Remedial Action Work Plan

NYC VCP Number: 13CVCP091M
E-Designation Site Number: E-201

Prepared for:
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OCTOBER 2012
# REMEDIAL ACTION WORK PLAN

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<td>AOC</td>
<td>Area of Concern</td>
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<tr>
<td>AST</td>
<td>Aboveground Storage Tank</td>
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<tr>
<td>BOA</td>
<td>Brownfield Opportunity Area</td>
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<tr>
<td>BPMD</td>
<td>Borough President Manhattan Datum</td>
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<tr>
<td>CAMP</td>
<td>Community Air Monitoring Plan</td>
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<td>CFR</td>
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<td>CHASP</td>
<td>Construction Health and Safety Plan</td>
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<td>DCR</td>
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<td>DNAPL</td>
<td>Dense Non-Aqueous Phase Liquids</td>
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<td>ECs/ICs</td>
<td>Engineering and Institutional Controls</td>
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<td>ELAP</td>
<td>Environmental Laboratory Approval Program</td>
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<td>GQS</td>
<td>Groundwater Quality Standards</td>
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<td>HASP</td>
<td>Health and Safety Plan</td>
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<td>LNAPL</td>
<td>Light Non-Aqueous Phase Liquid</td>
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<td>BCA</td>
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<td>NOC</td>
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<td>NYC BCP</td>
<td>New York City Brownfield Cleanup Program</td>
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<td>PCB</td>
<td>Polychlorinated Biphenyl</td>
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<td>PE</td>
<td>Professional Engineer</td>
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<td>Acronym</td>
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<td>PID</td>
<td>Photo Ionization Detector</td>
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<td>Quality Control/Quality Assurance</td>
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<td>SVOC</td>
<td>Semi-Volatile Organic Compound</td>
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<tr>
<td>VOC</td>
<td>Volatile Organic Compound</td>
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CERTIFICATION

I, Joel Landes, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the West 125th Street and Lenox Avenue Site (13CVCP091M).

I certify that this Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Joel B. Landes
Name
076348
NYS PE License Number
Signature
10/2/12
Date

Michael Burke
O&G Name
N/A
O&G Signature
10/2/12
Date
EXECUTIVE SUMMARY

125th and Lenox LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 0.75-acre site located at 281-291 Lenox Avenue, 107-113 West 124th Street, and 108-110 West 125th Street in the Harlem section of the borough of Manhattan, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance, and conforms with applicable laws and regulations.

Site Location and Current Usage

The Site is located on the eastern portion of the city block between 124th Street, 125th Street, Adam C. Powell Boulevard, and Lenox Avenue in the Harlem section of the borough of Manhattan, New York and consists of the following addresses: 281-291 Lenox Avenue (Block 1909, Lots 29, 129, 30, 31, 32, and 33), 107-113 West 124th Street (Block 1909, Lots 28, 27, 26, 25, and 140), and 108-110 West 125th Street (Block 1909, Lots 38 and 39). The Site consists of vacant, unpaved land encompassing an approximate area of 32,410 square feet and is bound by West 125th Street and a 10-story shopping center to the north, Lenox Avenue and multiple-story residential buildings with ground-level retail space to the east, West 124th Street and multiple-story residential buildings to the south, and a vacant lot and one-story retail building to the west. Chain-linked fencing with a locked gate on West 124th Street surrounds the Site. A New York City Transit (NYCT) tunnel for the Number 2 and 3 subway lines is present below Lenox Avenue, directly to the east of the Site. Beyond the adjoining properties, the surrounding area is comprised primarily of multiple-story residential and commercial buildings with ground-level retail space and restaurants.

The Site is an open air lot with approximately 150 feet of frontage along West 125th Street, 175 feet of frontage along West 124th Street, and 200 feet of frontage along Lenox Avenue. The Site is generally flat with approximate el. +26 Borough President Manhattan Datum (BPMD), while the sidewalk elevations fronting the Site on West 125th Street, West 124th Street and Lenox Avenue range between el. +24.60 to el. +26.75 BPMD.
Summary of Proposed Redevelopment Plan

The planned development consists of a 6-story retail building with a single cellar level and will span across the entire Site. The depth of the cellar will extend approximately 18 to 21 feet below the existing site grade. The foundation design is not yet complete, but is expected to extend to the groundwater table and will consist of either a mat foundation or spread footings with a pressure slab. Excavation and foundation construction will involve the removal and off-site disposal of approximately 35,000 tons of material.

