grab from grid WC-03 0-5 feet below grade, one grab from grid WC-06 5-10 feet (total of 2 samples)
- TCLP SVOCs (8270) - one composite from shallow grids, one composite from deep grids (total of 2 samples)
- TCLP Metals (6010) - one composite from each grid and depth (total of 1 sample)
- TCLP Pest/Herbicides/PCBs (8080) - one composite from each grid and depth (total of 1 sample)
- pH, ignitability, reactivity, total cyanide - one composite from each grid and depth (total of 1 sample)

After the results of the analysis are complete, they will be distributed to the NYSDEC and potential waste disposal facilities for approval. Anticipated disposal facilities include:

- Soil Safe in Logan Township, New Jersey (or equivalent)
- APEX Landfill in Ohio (or equivalent)

- Biogenie in Canada (or equivalent)

Based upon correspondence with NYSDEC Division of Solid and Hazardous Materials, investigation and remedial derived wastes will be disposed of as hazardous or non-hazardous waste based upon their characteristic qualities. Non-hazardous waste streams will be approved by NYSDEC in advance.

Soil sampling and equipment decontamination will be performed in accordance with USEPA SOP # 2001 General Field Sampling Guidelines, SOP# 2012 Soil Sampling, and SOP# 2006 Sampling Equipment Decontamination.

## **5.0 INTERIM REMEDIAL MEASURE COMPLETION REPORT PREPARATION**

An IRM Completion Report will incorporate the details and findings of the IRM activities performed as outlined in this work plan. The report will identify specific UST removal and disposal information, soil disposal volumes, and manifests, site restoration details, results of CAMP monitoring,

Electronic copies of the IRM Completion Report will be submitted to the NYSDEC. Analytical results of the investigation will be submitted in the electronic data delivery (EDD) format through the Departments environmental information management system (EIMS).

## **6.0 HEALTH AND SAFETY PLAN**

Field operations will be performed in accordance with the health and safety requirements to be provided in the site specific HASP (see **Appendix B**). The HASP outlines the requirements for training, medical surveillance, daily tailgate meetings, emergency response, and accident and injury reporting.

The PWGC Field Team Leader will be responsible for implementing the HASP, completing the daily tailgate safety meetings and performing necessary Industrial Hygiene (IH) monitoring as specified in the HASP.

PWGC sub-contractors will have the option of adopting this HASP or developing their own site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in the site HASP prepared by PWGC and must be made available to PWGC and NYSDEC.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926, and the PWGC Corporate Environmental Health and Safety policy. Modifications to the HASP may be made with the approval of the PWGC Health and Safety Manager (HSM) and/or Project Manager (PM).

## **7.0 COMMUNITY AIR MONITORING PLAN**

A site specific Community Air Monitoring Plan has been prepared to provide 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 contaminants as a direct result of the remedial

activities (see **Appendix C**). The primary concerns for this site are VOCs and dust particulates.

The CAMP will be implemented and executed in accordance with 29 CFR 1910.120(h), the New York State Department of Health's (NYSDOH) Generic CAMP, and the NYSDEC TAGM #4031.

## **8.0 SCHEDULE**

The preliminary schedule for the major project milestones is presented in **Table 1**. The field work is anticipated to start in July 2012 and be completed by August 2012. A draft IRM Report will be submitted to the NYSDEC by November 2013.

## **9.0 REFERENCES**

6 NYCRR Part 375 – Environmental Remediation Programs, December 2006

6 NYCRR Part 376 - Land Disposal Restrictions, September 2006

29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response

Associated Environmental Services Ltd, September 21, 2009, Remedial Investigation Work Plan - 3140 Coney Island Ave. Brooklyn, New York

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NYSDEC, Division of Technical and Administrative Guidance, June 1, 1992, Memorandum # 4042, Interim Remedial

Measures.

NYSDEC, Division of Technical and Administrative Guidance, December 9, 1992, Memorandum # 4048, Interim Remedial Measures - Procedures.

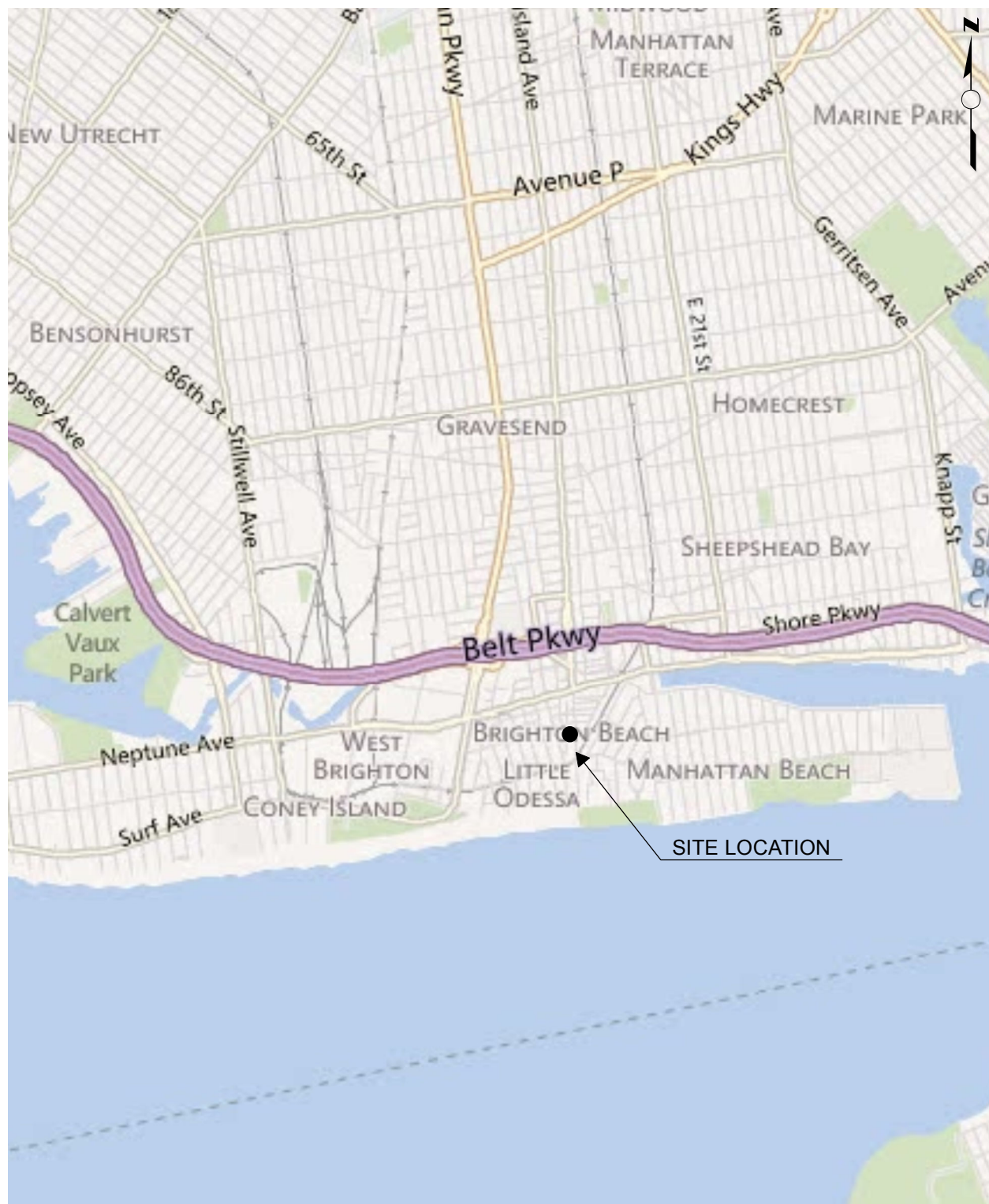
NYSDEC, Division of Technical and Administrative Guidance, October 27, 1989, Memorandum #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites

NYSDEC, Division of Water, June 1998, Addendum April 2000, Technical and Administrative Guidance Series 1:1:1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

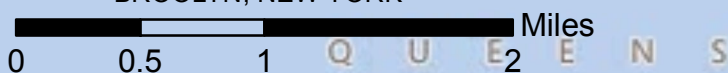
USEPA, SOP # 2001 General Field Sampling Guidelines, SOP# 2012 Soil Sampling, and SOP# 2006 Sampling Equipment Decontamination




## FIGURES



VICINITY MAP  
3140 CONEY ISLAND AVENUE  
BROOKLYN, NEW YORK



  
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Project:	CIR1101
Designed by:	NJ
Approved by:	KA
Drawn by:	NJ
Date:	12/8/2011
Figure No:	1







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-  Fuel Oil UST
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-  Property Line
-  Former Building

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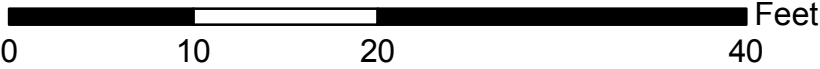

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PROJECT:	CIR1101	APPROVED BY:	KA
DESIGNED BY:	NJ	DATE:	12/8/2011
DRAWN BY:	NJ	SCALE:	As Shown

SHEET TITLE:

**SITE PLAN  
3140 CONEY ISLAND AVENUE  
BROOKLYN, NEW YORK**

FIGURE NO: 2

SHEET: 2 of 5



Groundwater				
Analyte	GW-1			
	10-14'	21-25'	33-37'	48-52'
cis-1,2-Dichloroethene	ND	ND	ND	ND
Tetrachloroethene	<b>20J</b>	1.3	1.2	1.7
trans-1,2-Dichloroethene	<b>16J</b>	ND	ND	ND
Trichloroethene	ND	ND	ND	ND
Vinyl Chloride	ND	ND	0.65J	ND

Groundwater				
Analyte	GW-3			
	10-14'	21-25'	33-37'	48-52'
cis-1,2-Dichloroethene	<b>940</b>	<b>1,200</b>	2.8	4.2
Tetrachloroethene	<b>72</b>	<b>220C</b>	<b>8.3</b>	<b>35</b>
trans-1,2-Dichloroethene	<b>5.2</b>	<b>8.8</b>	ND	ND
Trichloroethene	<b>120</b>	<b>330</b>	0.77J	1.4
Vinyl Chloride	<b>290</b>	<b>280</b>	ND	ND

Groundwater				
Analyte	GW-7			
	10-14'	21-25'	33-37'	48-52'
cis-1,2-Dichloroethene	ND	ND	ND	ND
Tetrachloroethene	0.84JC	ND	0.84JC	0.92J
trans-1,2-Dichloroethene	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND

Groundwater				
Analyte	GW-9			
	10-14'	21-25'	33-37'	48-52'
cis-1,2-Dichloroethene	3.8	ND	0.68J	ND
Tetrachloroethene	2.9	0.64J	1.3	0.97J
trans-1,2-Dichloroethene	0.58J	ND	ND	ND
Trichloroethene	ND	ND	ND	ND
Vinyl Chloride	<b>2.3</b>	ND	ND	ND

Groundwater	
Analyte	B-1
cis-1,2-Dichloroethene	<5
Tetrachloroethene	<b>116</b>
trans-1,2-Dichloroethene	<5
Trichloroethene	<b>10</b>
Vinyl Chloride	<5

Groundwater	
Analyte	B-5
cis-1,2-Dichloroethene	<25
Tetrachloroethene	<25
trans-1,2-Dichloroethene	<25
Trichloroethene	<25
Vinyl Chloride	<b>63</b>

Groundwater	
Analyte	B-2
cis-1,2-Dichloroethene	<5
Tetrachloroethene	<b>22</b>
trans-1,2-Dichloroethene	<5
Trichloroethene	<b>1,700</b>
Vinyl Chloride	<b>2,080</b>

Groundwater	
Analyte	B-6
cis-1,2-Dichloroethene	<5
Tetrachloroethene	<b>31</b>
trans-1,2-Dichloroethene	<5
Trichloroethene	<b>7</b>
Vinyl Chloride	<b>18</b>

Groundwater	
Analyte	B-3
cis-1,2-Dichloroethene	<5
Tetrachloroethene	<b>105</b>
trans-1,2-Dichloroethene	<5
Trichloroethene	<b>20</b>
Vinyl Chloride	<b>382</b>

Groundwater	
Analyte	B-7
cis-1,2-Dichloroethene	<5
Tetrachloroethene	<b>14</b>
trans-1,2-Dichloroethene	<5
Trichloroethene	<5
Vinyl Chloride	<5

Groundwater	
Analyte	B-4
cis-1,2-Dichloroethene	<5
Tetrachloroethene	<b>8</b>
trans-1,2-Dichloroethene	<5
Trichloroethene	<5
Vinyl Chloride	<b>46</b>

Soil	
Analyte	B-8
cis-1,2-Dichloroethene	<b>8-10'</b>
Tetrachloroethene	<b>5,000</b>
trans-1,2-Dichloroethene	990
Trichloroethene	ND
Vinyl Chloride	380J
Vinyl Chloride	ND

Groundwater				
Analyte	GW-2			
	10-14'	21-25'	33-37'	48-52'
cis-1,2-Dichloroethene	<b>470</b>	1.3	0.68J	ND
Tetrachloroethene	<b>20,000</b>	<b>86</b>	<b>53</b>	<b>18</b>
trans-1,2-Dichloroethene	<b>11</b>	ND	ND	ND
Trichloroethene	<b>1,600</b>	4.4	2.2	ND
Vinyl Chloride	<b>160</b>	ND	ND	ND

Groundwater				
Analyte	GW-6			
	10-14'	21-25'	33-37'	48-52'
cis-1,2-Dichloroethene	<b>5.1</b>	<b>260</b>	2.4	ND
Tetrachloroethene	<b>19C</b>	<b>11</b>	<b>5.8C</b>	<b>14</b>
trans-1,2-Dichloroethene	ND	ND	ND	ND
Trichloroethene	1.7	2.1	ND	0.59J
Vinyl Chloride	<b>3.7</b>	<b>350</b>	<b>8.5</b>	ND

Groundwater				
Analyte	GW-8			
	10-14'	21-25'	33-37'	48-52'
cis-1,2-Dichloroethene	<b>160</b>	1.9	2.0	2.0
Tetrachloroethene	<b>7.5</b>	0.88J	0.63J	1.3
trans-1,2-Dichloroethene	4.3	ND	ND	ND
Trichloroethene	3.8	ND	ND	ND
Vinyl Chloride	<b>9.2</b>	ND	ND	ND

Groundwater				
Analyte	OSB-1			
	10-12'	23-25'	35-37'	50-52'
cis-1,2-Dichloroethene	3	<b>5.2</b>	1.0	1.0
Tetrachloroethene	1.0	0.8	1.4	2.4
trans-1,2-Dichloroethene	ND	ND	ND	ND
Trichloroethene	ND	0.66	ND	ND
Vinyl Chloride	<b>15</b>	<b>5.5</b>	ND	ND

Groundwater				
Analyte	OSB-2			
	10-12'	23-25'	35-37'	50-52'
cis-1,2-Dichloroethene	<b>27,000</b>	<b>72</b>	<b>300</b>	<b>6.5</b>
Tetrachloroethene	ND	<b>6.5</b>	<b>7.7</b>	<b>14</b>
trans-1,2-Dichloroethene	ND	ND	ND	ND
Trichloroethene	ND	1.1	ND	ND
Vinyl Chloride	<b>8,300</b>	<b>24</b>	<b>10</b>	ND

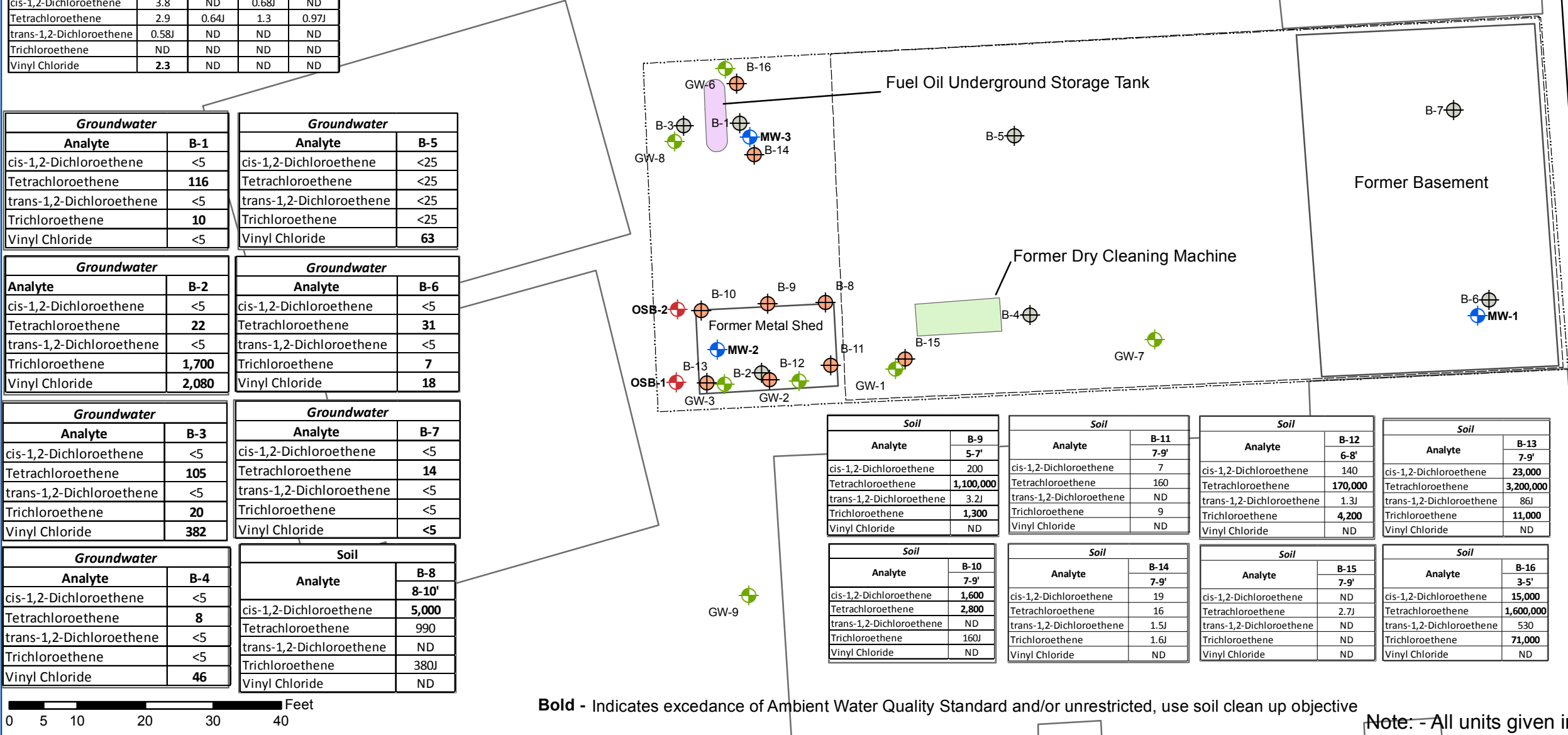
Soil	
Analyte	OSB-1
cis-1,2-Dichloroethene	<b>800</b>
Tetrachloroethene	120
trans-1,2-Dichloroethene	ND
Trichloroethene	ND
Vinyl Chloride	ND

Soil	
Analyte	OSB-2
cis-1,2-Dichloroethene	<b>1,200</b>
Tetrachloroethene	<b>32,000</b>
trans-1,2-Dichloroethene	27
Trichloroethene	<b>3,100</b>
Vinyl Chloride	2

Groundwater		
Analyte	AWQS	MW-1
cis-1,2-Dichloroethene	5	<b>3,200</b>
Tetrachloroethene	5	<b>1,000</b>
Trichloroethene	5	<b>620</b>
Vinyl Chloride	2	<b>760</b>

Groundwater		
Analyte	AWQS	MW-2
cis-1,2-Dichloroethene	5	<b>8,200</b>
Tetrachloroethene	5	<b>42,000</b>
Trichloroethene	5	<b>6,700</b>
Vinyl Chloride	2	ND

Groundwater		
Analyte	AWQS	MW-3
cis-1,2-Dichloroethene	5	<b>1,100</b>
Tetrachloroethene	5	<b>320</b>
Trichloroethene	5	<b>98</b>
Vinyl Chloride	2	<b>230</b>



0 5 10 20 30 40 Feet

Bold - Indicates exceedance of Ambient Water Quality Standard and/or unrestricted, use soil clean up objective

Note: - All units given in ug/L



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- Groundwater Borings
- 2010 Soil Borings
- Previous Soil Borings
- Offsite Soil Borings
- Monitoring Wells
- Former Building
- Property Line

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DESIGNED BY: BB DATE: 12/8/2011  
DRAWN BY: BB SCALE: As Shown

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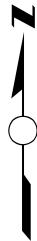
2011 Supplemental Remedial Investigation Report  
3140 Coney Island Avenue  
Brooklyn, New York

FIGURE NO:

3

SHEET:

3 of 5



Timber Sheeting Location  
(See Appendix A for additional detail)

Approximately 44'

UST to be removed

45'

Approximately 24'

minimum 20'



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- Sloped Area
- Excavation Area
- Fuel Oil UST
- Property Line

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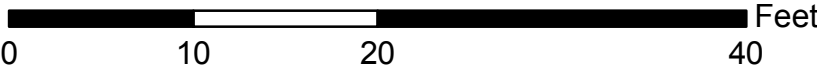
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DESIGNED BY: NJ	DATE: 12/8/2011
DRAWN BY: NJ	SCALE: As Shown

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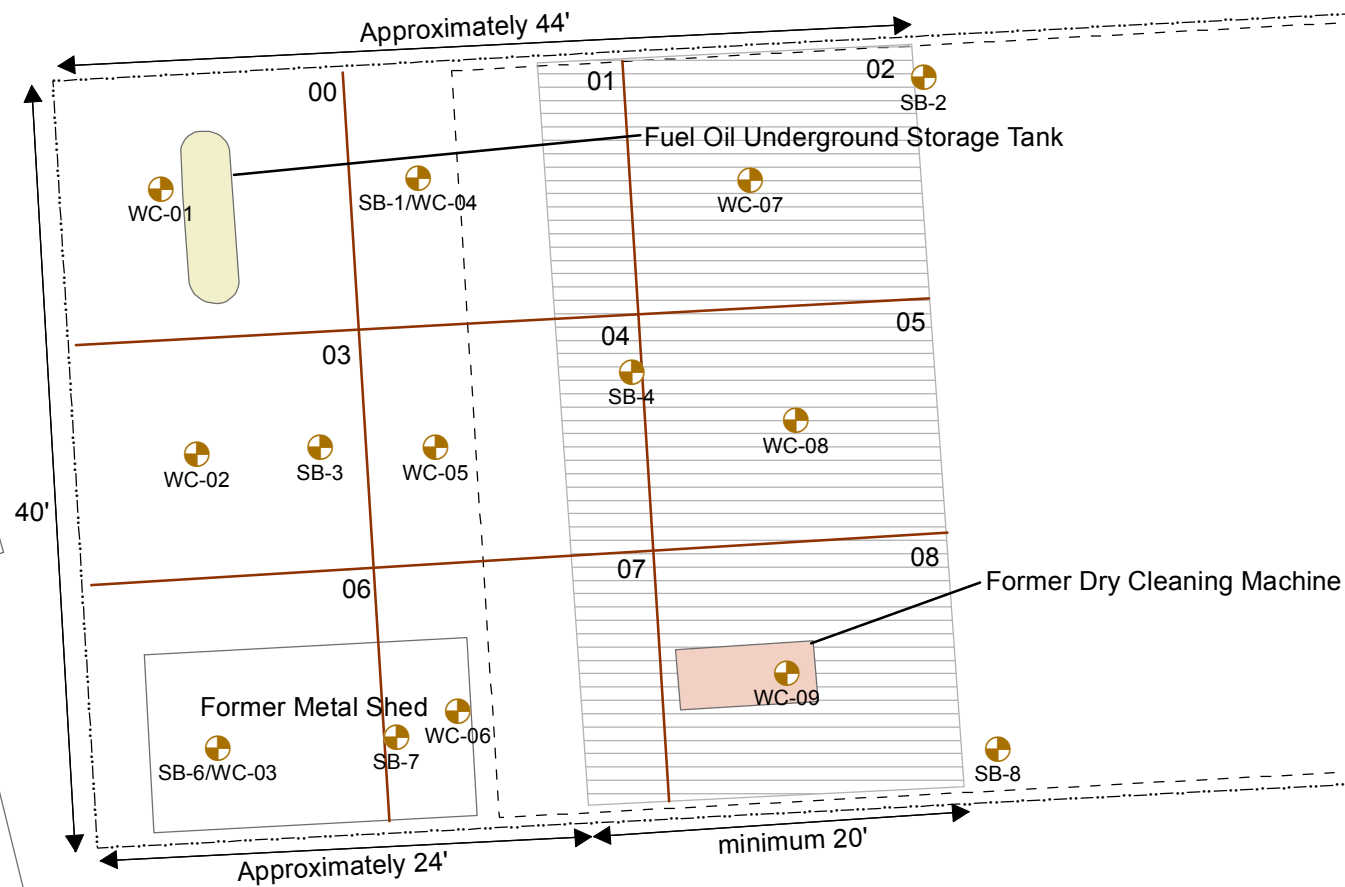
EXCAVATION PLAN  
3140 CONEY ISLAND AVENUE  
BROOKLYN, NEW YORK

FIGURE NO: 4

SHEET: 4 of 5







Coney Island Avenue



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- Proposed Soil Sample Location
- Grid
- Sloped Area
- Former Building
- Property Line

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DESIGNED BY: ZH	DATE: 6/12/2012
DRAWN BY: IB	SCALE: AS SHOWN

SHEET TITLE:

Waste Characterization Sample Locations  
3140 Coney Island Avenue  
Brooklyn, New York

FIGURE NO: 5

SHEET: 5 of 5

## TABLES

TABLE 1  
PROJECT SCHEDULE  
FORMER BRIGHTON CLEANERS SUPPLEMENTAL REMEDIAL INVESTIGATION

WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>TASK</b>																				
Completion of SRIWP field activities																				
Ten day notice to NYSDEC																				
Field Activities																				
Laboratory Analysis																				
Prepare IRM Report																				
Submission of Draft IRM Report to NYSDEC																				



## **APPENDIX A SHORING PLAN AND DETAIL**



## **APPENDIX B HEALTH AND SAFETY PLAN**

**3140 CONEY ISLAND AVENUE  
BROOKLYN, NEW YORK**

## **HEALTH AND SAFETY PLAN**

**SUBMITTED TO:**

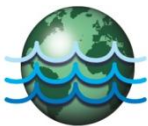


New York State Department of Environmental Conservation  
Division of Environmental Remediation  
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PWGC Project Number: CIR1101

**JUNE 22, 2012**

**HEALTH AND SAFETY PLAN  
3140 CONEY ISLAND AVENUE, BROOKLYN, NEW YORK**

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**HEALTH AND SAFETY PLAN  
3140 CONEY ISLAND AVENUE, BROOKLYN, NEW YORK**

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**APPENDICES**

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Appendix C	Heat/Cold Stress Protocols
Appendix D	Medical Data Sheet
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Appendix F	Hospital Route Map and Directions
Appendix G	Incident Report Form / Investigation Form
Appendix H	Daily Briefing Sign-In Sheet

## **1.0 STATEMENT OF COMMITMENT**

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to chemical, biological and physical hazards during implementation of the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) at 3140 Coney Island Avenue, Brooklyn, New York. P.W. Grosser Consulting Engineer & Hydrogeologist, PC's (PWGC's) policy is to minimize the possibility of work-related exposure through awareness and qualified supervision, health and safety training, medical monitoring, use of appropriate personal protective equipment, and the following activity specific safety protocols contained in this HASP. PWGC has established a guidance program to implement this policy in a manner that protects personnel to the maximum reasonable extent.

This HASP, which applies to persons present at the site actually or potentially exposed to safety or health hazards, describes emergency response procedures for actual and potential physical, biological and chemical hazards. This HASP 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.

## **2.0 INTRODUCTION**

### **2.1 Purpose**

This HASP addresses the minimum health and safety practices that will be employed by site workers participating in implementation of NYSDEC BCP activities at the project site located at 3140 Coney Island Avenue, Brooklyn, New York.

The HASP takes into account the specific hazards inherent to the site and presents the minimum requirements which are to be met by P.W. Grosser Consulting Engineer & Hydrogeologist, PC (PWGC), its' subcontractors, and other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. PWGC sub-contractors will have the option of adopting this HASP or developing their own site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in this HASP and must be made available to PWGC.

Activities performed under this HASP will comply with applicable parts of Occupational Safety and Health Administration (OSHA) Regulations, primarily 29 CFR Parts 1910 and 1926 and all other applicable federal, state, and local regulations. Modifications to the HASP may be made with the approval of the PWGC Health and Safety Manager (HSM) and/or Project Manager (PM). A copy of this HASP will be maintained on-site during all work activities.

Refusal to comply with the HASP or violation of any safety procedures by field personnel may result in their immediate removal from the site following consultation with the HSM and the Field Team Leader (FTL).

### **2.2 Scope**

This HASP addresses the potential hazards related to implementation of NYSDEC BCP activities. The primary BCP activities may include the following:

- Site Mobilization/Demobilization;
- Drilling, and;
- Soil, Groundwater, and Soil-Vapor Sampling

The potential hazards associated with this scope are listed below and are discussed in more detail in this HASP after the project organization and responsibilities section.

- Chemical Hazards
- Biological Hazards
- Physical Hazards



### **2.3 Application**

The HASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- PWGC employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

### **3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES**

This section specifies the project organization and responsibilities.

#### **3.1 Project Manager**

- Participates in major incident investigations;
- Ensures that the HASP has all of the required approvals before site work is conducted; and
- Has the overall project responsibility for project health and safety.

#### **3.2 Field Team Leader (FTL)/ Site Health and Safety Officer (SHSO)**

- Ensures that the HASP is implemented in conjunction with the Health and Safety Manager (HSM);
- Ensures that field work is scheduled with adequate equipment to complete the job safely;
- Enforces site health and safety rules;
- Ensures that proper personal protective equipment is utilized;
- Ensures that the HSM is informed of project changes that require modifications to the HASP;
- Ensures that the procedure modifications are implemented;
- Investigates incidents;
- Conducts the site safety briefing;
- Reports to HSM to provide summaries of field operations and progress; and
- Acts as Emergency Coordinator.

#### **3.3 Health and Safety Manager**

- Provides for the development of the HASP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves individuals who are assigned SHSO responsibilities;
- Coordinates revisions of this HASP with field personnel; and
- Assists in the investigation of major accidents.

#### **3.4 Site Personnel**

- Report any unsafe or potentially hazardous conditions to the FTL/SHSO;
- Maintain knowledge of the information, instructions and emergency response actions contained in this HASP; and
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions.

## **4.0 SITE HISTORY AND PROJECT DESCRIPTION**

### **4.1 Project Background**

This Health and Safety Plan (HASP) has been prepared by PWGC, on behalf of 3140 Coney Island, LLC. Previous investigations have identified volatile organic compounds (VOCs), specifically tetrachloroethene (PCE) and its degradation products, above guidance levels and/or standards in soil and groundwater at the site.

### **4.2 Site Description**

The subject site is located at 3140 Coney Island Avenue in the City of New York, New York. The site is located within the Borough of Brooklyn (Kings County). The site is situated on the west side of Coney Island Avenue, between Ocean View Avenue and Brighton Beach Avenue. The property is identified as Block: 8678 Lot: 64 by the New York City Department of Assessment. The site is approximately 4,000 square feet (0.1 acre) and is currently vacant and unoccupied.

### **4.3 Site History**

The site was formerly improved with a one-story commercial building with a basement, which was demolished in 2009. The building was used as a dry cleaning facility run by Brighton Cleaners. Sanborn maps show operations within the building as cleaning and dyeing from 1950 to 2003. A 1930 Sanborn map shows the building use as a market and according to historic Sanborn maps it was likely a residential or undeveloped area prior to the market.

### **4.4 Site Features**

The project site elevation is approximately 10 feet above mean sea level, and is generally level. The previously existing structure at the site has been demolished, and the site is currently vacant. Ground cover at the site is minimal and consists primarily of grass and weeds. The nearest surface water body is the Atlantic Ocean located approximately 0.4-mile south of the site.

### **4.5 Current and Future Site Use**

The site is currently vacant and unoccupied. Proposed future plans for the site include construction of a six-story commercial building with a partial basement to be used as medical offices. The partial basement will be constructed approximately 5.5 feet below sidewalk level. Proposed development plans call for the entirety of the property to be capped by the planned structure and asphalt paved parking areas.

## **5.0 POTENTIAL HAZARDS OF THE SITE**

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under Section 1.0. Additional information can be found in **Appendix A** - Material Safety Data Sheets or in **Appendix B** - Activity Hazard Analyses.

### **5.1 Chemical Hazards**

Review of historical information from the site indicates that the soil and groundwater at the site is contaminated with PCE and its degradation products, trichloroethene (TCE), cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride. These compounds may present an occupational exposure hazard during site operations.

Specific information on the chemicals identified at the Site can be found in Table 5-1 as well as on the Material Safety Data Sheets found in **Appendix A**.

**Table 5-1**  
**Chemical Hazards**

COMPOUND	CAS#	OSHA PEL	ROUTES OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
Tetrachloroethene	127-18-4	100 ppm	Inhalation Ingestion Skin Absorption Skin Contact	Irritates eyes, nose, throat; nausea; flushed face & neck; vertigo, dizziness, incoordination, headache, somnolence; skin erythema; potential human carcinogen.	Skin, eyes, respiratory system, kidneys, liver, CNS	Vapor pressure, 14 mm Hg Chloroform like odor, IP= 9.32 eV
Trichloroethene	79-01-6	100 ppm	Inhalation Ingestion Skin Contact	Irritates eyes, throat; redness, tearing, blurred vision, vertigo, dizziness, incoordination, irregular heart beat, potential human carcinogen.	Heart, liver, kidneys, CNS	Vapor pressure, 60 mm Hg Irritating odor at high concentrations
Vinyl Chloride	75-01-04	1 ppm	Inhalation Ingestion Skin Contact	Mild irritation to eyes, blurred vision, dizziness, confusion, tingling in hands and feet, symptoms of frost bite, confirmed human carcinogen.	Liver, spleen, kidneys, respiratory system, CNS	Vapor pressure, 35.3 psig, sweet ethereal odor
1,2-Dichloroethene	156-60-5	200 ppm	Inhalation Ingestion Skin Absorption	Irritates eyes, nose, and throat; nausea; drowsiness.	Skin, eyes, respiratory system	Vapor pressure, 400 mm Hg Pleasant odor

**Abbreviations**

C = Ceiling limit, not to be exceeded

CNS = Central Nervous System

PEL=Permissible Exposure Limit

TWA = Time-weighted average (8 hours)

OSHA = Occupational Safety and Health Administration

ppm = parts per million

VP = vapor pressure at approximately 68° F in mm Hg (mercury)

## 5.2 Biological Hazards

Work will be performed in an urban environment, however, during the course of the project, there is potential for workers to come into contact with biological hazards such as animals, insects and plants. The Activity Hazard Analyses found in **Appendix B** includes specific hazards and control measures for each task, if applicable.

### 5.2.1 Animals

The Site is located in a predominantly urban area. It is possible that dogs, cats, rats and mice may be present. Workers shall use discretion and avoid all contact with animals.

### 5.2.2 Insects

Insects, such as mosquitoes, ticks, bees and wasps may be present during certain times of the year. Workers will be encouraged to wear repellents and PPE, if deemed necessary, when working in areas where insects are expected to be present.

During the months of April through October, particular caution must be exercised to minimize exposure to deer ticks and the potential for contracting Lyme disease. Specific precautionary work practices that are recommended include the following:

- Cover your body as much as possible. Wear long pants and long sleeved shirts. Light color clothing makes spotting of ticks easier.
- Try to eliminate possible paths by which the Deer Tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. (Duct tape may be utilized to help seal cuffs and ankles). If heavy concentrations of ticks or insects are anticipated or encountered, Tyvek coveralls may be utilized for added protection when the potential for heat stress is not a concern.
- Conduct periodic and frequent, (e.g., hourly), surveys of your clothing for the presence of ticks. Remove any tick, save it and report to the clinic with the tick.
- Use insect /tick repellents that contain the chemical DEET (n,n-Diethyltoluamide). Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF and Maximum Strength OFF.

### 5.2.3 Plants

The site is currently vacant; poison ivy, sumac and oak may be present on site. The FTL/SHSO should identify the susceptible individuals. Worker shall avoid all contact with these plants.

## 5.3 Physical Hazards

Most safety hazards are discussed in the Activity Hazard Analyses (AHA) in **Appendix B** for the different phases of the project. In addition to the AHAs, general work rules and other safety procedures are described in Section 10 of this HASP.

### 5.3.1 *Temperature Extremes*

#### Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke.

#### Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, and poor judgment.

PWGC's Heat/Cold Stress Protocols are specified in **Appendix C**.

### 5.3.2 *Steam, Heat and Splashing*

Exposure to steam/heat/splashing hazards can occur during steam cleaning activities. Splashing can also occur during well development and sampling activities. Exposure to steam/heat/splashing can result in scalding/burns, eye injury, and puncture wounds.

### 5.3.3 *Noise*

Noise is a potential hazard associated with the operation of heavy equipment, drill rigs, pumps and engines. Workers will wear hearing protection while in the work zone when these types of machinery are operating.

### 5.3.4 *Fire and Explosion*

When conducting excavation or drilling activities, the opportunity of encountering fire and explosion hazards may exist from encountering underground utilities, from the use of diesel engine equipment, and other potential ignition sources. During dry periods there is an increased chance of forest and brush fires starting at the job site. If these conditions occur no smoking will be permitted at the site and all operations involving potential ignition sources will be monitored continuously (fire watch).

### 5.3.5 *Manual Lifting/Material Handling*

Manual lifting of heavy objects may be required. Failure to follow proper lifting technique can result in back injuries and strains. Back injuries are a serious concern as they are the most common work place injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

#### 5.3.6 *Slips, Trips and Falls*

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces that may be oil covered, or from rough terrain, surfaces that are steep inclines, surfaced debris, or surfaces which are wet from rain or ice. Falls may result in twisted ankles, broken bones, head trauma or back injuries.

#### 5.3.7 *Heavy Equipment Operation*

An excavator/backhoe will be used to excavate where required. Working with or near heavy equipment poses many potential hazards, including electrocution, fire/explosion, being struck by or against, or pinched/caught/crushed by, and can result in serious physical harm.

#### 5.3.8 *Electrocution*

Encountering underground utilities may pose electrical hazards to workers. Additionally, overhead electrical lines can be a concern during drilling operations. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.



## **6.0 ACTIVITY HAZARD ANALYSES**

The Activity Hazard Analysis (AHA) is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, control and mitigate those hazards. The AHAs will be used to train work crews in proper safety procedures during phase preparatory meetings.

AHAs have been developed by PWGC for the following phases of work:

1. Site Mobilization/Demobilization;
2. Excavation
3. Soil, Groundwater and Soil-Vapor sampling; and
4. Decontamination

Copies of these AHAs are included in **Appendix B** of this HASP.

## 7.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) specified in **Table 7-1** represents the hazard analysis and PPE selection required by 29 CFR 1910.132. Specific information on known potential hazards can be found under Section 4.0 and **Appendix B** - Activity Hazard Analyses. For the purposes of PPE selection, the HSM and FTL/SHSO are considered competent persons. The signatures on the approval page of the HASP constitute certification of the hazard assessment. For activities not covered by **Table 7-1**, the FTL/SHSO will conduct the hazard assessment, select the PPE, and document changes in the appropriate field logs. PPE selection will be made in consultation with the HSM.

Modifications for initial PPE selection may also be made by the FTL/SHSO in consultation with the HSM and changes documented accordingly. If major modifications occur, the HSM will notify the PM.

### 7.1 PPE Abbreviations

#### HEAD PROTECTION

HH = Hard Hat

#### HEARING PROTECTION

EP = ear plugs

EM = ear muffs

#### HAND PROTECTION

Cot = cotton

But = Butyl

LWG = Leather Work Gloves

Neo = Neoprene

Nit = Nitrile

Sur = Surgical

#### EYE/FACE PROTECTION

APR = Full Face Air Purifying  
Respirator

MFS = Mesh Face shield

PFS = Plastic Face shield

SG = ANSI approved safety  
glasses with side shields

#### BODY PROTECTION

WC = work clothes

Cot Cov = Cotton Coveralls

Poly = Polyethylene coated  
Tyvek® coveralls

Saran = Saranex coated  
coveralls

Tyvek® = Uncoated Tyvek®  
coveralls

#### FOOT PROTECTION

Neo = Neoprene

OB = Overboot

Poly = polyethylene coated boot

Rub = rubber slush boots

STB = Leather work boots with steel  
toe

#### RESPIRATORY PROTECTION

APR = Full-face air purifying respirator  
with organic vapor cartridges

ASR = Full face air supplied respirator  
with escape bottle

SCBA = Self-contained breathing  
apparatus

### 7.2 Hazard Assessment for Selection of Personal Protective Equipment

The initial selection of personal protective equipment for each task was done by performing a hazard assessment taking into consideration the following:

- Potential chemical and physical present;
- Work operations to be performed;
- Potential routes of exposure;

- Concentrations of contaminants present; and
- Characteristics, capabilities and limitations of PPE and any hazard that the PPE presents or magnifies.

A review of the analytical data from previous sampling events indicates that VOCs identified in **Table 5-1** are the primary contaminants of concern.

The exposure routes for these chemicals are inhalation, skin absorption, skin/eye contact and ingestion. Chemical protective gloves will be required for all activities that involve sample handling and the likelihood for skin contact. The proper use of PPE and strict adherence to decontamination and personal hygiene procedures will effectively minimize skin contact and ingestion as potential routes of exposure.

**Table 7-1**  
**Personal Protective Equipment Selection**

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Mobilization/ Demobilization	HH	SG	STB	WG	WC	None	None
Excavation, loading and backfilling	HH	SG	STB	WG	WC	EM or EP	None initially APR if action levels exceeded
Drilling Activities	HH	SG	STB	WG	WC	EM or EP	None initially APR if action levels exceeded
Soil/GW sampling	HH	SG	STB	WG, Nit & Sur as needed	WC, Tyvek® as needed	None	None initially APR if action levels exceeded
Decontamination	HH	SG	STB	Nit + Sur	WC, Tyvek® as needed	None	None initially APR if action levels exceeded

### 7.3 Respirator Cartridge Change-Out Schedule

A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. If the use of respirators is necessary, the respirator cartridge change-out schedule for this project will be as follows:

1. Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first; and
2. If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short of time period they were used the day before.

The schedule was developed based on the following scientific information and assumptions:

- Analytical data that is available regarding site contaminants;
- Using the Rule of Thumb provided by the AIHA;
- All of the chemicals have boiling points greater than 70°C;
- Total airborne concentration of contaminants is anticipated to be less than 200 ppm;
- The humidity is expected to be less than 85%; and
- Desorption of the contaminants (including those with poor warning properties) after partial use of the chemical cartridge can occur after a short period (hours) without use (eg, overnight) and result in a non-use exposure.

The following is a partial list of factors that may affect the usable cartridge service life and/or the degree of respiratory protection attainable under actual workplace conditions. These factors have been considered when developing the cartridge change-out schedule.

Type of contaminant(s);

- Contaminant concentration;
- Relative humidity;
- Breathing rate; Temperature; Changes in contaminant concentration, humidity, breathing rate and temperature;
- Mixtures of contaminants;
- Accuracy in the determination of the conditions;
- The contaminant concentration in the workplace can vary greatly. Consideration must be given to the quality of the estimate of the workplace concentration;
- Storage conditions between multiple uses of the same respirator cartridges. It is recommended that the chemical cartridges be replaced after each work shift. Contaminants adsorbed on a cartridge can migrate through the carbon bed without airflow;

- Age of the cartridge;
- Condition of the cartridge and respirator;
- Respirator and cartridge selection respirator fit;
- Respirator assembly, operation, and maintenance;
- User training, experience and medical fitness;
- Warning properties of the contaminant; and
- The quality of the warning properties should be considered when establishing the chemical cartridge change schedule. Good warning properties may provide a secondary or back-up indication for cartridge change-out.

## **8.0 AIR MONITORING**

Air monitoring will be performed 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 the site in accordance with the project Community Air Monitoring Plan (CAMP). The site specific CAMP provides measures for protection for on-site workers and the downwind community from potential airborne contaminants as a direct result of the Supplemental Investigation. The CAMP will be implemented and executed in accordance with 29 CFR 1910.120(h), the New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan, and the New York State Department of Environmental Conservation (NYSDEC) TAGM #4031.

Real-time monitoring for dust and VOCs will be conducted both within the work area, and along the site perimeter, during intrusive activities such as excavation and drilling activities.

Detailed information on the types, frequency and location of real-time monitoring and community air monitoring requirements are provided in the CAMP prepared for this project.

## **9.0 ZONES, PROTECTION AND COMMUNICATION**

### **9.1 Site Control**

Site zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It shall include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin.

This project is a hazardous waste remediation project, and any person working in an area where the potential for exposure to site contaminants exists, will only be allowed access after providing the FTL/SHSO with proper training and medical documentation.

The zones are based upon current knowledge of proposed site activities. It is possible that the zone configurations may be altered due to work plan revisions. Should this occur, the work zone will be adjusted accordingly, and documented through use of a field-change request form.

The following shall be used for guidance in revising these preliminary zone designations, if necessary.

**Support Zone** - The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

**Contamination Reduction Zone** - The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

**Exclusion Zone** - All activities, which may involve exposure to site contaminants, hazardous materials and/or conditions, should be considered an EZ. The FTL/SHSO may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the site HSO allowing adequate space for the activity to be completed, field members and emergency equipment.

### **9.2 Contamination Control**

Decontamination areas will be established for the following activities.

- Drilling/Sampling Activities
- Excavation



### 9.2.1 Personnel Decontamination Station

All personnel and portable equipment used in the EZ shall be subject to a thorough decontamination process, as deemed necessary by the FTL/SHSO. Sampling equipment shall be decontaminated. As necessary, all boots and gloves will be decontaminated using soap and water solution and scrub brushes or simple removal and disposal. All used respiratory protective equipment will be decontaminated daily and sanitized with appropriate sanitizer solution.

All drums generated as a result of sampling and decontamination activities will be marked and stored at a designated area at the site until the materials can be properly disposed of off-site.

All non-expendable sampling equipment will be decontaminated. This usually entails the use of Alconox, solvent and distilled/deionized water rinses to eliminate contaminants.

### 9.3 Communication

- Each team member will have a Nextel cell phone/radio for communication with the PM, HSO and other team members during field activities.
- Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

#### **SIGNAL**

Hand gripping throat

Grip on a partner's wrist or placement of both hands around a partner's waist.

Hands on top of head

Thumbs up

Thumbs down

#### **MEANING**

Out of air, can't breathe

Leave the area immediately, no debate.

Need assistance

Okay, I'm all right, I understand.

No, negative.

## **10.0 MEDICAL SURVEILLANCE PROCEDURES**

All contractor and subcontractor personnel performing field work where potential exposure to contaminants exists at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f).

### **10.1 Medical Surveillance Requirements**

A physician's medical release for work will be confirmed by the HSM before an employee can work in the exclusion zone. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months. Additional medical testing may be required by the HSM in consultation with the Corporate Medical Consultant and the FTL/SHSO if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance.

### **10.2 Medical Data Sheet**

A medical data sheet is provided in **Appendix D**. This medical data sheet is voluntary and should be completed by all on-site personnel and will be maintained at the site. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

## **11.0 SAFETY CONSIDERATIONS**

### **11.1 General Health and Safety Work Practices**

A list of general health and safety work practices is included as an included in **Appendix E**. The work rules will be posted in a conspicuous location at the site.

### **11.2 The Buddy System**

At a minimum, employees shall work in groups of two in such a manner that they can observe each other and maintain line-of-sight for each employee within the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

### **11.3 Sample Handling**

Personnel responsible for the handling of samples should wear the prescribed level of protection. Samples should be identified as to their hazard and packaged as to prevent spillage or breakage. Sample containers shall be decontaminated in the CRZ or EZ before entering a clean Support Zone area. Any unusual sample conditions, odors, or real-time readings should be noted. Laboratory personnel should be advised of sample hazard level and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling, in order to assure that the practices are appropriate for the suspected contaminants in the sample.

### **11.4 Drill Rigs**

When conducting drilling activities, the opportunity of encountering fire and explosion hazards exists from underground utilities and gases. The locations of underground utilities will be verified prior to performing any intrusive activities. Additionally, because of the inherently hazardous nature of drilling operations, safety and accident prevention are crucial when drilling operations are performed. Most drilling accidents occur as a direct result of lack of training and supervision, improper handling of equipment, and unsafe work practices. Hazards include: assembling and disassembling rigs, rotary and auger drilling, and grouting. The drilling contractor shall perform drilling in accordance with its own Health & Safety Program for Drill Rig Safety.

#### **11.4.1 Safety During Drilling Operations**

- Safety requires the attention and cooperation of every worker and site visitor.
- Do not drive the drill rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick), look up to check for overhead obstructions.
- Maintain a minimum of 15 feet clearance from all overhead electric lines.
- Before raising the mast (derrick), all drill rig personnel (with the exception of the operator) and visitors shall be cleared from the areas immediately to the rear and the sides of the mast. All drill rig personnel and visitors shall be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig must first be leveled and stabilized with leveling jacks and/or solid cribbing. Lower the mast (derrick) only when the leveling jacks are down and do not raise the leveling jack pads until the mast (derrick) is lowered completely.
- The operator of a drill rig shall only operate a drill rig from the position of the controls.

- Throwing or dropping tools shall not be permitted. All tools shall be carefully passed by hand between personnel or a hoist line shall be used.
- Do not consume alcoholic beverages or other depressants or chemical stimulants prior to starting work on a drill rig or while on the job.
- All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors, or animals from stepping or falling into the hole.
- Terminate drilling operations during an electrical storm and move the entire crew away from the drill rig.

### **11.5 Excavation**

Although extensive excavation is not anticipated for the scope of this project, excavations will be conducted in accordance with the requirements contained in 29 CFR 1926, Subpart P-Excavations. It provides for the designation of a "Competent Person" and general requirements for safe excavating practices. The program also incorporates company standards for the monitoring of potentially hazardous atmospheres; protection from water hazards; analyzing and maintaining the stability of adjacent structures; daily competent person inspections; soil classification; sloping and benching; protective systems; and training.