Summary of the Remedy

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and Performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan;

2. Implementation of a Community Air Monitoring Program (CAMP) for particulates;

3. Establish Track 1 Soil Cleanup Objectives (SCOs).

4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking and staking excavation areas;

5. Excavation and removal of soil/fill exceeding SCOs. Excavations will be performed to the depths from 18 feet to 21 feet. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media onsite;

6. Sampling and analysis of excavated media as required by disposal facility(ies);

7. Removal of underground storage tanks (if encountered) and closure of petroleum spills in compliance with applicable local, State and Federal laws and regulations;
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;

9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of Track 1 SCOs;

10. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;

11. Installation of a waterproofing/vapor barrier membrane beneath the building slab and over all sub-grade foundation sidewalls;

12. Construction and maintenance of an engineered composite cover consisting of a concrete building slab to prevent human exposure to residual soil/fill that may remain under the Site;

13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;

14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;

15. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site (only applicable if a complete Track 1 cleanup is not achieved); and

16. If Track 1 is not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency (only applicable if a complete Track 1 cleanup is not achieved).
17. If Track 1 is not achieved, Recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.
COMMUNITY PROTECTION STATEMENT

The Office of Environmental Remediation (NYC OER) created the New York City Voluntary Cleanup Program (NYC VCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan ("cleanup plan") describes the findings of prior environmental studies that show the location of contamination at the Site, and describes the plans to clean up the Site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities. This cleanup plan also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

Remedial Investigation and Cleanup Plan. Under the NYC VCP, a thorough cleanup study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and identify contaminant sources present on the property. The cleanup plan has been designed to address contaminant sources identified during the study of this property.

Identification of Sensitive Land Uses. Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

Qualitative Human Health Exposure Assessment. An important part of the cleanup planning for the Site is the performance of a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.
Health and Safety Plan. This cleanup plan includes a Health and Safety Plan that is designed to protect community residents and on-Site workers. The elements of this plan are in compliance with safety requirements of the United States Occupational Safety and Health Administration. This plan includes many protective elements including those discussed below.

Site Safety Coordinator. This project has a designated Site safety coordinator to implement the Health and Safety Plan. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is Jennifer Armstrong and can be reached at (646) 315-4613.

Worker Training. Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take annual refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

Community Air Monitoring Plan. Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air monitoring will be performed in accordance with a detailed plan called the Community Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC OER. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a ‘Contingency Plan’).

Odor, Dust and Noise Control. This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and include steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams, and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the on-site Project Manager Michael Burke at (212) 479-5413 or NYC OER Project Manager Jimit Shah and (212) 788-8348.

Quality Assurance. This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report (RAR). This report will be submitted to the NYC OER and will be thoroughly reviewed.
**Storm-Water Management.** To limit the potential for soil erosion and discharge, this cleanup plan has provisions for storm-water management. The main elements of the storm-water management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

**Hours of Operation.** The hours for operation of cleanup will comply with the NYC Department of Buildings (NYC DOB) construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation are 7:00 am to 5:00 pm Monday through Friday.

**Signage.** While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC VCP, provides project contact names and numbers, and locations of project documents can be viewed.

**Complaint Management.** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the Project Manager Michael Burke at (212) 479-5413, the NYC OER Project Manager Jimit Shah at phone number (212) 788-8348, or call 311 and mention the Site is in the NYC VCP.

**Utility Mark-outs.** To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

**Soil and Liquid Disposal.** All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations and required permits will be obtained.

**Soil Chemical Testing and Screening.** All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

**Stockpile Management.** Soil stockpiles will be kept covered with tarps to prevent dust, odors and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be
promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed to protect storm water catch basins and other discharge points.

**Trucks and Covers.** Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with all laws and regulations.

**Imported Material.** All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

**Equipment Decontamination.** All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

**Housekeeping.** Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

**Truck Routing.** Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-site line-ups (queueing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

**Final Report.** The results of all cleanup work will be fully documented in a final report (RAR) that will be available for you to review in the public document repositories located at Harlem Library.

**Long-Term Site Management.** To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management
Plan (SMP) that calls for continued inspection of protective controls, such as Site covers. The SMP is evaluated and approved by the NYC OER. Requirements that the property owner must comply with are defined in the property’s deed. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.
1.0 SITE BACKGROUND

125th and Lenox LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate the property located at 281-291 Lenox Avenue, 107-113 West 124th Street, and 108-110 West 125th Street in the Harlem section of Manhattan, New York (the Site). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives (RAOs), provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 Site Location and Current Usage

The Site is located on the eastern portion of the city block between 124th Street, 125th Street, Adam C. Powell Boulevard, and Lenox Avenue in the Harlem section of the borough of Manhattan, New York and consists of the following addresses: 281-291 Lenox Avenue (Block 1909, Lots 29, 129, 30, 31, 32, and 33), 107-113 West 124th Street (Block 1909, Lots 28, 27, 26, 25, and 140), and 108-110 West 125th Street (Block 1909, Lots 38 and 39). A Site Location Map is provided as Figure 1. The Site consists of vacant, unpaved land encompassing an approximate area of 32,410 square feet and is bound by West 125th Street and a 10-story shopping center to the north, Lenox Avenue and multiple-story residential buildings with ground-level retail space to the east, West 124th Street and multiple-story residential buildings to the south, and a vacant lot and one-story retail building to the west. Chain-linked fencing with a locked gate on West 124th Street surrounds the Site. A New York City Transit (NYCT) tunnel for the Number 2 and 3 subway lines is present below Lenox Avenue, directly to the east of the site. Beyond the adjoining properties, the surrounding area is comprised primarily of multiple-story residential and commercial buildings with ground-level retail space and restaurants. A plan showing the Site boundary is provided as Figure 2.
The Site is an open air lot with approximately 150 feet of frontage along West 125th Street, 175 feet of frontage along West 124th Street, and 200 feet of frontage along Lenox Avenue. The Site is generally flat with approximate el. +26 BPMD, while the sidewalk elevations fronting the Site on West 125th Street, West 124th Street and Lenox Avenue range between el. +24.60 to el. +26.75 BPMD.