The Competent Person will be the FTL or other designee with appropriate training and experience. The Competent Person will be assisted in his/her duties by other technical personnel such as the HSM, geologists, structural engineers and soils engineers.

No entry into excavations will be allowed for this phase of the project.

## **12.0 DISPOSAL PROCEDURES**

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site.

All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials will be collected and bagged for appropriate disposal as non-hazardous solid waste. Additional waste disposal procedures may be developed as applicable.

## **13.0 EMERGENCY RESPONSE PLAN**

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures which are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures.

### **13.1 Responsibilities**

#### *13.1.1 Health and Safety Manager (HSM)*

The HSM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The HSM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents.

#### *13.1.2 Field Team Leader/Site Health and Safety Officer (FTL/SHSO)*

The FTL/SHSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The FTL/SHSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can ensure that OSHA is notified within the required time frame. The HSM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of \$500 within 24 hours.

#### *13.1.3 Emergency Coordinator*

The Emergency Coordinator for the project is the FTL/SHSO.

The Emergency Coordinator shall make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the emergency coordinator will inform interested parties about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. The emergency coordinator will locate emergency phone numbers and identify hospital routes prior to beginning work on site. The emergency coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator will implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action.

#### *13.1.4 Site Personnel*

Site personnel are responsible for knowing the Emergency Response/Contingency Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency.

### **13.2 Communication**

A variety of communication systems may be utilized during emergency situations. These are discussed in the

following sections.

#### **13.2.1 Hand Signals**

Downrange field teams will employ hand signals where necessary for communication during emergency situations. Hand signals are found in Section 8.3.

#### **13.2.2 Field Radios and Cell Phones**

PWGC field personnel are provided cellular phones with telephone and two-way radio capabilities for site communication and emergency use.

### **13.3 Local Emergency Support Units**

A route map from the site to the nearest hospital can be found in **Appendix F**. This map will be placed with the above emergency telephone numbers in all on-site vehicles.

### **13.4 Pre-Emergency Planning**

PWGC will communicate directly with administrative personnel from the emergency room at the hospital to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from exposure to any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

Before the field activities begin, the local emergency response personnel will be notified of the schedule for field activities and about the materials that are thought to exist on the site so that they will be able to respond quickly and effectively in the event of a fire, explosion, or other emergency. Before fieldwork on the site commences, each person who will be working there or observing the operations will complete a medical data sheet (**Appendix D**). These data sheets will be filled out during site-specific training and will be kept on the site.

In the event of an incident where a team member becomes exposed or suffers from an acute symptom of exposure to site materials and has to be taken to a hospital, a copy of his/her medical data sheet will be presented to the attending physician.

**Table 13-1**  
**Emergency Telephone Numbers**

Contact	Firm or Agency	Telephone Number
Police		911
Fire		911
Hospital	Beth Israel Medical Center	(718) 951-2807
Ambulance		911
Project Manager/Health and Safety Manager	Kris Almskog PWGC	(631) 589-6353
Health & Safety Officer	Thomas Melia PWGC	(631) 589-6353
NYSDEC Site Contact	To Be Determined	(
Poison Control Center		(800) 962-1253
Chemtrec		(800) 424-9300

### 13.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the FTL/SHSO immediately. First aid equipment will be available on site at the following locations:

- First Aid Kit: Support Zone (or designated by FTL/SHSO upon arrival)
- Emergency Eye Wash: Support Zone (or designated by FTL/SHSO upon arrival)

During site-specific training, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

There will be at least one person with current First Aid and CPR certification on each active work shift. When personnel are transported to the hospital, the FTL/SHSO will provide a copy of the Medical Data Sheet to the



paramedics and treating physician.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance. **A map and directions to the hospital can be found in Appendix F.**

### **13.6 Emergency Site Evacuation Routes and Procedures**

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The EC will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The EC will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At his/her discretion, the EC also may order the closure of the site for an indefinite period.

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, an air horn will be sounded on the site. The horn will sound continuously for one blast, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the evacuation meeting point, which will be determined upon arrival at the site by the FTL/SHSO, prior to work beginning. This will then be conveyed to all crew members during the site-specific briefing.

The EC will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency. He/she will attend the site telephone specified by the EC from the time the alarm sounds until the emergency has ended.

After sounding the alarm and initiating emergency response procedures, the EC will check and verify that access roads are not obstructed. If traffic control is necessary, as in the event of a fire or explosion, a project team member, who has been trained in these procedures and designated at the site safety meeting, will take over these duties until local police and fire fighters arrive.

The EC will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. A map showing evacuation routes, meeting places and the location of emergency equipment will be posted in all trailers and used during site-specific training.

### **13.7 Fire Prevention and Protection**

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

### 13.7.1 Fire Prevention

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials;
- Storage of flammable liquids and gases away from oxidizers;
- No smoking in the exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities; and
- Monthly inspections of all fire extinguishers.

### 13.8 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

**SKIN AND EYE CONTACT:** Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.

**INHALATION:** Move to fresh air. Decontaminate and transport to hospital or local medical provider.

**INGESTION:** Decontaminate and transport to emergency medical facility.

**PUNCTURE WOUND OR LACERATION:** Decontaminate and transport to emergency medical facility.

### 13.9 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or postponed. The FTL/SHSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on-site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive

material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

### **13.10 Accident/Incident Reporting**

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

- Health and Safety Manager;
- Project Manager; and
- The employer of any injured worker who is not a PWGC employee.

Written confirmation of verbal reports are to be completed by the FTL/SHSO using the Incident Report Form and submitted within 24 hours. The incident report and investigation form is found in **Appendix G**. If the employee involved is not a PWGC employee, his employer will receive a copy of the report.

### **13.11 Adverse Weather Conditions**

In the event of adverse weather conditions, the FTL/SHSO will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries;
- Potential for cold stress and cold-related injuries;
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds);
- Limited visibility (fog);
- Potential for electrical storms;
- Earthquakes; and
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The FTL/SHSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

### **13.12 Spill Control and Response**

All small hazardous spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or drainage areas should be blocked. All spill containment materials will be properly disposed. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill. The

following seven steps should be taken by the Emergency Coordinator:

- Determine the nature, identity and amounts of major spill components;
- Make sure all unnecessary persons are removed from the spill area;
- Notify appropriate response teams and authorities;
- Use proper PPE in consultation with the FTL/SHSO;
- If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.);
- If possible, try to stop the leak with appropriate material; and,
- Remove all surrounding materials that can react or compound with the spill.

### **13.13 Emergency Equipment**

The following minimum emergency equipment shall be kept and maintained on-site:

- Industrial first aid kit;
- Burn kit and portable eye washes (one per field team);
- Fire extinguishers (one per work area); and
- Absorbent material /spill kit.

## **14.0 TRAINING**

### **14.1 General Health and Safety Training**

In accordance with PWGC corporate policy, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. At a minimum, the training shall have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical).

#### **14.1.1 *Three Day Supervised On the Job Training***

In addition to the required initial hazardous waste operations training, each employee shall have received three days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

### **14.2 Annual Eight-Hour Refresher Training**

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 1910.120 requirements and related company programs and procedures.

### **14.3 Site-Specific Training**

Prior to commencement of field activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site, and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

### **14.4 On-Site Safety Briefings**

Project personnel and visitors will be given on-site health and safety briefings daily by the FTL/SHSO to assist site personnel in safely conducting their work activities. A copy of the Daily Briefing Sign-In Sheet is contained in **Appendix H**. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity to periodically update the crews on monitoring results. Prior to starting any new activity, a training session using the Activity Hazard Analysis will be held for crew members involved in the activity.

### **14.5 First Aid and CPR**

The HSM will identify those individuals requiring first aid and CPR training to ensure that emergency medical treatment is available during field activities. It is anticipated that a minimum of one field person on-site at any one time will have first aid and CPR training. The training will be consistent with the requirements of the American

Red Cross Association or American Heart Association. If none are available on-site, then the HSM shall be notified.

#### **14.6 Supervisory Training**

Supervisors and health and safety personnel shall have completed an additional eight hours of specialized training in accordance with 29 CFR 1910.120.

## **15.0 LOGS, REPORTS AND RECORDKEEPING**

Changes to the HASP will be documented in the Health and Safety log book and as appropriate, the HSM and/or PM will be notified. Daily tailgate meetings will be documented in the H&S log book as well as personnel on-site.

### **15.1 Medical and Training Records**

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training and documentation of three day OJT) and medical clearance for hazardous waste site work and respirator use will be maintained on-site. Records for all subcontractor employees will also be kept on-site.

### **15.2 Incident Report and Investigation Form**

The incident report and investigation form is to be completed for all accidents and incidents, including near misses. The form can be found in **Appendix G**.

### **15.3 Health and Safety Logbooks**

The FTL/SHSO will maintain a logbook during site work. The daily site conditions, personnel, monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.

## 16.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of the HASP. It is maintained on site by the FTL/SHSO as a project record. Each field team member shall sign this section after site-specific training is completed and before being permitted to work on site.

I have read, or have been informed of, the Health and Safety Plan and understand the information presented. I will comply with the provisions contained therein.

<i><b>Name (Print and Sign)</b></i>	<i><b>Date</b></i>



## **Appendix A**

### **Material Safety Data Sheets**

# NIOSH Pocket Guide to Chemical Hazards

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Arsenic (inorganic compounds, as As)			CAS 7440-38-2 (metal)
As (metal)			RTECS CG0525000 (metal)
<b>Synonyms &amp; Trade Names</b> Arsenic metal: Arsenia Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except ARSINE.]			<b>DOT ID &amp; Guide</b> 1558 / 152 (metal) 1562 / 152 (dust)
Exposure Limits	NIOSH REL: Ca C 0.002 mg/m³ [15-minute] <a href="#">See Appendix A</a> OSHA PEL: [1910.1018] TWA 0.010 mg/m³		
IDLH Ca [5 mg/m³ (as As)] See: 7440382		Conversion	
<b>Physical Description</b> Metal: Silver-gray or tin-white, brittle, odorless solid.			
MW: 74.9	BP: Sublimes	MLT: 1135°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.73 (metal)
Fl.P: NA	UEL: NA	LEL: NA	
Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.			
<b>Incompatibilities &amp; Reactivities</b> Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]			
<b>Measurement Methods</b> NIOSH 7300, 7301, 7303, 7900, 9102; OSHA ID105 See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> ( <a href="#">See protection</a> ) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench		<b>First Aid</b> ( <a href="#">See procedures</a> ) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
<b>Respirator Recommendations</b> ( <a href="#">See Appendix E</a> ) NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>			
<b>Exposure Routes</b> inhalation, skin absorption, skin and/or eye contact ingestion			
<b>Symptoms</b> Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [potential occupational carcinogen]			
<b>Target Organs</b> Liver, kidneys, skin, lungs, lymphatic system			
<b>Cancer Site</b> [lung & lymphatic cancer]			
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: 0013 See MEDICAL TESTS: 0017			

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Beryllium & beryllium compounds (as Be)			CAS 7440-41-7 (metal)
Be (metal)			RTECS DS1750000 (metal)
Synonyms & Trade Names Beryllium metal: Beryllium Other synonyms vary depending upon the specific beryllium compound.			DOT ID & Guide 1566 / 154 (compounds) 1567 / 134 (powder)
Exposure Limits	NIOSH REL: Ca Not to exceed 0.0005 mg/m³ <a href="#">See Appendix A</a> OSHA PEL: TWA 0.002 mg/m³ C 0.005 mg/m³ 0.025 mg/m³ [30-minute maximum peak]		
IDLH Ca [4 mg/m³ (as Be)] See: IDLH INDEX		Conversion	
Physical Description Metal: A hard, brittle, gray-white solid.			
MW: 9.0	BP: 4532°F	MLT: 2349°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.85 (metal)
Fl.P: NA	UEL: NA	LEL: NA	
Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of a powder or dust.			
Incompatibilities & Reactivities Acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium			
Measurement Methods NIOSH 7102, 7300, 7301, 7303, 9102; OSHA ID125G, ID206 See: NMAM or OSHA Methods			
Personal Protection & Sanitation ( <a href="#">See protection</a> ) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash		First Aid ( <a href="#">See procedures</a> ) Eye: Irrigate immediately  Breathing: Fresh air	
Respirator Recommendations NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./ Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>			
Exposure Routes inhalation, skin and/or eye contact			
Symptoms Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]			
Target Organs Eyes, skin, respiratory system			
Cancer Site [lung cancer]			
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: 0226 See MEDICAL TESTS: 0025			

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Copper (dusts and mists, as Cu)			CAS 7440-50-8
Cu			RTECS GL5325000
Synonyms & Trade Names Copper metal dusts, Copper metal fumes			DOT ID & Guide
Exposure Limits		NIOSH REL*: TWA 1 mg/m³ [*Note: The REL also applies to other copper compounds (as Cu) except Copper fume.] OSHA PEL*: TWA 1 mg/m³ [*Note: The PEL also applies to other copper compounds (as Cu) except copper fume.]	
IDLH 100 mg/m³ (as Cu) See: 7440508		Conversion	
Physical Description Reddish, lustrous, malleable, odorless solid.			
MW: 63.5	BP: 4703°F	MLT: 1981°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.94
Fl.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid in bulk form, but powdered form may ignite.			
Incompatibilities & Reactivities Oxidizers, alkalis, sodium azide, acetylene			
Measurement Methods NIOSH 7029, 7300, 7301, 7303, 9102; OSHA ID121, ID125G See: NMAM or OSHA Methods			
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations NIOSH/OSHA Up to 5 mg/m³: (APF = 5) Any quarter-mask respirator. <a href="#">Click here</a> for information on selection of N, R, or P filters.* Up to 10 mg/m³: (APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. <a href="#">Click here</a> for information on selection of N, R, or P filters.* (APF = 10) Any supplied-air respirator* Up to 25 mg/m³: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode* (APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.* Up to 50 mg/m³: (APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter* (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Up to 100 mg/m³: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./ Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>			
Exposure Routes inhalation, ingestion, skin and/or eye contact			

<b>Symptoms</b> Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational carcinogen]
<b>Target Organs</b> Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: 0240 See MEDICAL TESTS: 0057

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Iron oxide dust and fume (as Fe)		CAS 1309-37-1
Fe <sub>2</sub> O <sub>3</sub>		RTECS NO7400000 NO7525000 (fume)
<b>Synonyms &amp; Trade Names</b> Ferric oxide, Iron(III) oxide		<b>DOT ID &amp; Guide</b> 1376 / 135 (spent)
Exposure Limits	NIOSH REL: TWA 5 mg/m <sup>3</sup> OSHA PEL: TWA 10 mg/m <sup>3</sup>	
IDLH 2500 mg/m <sup>3</sup> (as Fe) See: 1309371		Conversion
<b>Physical Description</b> Reddish-brown solid. [Note: Exposure to fume may occur during the arc-welding of iron.]		
MW: 159.7	BP: ?	MLT: 2664°F
VP: 0 mmHg (approx)	IP: NA	Sol: Insoluble
Fl.P: NA	UEL: NA	Sp.Gr: 5.24
Noncombustible Solid		
<b>Incompatibilities &amp; Reactivities</b> Calcium hypochlorite		
<b>Measurement Methods</b> NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G See: NMAM or OSHA Methods		
<b>Personal Protection &amp; Sanitation</b> ( <a href="#">See protection</a> ) Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation		<b>First Aid</b> ( <a href="#">See procedures</a> ) Breathing: Respiratory support
<b>Respirator Recommendations</b> NIOSH Up to 50 mg/m <sup>3</sup> : (APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 10) Any supplied-air respirator Up to 125 mg/m <sup>3</sup> : (APF = 25) Any supplied-air respirator operated in a continuous-flow mode (APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter. Up to 250 mg/m <sup>3</sup> : (APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode (APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Up to 2500 mg/m <sup>3</sup> : (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./ Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>		
<b>Exposure Routes</b> inhalation		
<b>Symptoms</b> Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis)		

**Target Organs** respiratory system

See also: [INTRODUCTION](#) MEDICAL TESTS: 0122

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Lead			CAS 7439-92-1
Pb			RTECS OF7525000
Synonyms & Trade Names Lead metal, Plumbum			DOT ID & Guide
Exposure Limits	NIOSH REL*: TWA 0.050 mg/m³ <a href="#">See Appendix C</a> [*Note: The REL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C.</a> ]		
	OSHA PEL*: [1910.1025] TWA 0.050 mg/m³ <a href="#">See Appendix C</a> [*Note: The PEL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C.</a> ]		
IDLH 100 mg/m³ (as Pb) See: 7439921	Conversion		
Physical Description A heavy, ductile, soft, gray solid.			
MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
Fl.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid in bulk form.			
Incompatibilities & Reactivities Strong oxidizers, hydrogen peroxide, acids			
Measurement Methods NIOSH 7082, 7105, 7300, 7301, 7303, 7700, 7701, 7702, 9100, 9102, 9105; OSHA ID121, ID125G, ID206 See: NMAM or OSHA Methods			
Personal Protection & Sanitation ( <a href="#">See protection</a> ) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily		First Aid ( <a href="#">See procedures</a> ) Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations ( <a href="#">See Appendix E</a> ) NIOSH/OSHA Up to 0.5 mg/m³: (APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facepieces) except quarter-mask respirators. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 10) Any supplied-air respirator Up to 1.25 mg/m³: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode (APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter Up to 2.5 mg/m³: (APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode (APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Up to 50 mg/m³: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode Up to 100 mg/m³: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./ Any appropriate escape-type, self-contained breathing apparatus			



[Important additional information about respirator selection](#)

**Exposure Routes** inhalation, ingestion, skin and/or eye contact

**Symptoms** Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension

**Target Organs** Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

See also: [INTRODUCTION](#) See ICSC CARD: 0052 See MEDICAL TESTS: 0127

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Mercury compounds [except (organo) alkyls] (as Hg)		CAS 7439-97-6 (metal)
Hg (metal)		RTECS OV4550000 (metal)
<b>Synonyms &amp; Trade Names</b> Mercury metal: Colloidal mercury, Metallic mercury, Quicksilver Synonyms of "other" Hg compounds vary depending upon the specific compound.		<b>DOT ID &amp; Guide</b> 2809 / 172 (metal)
Exposure Limits	NIOSH REL: Hg Vapor: TWA 0.05 mg/m <sup>3</sup> [skin] Other: C 0.1 mg/m <sup>3</sup> [skin] OSHA PEL†: C 0.1 mg/m <sup>3</sup>	
IDLH 10 mg/m <sup>3</sup> (as Hg) See: 7439976		Conversion
<b>Physical Description</b> Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.]		
MW: 200.6	BP: 674°F	FRZ: -38°F
VP: 0.0012 mmHg	IP: ?	Sol: Insoluble
Fl.P: NA	UEL: NA	Sp.Gr: 13.6 (metal)
Metal: Noncombustible Liquid		
<b>Incompatibilities &amp; Reactivities</b> Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper		
<b>Measurement Methods</b> NIOSH 6009; OSHA ID140 See: NMAM or OSHA Methods		
<b>Personal Protection &amp; Sanitation</b> ( <a href="#">See protection</a> ) Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: Daily		<b>First Aid</b> ( <a href="#">See procedures</a> ) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
<b>Respirator Recommendations</b> Mercury vapor: NIOSH Up to 0.5 mg/m <sup>3</sup> : (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern† (APF = 10) Any supplied-air respirator Up to 1.25 mg/m <sup>3</sup> : (APF = 25) Any supplied-air respirator operated in a continuous-flow mode (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister) Up to 2.5 mg/m <sup>3</sup> : (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern† (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern† (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPRTS(canister) (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Up to 10 mg/m <sup>3</sup> : (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus Other mercury compounds: NIOSH/OSHA Up to 1 mg/m <sup>3</sup> :		

<p>(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†                      (APF = 10) Any supplied-air respirator                      Up to 2.5 mg/m<sup>3</sup>:                      (APF = 25) Any supplied-air respirator operated in a continuous-flow mode                      (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister)                      Up to 5 mg/m<sup>3</sup>:                      (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†                      (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†                      (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPRTS(canister)                      (APF = 50) Any self-contained breathing apparatus with a full facepiece                      (APF = 50) Any supplied-air respirator with a full facepiece                      Up to 10 mg/m<sup>3</sup>:                      (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode                      Emergency or planned entry into unknown concentrations or IDLH conditions:                      (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode                      (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus                      Escape:                      (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus  <a href="#">Important additional information about respirator selection</a></p>
<p><b>Exposure Routes</b> inhalation, skin absorption, ingestion, skin and/or eye contact</p>
<p><b>Symptoms</b> Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria</p>
<p><b>Target Organs</b> Eyes, skin, respiratory system, central nervous system, kidneys</p>
<p>See also: <a href="#">INTRODUCTION</a> See ICSC CARD: 0056 See MEDICAL TESTS: 0136</p>

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Nickel metal and other compounds (as Ni)			CAS 7440-02-0 (Metal)
Ni (Metal)			RTECS QR5950000 (Metal)
<b>Synonyms &amp; Trade Names</b> Nickel metal: Elemental nickel, Nickel catalyst Synonyms of other nickel compounds vary depending upon the specific compound.			<b>DOT ID &amp; Guide</b>
Exposure Limits	NIOSH REL*: Ca TWA 0.015 mg/m <sup>3</sup> <a href="#">See Appendix A</a> [*Note: The REL does not apply to Nickel carbonyl.] OSHA PEL*†: TWA 1 mg/m <sup>3</sup> [*Note: The PEL does not apply to Nickel carbonyl.]		
IDLH Ca [10 mg/m <sup>3</sup> (as Ni)] See: 7440020		Conversion	
<b>Physical Description</b> Metal: Lustrous, silvery, odorless solid.			
MW: 58.7	BP: 5139°F	MLT: 2831°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.90 (Metal)
Fl.P: NA	UEL: NA	LEL: NA	
Metal: Combustible Solid; nickel sponge catalyst may ignite SPONTANEOUSLY in air.			
<b>Incompatibilities &amp; Reactivities</b> Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate			
<b>Measurement Methods</b> NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> ( <a href="#">See protection</a> ) Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily		<b>First Aid</b> ( <a href="#">See procedures</a> )  Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately	
<b>Respirator Recommendations</b> NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./ Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>			
<b>Exposure Routes</b> inhalation, ingestion, skin and/or eye contact			
<b>Symptoms</b> Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]			
<b>Target Organs</b> Nasal cavities, lungs, skin			
<b>Cancer Site</b> [lung and nasal cancer]			
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: 0062 See MEDICAL TESTS: 0156			

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Naphthalene		CAS 91-20-3	
C <sub>10</sub> H <sub>8</sub>		RTECS QJ0525000	
Synonyms & Trade Names Naphthalin, Tar camphor, White tar		DOT ID & Guide 1334 / 133 (crude or refined) 2304 / 133 (molten)	
Exposure Limits	NIOSH REL: TWA 10 ppm (50 mg/m <sup>3</sup> ) ST 15 ppm (75 mg/m <sup>3</sup> )		
	OSHA PEL†: TWA 10 ppm (50 mg/m <sup>3</sup> )		
IDLH 250 ppm See: 91203	Conversion 1 ppm = 5.24 mg/m <sup>3</sup>		
Physical Description Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]			
MW: 128.2	BP: 424°F	MLT: 176°F	Sol: 0.003%
VP: 0.08 mmHg	IP: 8.12 eV		Sp.Gr: 1.15
Fl.P: 174°F	UEL: 5.9%	LEL: 0.9%	
Combustible Solid, but will take some effort to ignite.			
Incompatibilities & Reactivities Strong oxidizers, chromic anhydride			
Measurement Methods NIOSH 1501; OSHA 35 See: NMAM or OSHA Methods			
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily		First Aid (See procedures) Eye: Irrigate immediately Skin: Molten flush immediately/solid-liquid soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations NIOSH/OSHA Up to 100 ppm: (APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100, P100. <a href="#">Click here</a> for information on selection of N, R, or P filters.* (APF = 10) Any supplied-air respirator* Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode* (APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 25) Any powered air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency particulate filter.* (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>			
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact			
Symptoms Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage			
Target Organs Eyes, skin, blood, liver, kidneys, central nervous system			
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: 0667 See MEDICAL TESTS: 0152			



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Coal tar pitch volatiles		CAS 65996-93-2	
		RTECS GF8655000	
Synonyms & Trade Names Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]		DOT ID & Guide 2713 / 153 (acridine)	
Exposure Limits	NIOSH REL: Ca TWA 0.1 mg/m³ (cyclohexane-extractable fraction) <a href="#">See Appendix A</a> <a href="#">See Appendix C</a>		
	OSHA PEL: TWA 0.2 mg/m³ (benzene-soluble fraction) [1910.1002] <a href="#">See Appendix C</a>		
IDLH Ca [80 mg/m³] See: 65996932		Conversion	
Physical Description Black or dark-brown amorphous residue.			
Properties vary depending upon the specific compound.			
Combustible Solids			
Incompatibilities & Reactivities Strong oxidizers			
Measurement Methods OSHA 58 See: NMAM or OSHA Methods			
Personal Protection & Sanitation ( <a href="#">See protection</a> ) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily		First Aid ( <a href="#">See procedures</a> ) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>			
Exposure Routes inhalation, skin and/or eye contact			
Symptoms Dermatitis, bronchitis, [potential occupational carcinogen]			
Target Organs respiratory system, skin, bladder, kidneys			
Cancer Site [lung, kidney & skin cancer]			
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: 1415 See MEDICAL TESTS: 0054			

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p-Cresol			CAS 106-44-5
CH <sub>3</sub> C <sub>6</sub> H <sub>4</sub> OH			RTECS GO6475000
Synonyms & Trade Names para-Cresol, 4-Cresol, p-Cresylic acid, 1-Hydroxy-4-methylbenzene, 4-Hydroxytoluene, 4-Methyl phenol			DOT ID & Guide 2076 / 153
Exposure Limits	NIOSH REL: TWA 2.3 ppm (10 mg/m <sup>3</sup> )		
	OSHA PEL: TWA 5 ppm (22 mg/m <sup>3</sup> ) [skin]		
IDLH 250 ppm See: cresol	Conversion 1 ppm = 4.43 mg/m <sup>3</sup>		
Physical Description			
Crystalline solid with a sweet, tarry odor. [Note: A liquid above 95°F.]			
MW: 108.2	BP: 396°F	MLT: 95°F	Sol: 2%
VP(77°F): 0.11 mmHg	IP: 8.97 eV		Sp.Gr: 1.04
Fl.P: 187°F	UEL: ?	LEL(300°F): 1.1%	
Combustible Solid Class IIIA Combustible Liquid			
Incompatibilities & Reactivities			
Strong oxidizers, acids			
Measurement Methods			
NIOSH 2546; OSHA 32			
See: NMAM or OSHA Methods			
Personal Protection & Sanitation ( <a href="#">See protection</a> )		First Aid ( <a href="#">See procedures</a> )	
Skin: Prevent skin contact		Eye: Irrigate immediately	
Eyes: Prevent eye contact		Skin: Soap wash immediately	
Wash skin: When contaminated		Breathing: Respiratory support	
Remove: When wet or contaminated		Swallow: Medical attention immediately	
Change: Daily			
Provide: Eyewash, Quick drench			
Respirator Recommendations NIOSH			
Up to 23 ppm:			
(APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100, P100. <a href="#">Click here</a> for information on selection of N, R, or P filters.			
(APF = 10) Any supplied-air respirator			
Up to 57.5 ppm:			
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode			
(APF = 25) Any powered air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency particulate filter.			
Up to 115 ppm:			
(APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N100, R100, or P100 filter.			
<a href="#">Click here</a> for information on selection of N, R, or P filters.			
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters.			
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter*			
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*			
(APF = 50) Any self-contained breathing apparatus with a full facepiece			
(APF = 50) Any supplied-air respirator with a full facepiece			
Up to 250 ppm:			
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode			
Emergency or planned entry into unknown concentrations or IDLH conditions:			
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode			
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus			
Escape:			
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus			
<a href="#">Important additional information about respirator selection</a>			



**Exposure Routes** inhalation, skin absorption, ingestion, skin and/or eye contact

**Symptoms** Irritation eyes, skin, mucous membrane; central nervous system effects: confusion, depression, respiratory failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage

**Target Organs** Eyes, skin, respiratory system, central nervous system, liver, kidneys, pancreas, cardiovascular system

See also: [INTRODUCTION](#) See ICSC CARD: 0031 See MEDICAL TESTS: 0059

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m-Cresol			CAS 108-39-4
CH <sub>3</sub> C <sub>6</sub> H <sub>4</sub> OH			RTECS GO6125000
Synonyms & Trade Names meta-Cresol, 3-Cresol, m-Cresylic acid, 1-Hydroxy-3-methylbenzene, 3-Hydroxytoluene, 3-Methyl phenol			DOT ID & Guide 2076 / 153
Exposure Limits	NIOSH REL: TWA 2.3 ppm (10 mg/m³)		
	OSHA PEL: TWA 5 ppm (22 mg/m³) [skin]		
IDLH 250 ppm See: cresol	Conversion 1 ppm = 4.43 mg/m³		
Physical Description Colorless to yellowish liquid with a sweet, tarry odor. [Note: A solid below 54°F.]			
MW: 108.2	BP: 397°F	FRZ: 54°F	Sol: 2%
VP(77°F): 0.14 mmHg	IP: 8.98 eV		Sp.Gr: 1.03
Fl.P: 187°F	UEL: ?	LEL(300°F): 1.1%	
Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.			
Incompatibilities & Reactivities Strong oxidizers, acids			
Measurement Methods NIOSH 2546; OSHA 32 See: NMAM or OSHA Methods			
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Respirator Recommendations NIOSH Up to 23 ppm: (APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100, P100. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 10) Any supplied-air respirator Up to 57.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode (APF = 25) Any powered air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency particulate filter. Up to 115 ppm: (APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter* (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode* (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Up to 250 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>			

**Exposure Routes** inhalation, skin absorption, ingestion, skin and/or eye contact

**Symptoms** Irritation eyes, skin, mucous membrane; central nervous system effects: confusion, depression, respiratory failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage

**Target Organs** Eyes, skin, respiratory system, central nervous system, liver, kidneys, pancreas, cardiovascular system

See also: [INTRODUCTION](#) See ICSC CARD: 0646

# NIOSH Pocket Guide to Chemical Hazards

[NPG Home](#) | [Introduction](#) | [Names, Synonyms and Trade Names](#) | [Chemical Names](#) | [CAS Numbers](#) | [RTECS Numbers](#) | [Appendices](#)

o-Cresol			CAS 95-48-7
CH <sub>3</sub> C <sub>6</sub> H <sub>4</sub> OH			RTECS GO6300000
Synonyms & Trade Names ortho-Cresol, 2-Cresol, o-Cresylic acid, 1-Hydroxy-2-methylbenzene, 2-Hydroxytoluene, 2-Methyl phenol			DOT ID & Guide 2076 / 153
Exposure Limits	NIOSH REL: TWA 2.3 ppm (10 mg/m <sup>3</sup> )		
	OSHA PEL: TWA 5 ppm (22 mg/m <sup>3</sup> ) [skin]		
IDLH 250 ppm See: cresol	Conversion 1 ppm = 4.43 mg/m <sup>3</sup>		
Physical Description			
White crystals with a sweet, tarry odor. [Note: A liquid above 88°F.]			
MW: 108.2	BP: 376°F	MLT: 88°F	Sol: 2%
VP(77°F): 0.29 mmHg	IP: 8.93 eV		Sp.Gr: 1.05
Fl.P: 178°F	UEL: ?	LEL(300°F): 1.4%	
Combustible Solid Class IIIA Combustible Liquid			
Incompatibilities & Reactivities			
Strong oxidizers, acids			
Measurement Methods			
NIOSH 2546; OSHA 32			
See: NMAM or OSHA Methods			
Personal Protection & Sanitation ( <a href="#">See protection</a> )		First Aid ( <a href="#">See procedures</a> )	
Skin: Prevent skin contact		Eye: Irrigate immediately	
Eyes: Prevent eye contact		Skin: Soap wash immediately	
Wash skin: When contaminated		Breathing: Respiratory support	
Remove: When wet or contaminated		Swallow: Medical attention immediately	
Change: Daily			
Provide: Eyewash, Quick drench			
Respirator Recommendations NIOSH			
Up to 23 ppm:			
(APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100, P100. <a href="#">Click here</a> for information on selection of N, R, or P filters.			
(APF = 10) Any supplied-air respirator			
Up to 57.5 ppm:			
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode			
(APF = 25) Any powered air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency particulate filter.			
Up to 115 ppm:			
(APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N100, R100, or P100 filter.			
<a href="#">Click here</a> for information on selection of N, R, or P filters.			
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters.			
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter*			
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*			
(APF = 50) Any self-contained breathing apparatus with a full facepiece			
(APF = 50) Any supplied-air respirator with a full facepiece			
Up to 250 ppm:			
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode			
Emergency or planned entry into unknown concentrations or IDLH conditions:			
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode			
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus			
Escape:			
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus			
<a href="#">Important additional information about respirator selection</a>			

**Exposure Routes** inhalation, skin absorption, ingestion, skin and/or eye contact

**Symptoms** Irritation eyes, skin, mucous membrane; central nervous system effects: confusion, depression, respiratory failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage

**Target Organs** Eyes, skin, respiratory system, central nervous system, liver, kidneys, pancreas, cardiovascular system

See also: [INTRODUCTION](#) See ICSC CARD: 0030

NIOSH Publication No. 2005-151:

September 2005

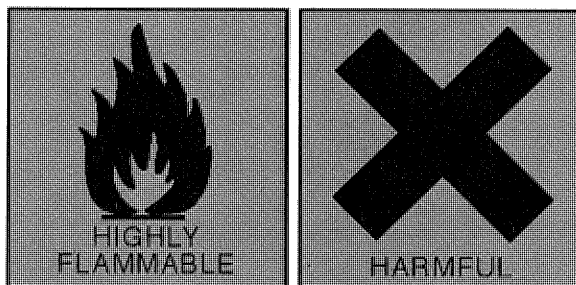
# NIOSH Pocket Guide to Chemical Hazards

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Phenol			CAS 108-95-2
C <sub>6</sub> H <sub>5</sub> OH			RTECS SJ3325000
<b>Synonyms &amp; Trade Names</b> Carbolic acid, Hydroxybenzene, Monohydroxybenzene, Phenyl alcohol, Phenyl hydroxide			<b>DOT ID &amp; Guide</b> 1671 / 153 (solid) 2312 / 153 (molten) 2821 / 153 (solution)
Exposure Limits	NIOSH REL: TWA 5 ppm (19 mg/m <sup>3</sup> ) C 15.6 ppm (60 mg/m <sup>3</sup> ) [15-minute] [skin]		
	OSHA PEL: TWA 5 ppm (19 mg/m <sup>3</sup> ) [skin]		
IDLH 250 ppm See: 108952	<b>Conversion</b> 1 ppm = 3.85 mg/m <sup>3</sup>		
<b>Physical Description</b> Colorless to light-pink, crystalline solid with a sweet, acrid odor. [Note: Phenol liquefies by mixing with about 8% water.]			
MW: 94.1	BP: 359°F	MLT: 109°F	Sol(77°F): 9%
VP: 0.4 mmHg	IP: 8.50 eV		Sp.Gr: 1.06
Fl.P: 175°F	UEL: 8.6%	LEL: 1.8%	
Combustible Solid			
<b>Incompatibilities &amp; Reactivities</b> Strong oxidizers, calcium hypochlorite, aluminum chloride, acids			
<b>Measurement Methods</b> NIOSH 2546; OSHA 32 See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> ( <a href="#">See protection</a> ) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench		<b>First Aid</b> ( <a href="#">See procedures</a> ) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
<b>Respirator Recommendations</b> NIOSH/OSHA Up to 50 ppm: (APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100, P100. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 10) Any supplied-air respirator Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode (APF = 25) Any powered air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency particulate filter. Up to 250 ppm: (APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters. (APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. <a href="#">Click here</a> for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus <a href="#">Important additional information about respirator selection</a>			

<b>Exposure Routes</b> inhalation, skin absorption, ingestion, skin and/or eye contact
<b>Symptoms</b> Irritation eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching
<b>Target Organs</b> Eyes, skin, respiratory system, liver, kidneys
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: 0070 See MEDICAL TESTS: 0182

# Safety data for 1,1-dichloroethylene



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Glossary of terms on this data sheet.

The information on this web page is provided to help you to work safely, but it is intended to be an overview of hazards, not a replacement for a full Material Safety Data Sheet (MSDS). MSDS forms can be downloaded from the web sites of many chemical suppliers.

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## General

Synonyms: 1,1-dce, NCI-C54262, vinylidene chloride, sconatex, asym-dichloroethylene, 1,1-dichloroethene, VDC, vinylidene dichloride

Molecular formula:  $C_2H_2Cl_2$

CAS No: 75-35-4

EC No: 200-864-0

Annex I Index No: 602-025-00-8

## Physical data

Appearance: colourless liquid

Melting point: -122 C

Boiling point: 31.7 C

Vapour density: 3.46 g/l

Vapour pressure: 500 mm Hg at 20 C

Density ( $g\ cm^{-3}$ ): 1.218

Flash point: -10 C



Explosion limits: 6.5 - 15.5%

Autoignition temperature:

Water solubility: moderate

## Stability

Stable. Very flammable - note low flash point. Vapour may travel considerable distances to a source of ignition. Incompatible with strong oxidizing agents, alcohols, halides, copper, aluminium. Rapidly absorbs oxygen from the air and forms explosive peroxides. Light and water promote self-polymerisation. May form explosive mixtures with air. Usually inhibited with a small amount (ca. 0.02%) of hydroquinone monomethyl ether.

## Toxicology

Poison. Harmful if ingested, inhaled or absorbed through the skin. An experimental carcinogen, tumorigen, neoplastigen and teratogen. May cause systemic effects if inhaled. May cause reproductive damage. Note that a maximum exposure limit is defined for this material for use in the UK.

### Toxicity data

(The meaning of any abbreviations which appear in this section is given here.)

IHL-HMN TCLO 25 ppm

ORL-RAT LD50 200 mg kg<sup>-1</sup>

ORL-MUS LD50 194 mg kg<sup>-1</sup>

IVN-DOG LDLO 225 mg kg<sup>-1</sup>

### Risk phrases

(The meaning of any risk phrases which appear in this section is given here.)

R12 R20 R40. (Note: Annex I does not quote risk phrase R19. However, this material is reported to form peroxides when stored in contact with the air and should be handled as though R19 applies.)

## Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)

UN No 1303. Hazard class 3. Packing group I.

## Personal protection

Safety glasses, gloves, good ventilation. Treat as a possible carcinogen. Remove all sources of ignition, including hot plates, from working area.

### Safety phrases

(The meaning of any safety phrases which appear in this section is given here.)

[Return to [Physical & Theoretical Chemistry Lab. Safety home page.](#)]

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This information was last updated on March 29, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

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# 1,2-DICHLOROETHYLENE

0436  
May 2003

CAS No: 540-59-0  
RTECS No: KV9360000  
UN No: 1150  
EC No: 602-026-00-3

1,2-Dichloroethene  
Acetylene dichloride  
symmetrical Dichloroethylene  
 $C_2H_2Cl_2$  /  $ClCH=CHCl$   
Molecular mass: 96.95

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	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.
<b>EXPOSURE</b>		<b>STRICT HYGIENE!</b>	
<b>Inhalation</b>	Cough. Sore throat. Dizziness. Nausea. Drowsiness. Weakness. Unconsciousness. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>Skin</b>	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>Eyes</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>PACKAGING &amp; LABELLING</b>	
Remove all ignition sources. Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in dry sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. (Extra personal protection: complete protective clothing including self-contained breathing apparatus.)		F Symbol Xn Symbol R: 11-20-52/53 S: (2-)7-16-29-61 Note: C UN Hazard Class: 3 UN Pack Group: II	
<b>EMERGENCY RESPONSE</b>		<b>STORAGE</b>	
Transport Emergency Card: TEC (R)-30GF1-I+II NFPA Code: H2; F3; R2		Fireproof. Well closed. See Chemical Dangers.	

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International  
Programme on  
Chemical Safety



Prepared in the context of cooperation between the International  
Programme on Chemical Safety and the European Commission  
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SEE IMPORTANT INFORMATION ON THE BACK.

## 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.

**Chemical dangers**

The substance decomposes on heating or under the influence of air, light and moisture producing toxic and corrosive fumes including hydrogen chloride. Reacts with strong oxidants. Reacts with copper or copper alloys, and bases to produce toxic chloroacetylene which is spontaneously flammable in contact with air. Attacks plastic.

**Occupational exposure limits**

TLV: 200 ppm as TWA; (ACGIH 2003).  
MAK: 200 ppm, 800 mg/m<sup>3</sup>; Peak limitation category: II(2); (DFG 2002).

**Routes of exposure**

The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

**Inhalation risk**

A harmful contamination of the air will be reached quickly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

**Effects of short-term exposure**

The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the central nervous system at high levels, resulting in lowering of consciousness.

**Effects of long-term or repeated exposure**

The liquid defats the skin. The substance may have effects on the liver.

## PHYSICAL PROPERTIES

Boiling point: 55°C

Relative density (water = 1): 1.28

Solubility in water: poor

Relative vapour density (air = 1): 3.34

Flash point: 2°C c.c.

Auto-ignition temperature: 460°C

Explosive limits, vol% in air: 9.7-12.8

Octanol/water partition coefficient as log Pow: 2

## ENVIRONMENTAL DATA

## NOTES

This compound has two isomers, cis and trans. Data for the isomers: cis-isomer (CAS 156-59-2), trans isomer (CAS 156-60-5), other boiling point 60.3, melting point -81.5°C (cis), -49.4°C (trans); flash point c.c. 6°C (cis), 2-4°C (trans); relative density (water = 1) 1.28 (cis), 1.26 (trans); vapour pressure 24.0 kPa (cis), 35.3 kPa (trans) at 20°C; relative density of the vapour/air-mixture at 20°C (air = 1): 1.6 (cis), 1.8 (trans); octanol/water partition coefficient as log Pow: 1.86 (cis), 2.09 (trans). Depending on the degree of exposure, periodic medical examination is suggested.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

# 1,1,1-TRICHLOROETHANE

0079

October 1994

CAS No: 71-55-6  
RTECS No: KJ2975000  
UN No: 2831  
EC No: 602-013-00-2

Methyl chloroform  
Methyltrichloromethane  
alpha-Trichloroethane  
 $C_2H_3Cl_3$  /  $CCl_3CH_3$   
Molecular mass: 133.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions. Heating will cause rise in pressure with risk of bursting. See Notes. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		<b>PREVENT GENERATION OF MISTS!</b>	
<b>Inhalation</b>	Headache. Dizziness. Drowsiness. Nausea. Ataxia. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>Skin</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>	Redness.	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.
<b>Ingestion</b>	Diarrhoea. Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>PACKAGING &amp; LABELLING</b>	
Ventilation. Collect leaking and spilled liquid in sealable, suitable 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: self-contained breathing apparatus.		Xn Symbol N Symbol R: 20-59 S: (2-)24/25-59-61 Note: F UN Hazard Class: 6.1 UN Pack Group: III  Do not transport with food and feedstuffs. Marine pollutant.	
<b>EMERGENCY RESPONSE</b>		<b>SAFE STORAGE</b>	
Transport Emergency Card: TEC (R)-61S2831 NFPA Code: H2; F1; R0		Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials. See Chemical Dangers. Cool. Dry. Ventilation along the floor.	

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SEE IMPORTANT INFORMATION ON THE BACK.

## IMPORTANT DATA

**Physical State; Appearance**

COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**Physical dangers**

The vapour is heavier than air.

**Chemical dangers**

The substance decomposes on heating or on burning producing toxic and corrosive fumes including phosgene and hydrogen chloride. Reacts violently with aluminium, manganese and their alloys, alkalis, strong oxidants, acetone and zinc. Attacks natural rubber. Mixtures of 1,1,1-trichloroethane with potassium or its alloys are shock sensitive. Reacts slowly with water releasing corrosive hydrochloric acid.

**Occupational exposure limits**

TLV: 350 ppm as TWA, 450 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued (ACGIH 2004).  
MAK: 200 ppm, 1100 mg/m<sup>3</sup>; Peak limitation category: II(1); skin absorption (H); Pregnancy risk group: C; (DFG 2004).

**Routes of exposure**

The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

**Inhalation risk**

A harmful contamination of the air can be reached rather 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. The substance may cause effects on the heart, central nervous system and liver, resulting in cardiac disorders and respiratory failure. Exposure at high levels may result in death. Medical observation is indicated.

**Effects of long-term or repeated exposure**

The liquid defats the skin. The substance may have effects on the liver.

## PHYSICAL PROPERTIES

Boiling point: 74 C  
Melting point: -30 C  
Relative density (water = 1): 1.34  
Solubility in water: none  
Vapour pressure, kPa at 20 C: 13.3

Relative vapour density (air = 1): 4.6  
Flash point: see Notes  
Auto-ignition temperature: 537 C  
Explosive limits, vol% in air: 8-16  
Octanol/water partition coefficient as log Pow: 2.49

## ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to air quality and ground water contamination.

## NOTES

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions.  
The substance burns only in excess oxygen or if a strong source of ignition is present.  
Use of alcoholic beverages enhances the harmful effect.  
Depending on the degree of exposure, periodic medical examination is suggested.  
An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.  
Do NOT use in the vicinity of a fire or a hot surface, or during welding.  
Aerotherne, Algylen, Trichloran, Chlorylen, Genklene, Chlorothene NU, Chlorothene VG, and Solvent 111 are trade names.  
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

**BENZ(a)ANTHRACENE****0385**

October 1995

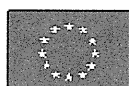
**CAS No:** 56-55-3  
**RTECS No:** CV9275000  
**EC No:** 601-033-00-9

1,2-Benzoanthracene  
Benzo(a)anthracene  
2,3-Benzphenanthrene  
Naphthanthracene  
 $C_{18}H_{12}$   
Molecular mass: 228.3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
<b>Inhalation</b>		Local exhaust or breathing protection.	Fresh air, rest.
<b>Skin</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>		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.
<b>Ingestion</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.
<b>SPILLAGE DISPOSAL</b>		<b>PACKAGING &amp; LABELLING</b>	
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.		T Symbol N Symbol R: 45-50/53 S: 53-45-60-61	
<b>EMERGENCY RESPONSE</b>		<b>SAFE STORAGE</b>	
		Well closed.	

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## IMPORTANT DATA

**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.

**Occupational exposure limits**

TLV: A2 (suspected human carcinogen); (ACGIH 2004).

**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 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.

## NOTES

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. See sections Occupational Exposure Limits, EU classification.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

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# CHROMIUM

0029

October 2004

CAS No: 7440-47-3  
RTECS No: GB4200000

Chrome  
(powder)  
Cr  
Atomic mass: 52.0

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

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting.  
Personal protection: P2 filter respirator for harmful particles.

## PACKAGING & LABELLING

## EMERGENCY RESPONSE

## SAFE STORAGE

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## IMPORTANT DATA

**Physical State; Appearance**

GREY POWDER

**Physical dangers**

Dust explosion possible if in powder or granular form, mixed with air.

**Chemical dangers**

Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances, causing fire and explosion hazard.

**Occupational exposure limits**TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m<sup>3</sup> as TWA; A4; (ACGIH 2004).

MAK not established.

**Inhalation risk**

A harmful concentration of airborne particles can be reached quickly when dispersed.

**Effects of short-term exposure**

May cause mechanical irritation to the eyes and the respiratory tract.

## PHYSICAL PROPERTIES

Boiling point: 2642 C

Melting point: 1900 C

Density: 7.15 g/cm<sup>3</sup>

Solubility in water: none

## ENVIRONMENTAL DATA

## NOTES

The surface of the chromium particles is oxidized to chromium(III)oxide in air.  
See ICSC 1531 Chromium(III) oxide.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

CAS No: 218-01-9  
RTECS No: GC0700000  
UN No: 3077  
EC No: 601-048-00-0

Benzoaphenanthrene  
1,2-Benzophenanthrene  
1,2,5,6-Dibenzonaphthalene  
C<sub>18</sub>H<sub>12</sub>  
Molecular mass: 228.3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
<b>Inhalation</b>		Local exhaust or breathing protection.	Fresh air, rest.
<b>Skin</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	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.	<b>EU classification</b> T Symbol N Symbol R: 45-68-50/53 S: 53-45-60-61 <b>UN classification</b> UN Hazard Class: 9 UN Pack Group: III <b>GHS classification</b> Signal: Warning Health haz-Enviro Suspected of causing cancer Very toxic to aquatic life Toxic to aquatic life with long lasting effects

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-90GM7-III	Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

## 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: skin absorption (H); Carcinogen category: 2 (DFG 2007).

**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 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/cm<sup>3</sup>

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.

Card has been partially updated in January 2008: see Occupational Exposure Limits.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

**DIBENZO(a,h)ANTHRACENE****0431**

October 1995

**CAS No: 53-70-3**  
RTECS No: HN2625000  
EC No: 601-041-00-2

1,2:5,6-Dibenzanthracene  
 $C_{22}H_{14}$   
Molecular mass: 278.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, powder.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
<b>Inhalation</b>		Local exhaust or breathing protection.	Fresh air, rest.
<b>Skin</b>	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>	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.
<b>Ingestion</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.
<b>SPILLAGE DISPOSAL</b>		<b>PACKAGING &amp; LABELLING</b>	
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.		T Symbol N Symbol R: 45-50/53 S: 53-45-60-61	
<b>EMERGENCY RESPONSE</b>		<b>SAFE STORAGE</b>	
		Well closed.	

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## IMPORTANT DATA

**Physical State; Appearance**

COLOURLESS CRYSTALLINE POWDER.

**Occupational exposure limits**

TLV not established.

**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 long-term or repeated exposure**

The substance may have effects on the skin, resulting in photosensitization. This substance is probably carcinogenic to humans.

## PHYSICAL PROPERTIES

Boiling point: 524 C

Melting point: 267 C

Relative density (water = 1): 1.28

Solubility in water: none

Octanol/water partition coefficient as log Pow: 6.5

## ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in seafood.

## NOTES

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).

Card has been partly updated in October 2005. See section EU classification.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

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**DIETHYL PHTHALATE****0258**

March 2001

CAS No: 84-66-2  
RTECS No: T110500001,2-Benzenedicarboxylic acid diethyl ester  
DEP  
 $C_6H_4(COOC_2H_5)_2$  /  $C_{12}H_{14}O_4$   
Molecular mass: 222.3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Alcohol-resistant foam, powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>			
<b>Inhalation</b>	Dizziness. Dullness.	Ventilation. Local exhaust.	Fresh air, rest.
<b>Skin</b>		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>Eyes</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>	Abdominal pain. Nausea.	Do not eat, drink, or smoke during work.	Rinse mouth. Give one or two glasses of water to drink. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>PACKAGING &amp; LABELLING</b>	
Personal protection: particulate filter adapted to the airborne concentration of the substance. 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.			
<b>EMERGENCY RESPONSE</b>		<b>SAFE STORAGE</b>	
NFPA Code: H 0; F 1; R 0			

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## IMPORTANT DATA

**Physical State; Appearance**  
COLOURLESS OILY LIQUID**Chemical dangers**

The substance decomposes on heating or on burning producing toxic fumes and gases (phthalic anhydride - see ICSC 0315). Attacks some plastics.

**Occupational exposure limits**

TLV: 5 mg/m<sup>3</sup> as TWA; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2005).  
MAK not established.

**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 not or will only very slowly be reached on evaporation of this substance at 20 C.

## PHYSICAL PROPERTIES

Boiling point: 295 C  
Melting point: -67 to -44 C  
Relative density (water = 1): 1.1  
Solubility in water, g/100 ml at 25 C: none  
Relative vapour density (air = 1): 7.7

Flash point: 117 C (c.c.)  
Auto-ignition temperature: 457 C  
Explosive limits, vol% in air: 0.7%- ?  
Octanol/water partition coefficient as log Pow: 2.47

## ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to fish.

## NOTES

Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.  
Card has been partially updated in July 2007: see Spillage Disposal.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

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**TETRACHLOROETHYLENE****0076**  
April 2000**CAS No: 127-18-4**  
RTECS No: KX3850000  
UN No: 1897  
EC No: 602-028-00-41,1,2,2-Tetrachloroethylene  
Perchloroethylene  
Tetrachloroethene  
 $C_2Cl_4$  /  $Cl_2C=CCl_2$   
Molecular mass: 165.8

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		<b>STRICT HYGIENE! PREVENT GENERATION OF MISTS!</b>	
<b>Inhalation</b>	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>Skin</b>	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>	Redness. Pain.	Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Ventilation. 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.	Xn Symbol N Symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Pack Group: III Do not transport with food and feedstuffs. Marine pollutant.

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-61S1897 NFPA Code: H2; F0; R0	Separated from metals, (see Chemical Dangers), food and feedstuffs. Keep in the dark. Ventilation along the floor.

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## IMPORTANT DATA

**Physical State; Appearance**

COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**Physical dangers**

The vapour is heavier than air.

**Chemical dangers**

On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.

**Occupational exposure limits**

TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).

MAK: skin absorption (H); Carcinogen category: 3B; (DFG 2004).

**Routes of exposure**

The substance can be absorbed into the body by inhalation 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, 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. Exposure at high levels may result in unconsciousness.

**Effects of long-term or repeated exposure**

Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.

## PHYSICAL PROPERTIES

Boiling point: 121 C

Melting point: -22 C

Relative density (water = 1): 1.6

Solubility in water, g/100 ml at 20 C: 0.015

Vapour pressure, kPa at 20 C: 1.9

Relative vapour density (air = 1): 5.8

Relative density of the vapour/air-mixture at 20 C (air = 1): 1.09

Octanol/water partition coefficient as log Pow: 2.9

## ENVIRONMENTAL DATA

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

## NOTES

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.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

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# TRICHLOROETHYLENE

**0081**  
October 2000

**CAS No: 79-01-6**  
RTECS No: KX4550000  
UN No: 1710  
EC No: 602-027-00-9

1,1,2-Trichloroethylene  
Trichloroethene  
Ethylene trichloride  
Acetylene trichloride  
 $C_2HCl_3$  /  $ClCH=CCl_2$   
Molecular mass: 131.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
<b>EXPLOSION</b>		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		<b>PREVENT GENERATION OF MISTS! STRICT HYGIENE!</b>	
<b>Inhalation</b>	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>Skin</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>	Redness. Pain.	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.
<b>Ingestion</b>	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Ventilation. 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. Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment.	T Symbol R: 45-36/38-52/53-67 S: 53-45-61 UN Hazard Class: 6.1 UN Pack Group: III Do not transport with food and feedstuffs. Marine pollutant.

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-61S1710 NFPA Code: H2; F1; R0	Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs. Dry. Keep in the dark. Ventilation along the floor.

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## IMPORTANT DATA

**Physical State; Appearance**

COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**Physical dangers**

The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

**Chemical dangers**

On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (phosgene, hydrogen chloride). The substance decomposes on contact with strong alkali producing dichloroacetylene, which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.

**Occupational exposure limits**

TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004).  
MAK: Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2004).

**Routes of exposure**

The substance can be absorbed into the body by inhalation and by ingestion.

**Inhalation risk**

A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20 C.

**Effects of short-term exposure**

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, resulting in respiratory failure. Exposure could cause lowering of consciousness.

**Effects of long-term or repeated exposure**

Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system, resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.

## PHYSICAL PROPERTIES

Boiling point: 87 C  
Melting point: -73 C  
Relative density (water = 1): 1.5  
Solubility in water, g/100 ml at 20 C: 0.1  
Vapour pressure, kPa at 20 C: 7.8

Relative vapour density (air = 1): 4.5  
Relative density of the vapour/air-mixture at 20 C (air = 1): 1.3  
Auto-ignition temperature: 410 C  
Explosive limits, vol% in air: 8-10.5  
Octanol/water partition coefficient as log Pow: 2.42

## ENVIRONMENTAL DATA

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

## NOTES

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions.  
Use of alcoholic beverages enhances the harmful effect.  
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 October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

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# VINYL CHLORIDE

**0082**  
April 2000

**CAS No: 75-01-4**  
RTECS No: KU9625000  
UN No: 1086 (stabilized)  
EC No: 602-023-00-7

Chloroethene  
Chloroethylene  
VCM  
(cylinder)  
 $C_2H_3Cl$  /  $H_2C=CHCl$   
Molecular mass: 62.5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	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.
<b>EXPLOSION</b>	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!
<b>Inhalation</b>	Dizziness. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>Skin</b>	ON CONTACT WITH LIQUID: FROSTBITE.	Protective gloves. Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.
<b>Eyes</b>	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.
<b>Ingestion</b>		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Personal protection: complete protective clothing including self-contained breathing apparatus.	F+ Symbol T Symbol R: 45-12 S: 53-45 Note: D UN Hazard Class: 2.1

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-20S1086 NFPA Code: H 2; F 4; R 2	Fireproof. Separated from incompatible materials. (See Chemical Dangers.) Cool. Store only if stabilized.

**IPCS**

International  
Programme on  
Chemical Safety



Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission ©  
IPCS 2005

SEE IMPORTANT INFORMATION ON THE BACK.

## IMPORTANT DATA

**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).

**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 and peripheral 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.

## NOTES

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.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

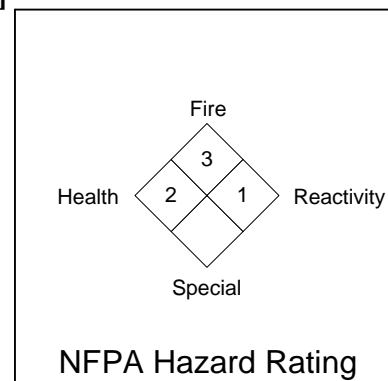
Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

**Material Safety Data Sheet: Isopropylbenzene [Cumene]****1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION****Product name****Isopropylbenzene [Cumene]****Effective date**

August 2007

**Synonyms**Isopropylbenzene, cumol,  
2-phenylethane,  
(1-methylethyl) benzene,  
cumene**Chemical formula** $(\text{CH}_3)_2\text{CHC}_6\text{H}_5$ **CAS name & no.**

Benzene, (1-methylethyl), 98-82-8

**Manufacturer's name and  
address**Georgia Gulf Chemicals and Vinyls, LLC  
P.O. Box 1959  
Pasadena, TX 77501**Emergency telephone number**For transportation emergencies:  
CHEMTREC (800) 424-9300  
For all other emergencies: (225) 685-2500**MSDS contact**Corporate Health & Safety Department  
P.O. Box 629  
Plaquemine, LA 70765  
Phone Number (225) 685-2500

**Material Safety Data Sheet: Isopropylbenzene [Cumene]****2. COMPOSITION/INFORMATION ON INGREDIENTS**

Component	CAS No.	Wt. %.
Isopropylbenzene [Cumene]	98-82-8	99.97

**3. HAZARDS IDENTIFICATION****PRECAUTIONARY INFORMATION**

**Flammable liquid. Eye, skin and respiratory tract irritant. May cause narcosis. Causes dizziness, drowsiness and unconsciousness.**

**POTENTIAL HEALTH EFFECTS****Primary Routes of Entry**

Inhalation, ingestion, skin, and eye contact.

**Acute Effects**

Isopropylbenzene may act as a central nervous system depressant and a narcotic. Inhalation of high vapor concentrations may cause dizziness, slight incoordination, and unconsciousness. This chemical may also be toxic to the liver, spleen, and gall bladder, but there is little human evidence of these effects. This chemical is also a skin and eye irritant.

**Chronic Effects**

Prolonged skin contact may result in skin rashes. Chronic experiments in animals found isopropylbenzene to cause damage to the spleen and fatty changes in the liver, but no renal or pulmonary irritancy. Subacute inhalation experiments showed no significant changes in peripheral blood, but exhibited some liver, kidney, and lung effects.

**Potential Adverse Chemical Interactions**

Persons with kidney diseases, liver diseases, skin diseases or respiratory diseases, especially obstructive airway disease, may be at increased risks due to the toxic effects of isopropylbenzene on these organs.

**Carcinogen Status**

Isopropylbenzene is not considered to be carcinogenic by OSHA, NIOSH, NTP, IARC, or EPA.



**Material Safety Data Sheet: Isopropylbenzene [Cumene]****4. FIRST AID MEASURES****Inhalation**

If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, begin artificial respiration and if heart action has stopped, CPR. Get medical attention as soon as possible.

**Skin Contact**

If this chemical contacts the skin, flush the contaminated skin with copious quantities of water for at least 15 minutes. If this chemical penetrates the clothing, immediately remove clothing and flush the skin with water promptly. If irritation persists after washing, get medical attention.

**Eye Contact**

If the chemical contacts the eyes, immediately wash the eyes with large amounts of room temperature water for at least 15 minutes, occasionally lifting the lower and upper lids. Get medical attention immediately.

**Ingestion**

If the chemical is ingested do not induce vomiting. Get medical attention immediately.

**5. FIRE FIGHTING MEASURES**

**Flash Point** 33°C (closed cup)

**Flammable Limits (% By Vol.)**

Lower Explosive Limit (LEL) 0.9

Upper Explosive Limit (UEL) 6.5

**Autoignition Temperature** 425° C

**Fire Fighting Procedures/Fire Extinguishing Media**

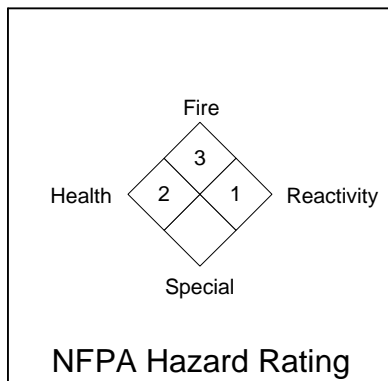
Keep unnecessary people away; isolate hazard area and deny entry. Avoid breathing vapors, stay upwind. Use NIOSH approved self-contained respirator in the positive pressure mode as combustion of isopropylbenzene produces toxic vapors. Structural firefighter's protective clothing is NOT effective for this material. Use an acceptable halon replacement such as carbon dioxide extinguishers, alcohol foam or dry chemical for small fires. Large fires should be extinguished with alcohol foam. Water sprays may be used to keep the containers cool but may be insufficient to extinguish the fire. Direct water streams may promote the spread of isopropylbenzene flames, as isopropylbenzene is lighter than water. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire.

**Unusual Fire and Explosion Hazards**

Dangerous fire and explosion hazard when exposed to heat or flame. Isopropylbenzene vapor forms explosive mixtures in air. Flowing isopropylbenzene may ignite by self-generated static electricity. Do not weld, cut, drill, grind, or perform similar operations on or near containers (even empty containers, as even residues of isopropylbenzene can ignite explosively).

**Material Safety Data Sheet: Isopropylbenzene [Cumene]****5. FIRE FIGHTING MEASURES (continued)**

Isopropylbenzene vapors are heavier than air and may travel back a considerable distance to a source of ignition and flash back. Containers exposed to heat from fires should be cooled with water to prevent vapor pressure buildup, which could result in container rupture. Combustion of isopropylbenzene produces irritants and toxic gases.

**National Fire Protection Association Hazard Rating**

4 = Extreme

3 = High

2 = Moderate

1 = Slight

0 = Insignificant

**6. ACCIDENTAL RELEASE MEASURES**

Shut off all sources of ignition. No smoking or flares allowed in the spill area. Restrict access to spill area, and move unprotected personnel upwind of the area. Keep out of low areas. Allow only trained personnel wearing appropriate protective clothing and self-contained respirator in the vicinity of the spill. Do not touch spilled material; stop leak if you can without risk. If fire potential exists, cover spill with foam. Prevent isopropylbenzene from entering water bodies, drains and any sewage collection systems. Isopropylbenzene will float on water and the runoff will present an explosion or fire hazard. For small spills take up with sand or other non-combustible absorbent material, and place into containers for later disposal. Control large spills by diking. Dispose all spill material in accordance with federal, state and local regulations. Isopropylbenzene spills over the reportable quantity (5,000 lbs) should be reported to the National Response Center (800-424-8802).

**7. HANDLING AND STORAGE**

Store in a well ventilated place away from sources of ignition, and oxidizing agents and in accordance with 29 CFR 1910.106. Store in metal containers. Ground and bond all storage and transfer equipment to prevent possible ignition from static sparks. Use spark resistant equipment (tools) in the isopropylbenzene area. Store in an area equipped with automatic sprinklers or fire extinguishing system. Wear appropriate protective equipment when handling isopropylbenzene. All seals, gaskets, liners and other such parts exposed to isopropylbenzene service should be made of aromatic resistant elastomers. Do not use rubber-lined tanks. Since emptied containers retain product residues, assume emptied containers to have the same hazards as full containers. Follow all federal, state and local regulations as well as all insurance codes when storing and handling isopropylbenzene.

**Material Safety Data Sheet: Isopropylbenzene [Cumene]****8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Respiratory Protection**

Use appropriate NIOSH approved respirators in accordance with 29 CFR 1910.132 and 1910.134, to prevent overexposure. Respirators must be selected based on the airborne levels found in the workplace and must not exceed the working limits of the respirator.

**Eye Protection**

Use splash proof chemical safety goggles or appropriate full-face respirator. Follow the eye and face protection guidelines of 29 CFR 1910.132 and 1910.133. Where there is any possibility that an individual's eyes may be exposed to isopropylbenzene, an eye wash fountain (in accordance with 29 CFR 1910.151) should be within the immediate work area for emergency use.

**Protective Gloves**

Use gloves in accordance with 29 CFR 1910.132 and 29 CFR 1910.138.

**Ventilation**

Provide local ventilation to maintain exposure levels below recommended exposure limits, and to prevent accumulation of isopropylbenzene in explosive levels. Use explosion proof ventilation equipment. Local exhaust ventilation should comply with OSHA regulations and the American Conference of Governmental Industrial Hygienists, Industrial Ventilation - A Manual of Recommended Practice.

**Exposure Guidelines**

The OSHA-PEL, NIOSH-REL and ACGIH-TLV for Isopropylbenzene [Cumene] is 50 ppm (8-hr TWA). The IDLH is 900 ppm [10% LEL].

**Other**

Where there is a possibility of exposure of an individual's body to isopropylbenzene, facilities for quick drenching of the body should be provided (in accordance with 29 CFR 1910.151) within the immediate work area for emergency use. Such individuals should be provided with and required to use impervious clothing in accordance with 29 CFR 1910.132.

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Clear colorless liquid

**Odor**

Sharp penetrating aromatic odor

**Molecular Weight**

120.2

**Boiling Point**

152°C

**Melting Point**

-96°C

**Solubility**

Insoluble in water, soluble in alcohol, ether, benzene, and chlorinated solvents

**Specific Gravity (Water = 1.0)**

0.86

**Vapor Density (Air = 1.0)**

4.14

**Vapor Pressure**

3.2 mm Hg @ 20°C

**pH**

Not Available

**Material Safety Data Sheet: Isopropylbenzene [Cumene]****10. STABILITY AND REACTIVITY****Stability**

Stable under normal conditions.

**Polymerization**

Hazardous polymerization does not occur.

**Hazardous Decomposition Products**

Combustion products of isopropylbenzene may include styrene, benzaldehyde, acetophenone, benzene, carbon monoxide, and carbon dioxide. Other unidentified organic compounds may be formed during combustion.

**Incompatible Materials**

Violent reactions may take place between isopropylbenzene and nitric acid, oleum and cholorsulphonic acid. Isopropylbenzene reacts with oxidizing agents to form isopropylbenzene hydroperoxide, which may cause explosive hazards.

**11. TOXICOLOGICAL INFORMATION****Animal Toxicity:**

<b>Oral:</b>	Rat LD <sub>50</sub>	1.4 g/kg
<b>Inhalation:</b>	Rat LC <sub>LO</sub>	8,000 ppm (4hr)
	Mouse LC <sub>LO</sub>	5,042 ppm (2hr)
	Human LC <sub>LO</sub>	200 ppm (somnolence, irritability)

LC<sub>LO</sub> = Lowest air concentration that is lethal to a given species in a given time.

LC<sub>50</sub> = Dose that is lethal to 50% of a given species by a given route of exposure.

Animal experiments indicate that isopropylbenzene may be toxic at very high concentrations to the spleen and liver. Cataract formation has also been observed in experimental animals exposed to high concentrations of isopropylbenzene vapor.

**12. ECOLOGICAL INFORMATION**

**Environmental Fate:** The following information on isopropylbenzene [cumene] is extracted from the TOXNET database maintained by the National Library of Medicine.

**Atmosphere:** According to a model of gas/particle partitioning of semi-volatile organic compounds in the atmosphere, cumene, which has a vapor pressure of 4.5 mm Hg at 25 deg C, is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase cumene is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 2.5 days, calculated from its rate constant of  $6.5 \times 10^{-12}$  cu cm/molecule-sec at 25 deg C. Vapor-phase cumene is also degraded in the atmosphere by reaction with ozone radicals; the half-life for this reaction in air is estimated to be 3 yrs, calculated from its estimated rate constant of  $1.0 \times 10^{-20}$  cu cm/molecule-sec at 25 deg C.

**Material Safety Data Sheet: Isopropylbenzene [Cumene]****12. ECOLOGICAL INFORMATION (continued)**

**Terrestrial:** Based on a classification scheme, an estimated Koc value of 820, determined from a structure estimation method, indicates that cumene is expected to have low mobility in soil. Volatilization of cumene from moist soil surfaces is expected to be an important fate process given a Henry's Law constant of 0.0115 atm-cu m/mole. The potential for volatilization of cumene from dry soil surfaces may exist based upon a vapor pressure of 4.5 mm Hg. However, adsorption to soil is expected to attenuate volatilization. After a 10 and 20 day exposure of wastewater inoculum to cumene, a theoretical BOD of 62% and 70% was observed, respectively. Based on these results, cumene is expected to undergo considerable biodegradation in soil environments.

**Aquatic:** Based on a classification scheme, an estimated Koc value of 820, determined from an estimation method, indicates that cumene is expected to adsorb to sediment and suspended solids in water. Volatilization from water surfaces is expected based upon a Henry's Law constant of 0.0115 atm-cu m/mole. Using this Henry's Law constant and an estimation method, volatilization half-lives for a model river and model lake are 1.2 hrs and 4.4 days, respectively. In natural waters, cumene is degraded by reaction with hydroxyl radicals; the half-life for this reaction in water is estimated to be 107 days, calculated from its rate constant of  $7.5 \times 10^9$  L/mol sec at pH 7.

**Biodegradation:**

**Aerobic:** Using river water and sediment in a test system, the aerobic biodegradation of cumene was studied in a closed system. The disappearance rate constant of cumene (avg concn 2.5 mg/l) for total mineralization was 0.02/day; this equates to a half-life of 34.6 days. However, when volatilization was considered coupled with biodegradation, the half-life for cumene became 2.5 days. Cumene biodegradation experienced a lag time of approximately 5 days. Based on the results of this experiment, residence time of cumene in aquatic ecosystems will likely be brief.

**Anaerobic:** In an in-situ anaerobic biodegradation study of various alkyl benzene compounds, cumene was found to undergo considerable biodegradation. Biodegradation proceeded via methanogenic and fermentative bacteria.

**Ecotoxicity:**

LC<sub>50</sub> Daphnia magna 0.6 ppm/48 hr /Conditions of bioassay not specified

LD<sub>50</sub> Agelaius phoeniceus (red-winged blackbird) oral 98 mg/kg

Mytilus edulis (mussel larvae): no significant alteration of growth rate at concentrations of 1 to 50 ppm.

**13. DISPOSAL CONSIDERATIONS**

**Waste Management Information:** Any disposal practice must be in compliance with local, state and federal laws and regulations.

**14. TRANSPORTATION INFORMATION**

<b>Proper shipping name</b>	Isopropylbenzene
<b>DOT Hazard class</b>	3, (Flammable liquid)
<b>DOT Shipping I.D. No.</b>	UN 1918
<b>PG</b>	III
<b>Labeling</b>	Flammable
<b>RQ</b>	Cumene

**Material Safety Data Sheet: Isopropylbenzene [Cumene]****15. REGULATORY INFORMATION****SARA Title III**

Section 302 and 304 of the Emergency Planning and Community Right to Know Act; Extremely Hazardous Substances (40 CFR 355)

<u>COMPONENT</u>	<u>CAS No.</u>	<u>TPQ (lbs)</u>	<u>RQ</u>
None	Not Applicable	Not Applicable	Not Applicable

NOTE: TPQ - Threshold Planning Quantity

RQ - Reportable Quantity

**Section 311 and 312 Hazard Categorization (40 CFR 370)**

<u>ACUTE</u>	<u>CHRONIC</u>	<u>FIRE</u>	<u>PRESSURE</u>	<u>REACTIVE</u>
X	X	X		

**Section 313 Toxic Chemicals (40 CFR 372.65)**

<u>COMPONENT</u>	<u>CAS No.</u>	<u>WT. %</u>
Isopropylbenzene	98-82-8	99.97

**CERCLA****Section 102(a) Hazardous Substances (40 CFR 302.4)**

<u>COMPONENT</u>	<u>CAS No.</u>	<u>WT. %</u>	<u>RQ (lbs)</u>
Isopropylbenzene	98-82-8	99.97	5,000

**RCRA**

40 CFR 261.21 Hazardous Waste Number:

Isopropylbenzene waste and material contaminated with isopropylbenzene would be regulated as a hazardous waste material under the hazardous waste number U055.

**TSCA**

Isopropylbenzene is listed on the TSCA inventory.

**Canadian Regulations**

This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33 and the MSDS contains all information required by this regulation. WHMIS Classification- BD2

**Canadian Environmental Protection Act (CEPA)**

All substances in this product are listed on the Canadian Domestic Substances (DSL) list or are not required to be listed.

**16. OTHER INFORMATION**

**IMPORTANT:** The information and data herein are believed to be accurate and have been compiled from sources believed to be reliable. It is offered for your consideration, investigation and verification. Buyer assumes all risk of use, storage and handling of the product in compliance with applicable federal, state and local laws and regulations. **GEORGIA GULF CHEMICALS AND VINYLs, LLC MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, CONCERNING THE ACCURACY OR COMPLETENESS OF THE INFORMATION AND DATA HEREIN.** Georgia Gulf will not be liable for claims relating to any party's use of or reliance on information and data contained herein regardless of whether it is claimed that the information and data are inaccurate, incomplete or otherwise misleading. This information relates to the material designated and may not be valid for such material used in combination with any other materials nor in any process.

**MSDS Status:** Revision Date: 08/24/2007

Supersedes: 6/10/04



## MATERIAL SAFETY DATA SHEET

Benzene

MSDS No. 1785

## EMERGENCY OVERVIEW

## DANGER!

**FLAMMABLE - BLOOD TOXIN AND CARCINOGEN - ABSORBED THROUGH THE SKIN - CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD**



NFPA 704 (Section 16)

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause blood disease, including anemia and leukemia.

## 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

HOVENSA L.L.C.

1 Estate Hope

Christiansted, VI 00820-5652

EMERGENCY TELEPHONE NUMBER (24 hrs):

CHEMTREC (800) 424-9300

COMPANY CONTACT (business hours):

Safety Department (340) 692-3000

**SYNONYMS:** Benzol; Coal Naphtha; coal tar naphtha; Cyclohexatriene; Phenyl hydride  
See Section 16 for abbreviations and acronyms.

## 2. COMPOSITION and CHEMICAL INFORMATION ON INGREDIENTS

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Benzene (71-43-2)	100

## 3. HAZARDS IDENTIFICATION

**EYES**

Moderate to severe irritant. Contact with liquid or vapor may cause irritation.

**SKIN**

Moderate to severe irritant. May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

**INGESTION**

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.



## MATERIAL SAFETY DATA SHEET

**Benzene**

**MSDS No. 1785**

### **INHALATION**

Excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

Effects to the blood (including decreased platelet and white blood cell counts), cardiovascular system, nervous system, retina, lungs, gastrointestinal system, spleen, and kidneys have been reported from large, acute (short) and repeated or prolonged exposures.

### **CHRONIC EFFECTS and CARCINOGENICITY**

Benzene is a regulated human carcinogen. Benzene has the potential to cause bone marrow depression, aplastic anemia (low red blood cell count) and other blood diseases, including leukemia, after repeated and prolonged exposure. Benzene can cause liver and kidney toxicity.

### **MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE**

Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Pre-existing chronic respiratory disease, liver or kidney dysfunction, or blood, cardiovascular and central nervous system disorders may be aggravated by exposure.

## **4. FIRST AID MEASURES**

### **EYES**

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

### **SKIN**

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

### **INGESTION**

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

### **INHALATION**

Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

### **NOTE TO PHYSICIAN**

OSHA and US Coast Guard require that a person exposed to benzene in an emergency have a urine sample taken at the end of the shift and have a urine phenol test performed within 72 hours. For results equal to or greater than 75 ml/L of urine, employees must have a complete blood count every month for three months after the emergency exposure. See OSHA 29 CFR 1910.1028 or USCG 49 CFR 193.





## MATERIAL SAFETY DATA SHEET

**Benzene**

**MSDS No. 1785**

### 5. FIRE FIGHTING MEASURES

#### **FLAMMABLE PROPERTIES:**

FLASH POINT: 12 °F (-11°C)  
AUTOIGNITION TEMPERATURE: 928 °F (498 °C)  
OSHA/NFPA FLAMMABILITY CLASS: 1B (flammable liquid)  
LOWER EXPLOSIVE LIMIT (%): 1.3%  
UPPER EXPLOSIVE LIMIT (%): 7.9%

#### **FIRE AND EXPLOSION HAZARDS**

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

#### **EXTINGUISHING MEDIA**

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO<sub>2</sub>, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

#### **FIRE FIGHTING INSTRUCTIONS**

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

### 6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Product may release substantial amounts of flammable vapors and gases (e.g., methane, ethane, and propane), at or below ambient temperature depending on source and process conditions and pressure.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection - do not discharge solid water stream patterns into the liquid resulting in splashing.



## MATERIAL SAFETY DATA SHEET

**Benzene**

**MSDS No. 1785**

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

### **7. HANDLING and STORAGE**

#### **HANDLING and STORAGE PRECAUTIONS**

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

#### **STORAGE PRECAUTIONS**

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

#### **WORK/HYGIENIC PRACTICES**

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

### **8. EXPOSURE CONTROLS and PERSONAL PROTECTION**

#### **EXPOSURE LIMITS**

Components (CAS No.)		Source	Exposure Limits	Note
			TWA/STEL	
Benzene (71-43-2)		OSHA	PEL = 1ppm; STEL = 5 ppm	A1; skin; BEI
		ACGIH	TLV = 0.5 ppm; STEL = 2.5 ppm	

#### **ENGINEERING CONTROLS**

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

#### **EYE/FACE PROTECTION**

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

#### **SKIN PROTECTION**

Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as of E.I. DuPont Tyvek-Saranex 23®, Tychem®, Barricade® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.



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**Benzene**

**MSDS No. 1785**

### **RESPIRATORY PROTECTION**

A NIOSH -approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

### **9. PHYSICAL and CHEMICAL PROPERTIES**

#### **APPEARANCE**

A clear, water-like liquid

#### **ODOR**

A sweet, aromatic odor.

#### **ODOR THRESHOLD**

4.7 ppm

#### **BASIC PHYSICAL PROPERTIES**

BOILING RANGE: 176 °F (80 °C)  
VAPOR PRESSURE: 74.6 mm Hg @ 68 °F (20 °C)  
VAPOR DENSITY (air = 1): 2.8  
SPECIFIC GRAVITY (H<sub>2</sub>O = 1): 0.87  
EVAPORATION RATE: High  
PERCENT VOLATILES: 100 %  
SOLUBILITY (H<sub>2</sub>O): Insoluble to slightly soluble

### **10. STABILITY and REACTIVITY**

**STABILITY:** Stable. Hazardous polymerization will not occur.

#### **CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS**

Material is stable under normal conditions. Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

#### **HAZARDOUS DECOMPOSITION PRODUCTS**

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

### **11. TOXICOLOGICAL PROPERTIES**

#### **ACUTE TOXICITY**

Acute Dermal LD50 (rabbits): > 9.4 ml/kg	Acute Oral LD50 (mouse): 4.7 g/kg
Acute inhalation LC50: 10,000 ppm (rat; 7 hours)	Eye irritation (rabbit): mild to moderate
Primary dermal irritation (rabbits): mild to moderate	

#### **CHRONIC EFFECTS AND CARCINOGENICITY**

Carcinogenicity: OSHA: YES IARC: (1) NTP: YES ACGIH: (A1)

Numerous epidemiological (human) and animal studies have reported an increased incidence or a causal relationship between leukemia and benzene exposure.

Mutagenicity: positive



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### 12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

### 13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options.

### 14. TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME: Benzene  
DOT HAZARD CLASS and PACKING GROUP: 3, PG II  
DOT IDENTIFICATION NUMBER: UN 1114  
DOT SHIPPING LABEL: FLAMMABLE LIQUID

PLACARD:



### 15. REGULATORY INFORMATION

#### U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

#### CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

#### CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

Benzene is a CERCLA Section 103 "hazardous substance" subject to CERCLA and SARA Section 304 reporting requirements.

Reportable Quantity: 10 pounds

#### SARA SECTION 311/312 - HAZARD CLASSES

<u>ACUTE HEALTH</u>	<u>CHRONIC HEALTH</u>	<u>FIRE</u>	<u>SUDDEN RELEASE OF PRESSURE</u>	<u>REACTIVE</u>
X	X	X	--	--

#### SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

<u>INGREDIENT NAME</u>	<u>CONCENTRATION PERCENT BY WEIGHT</u>
Benzene	CAS NUMBER: 71-43-2 < 0.1 to 2

#### CANADIAN REGULATORY INFORMATION (WHMIS)

Class B Division 2 (Flammable Liquid)  
Class D Division 2 Subdivision A (Very toxic by other means)  
Class D Division 1 Subdivision A (Very toxic acute)  
Class D Division 2 Subdivision B (Toxic by other means)



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### **CALIFORNIA PROPOSITION 65 LIST OF CHEMICALS**

This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

<b><u>INGREDIENT NAME (CAS NUMBER)</u></b>	<b><u>Date Listed</u></b>
Benzene	2/27/1987

<b><u>NFPA® HAZARD RATING</u></b>	HEALTH:	2
	FIRE:	3
	REACTIVITY:	0

Refer to NJPA 704 "Identification of the Fire Hazards of Materials" for further information

<b><u>HMIS® HAZARD RATING</u></b>	HEALTH:	3 *	Slight
	FIRE:	3	Moderate
	PHYSICAL:	0	Negligible
			* Chronic

**SUPERSEDES MSDS DATED:** 01/14/1999

### **ABBREVIATIONS:**

AP = Approximately      < = Less than      > = Greater than  
N/A = Not Applicable      N/D = Not Determined      ppm = parts per million

### **ACRONYMS:**

ACGIH	American Conference of Governmental Industrial Hygienists	NTP	National Toxicology Program
AIHA	American Industrial Hygiene Association	OPA	Oil Pollution Act of 1990
ANSI	American National Standards Institute (212) 642-4900	OSHA	U.S. Occupational Safety & Health Administration
API	American Petroleum Institute (202) 682-8000	PEL	Permissible Exposure Limit (OSHA)
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act	RCRA	Resource Conservation and Recovery Act
DOT	U.S. Department of Transportation [General info: (800) 467-4922]	REL	Recommended Exposure Limit (NIOSH)
EPA	U.S. Environmental Protection Agency	SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
HMIS	Hazardous Materials Information System	SCBA	Self-Contained Breathing Apparatus
IARC	International Agency For Research On Cancer	SPCC	Spill Prevention, Control, and Countermeasures
MSHA	Mine Safety and Health Administration	STEL	Short-Term Exposure Limit (generally 15 minutes)
NFPA	National Fire Protection Association (617)770-3000	TLV	Threshold Limit Value (ACGIH)
NIOSH	National Institute of Occupational Safety and Health	TSCA	Toxic Substances Control Act
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)	TWA	Time Weighted Average (8 hr.)
		WEEL	Workplace Environmental Exposure Level (AIHA)
		WHMIS	Canadian Workplace Hazardous Materials Information System



## MATERIAL SAFETY DATA SHEET

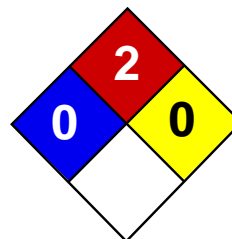
**Benzene**

**MSDS No. 1785**

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Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.



Health	0
Fire	2
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Mesitylene MSDS

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

**Product Name:** Mesitylene

**Catalog Codes:** SLM2410

**CAS#:** 108-67-8

**RTECS:** OX6825000

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

**CI#:** Not available.

**Synonym:** 1,3,5-Trimethylbenzene

**Chemical Formula:** C<sub>9</sub>H<sub>12</sub>

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

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

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

Order Online: [ScienceLab.com](http://ScienceLab.com)

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

1-800-424-9300

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

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

#### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Mesitylene	108-67-8	100

**Toxicological Data on Ingredients:** Mesitylene: VAPOR (LC50): Acute: 4881.9 ppm 4 hour(s) [Rat].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:**

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

**Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

#### Section 4: First Aid Measures

**Eye Contact:**

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

**Skin Contact:**

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

**Serious Skin Contact:** Not available.

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

**Serious Inhalation:**

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

**Ingestion:**

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 559°C (1038.2°F)

**Flash Points:** CLOSED CUP: 43°C (109.4°F).

**Flammable Limits:** Not available.

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

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

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

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

**Fire Fighting Media and Instructions:**

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

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

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

## Section 6: Accidental Release Measures

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

**Large Spill:**

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

## Section 7: Handling and Storage

**Precautions:**

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Avoid contact with eyes. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label.



**Storage:**

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

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

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

**Personal Protection:**

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

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

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

**Exposure Limits:**

TWA: 25 CEIL: 35 (ppm) TWA: 125 CEIL: 170 (mg/m<sup>3</sup>) Consult local authorities for acceptable exposure limits.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Liquid.

**Odor:** Aromatic.

**Taste:** Not available.

**Molecular Weight:** 120.2 g/mole

**Color:** Not available.

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

**Boiling Point:** 164.7°C (328.5°F)

**Melting Point:** -44.8°C (-48.6°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.8637 (Water = 1)

**Vapor Pressure:** 1.86 mm of Hg (@ 20°C)

**Vapor Density:** 4.14 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.23 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

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

**Dispersion Properties:** Not available.

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

**Section 10: Stability and Reactivity Data**

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

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

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

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

**Polymerization:** No.

## Section 11: Toxicological Information

**Routes of Entry:** Eye contact. Ingestion.

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute toxicity of the vapor (LC50): 4881.9 ppm 4 hour(s) [Rat].

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

**Other Toxic Effects on Humans:**

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

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

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

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

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

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

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

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

## Section 13: Disposal Considerations

**Waste Disposal:**

## Section 14: Transport Information

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

**Identification:** : 1,3,5-Trimethylbenzene : UN2325 PG: III

**Special Provisions for Transport:** Marine Pollutant

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Florida: Mesitylene New Jersey: Mesitylene TSCA 8(b) inventory: Mesitylene

**Other Regulations:**

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

**Other Classifications:****WHMIS (Canada):**

CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

**DSCL (EEC):**

R10- Flammable. R36/37- Irritating to eyes and respiratory system.

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

**Health Hazard:** 0

**Fire Hazard:** 2

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 0

**Flammability:** 2

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

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

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:06 PM

**Last Updated:** 11/01/2010 12:00 PM

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# MATERIAL SAFETY DATA SHEET

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** 1,2,4-Trimethylbenzene  
**Catalog Numbers:** AC140090000, AC140090010, AC140090025, AC140095000  
**Synonyms:** Pseudocumene.  
**Company Identification:** Acros Organics BVBA  
 Janssen Pharmaceuticaaan 3a  
 2440 Geel, Belgium  
**Company Identification: (USA)** Acros Organics  
 One Reagent Lane  
 Fair Lawn, NJ 07410  
**For information in the US, call:** 800-ACROS-01  
**For information in Europe, call:** +32 14 57 52 11  
**Emergency Number, Europe:** +32 14 57 52 99  
**Emergency Number US:** 201-796-7100  
**CHEMTREC Phone Number, US:** 800-424-9300  
**CHEMTREC Phone Number, Europe:** 703-527-3887

## Section 2 - Composition, Information on Ingredients

**CAS#:** 95-63-6  
**Chemical Name:** 1,2,4-Trimethylbenzene  
**%:** 98  
**EINECS#:** 202-436-9

### Hazard Symbols:



XN N



### Risk Phrases:

10 20 36/37/38 51/53

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Warning! Flammable liquid and vapor. Harmful if inhaled. Causes eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Target Organs: Blood, central nervous system, respiratory system, eyes, skin.

### Potential Health Effects

**Eye:** Causes eye irritation. Causes redness and pain.  
**Skin:** Causes skin irritation. Causes redness and pain. May be harmful if absorbed through the skin.  
**Ingestion:** May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May be harmful if swallowed. May cause central nervous system depression.  
**Inhalation:** Harmful if inhaled. Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central nervous system depression.  
**Chronic:** Prolonged or repeated skin contact may cause dermatitis. May cause anemia and other blood cell abnormalities. Prolonged exposure may produce a narcotic effect. Prolonged or repeated exposure may cause nausea, dizziness, and headache.

### Section 4 - First Aid Measures

- Eyes:** Immediately 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. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Ingestion:** Do not induce vomiting. Possible aspiration hazard. Get medical aid immediately. Call a poison control center.
- Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Possible aspiration hazard. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

**Notes to Physician:**

### 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. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire. Flammable liquid and vapor.
- Extinguishing Media:** Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.
- Autoignition Temperature:** 500 deg C ( 932.00 deg F)
- Flash Point:** 48 deg C ( 118.40 deg F)
- Explosion Limits: Lower:** 0.9 vol %
- Explosion Limits: Upper:** 6.4 vol %
- NFPA Rating:** health: 2; flammability: 2; instability: 0;

### 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. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Remove all sources of ignition. Use a spark-proof tool. Do not let this chemical enter the environment.

### Section 7 - Handling and Storage

- Handling:** Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood. Keep away from heat, sparks and flame.
- Storage:** Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.

### Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,2,4-Trimethylbenzene	25 ppm TWA (listed under Trimethyl benzene).	25 ppm TWA; 125 mg/m3 TWA	none listed

OSHA Vacated PELs: 1,2,4-Trimethylbenzene: 25 ppm TWA; 125 mg/m3 TWA (listed under Trimethyl benzene)

#### Engineering Controls:

Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

#### Exposure Limits

**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:** Clear liquid  
**Color:** colorless  
**Odor:** aromatic odor  
**pH:** Not available  
**Vapor Pressure:** 7 mm Hg @ 44.4 deg C  
**Vapor Density:** 4.15 (air=1)  
**Evaporation Rate:** Not available  
**Viscosity:** Not available  
**Boiling Point:** 168 deg C @ 760 mmHg ( 334.40°F)  
**Freezing/Melting Point:** -44 deg C ( -47.20°F)  
**Decomposition Temperature:** Not available  
**Solubility in water:** Insoluble  
**Specific Gravity/Density:** 0.880 g/cm3  
**Molecular Formula:** C9H12  
**Molecular Weight:** 120.19

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** Incompatible materials, ignition sources, excess heat.  
**Incompatibilities with Other Materials** Strong oxidizing agents.  
**Hazardous Decomposition Products** Carbon monoxide, carbon dioxide.  
**Hazardous Polymerization** Will not occur.

**Section 11 - Toxicological Information**

**RTECS#:** CAS# 95-63-6: DC3325000  
**LD50/LC50:** RTECS:  
**CAS# 95-63-6:** Inhalation, rat: LC50 = 18000 mg/m3/4H;  
Oral, mouse: LD50 = 6900 mg/kg;  
Oral, rat: LD50 = 5 gm/kg;  
**Carcinogenicity:** 1,2,4-Trimethylbenzene - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.  
**Other:** See actual entry in RTECS for complete information.

**Section 12 - Ecological Information**

**Ecotoxicity:** Fish: Fathead Minnow: LC50 = 77.2 mg/L; 96 Hr; Flow-through at 25 C (pH 7.24)  
**Other:** Do not empty into drains.

**Section 13 - Disposal Considerations**

Dispose of in a manner consistent with federal, state, and local regulations.

**Section 14 - Transport Information**

US DOT  
Shipping Name: FLAMMABLE LIQUIDS, N.O.S. (1,2,4-Trimethylbenzene)  
Hazard Class: 3  
UN Number: UN1993  
Packing Group: III  
Canada TDG

Shipping Name: Not available  
Hazard Class:  
UN Number:  
Packing Group:

## Section 15 - Regulatory Information

### European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN N

Risk Phrases:

R 10 Flammable.

R 20 Harmful by inhalation.

R 36/37/38 Irritating to eyes, respiratory system and skin.

R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 95-63-6: 3

Canada

CAS# 95-63-6 is listed on Canada's DSL List

Canadian WHMIS Classifications: B3, D1B, D2B

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.

CAS# 95-63-6 is listed on Canada's Ingredient Disclosure List

### US Federal

TSCA

CAS# 95-63-6 is listed on the TSCA  
Inventory.

## Section 16 - Other Information

**MSDS Creation Date:** 5/19/1999

**Revision #5 Date** 8/30/2007

**Revisions were made in Sections:** 3, 4, 5, 6, 7, 8, 9, 10, 11, 1

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

# MATERIAL SAFETY DATA SHEET

Xylenes (Xylol)

## SECTION 1 . Product and Company Identification

Product Name and Synonym: Xylenes (Xylol)

Product Code: 280-20

Material Uses:  
Manufacturer: OFI Testing Equipment, Inc.

11302 Steeplecrest Drive  
Houston, TX 77065 USA  
Phone: (713) 880-9885  
Fax: (713) 880-9886

Entry Date : 5/12/2010

Print Date: 9/13/2010

24 Hour Emergency Assistance : Chemtrec 800-424-9300  
Canutec 613-996-6666

Health:	2
Flammability:	3
Reactivity:	0

**Hazard Rating:**

Least	Slight	Moderate	High	Extreme
0	1	2	3	4

NA = Not Applicable NE = Not Established

## SECTION 2 HAZARD IDENTIFICATION

Keep away from heat and ignition sources. May be harmful if swallowed. Avoid breathing vapor or dust. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

Emergency Overview: Danger! Harmful Or Fatal If Swallowed. Vapor Harmful. Affects Central Nervous System. Causes Severe Eye Irritation. Causes Irritation To Skin And Respiratory Tract. Chronic Exposure Can Cause Adverse Liver, Kidney, And Blood Effects. Flammable Liquid And Vapor.

Inhalation: Inhalation of Vapors May be Irritating To The Nose And Throat. Inhalation Of High Concentrations May Result In Nausea, Vomiting, Headache, Ringing In The Ears, And Severe Breathing Difficulties Which May Be Delayed In Onset. Substernal Pain, Cough, And Hoarseness Are Also Reported. High Vapor Concentrations Are Anesthetic And Central Nervous System Depressants.

Ingestion: Ingestion Causes Burning Sensation in Mouth and Stomach, Nausea, Vomiting and Salvation. Minute Amounts Aspirated into the Lungs can Produce a Severe Hemorrhagic Pneumonitis with Severe Pulmonary Injury or Death.

Skin: Skin Contact Results in Loss of Natural Oils and Often Results in Characteristic Dermatitis. May be Absorbed Through the Skin.

Eye Contact: Vapors Cause Eye Irritation. Splashes Cause Severe Irritation, Possible Corneal Burns and Eye Damage.

Chronic Exposure: Chronic Inhalation Can Cause Headache, Loss of Appetite, Nervousness and Pale Skin. Repeated or Prolonged Skin Contact may Cause a Skin Rash. Repeated Exposure of the Eyes to High Concentrations of Vapor may Cause Reversible Eye Damage. Repeated Exposure can Damage Bone Marrow, Causing Low Blood Cell Count. May Damage Liver and Kidneys.

Aggravated by Exposure: Persons with Pre-Existing Skin Disorders or Eye Problems or Impaired Respiratory Function, or Impaired Liver or Kidney Function may be more Susceptible to the Effects of the Substance.

## SECTION 3 MIXTURE COMPONENTS



## Xylenes (Xylol)

SARA 313	Component	CAS Number	Percent Comp.	Dimension	Exposure Limits
<input checked="" type="checkbox"/>	Xylenes (Xylol)	CAS# 1330-20-7	100	V/V	OSHA TWA 100 ppm (435 mg/m <sup>3</sup> )

### SECTION 4 FIRST AID MEASURES

Keep away from heat and ignition sources. May be harmful if swallowed. Avoid breathing vapor or dust. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

FIRST AID: SKIN: Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention

EYES: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen

INGESTION: Give several glasses of milk or water. Vomiting may occur spontaneously, but DO NOT INDUCE! Never give anything by mouth to an unconscious person.

### SECTION 5 FIRE FIGHTING MEASURES

Fire Extinguisher Type:	Water spray, dry chemical, carbon dioxide, alcohol foam
Fire / Explosion Hazards:	Vapor may travel considerable distance to source of ignition and flash back.
Fire Fighting Procedure:	Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

### SECTION 6 ACCIDENTAL RELEASE MEASURES

Remove all sources of ignition. Ventilate area of leak or spill. Wear protective equipment. Clean up in a manner that doesn't disperse dust.

Ventilate area or Leak or Spill. Remove all Sources of Ignition. Wear Appropriate Personal Protective Equipment as Specified in Section 8. Isolate Hazard Area. Keep Unnecessary and Unprotected Personnel from Entering. Contain and Recover Liquid when Possible. Use Non-Sparking Tools and Equipment. Collect Liquid in an Appropriate Container or Absorb with an Inert Material (e.g., Vermiculite, Dry Sand, Earth), and Place in a Chemical Waste Container. Do Not Use Combustible Materials, such as Saw Dust. Do Not Flush to Sewer! US Regulations (CERCLA) Require Reporting Spills and Releases to Soil, Water and Air in Excess of Reportable Quantities.

### SECTION 7 HANDLING AND STORAGE

Keep away from heat and flame. Do not get in eyes, on skin, on clothing. Use with adequate ventilation.

### SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection:	NIOSH/MSHA-approved respirator
Ventilation	Local Exhaust <input checked="" type="checkbox"/>

## Xylenes (Xylol)

	Mechanical <input type="checkbox"/>
Protective Gloves:	Gloves to prevent skin exposure as rubber or vinyl
Eye Protection:	Goggles and Face Shield
Other Protective Equipment:	Wear appropriate clothing to prevent skin exposure

### SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Melting Point:	12.2° C	Percent Volatile by Volume:	> 99%
Boiling Point:	138° C	Evaporation Rate	Information not available
Vapor Pressure:	6.72	Evaporation Standard	
Vapor Density:	3.66	Auto Ignition Temp	Information not available
Solubility in Water:	Negligible	Lower Flamm. Limit in Air	1.0
Appearance /Odors:	Red liquid, solvent odor	Upper Flamm. Limit in Air	6.0
Flash Point:	17.0° C		
Specific Gravity:	0.864		

### SECTION 10 STABILITY AND REACTIVITY INFORMATION

Stability:	Stable
Conditions to Avoid:	Avoid contact with heat, sparks, flames, or other sources of ignition.
Materials to Avoid:	Oxidizing materials
Hazardous Decomposition Products:	Oxides of carbon, acrid fumes
Hazardous polymerization:	Will Not Occur
Conditions to Avoid:	None known

### SECTION 11 Toxicological Information

Carcinogenic References: NTP Carcinogen - Known: No, IARC Category- 3

### SECTION 12 Ecological Information

Environmental Toxicity: When Released to the Soil and Water, this Material may Evaporate to Moderate Extent.

Environmental Toxicity: This material may be toxic to aquatic life. The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l.

### SECTION 13 Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

### SECTION 14 Transport Information

## Xylenes (Xylol)

DOT Classification: Xylenes, 3, UN1307, PG III

DOT Regulations may change from time to time. Please consult the most recent D.O.T. regulations.

### SECTION 15 Regulatory Information

#### Chemical Inventory Status –

Part 1:Ingredient

p-Xylene (106-42-3)

TSCA Yes

EC Yes

Japan YES

Australia Yes

#### Chemical Inventory Status –

Part 2:Ingredient

p-Xylene (106-42-3)

Korea Yes

DSL Yes

NDSL No

Phil. Yes

#### Federal, State & International Regulations –

Part 1: Ingredient.

p-Xylene (106-42-3)

RQ No

TPQ No

List YES

Chemical Catg No

#### Federal, State & International Regulations –

Part 2:Ingredient

p-Xylene (106-42-3)

CERCLA 100

261.33 No

8(d) YES

Chemical Weapons Convention: No

TSCA 12 (b):YES

CDTA:NO PURE/LIQUID

SARA 311/312: Acute:YES

Chronic: YES

Fire: YES

Pressure: No

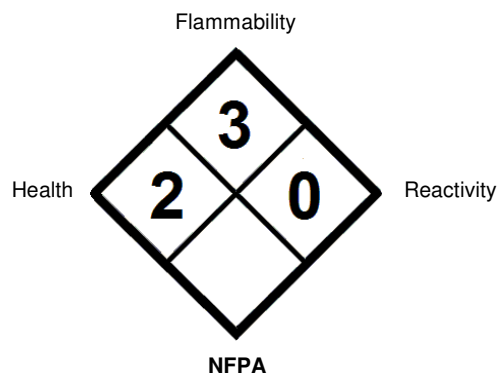
Reactivity: No

Australian Hazchem Code: 3Y

Poison Schedule:S6

### SECTION 16 Additional Information

Effects of overexposure, Acute and Chronic: Irritation of eyes, nose and throat. Reversible eye damage, dermatitis, chemical pneumonia, central nervous system depression. Conditions aggravated: Persons with pre-existing eye, skin or respiratory conditions may be more susceptible. Target organs: Liver and kidneys.

**Revisions**

6/22/2010

0.1

updated msds to 16 section from 10 section  
msds. STN

The information herein is believed to be accurate and is offered in good faith for the user's consideration and investigation. No warranty either expressed or implied is made for the completeness or accuracy of the information whether originating from the above mentioned company or not. Users of this material should satisfy themselves by independent investigation of current scientific and medical knowledge that the material can be used safely.

# Material Safety Data Sheet

## 1,2,4,5-Tetramethylbenzene, 99% (UV-VIS)

ACC# 75500

### Section 1 - Chemical Product and Company Identification

MSDS Name: 1,2,4,5-Tetramethylbenzene, 99% (UV-VIS)

Catalog Numbers: AC409390000, AC409390050, AC409391000, AC409395000, EK 114 4260, EK 114 4278, EK114 4260, EK114 4278, EK1144260, EK1144278

Synonyms: Durene; Durol; P-Xylene, 2,5-Dimethyl-.

Company Identification:

Fisher Scientific

1 Reagent Lane

Fair Lawn, NJ 07410

For information, call: 201-796-7100

Emergency Number: 201-796-7100

For CHEMTREC assistance, call: 800-424-9300

For International CHEMTREC assistance, call: 703-527-3887

### Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
95-93-2	1,2,4,5-Tetramethylbenzene	98%	202-465-7

Hazard Symbols: None listed.

Risk Phrases: None listed.

### Section 3 - Hazards Identification

#### EMERGENCY OVERVIEW

Appearance: white powder. Flash Point: 73 deg C. The toxicological properties of this material have not been fully investigated. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. Warning! Flammable solid.

Target Organs: None.

#### Potential Health Effects

Eye: May cause eye irritation.

Skin: May cause skin irritation.

Ingestion: May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated.

Inhalation: May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. Vapors may cause dizziness or suffocation.

Chronic: No information found.

## 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 soap and 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.

**Inhalation:** Remove from exposure 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. Dusts at sufficient concentrations can form explosive mixtures with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Flammable solid. May burn rapidly with flare burning effect. May re-ignite after fire is extinguished.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Use agent most appropriate to extinguish fire. For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, sand, earth, 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:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. 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. Use only in a well-ventilated area. Minimize dust generation and accumulation. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Keep from contact with moist air and steam.

**Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. 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. Flammables-area.

## 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 general or local explosion-proof ventilation to keep airborne levels to acceptable levels. Wet processing methods may be used to reduce dust generation.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,2,4,5-Tetramethylbenzene	none listed	none listed	none listed

OSHA Vacated PELs: 1,2,4,5-Tetramethylbenzene: No OSHA Vacated PELs are listed for this chemical.

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 a respirator's use.

## Section 9 - Physical and Chemical Properties

Physical State: Crystalline powder

Appearance: white powder

Odor: None reported.

pH: Not available.

Vapor Pressure: 160 mmHg @ 140

Vapor Density: 4.6

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 196.0 - 197.0 deg C @ 760.00m

Freezing/Melting Point: 80.00 - 82.00 deg C

Autoignition Temperature: Not applicable.

Flash Point: 73 deg C ( 163.40 deg F)

Decomposition Temperature: Not available.

NFPA Rating: (estimated) Health: 0; Flammability: 2; Reactivity: 0

Explosion Limits, Lower: Not available.

Upper: Not available.

Solubility: Insoluble.

Specific Gravity/Density: .8380g/cm<sup>3</sup>

Molecular Formula: C<sub>10</sub>H<sub>14</sub>

Molecular Weight: 134.22

## Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. Volatile in steam.  
Conditions to Avoid: Incompatible materials, ignition sources, dust generation, excess heat, strong oxidants, steam.  
Incompatibilities with Other Materials: Strong oxidizing agents.  
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.  
Hazardous Polymerization: Has not been reported.

## Section 11 - Toxicological Information

RTECS#:  
CAS# 95-93-2: DC0500000  
LD50/LC50:  
CAS# 95-93-2:  
Oral, rat: LD50 = 6989 mg/kg;  
Carcinogenicity:  
CAS# 95-93-2: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.  
Epidemiology: No information available.  
Teratogenicity: No information available.  
Reproductive Effects: No information available.  
Neurotoxicity: No information available.  
Mutagenicity: No information available.  
Other Studies: No data available.

## 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

IATA

RID/ADR

IMO

Canada TDG



<b>Shipping Name:</b>	No information available.
<b>Hazard Class:</b>	
<b>UN Number:</b>	
<b>Packing Group:</b>	

No information  
available.

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 95-93-2 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.

#### SARA

Section 302 (RQ)

None of the chemicals in this material have an RQ.

Section 302 (TPQ)

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 95-93-2: flammable.

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 depleters. This material does not contain any Class 2 Ozone depleters.

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# 95-93-2 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

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:

Not available.

Risk Phrases:

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.  
S 24/25 Avoid contact with skin and eyes.  
S 33 Take precautionary measures against static discharges.  
S 37 Wear suitable gloves.  
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).  
S 9 Keep container in a well-ventilated place.  
S 28A After contact with skin, wash immediately with plenty of water.

WGK (Water Danger/Protection)

CAS# 95-93-2: 1

Canada

CAS# 95-93-2 is listed on Canada's DSL List. CAS# 95-93-2 is listed on Canada's DSL List.

This product has a WHMIS classification of B4, D2B.

CAS# 95-93-2 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

## Section 16 - Additional Information

MSDS Creation Date: 8/24/1997

Revision #2 Date: 8/02/2000

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

## **Appendix B**

### **Activity Hazard Analyses**

<b>Project Identification</b> 3140 Coney Island Ave	<b>Location</b> Various	<b>Estimated Dates</b> TBD
<b>Phase of Work</b> Mobilization/ Demobilization	<b>Page 1 of 1</b>	<b>Analysis Approved by</b> Kris Almskog, PM/HSM
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Mobilization and demobilization of equipment site tools, personnel	Slips/trips/falls	<ul style="list-style-type: none"> <li>• Maintain alertness to slip/trip/fall hazards;</li> <li>• Maintain good housekeeping;</li> <li>• Walk, do not run;</li> <li>• Wear footwear with soles that grip;</li> <li>• Unloading areas should be on even terrain; and</li> <li>• Mark and repair if possible tripping hazards.</li> </ul>
	Manual lifting and material handling	<ul style="list-style-type: none"> <li>• Instruct personnel on proper lifting techniques;</li> <li>• Use proper lifting techniques; and</li> <li>• Team lifting will be used for heavy loads or use mechanical lifting devices.</li> </ul>
	Temperature extremes	<ul style="list-style-type: none"> <li>• Drink plenty of fluids;</li> <li>• Train personnel of signs/symptoms of heat/cold stress;</li> <li>• Monitor air temperatures when extreme weather conditions are present; and</li> <li>• Stay in visual and verbal contact with your buddy.</li> </ul>
	Vehicular traffic	<ul style="list-style-type: none"> <li>• Spotters will be used when backing up trucks and heavy equipment and when moving equipment.</li> </ul>
	Overhead hazards	<ul style="list-style-type: none"> <li>• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1;</li> <li>• Ground personnel will stay clear of suspended loads;</li> <li>• Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and</li> <li>• Overhead hazards will be identified prior to commencing work operations.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Ear plugs or ear muffs shall be worn for operations that exceed 85 decibels.</li> </ul>
	Electrocution	<ul style="list-style-type: none"> <li>• Equipment will be equipped with GFCI;</li> <li>• A licensed electrician will conduct electrical work;</li> <li>• Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.</li> </ul>
	Biological hazards	<ul style="list-style-type: none"> <li>• Be alert to the presence of biological hazards;</li> <li>• Wear insect repellent;</li> <li>• Follow procedures in Section 4.2.2 for tick bites;</li> <li>• FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.</li> </ul>

<b>Project Identification</b> 3140 Coney Island Ave	<b>Location</b> Various	<b>Estimated Dates</b> TBD
<b>Phase of Work</b> Excavation	<b>Page 1 of 2</b>	<b>Analysis Approved by</b> Kris Almskog, PM/HSM
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Excavate to required depths; soil handling and transport	Chemical hazards	<ul style="list-style-type: none"> <li>Wear appropriate PPE per Table 6-1;</li> <li>Perform air monitoring per Community Air Monitoring Plan;</li> <li>Practice contamination avoidance;</li> <li>Follow proper decontamination procedures; and</li> <li>Wash hands/face before eating, drinking or smoking.</li> </ul>
	Hand and power tool usage	<ul style="list-style-type: none"> <li>Equip electrical equipment with GFCI's;</li> <li>Inspect electrical equipment and tools prior to use;</li> <li>Daily inspections will be performed;</li> <li>Remove broken or damaged tools from service;</li> <li>Use the tool for its intended purpose;</li> <li>Use in accordance with manufacturer instructions; and</li> <li>Tag and remove defective equipment.</li> </ul>
	Temperature extremes	<ul style="list-style-type: none"> <li>Drink plenty of fluids;</li> <li>Train personnel of signs/symptoms of heat/cold stress;</li> <li>Monitor air temperatures when extreme weather conditions are present; and,</li> <li>Stay in visual and verbal contact with your buddy.</li> </ul>
	Manual lifting and material handling	<ul style="list-style-type: none"> <li>Instruct personnel on proper lifting techniques;</li> <li>Use proper lifting techniques; and</li> <li>Team lifting will be used for heavy loads or use mechanical lifting devices.</li> </ul>
	Fire/Explosion	<ul style="list-style-type: none"> <li>ABC type fire extinguishers shall be readily available;</li> <li>No smoking in work area.</li> </ul>
	Biological hazards	<ul style="list-style-type: none"> <li>Be alert to the presence of biological hazards;</li> <li>Wear insect repellent;</li> <li>Follow procedures in Section 4.2.2 for tick bites;</li> <li>FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.</li> </ul>
	Heavy equipment	<ul style="list-style-type: none"> <li>Ground personnel will stay clear of suspended loads;</li> <li>Ground personnel will stay out of the swing radius;</li> <li>Eye contact with operators will be made before approaching equipment;</li> <li>Equipment will not be approached on blind sides;</li> <li>Equipment will be equipped with backup alarms or spotters shall be used.</li> </ul>
	Slips/Trips/Falls	<ul style="list-style-type: none"> <li>Maintain alertness to slip/trip/fall hazards;</li> <li>Maintain good housekeeping;</li> <li>Walk, do not run;</li> <li>Wear footwear with soles that grip;</li> <li>Unloading areas should be on even terrain; and mark and repair if possible tripping hazards are present.</li> </ul>
	Electrocution	<ul style="list-style-type: none"> <li>Equipment will be equipped with GFCI;</li> <li>A licensed electrician will conduct electrical work;</li> <li>Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.</li> </ul>

<b>Project Identification</b> 3140 Coney Island Ave	<b>Location</b> Various	<b>Estimated Dates</b> TBD
<b>Phase of Work</b> Drilling	<b>Page 2 of 2</b>	<b>Analysis Approved by</b> Kris Almskog, PM/HSM
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
	Noise	<ul style="list-style-type: none"> <li>Hearing protection mandatory at or above 85 dBA.</li> <li>Instruct personnel how to properly wear hearing protective devices.</li> <li>Disposable ear plugs or other hearing protection required when working near noisy equipment..</li> </ul>
	Steam/Heat/Splashing	<ul style="list-style-type: none"> <li>Use face shield and safety glasses or goggles;</li> <li>Stay out of the splash/steam radius;</li> <li>Do not direct steam at anyone;</li> <li>Do not hold objects with your foot and steam area near it;</li> <li>Direct spray to minimize spread of constituents of concern; and</li> <li>Use shielding as necessary.</li> </ul>
	Excavation hazards	<ul style="list-style-type: none"> <li>Follow 29 CFR 1926 Subpart P.</li> </ul>
	Overhead hazards	<ul style="list-style-type: none"> <li>Personnel will be required to wear hard hats that meet ANSI Standard Z89.1;</li> <li>Ground personnel will stay clear of suspended loads;</li> <li>Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and</li> <li>Overhead hazards will be identified prior to commencing work operations.</li> </ul>
	Electrocution	<ul style="list-style-type: none"> <li>Equipment will be equipped with GFCI;</li> <li>A licensed electrician will conduct electrical work;</li> <li>Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.</li> </ul>
	Track Hazards	<ul style="list-style-type: none"> <li>Caution will be used when working in close proximity to the electrified third rail (see "Electrocution" above).</li> <li>Workers are required to have completed NYCT Track Safety Training</li> <li>Flag men will be used when necessary (e.g., working in limited access track areas).</li> </ul>

<b>Project Identification</b> 3140 Coney Island Ave	<b>Location</b> Various	<b>Estimated Dates</b> TBD
<b>Phase of Work</b> Soil/Groundwater Sampling	<b>Page 1 of 1</b>	<b>Analysis Approved by</b> Kris Almskog, PM/HSM
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Collect soil/groundwater samples.	Chemical hazards	<ul style="list-style-type: none"> <li>Wear appropriate PPE per Table 6-1;</li> <li>Practice contamination avoidance;</li> <li>Follow proper decontamination procedures; and</li> <li>Wash hands/face before eating, drinking or smoking.</li> </ul>
	Temperature extremes	<ul style="list-style-type: none"> <li>Drink plenty of fluids;</li> <li>Train personnel of signs/symptoms of heat/cold stress;</li> <li>Monitor air temperatures when extreme weather conditions are present; and</li> <li>Stay in visual and verbal contact with your buddy.</li> </ul>
	Manual lifting and material handling	<ul style="list-style-type: none"> <li>Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.</li> </ul>
	Slips/Trips/Falls	<ul style="list-style-type: none"> <li>Maintain alertness to slip/trip/fall hazards;</li> <li>Maintain good housekeeping;</li> <li>Walk, do not run;</li> <li>Wear footwear with soles that grip;</li> <li>Unloading areas should be on even terrain; and</li> <li>Mark and repair if possible tripping hazards.</li> </ul>
	Electrocution	<ul style="list-style-type: none"> <li>Equipment will be equipped with GFCI;</li> <li>A licensed electrician will conduct electrical work;</li> <li>Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.</li> </ul>
	Track Hazards	<ul style="list-style-type: none"> <li>Caution will be used when working in close proximity to the electrified third rail (see "Electrocution" above).</li> <li>Workers are required to have completed NYCT Track Safety Training</li> <li>Flag men will be used when necessary (e.g., working in limited access track areas).</li> </ul>

<b>Project Identification</b> 3140 Coney Island Ave	<b>Location</b> Various	<b>Estimated Dates</b> TBD
<b>Phase of Work</b> Decontamination	<b>Page 1 of 1</b>	<b>Analysis Approved by</b> Kris Almskog, PM/HSM
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Decontaminate equipment	Chemical hazards	<ul style="list-style-type: none"> <li>• Wear appropriate PPE per Table 6-1;</li> <li>• Practice contamination avoidance;</li> <li>• Follow proper decontamination procedures; and</li> <li>• Wash hands/face before eating, drinking or smoking.</li> </ul>
	Temperature extremes	<ul style="list-style-type: none"> <li>• Drink plenty of fluids;</li> <li>• Train personnel of signs/symptoms of heat/cold stress;</li> <li>• Monitor air temperatures when extreme weather conditions are present; and</li> <li>• Stay in visual and verbal contact with your buddy.</li> </ul>
	Manual lifting and material handling	<ul style="list-style-type: none"> <li>• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.</li> </ul>
	Slips/Trips/Falls	<ul style="list-style-type: none"> <li>• Maintain alertness to slip/trip/fall hazards;</li> <li>• Maintain good housekeeping;</li> <li>• Walk, do not run;</li> <li>• Wear footwear with soles that grip;</li> <li>• Unloading areas should be on even terrain; and</li> <li>• Mark and repair if possible tripping hazards.</li> </ul>
	Electrocution	<ul style="list-style-type: none"> <li>• Equipment will be equipped with GFCI;</li> <li>• A licensed electrician will conduct electrical work;</li> <li>• Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.</li> </ul>
	Track Hazards	<ul style="list-style-type: none"> <li>• Caution will be used when working in close proximity to the electrified third rail (see "Electrocution" above).</li> <li>• Workers are required to have completed NYCT Track Safety Training</li> <li>• Flag men will be used when necessary (e.g., working in limited access track areas).</li> </ul>



## **Appendix C**

### **Heat/Cold Stress Protocols**

## **HEAT STRESS**

### **Heat Stress (Hyperthermia)**

Heat stress is the body's inability to regulate the core temperature. A worker's susceptibility to heat stress can vary according to his/her physical fitness, degree of acclimation to heat, humidity, age and diet.

1. Prior to site activity, the field team leader may make arrangements for heat stress monitoring (i.e., monitoring heart rate, body temperature, and body water loss) during actual site work if conditions warrant. In addition, the FTL is to ensure that each team member has been acclimatized to the prevailing environmental conditions, that personnel are aware of the signs and symptoms of heat sickness, that they have been adequately trained in first aid procedures, and that there are enough personnel on-site to rotate work assignments and schedule work during hours of reduced temperatures. Personnel should not consume alcoholic or caffeinated beverages but rather drink moderate levels of an electrolyte solution and eat well prior to commencing site work.
2. Although there is no specific test given during a baseline physical that would identify a person's intolerance to heat, some indicators are tobacco or medication use, dietary habits, body weight, and chronic conditions such as high blood pressure or diabetes.
3. *Heat cramps*, caused by profuse perspiration with inadequate fluid intake and salt replacement, most often afflict people in good physical condition who work in high temperature and humidity. Heat cramps usually come on suddenly during vigorous activity. Untreated, heat cramps may progress rapidly to heat exhaustion or heat stroke. First aid treatment: remove victim to a cool place and replace lost fluids with water.
4. Thirst is not an adequate indicator of heat exposure. Drinking fluid by itself does not indicate sufficient water replacement during heat exposure. A general rule, the amount of water administered should replace the amount of water lost, and it should be administered at regular intervals throughout the day. For every half pound of water lost, 8 ounces of water should be ingested. Water should be replaced by drinking 2 – 4 ounce servings during every rest period. A recommended alternative to water is an electrolyte drink split 50/50 with water.

5. *Heat exhaustion* results from salt and water loss along with peripheral pooling of blood. Like heat cramps, heat exhaustion tends to occur in persons in good physical health who are working in high temperatures and humidity. Heat exhaustion may come on suddenly as dizziness and collapse. Untreated, heat exhaustion may progress to heat stroke.
6. *Treatment for heat exhaustion:* Move the victim to a cool environment (e.g. air-conditioned room/car), lay victim down and fan him/her. If the air-conditioning is not available, remove the victim to a shaded area, remove shirt, and fan. If symptoms do not subside within an hour, notify 911 to transport to hospital.
7. *Heat stroke* results from the body's inability to dissipate excess heat. A true medical emergency that requires immediate care, it usually occurs when one ignores the signs of heat exhaustion and continues strenuous activities. Working when the relative humidity exceeds 60% is a particular problem. Workers in the early phase of heat stress may not be coherent of they will be confused, delirious or comatose. Changes in behavior, irritability and combativeness are useful early signs of heat stroke.
8. *Treatment of heat stroke:* Move the victim to a cool, air-conditioned environment. Place victim in a semi-reclined position with head elevated and strip to underclothing. Cool victim as rapidly as possible, applying ice packs to the arms and legs and massaging the neck and torso. Spray victim with tepid water and constantly fan to promote evaporation. Notify 911 to transport to hospital as soon as possible.

**TABLE 1**

**SYMPTOMS OF HEAT STRESS**

*Heat cramps* are caused by heavy sweating with inadequate fluid intake. Symptoms include;

- Muscle cramps
- Cramps in the hands, legs, feet and abdomen

*Heat exhaustion* occurs when body organs attempt to keep the body cool. Symptoms include;

- |                                  |                    |
|----------------------------------|--------------------|
| • Pale, cool moist skin          | • Rapid heart rate |
| • Core temperature elevated 1-2° | • Heavy sweating   |
| • Thirst                         | • Dizziness        |
| • Anxiety                        | • Nausea           |

*Heat stroke* is the most serious form of heat stress. Immediate action must be taken to cool the body before serious injury and death occur. Symptoms are;

- Red, hot, dry skin
- Lack of perspiration
- Seizures
- Dizziness and confusion
- Strong, rapid pulse
- Core temperature of 104° or above
- Coma

**TABLE 2**

**HEAT STRESS INDICATORS**

<b>Heat stress indicator</b>	<b>When to measure</b>	<b>If Exceeds...</b>	<b>Action</b>
Heart rate (pulse)	Beginning of rest period	110 beats per minute	Shorten next work period by 33%
Oral temperature	Beginning of rest period	99°F (after thermometer is under tongue for 3 minutes)	Shorten next work period by 33%
		100.6°F	Prohibit work in impermeable clothing
Body weight	1. Before workday begins (a.m.) 2. After workday ends (p.m.)		Increase fluid intake

## **COLD STRESS**

### **Cold stress (Hypothermia)**

In hypothermia the core body temperature drops below 95°F. Hypothermia can be attributed to a decrease in heat production, increased heat loss or both.

### **Prevention**

Institute the following steps to prevent overexposure of workers to cold:

1. Maintain body core temperature at 98.6°F or above by encouraging workers to drink warm liquids during breaks (preferably not coffee) and wear several layers of clothing that can keep the body warm even when the clothing is wet.
2. Avoid frostbite by adequately covering hands, feet and other extremities. Clothing such as insulated gloves or mittens, earmuffs and hat liners should be worn. To prevent contact frostbite (from touching metal and cold surfaces below 20°F), workers should wear gloves. Tool handles should be covered with insulating material.
3. Adjust work schedules to provide adequate rest periods. When feasible, rotate personnel and perform work during the warmer hours of the day.
4. Provide heated shelter. Workers should remove their outer layer(s) of clothing while in the shelter to allow sweat to evaporate.
5. In the event that wind barriers are constructed around an intrusive operation (such as drilling), the enclosure must be properly vented to prevent the buildup of toxic or explosive gases or vapors. Care must be taken to keep a heat source away from flammable substances.
6. Using a wind chill chart such as the one in Table 3, obtain the equivalent chill temperature (ECT) based on actual wind speed and temperature. Refer to the ECT when setting up work warm-up schedules, planning appropriate clothing, etc. Workers should use warming shelters at regular intervals at or below an ECT of 20°F. For exposed skin, continuous exposure should not be permitted at or below an ECT of -25°F.

### **Frostbite**

Personnel should be aware of symptoms of frostbite/hypothermia. If the following symptoms are noticed in any worker, he/she should immediately go to a warm shelter.

Condition	Skin Surface	Tissue Under Skin	Skin Color
Frostnip	Soft	Soft	Initially red, then white
Frostbite	Hard	Soft	White and waxy
Freezing	Hard	Hard	Blotchy, white to yellow-gray to gray

1. *Frostnip* is the incipient stage of frostbite, brought about by direct contact with a cold object or exposure of a body part to cool/cold air. Wind chill or cold water also can be major factors. This condition is not serious. Tissue damage is minor and the response to care is good. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostnip.
2. *Treatment of frostnip*: Care for frostnip by warming affected areas. Usually the worker can apply warmth from his/her bare hands, blow warm air on the site, or, if the fingers are involved, hold them in the armpits. During recovery, the worker may complain of tingling or burning sensation, which is normal. If the condition does not respond to this simple care, begin treatment for frostbite.
3. *Frostbite*: The skin and subcutaneous layers become involved. If frostnip goes untreated, it becomes superficial frostbite. This condition is serious. Tissue damage may be serious. The worker must be transported to a medical facility for evaluation. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostbite. The affected area will feel frozen, but only on the surface. The tissue below the surface must still be soft and have normal response to touch. **DO NOT** squeeze or poke the tissue. The condition of the deeper tissues can be determined by gently palpating the affected area. The skin will turn mottled or blotchy. It may also be white and then turn grayish-yellow.
4. *Treatment of frostbite*: When practical, transport victim as soon as possible. Get the worker inside and keep him/her warm. Do not allow any smoking or alcohol consumption. Thaw frozen parts by immersion, re-warming in a 100°F to 106°F water bath. Water temperature will drop rapidly, requiring additional warm water throughout the process. Cover the thawed part with a dry sterile dressing. Do not puncture or drain any blisters.

**NOTE:** Never listen to myths and folk tales about the care of frostbite. *Never* rub a frostbitten or frozen area. *Never* rub snow on a frostbitten or frozen area. Rubbing the area may cause

serious damage to already injured tissues. Do not attempt to thaw a frozen area if there is any chance it will be re-frozen.

5. *General cooling/Hypothermia:* General cooling of the body is known as systemic hypothermia. This condition is not a common problem unless workers are exposed to cold for prolonged periods of time without any shelter.

Body Temperature	°C	Symptoms
99-96	37-35.5	Intense, uncontrollable shivering
95-91	35.5-32.7	Violent shivering persists. If victim is conscious, he has difficulty speaking.
90-86	32-30	Shivering decreases and is replaced by strong muscular rigidity. Muscle coordination is affected. Erratic or jerkey movements are produced. Thinking is less clear. General comprehension is dulled. There may be total amnesia. The worker is generally still able to maintain the appearance of psychological contact with his surroundings.
85-81	29.4-27.2	Victim becomes irrational, loses contact with his environment, and drifts into a stuporous state. Muscular rigidity continues. Pulse and respirations are slow and the worker may develop cardiac arrhythmias.
80-78	26.6-18.5	Victim becomes unconscious. He does not respond to the spoken word. Most reflexes cease to function. Heartbeat becomes erratic
Below 78	25.5	Cardiac and respiratory centers of the brain fail. Ventricular fibrillation occurs; probably edema and hemorrhage in the lungs; death.

6. *Treatment of hypothermia:* Keep worker dry. Remove any wet clothing and replace with dry clothes, or wrap person in dry blankets. Keep person at rest. Do not allow him/her to move around. Transport the victim to a medical facility as soon as possible.



**TABLE 3<sup>(1)</sup>**  
**COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED**  
**AS AN EQUIVALENT TEMPERATURE (UNDER CALM CONDITIONS)**

Estimated wind Speed (in mph)	Actual Temperature Reading (°F)P											
	50	40	30	20	10	0	10	20	30	40	50	60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	15	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-146
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER in < hr with dry skin. Maximum danger of false sense of security.			INCREASING DANGER Danger from freezing of exposed flesh within one minute				GREAT DANGER may freeze within 30 seconds.				Flesh
	Trench foot and immersion foot may occur at any point on this chart											

Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

(1) Reproduced from American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1985-1986, p.01.

## **Appendix D**

### **Medical Data Sheet**

## MEDICAL DATA SHEET

The brief medical data sheet shall be completed by on-site personnel and will be kept in the Support Zone by the HSO as a project record during the conduct of site operations. It accompanies any personnel when medical assistance is needed or if transport to a hospital is required.

Project: \_\_\_\_\_

Name: \_\_\_\_\_

Home Telephone: \_\_\_\_\_

Address: \_\_\_\_\_

Age: \_\_\_\_\_ Height: \_\_\_\_\_ Weight: \_\_\_\_\_ Blood Type: \_\_\_\_\_

Name and Telephone Number of Emergency Contact: \_\_\_\_\_

Drug or Other Allergies: \_\_\_\_\_

Particular Sensitivities: \_\_\_\_\_

Do You Wear Contacts? \_\_\_\_\_

Provide A Check List Of Previous Illnesses: \_\_\_\_\_

What Medications Are You Presently Using? \_\_\_\_\_

Do You Have Any Medical Restrictions? \_\_\_\_\_

Name, Address, And Phone Number Of Personal Physician: \_\_\_\_\_

## **Appendix E**

### **General Health and Safety Work Practices**

## **GENERAL HEALTH AND SAFETY WORK PRACTICES**

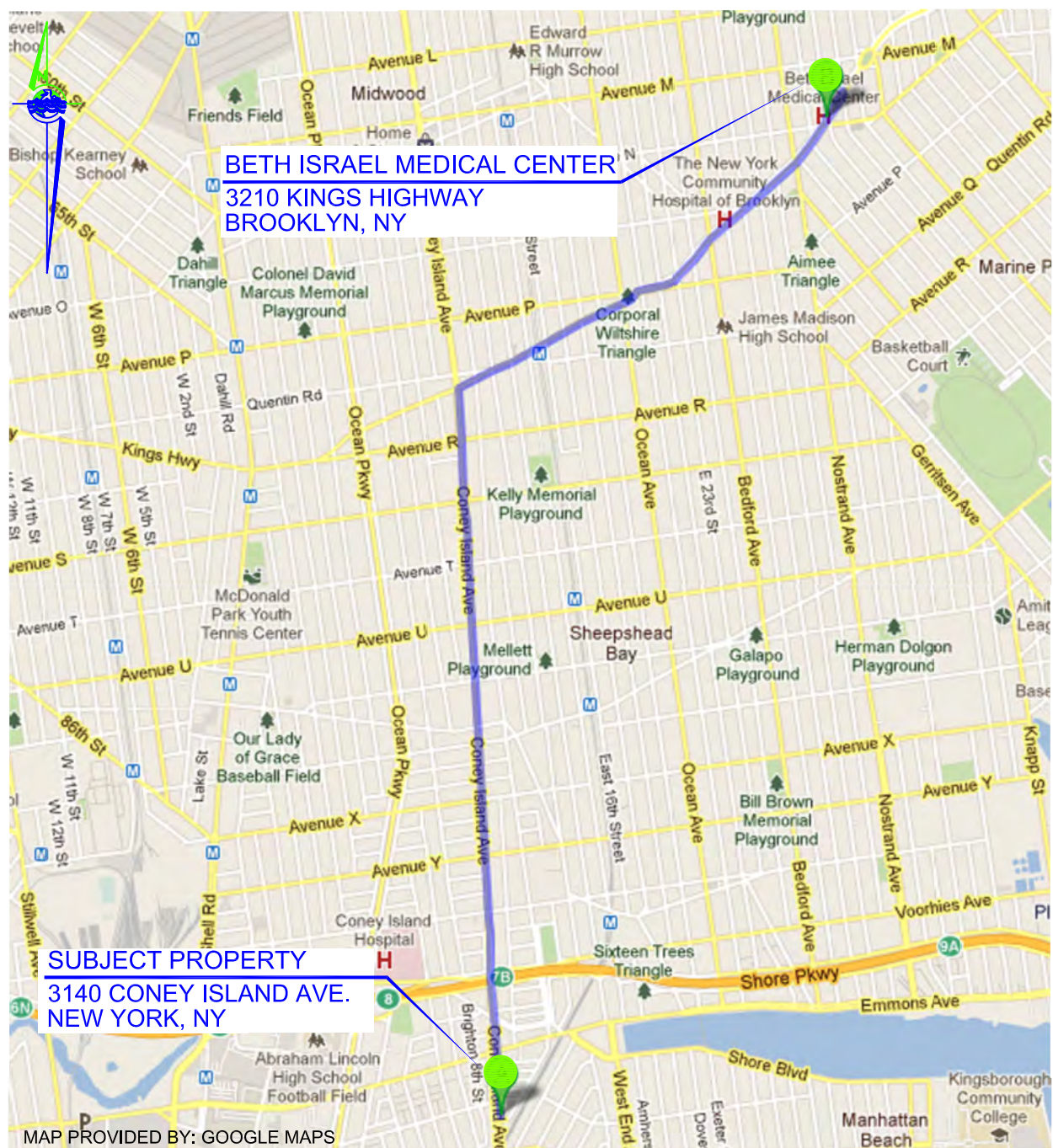
1. Site personnel must attend each day's Daily Briefing and sign the attendance sheet.
2. Any individual taking prescribed drugs shall inform the FTL/HSO of the type of medication. The FTL/HSO will review the matter with the HSM and the Corporate Medical Consultant (CMC), who will decide if the employee can safely work on-site while taking the medication.
3. The personal protective equipment specified by the FTL/HSO and/or associated procedures shall be worn by site personnel. This includes hard hats and safety glasses which must be worn in active work areas.
4. Facial hair (beards, long sideburns or mustaches) which may interfere with a satisfactory fit of a respirator mask is not allowed on any person who may be required to wear a respirator.
5. Personnel must follow proper decontamination procedures and shower as soon as possible upon completion of work shift.
6. Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the exclusion zone or the contamination reduction zone. (Exceptions may be permitted by the HSM to allow fluid intake during heat stress conditions).
7. Lighters, matches, cigarettes and other forms of tobacco are prohibited in the Exclusion Zone.
8. Signs and demarcations shall be followed. Such signs and demarcation shall not be removed, except as authorized by the FTL/HSO.
9. No one shall enter a permit-required confined space without a permit and appropriate training. Confined space entry permits shall be implemented as issued.
10. Personnel must follow Hot Work Permits as issued.
11. Personnel must use the Buddy System in the Exclusion Zone.
12. Personnel must follow the work-rest regimens and other practices required by the heat stress program.
13. Personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.
14. No person shall operate equipment unless trained and authorized.
15. No one may enter an excavation greater than four feet deep unless authorized by the Competent Person. Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.
16. Ladders and scaffolds shall be solidly constructed, in good working condition, and inspected prior to use. No one may use defective ladders or scaffolds.
17. Fall protection or fall arrest systems must be in place when working at elevations greater than six feet for temporary working surfaces and four feet for fixed platforms.

18. Safety belts, harnesses and lanyards must be selected by the Supervisor. The user must inspect the equipment prior to use. No defective personal fall protection equipment shall be used. Personal fall protection that has been shock loaded must be discarded.
19. Hand and portable power tools must be inspected prior to use. Defective tools and equipment shall not be used.
20. Ground fault interrupters shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out walkways and puddles unless protected and rated for the service.
21. Improper use, mishandling, or tampering with health and safety equipment and samples is prohibited.
22. Horseplay of any kind is prohibited.
23. Possession or use of alcoholic beverages, controlled substances, or firearms on any site is forbidden.
24. Incidents, no matter how minor, must be reported immediately to the Supervisor.
25. Personnel shall be familiar with the Site Emergency Action Plan, which is contained in Section 12 of the HASP/EAP.

**The above Health and Safety Rules are not all inclusive and it is your responsibility to comply with regulations set forth by OSHA, the client, PWGC Supervisors, and the FTL/HSO.**

## **Appendix F**

### **Hospital Route Map and Directions**



### DIRECTIONS:

- |   |         |
|---|---------|
| 1. Head NORTH on CONEY ISLAND AVE. toward OCEAN VIEW AVE. | 1.9 Mi. |
| 2. Turn RIGHT onto KINGS HIGHWAY                          | 0.5 Mi. |
| 3. Slight LEFT to stay on KINGS HIGHWAY                   | 148 Ft. |
| 4. Slight RIGHT onto AVENUE P.                            | 72 Ft.  |
| 5. Continue onto KINGS HIGHWAY                            | 0.8 Mi. |
| 6. Make U-TURN at NEW YORK AVE.                           | 0.1 Mi. |
| 7. DESTINATION WILL BE ON RIGHT                           |         |

## HOSPITAL ROUTE MAP

SCALE: NOT TO SCALE

J:\Projects A-D\CIR\CAD\Hospital\_Route\_Map.dwg



## **Appendix G**

### **Incident Report Form / Investigation Form**

<b>INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 1 OF 2</b>		
<b>TYPE OF INCIDENT - CHECK ALL THAT APPLY</b>		
<input type="checkbox"/> INJURY/ILLNESS	<input type="checkbox"/> VEHICLE DAMAGE	<input type="checkbox"/> PROPERTY DAMAGE
<input type="checkbox"/> SPILL/RELEASE	<input type="checkbox"/> PERMIT EXCEEDENCE	<input type="checkbox"/> NEAR MISS
<input type="checkbox"/> FIRE		
<input type="checkbox"/> OTHER		
<b>GENERAL INFORMATION</b>		
PROJECT NAME:	DATE OF REPORT:	REPORT NO.:
DATE OF INCIDENT:	TIME:	DAY OF WEEK:
LOCATION OF INCIDENT:		
WEATHER CONDITIONS:      ADEQUATE LIGHTING AT SCENE? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A		
<b>DESCRIBE WHAT HAPPENED (STEP BY STEP - USE ADDITIONAL PAGES IF NECESSARY)</b>		
<b>AFFECTED EMPLOYEE INFORMATION</b>		
NAME:	EMPLOYEE: <input type="checkbox"/> YES <input type="checkbox"/> NO	
HOME ADDRESS:		
SOCIAL SECURITY NO.:	HOME PHONE NO.:	
JOB CLASSIFICATION:	YEARS IN JOB CLASSIFICATION:	
HOURS WORKED ON SHIFT PRIOR TO INCIDENT:	AGE:	
DID INCIDENT RELATE TO ROUTINE TASK FOR JOB CLASSIFICATION? <input type="checkbox"/> YES <input type="checkbox"/> NO		
<b>INJURY/ILLNESS INFORMATION</b>		
NATURE OF INJURY OR ILLNESS:		
OBJECT/EQUIPMENT/SUBSTANCE CAUSING HARM:		
FIRST AID PROVIDED? <input type="checkbox"/> YES <input type="checkbox"/> NO		
IF YES, WHERE WAS IT GIVEN: <input type="checkbox"/> ON-SITE <input type="checkbox"/> OFF-SITE		
IF YES, WHO PROVIDED FIRST AID:		
WILL THE INJURY/ILLNESS RESULT IN: <input type="checkbox"/> RESTRICTED DUTY <input type="checkbox"/> LOST TIME <input type="checkbox"/> UNKNOWN		

<b>INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 2 OF 2</b>		<b>REPORT NO.</b>
<b>MEDICAL TREATMENT INFORMATION</b>		
WAS MEDICAL TREATMENT PROVIDED? <input type="checkbox"/> YES <input type="checkbox"/> NO		
IF YES, WAS MEDICAL TREATMENT PROVIDED: <input type="checkbox"/> ON-SITE <input type="checkbox"/> DR.'S OFFICE <input type="checkbox"/> HOSPITAL		
NAME OF PERSON(S) PROVIDING TREATMENT:		
ADDRESS WHERE TREATMENT WAS PROVIDED:		
TYPE OF TREATMENT:		
<b>VEHICLE AND PROPERTY DAMAGE INFORMATION</b>		
VEHICLE/PROPERTY DAMAGED:		
DESCRIPTION OF DAMAGE:		
<b>SPILL AND AIR EMISSIONS INFORMATION:</b>		
SUBSTANCE SPILLED OR RELEASED:	FROM WHERE:	TO WHERE:
ESTIMATED QUANTITY/DURATION:		
CERCLA HAZARDOUS SUBSTANCE? <input type="checkbox"/> YES <input type="checkbox"/> NO		
REPORTABLE TO AGENCY? <input type="checkbox"/> YES <input type="checkbox"/> NO SPECIFY:		
WRITTEN REPORT: <input type="checkbox"/> YES <input type="checkbox"/> NO TIME FRAME:		
RESPONSE ACTION TAKEN:		
<b>PERMIT EXCEEDENCE</b>		
TYPE OF PERMIT:	PERMIT #:	
DATE OF EXCEEDENCE:	DATE FIRST KNOWLEDGE OF EXCEEDENCE:	
PERMITTED LEVEL OR CRITERIA:		
EXCEEDENCE LEVEL OR CRITERIA:		
REPORTABLE TO AGENCY? <input type="checkbox"/> YES <input type="checkbox"/> NO SPECIFY:		
WRITTEN REPORT: <input type="checkbox"/> YES <input type="checkbox"/> NO TIME FRAME:		
RESPONSE ACTION TAKEN:		
<b>NOTIFICATIONS</b>		
NAMES OF PERSONNEL NOTIFIED:	DATE/TIME:	
CLIENT NOTIFIED:	DATE/TIME:	
AGENCY NOTIFIED:	DATE/TIME:	
CONTACT NAME:		
<b>PERSONS PREPARING REPORT</b>		
EMPLOYEE'S NAME:(PRINT)	SIGN:	
SUPERVISOR'S NAME:(PRINT)	SIGN:	

<b>INVESTIGATIVE REPORT</b>			
DATE OF INCIDENT:		DATE OF REPORT:	
REPORT NUMBER:			
INCIDENT COST: ESTIMATED: \$ _____ ACTUAL: \$ _____			
OSHA RECORDABLE(S): <input type="checkbox"/> YES <input type="checkbox"/> NO # RESTRICTED DAYS ____ # DAYS AWAY FROM WORK ____			
<b>CAUSE ANALYSIS</b>			
IMMEDIATE CAUSES - WHAT ACTIONS AND CONDITIONS CONTRIBUTED TO THIS EVENT?			
BASIC CAUSES - WHAT SPECIFIC PERSONAL OR JOB FACTORS CONTRIBUTED TO THIS EVENT?			
<b>ACTION PLAN</b>			
REMEDIAL ACTIONS - WHAT HAS AND OR SHOULD BE DONE TO CONTROL EACH OF THE CAUSES LISTED?			
ACTION	PERSON RESPONSIBLE	TARGET DATE	COMPLETION DATE
<b>PERSONS PERFORMING INVESTIGATION</b>			
INVESTIGATOR'S NAME: (PRINT)		SIGN: DATE:	
INVESTIGATOR'S NAME: (PRINT)		SIGN: DATE:	
INVESTIGATOR'S NAME: (PRINT)		SIGN: DATE:	
<b>MANAGEMENT REVIEW</b>			
PROJECT MANAGER: (PRINT)		SIGN: DATE:	
COMMENTS:			
H&S MANAGER: (PRINT)		SIGN: DATE:	
COMMENTS:			

## EXAMPLES OF IMMEDIATE CAUSES

### Substandard Actions

1. Operating equipment without authority
2. Failure to warn
3. Failure to secure
4. Operating at improper speed
5. Making safety devices inoperable
6. Removing safety devices
7. Using defective equipment
8. Failure to use PPE properly
9. Improper loading
10. Improper placement
11. Improper lifting
12. Improper position for task
13. Servicing equipment in operation
14. Under influence of alcohol/drugs
15. Horseplay

### Substandard Conditions

1. Guards or barriers
2. Protective equipment
3. Tools, equipment, or materials
4. Congestion
5. Warning system
6. Fire and explosion hazards
7. Poor housekeeping
8. Noise exposure
9. Exposure to hazardous materials
10. Extreme temperature exposure
11. Illumination
12. Ventilation
13. Visibility

## EXAMPLES OF BASIC CAUSES

### Personal Factors

1. Capability
2. Knowledge
3. Skill
4. Stress
5. Motivation
6. Work Standards
7. Wear and tear
8. Abuse or misuse

### Job Factors

1. Supervision
2. Engineering
3. Purchasing
4. Maintenance
5. Tools/equipment

## MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS

1. Leadership and administration
2. Management training
3. Planned inspections
4. Task analysis and procedures
5. Task observation
6. Emergency preparedness
7. Organizational rules
8. Accident/incident analysis
9. Personal protective equipment

10. Health control
11. Program audits
12. Engineering controls
13. Personal communications
14. Group meetings
15. General promotion
16. Hiring and placement
17. Purchasing controls

## **Appendix H**

### **Daily Briefing Sign-In Sheet**

## DAILY BRIEFING SIGN-IN SHEET

Date: \_\_\_\_\_ Project Name/Location: \_\_\_\_\_

Person Conducting Briefing: \_\_\_\_\_

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

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2. OTHER ISSUES (HASP/EAP changes, attendee comments, etc.)

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3. ATTENDEES (Print Name):

1.	21.
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3.	23.
4.	24.
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## **APPENDIX C**

# **COMMUNITY AIR MONITORING PLAN**



**3140 CONEY ISLAND AVENUE  
BROOKLYN, NEW YORK**

## **COMMUNITY AIR MONITORING PLAN**

**SUBMITTED TO:**



New York State Department of Environmental Conservation  
Division of Environmental Remediation  
Remedial Bureau A, Section C  
625 Broadway  
Albany, New York 12233

**PREPARED FOR:**

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PWGC Project Number: CIR1101

**JUNE 20, 2012**

**COMMUNITY AIR MONITORING PLAN  
3140 CONEY ISLAND AVENUE  
BROOKLYN, NEW YORK**

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## **1.0 INTRODUCTION**

This 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 investigation) from potential airborne contaminant releases resulting from Supplemental Remedial Investigation (RI) at 3140 Coney Island Avenue, Brooklyn, New York.

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.

Based on previous investigations at the site, the primary concerns for this site are VOCs and dust particulates.

### **1.1 Regulatory Requirements**

This CAMP was established in accordance with the following requirements:

- 29 CFR 1910.120(h): This regulation specifies that air shall be monitored to identify and quantify levels of airborne hazardous substances and health hazards, and to determine the appropriate level of protection for workers.
- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan: 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.
- New York State Department of Environmental Conservation (NYSDEC) Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

## **2.0 AIR MONITORING**

The following sections contain information describing the types, frequency and location of real-time monitoring.

### **2.1 Real-Time Monitoring**

This section addresses the real-time monitoring that will be conducted within the work area, and along the site perimeter, during intrusive activities such as excavation, product recovery, manipulation of soil piles, extraction of sheet piling, etc.

#### **2.1.1 Work Area**

The following instruments will be used for work area monitoring:

- PhotoionizationDetector (PID)

- Dust Monitor

Table 1-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. Table 1-2 lists the Real-Time Air Monitoring Action Levels to be used in all work areas.

#### 2.1.2 *Community Air Monitoring Requirements*

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before investigation activities begin. These points will be monitored periodically in series during the site work.

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 Photovac MicroTip photoionization detector (PID), or equivalent. Table 1-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. Table 1-2 lists the Real-Time Air Monitoring Action Levels to be used in all work areas. All air monitoring data is documented in a site log book by the designated site safety officer. PWGC's 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.

**Table 1-1**  
**Frequency and Location of Air Monitoring**

ACTIVITY	AIR MONITORING INSTRUMENT	FREQUENCY AND LOCATION
Drilling, Sampling, Excavation	PID, Dust Monitor	Continuous in Breathing Zone (BZ) during intrusive activities or if odors become apparent, screening in the BZ every 30 minutes during non-intrusive activities

**Table 1-2**  
**Real-Time Air Monitoring Action Levels**

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
PID	Breathing Zone	0-25 ppm, non-transient	None	Exposure below established exposure limits
PID	Breathing Zone	25-100 ppm, non-transient	Don APR	Based on potential exposure to VOCs
PID	Breathing Zone	>100 ppm, non-transient	Don ASR or SCBA, Institute vapor/odor suppression measures, Notify HSM.	Increased exposure to site contaminants, potential for vapor release to public areas.
PID	Work Area Perimeter	< 5 ppm	None	Exposure below established exposure limits.
PID	Work Area Perimeter	> 5 ppm	Stop work and implement vapor release response plan until readings return to acceptable levels, Notify HSM.	Increased exposure to site contaminants, potential for vapor release to public areas
Aerosol Monitor	Work Area Perimeter	>100 but < 150 $\mu\text{g}/\text{m}^3$ for 15 minutes	Institute dust suppression measures, Notify HSM.	Work to continue if particulate concentrations remain below 150 $\mu\text{g}/\text{m}^3$
Aerosol Monitor	Work Area Perimeter	>150 $\mu\text{g}/\text{m}^3$	Don ASR or SCBA, Institute dust suppression measures, Notify HSM.	Stop work and implement dust suppression techniques until readings return to acceptable levels, Notify HSM.

### 3.0 VAPOR EMISSION RESPONSE PLAN

This section is excerpted from the NYSDOH guidance for Community Air Monitoring Plan - Ground Intrusive Activities.

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. Vapor suppression measures can also be taken at this time. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- The organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down. When work shutdown occurs, downwind air monitoring as directed by the Site Health & Safety Officer (SHSO) will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan Section.

#### **4.0 MAJOR VAPOR EMISSION RESPONSE PLAN**

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source (see Section 5.0) are unsuccessful and if organic vapor levels are approaching 5 ppm above background for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect.

However, the Major Vapor Emission Response Plan shall be immediately placed in effect if organic vapor levels are greater than 10 ppm above background.

Upon activation, the following activities will be undertaken:

1. All emergency Response Contacts as listed in the Health & Safety Plan will go into effect.
2. The local police authorities will immediately be contacted by the Health & Safety Officer and advised of the situation.
3. Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by

the Health & Safety Officer.

## **5.0 VAPOR SUPPRESSION TECHNIQUES**

Vapor suppression techniques must be employed when action levels warrant the use of these techniques.

The techniques to be implemented for control of VOCs from stockpiled soil or from the open excavation will include one or more of the following:

- cover with plastic
- cover with "clean soil"
- application of hydro-mulch material or encapsulating foam
- limit working hours to favorable wind and temperature conditions

## **6.0 DUST SUPPRESSION TECHNIQUES**

Reasonable dust-suppression techniques must be employed during all work that may generate dust, such as drilling, excavation, grading, and placement of clean fill. The following techniques were shown to be effective for controlling the generation and migration of dust during remedial activities:

- Wetting equipment and excavation faces;
- Spraying water on buckets during excavation and dumping;
- Hauling materials in properly covered containers; and,
- Restricting vehicle speeds to 10 mph.

It is imperative that utilizing water for suppressing dust will not create surface runoff.

## **7.0 DATA QUALITY ASSURANCE**

### **7.1 Calibration**

Instrument calibration shall be documented in the designated field logbook. All instruments shall be calibrated before each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

### **7.2 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 FOL/HSO for reference.

### **7.3 Data Review**

The Field Team Leader FOL/SHSO will interpret all monitoring data based on Table 1-2 and his/her professional judgment. The FOL/HSO shall review the data with the HSM 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 HSM.

### **8.0 RECORDS AND REPORTING**

All readings must be recorded and available for review by personnel from NYSDEC and NYSDOH. Should any of the action levels be exceeded, the NYSDEC Division of Air Resources must be notified in writing within five (5) working days.

The notification shall include a description of the control measures implemented to prevent further exceedances.