1.2 Proposed Redevelopment Plan

The planned development consists of a 6-story retail building with a single cellar level and will span across the entire Site. The depth of the cellar will extend approximately 18 to 21 feet below the existing site grade. The foundation design is not yet complete, but is expected to extend to the groundwater table and will consist of either a mat foundation or spread footings with a pressure slab. Excavation and foundation construction will involve the removal and off-site disposal of approximately 35,000 tons of material. Proposed development plans are included in Appendix A.

The current zoning designation is C6-3 with a C4-4D overlay on the southern portion of the Site. The Site is located within the Special 125th Street District. Development projects within this district must comply with Zoning Resolution, Article IX: Special Purpose Districts, Chapter 7: Special 125th Street District. The proposed Site use is consistent with existing zoning.

The New York City Department of City Planning (NYCDCP) has assigned an E-designation (E-201) to the Site. The E-designations for each lot that comprise the Site are presented in the following table:

<table>
<thead>
<tr>
<th>Lot (address)</th>
<th>Window Wall Attenuation - Alternative Ventilation</th>
<th>Underground Gasoline Storage Tank Testing Protocol</th>
<th>Air Quality – No. 2 Fuel Oil or Natural Gas Heat and Hot Water</th>
<th>Exhaust Stack Location Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot 33 (291 Lenox Avenue)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lot 38 (108 West 125th Street)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Lot 39 (110 West 125th Street)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
### The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

#### 1.3 Description of Surrounding Property

The Site is bordered by West 125th Street and a 10-story shopping center to the north, Lenox Avenue and multiple-story residential buildings with ground-level retail space to the east, West 124th Street and multiple-story residential buildings to the south, and a vacant lot and one-story retail building to the west. Beyond the adjoining properties, the surrounding area is

<table>
<thead>
<tr>
<th>Lot (address)</th>
<th>Window Wall Attenuation - Alternative Ventilation</th>
<th>Underground Gasoline Storage Tank Testing Protocol</th>
<th>Air Quality – No. 2 Fuel Oil or Natural Gas Heat and Hot Water</th>
<th>Exhaust Stack Location Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot 32 (289 Lenox Avenue)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lot 31 (287 Lenox Avenue)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lot 30 (285 Lenox Avenue)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lot 129 (283 Lenox Avenue)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lot 29 (281 Lenox Avenue)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Lot 28 (107 West 124th Street)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lot 27 (109 West 124th Street)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lot 25 and 140 (113 West 124 Street)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lot 26 (111 West 124th Street)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
comprised primarily of multiple-story residential and commercial buildings with ground-level retail space and restaurants.

The surrounding neighborhood is generally characterized by multiple-story, mixed-use residential, commercial, and retail properties. The major thoroughfares, West 125th Street and Lenox Avenue, are zoned for commercial usage and generally populated with commercial and retail properties with mixed-use residential and commercial buildings. Properties along the numbered side streets are zoned for residential usage and typically contain multiple-story residential buildings with ground-floor retail. Figure 3 shows the surrounding land usage.

The New York City Office of Environmental Remediation (NYC OER) Searchable Property Environmental E-Database (SPEED) was utilized to research sensitive environmental receptors within a 500-foot radius of the Site. This evaluation revealed that no sensitive receptors such as schools, hospitals, and day care centers exist within the target radius.

1.4 Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “Remedial Investigation Report, West 125th Street and Lenox Avenue”, dated July 2012 (RIR).

Summary of Past Uses of Site and Areas of Concern

The Site was developed with multiple-story residential buildings by 1902. One 5-story and eight 4-story mixed-use buildings occupied the Site (exclusive of Lots 25 through 28 and 140) through 2006. Each of the former buildings contained a basement and a rear yard. The basements contained mechanical rooms and storage areas, ground-level spaces contained lobbies or retail/commercial space, and the upper floors were occupied by residential apartments. A five-story building with a ground-floor automobile repair facility was demolished on Lot 28 in 2002, a two-story residential building was demolished on Lot 27 in 1977, and four-story residential dwellings were demolished on Lots 25, 140, and 26 in 1969. The following Areas of Concern (AOCs) have been identified at the Site:

1. Historical concrete-encased 1,500-gallon and 5,000-gallon fuel oil aboveground storage tanks (ASTs) located in the basement of the former building on Lot 33 (through 2006).
2. One historical AST located in the basement of the former building on Lot 31 (through 2006).

3. One historical fuel oil underground storage tank (UST) that was removed from Lots 25 and 140 in 2008.


6. A historical off-site automotive repair and salvage facility located on the adjoining property west of the Site at 117-119 West 124th Street from 1951 to 2003.

7. A historical off-site dry cleaning facility located approximately 120 feet south (cross-gradient) of the Site between 1976 and 2005.

8. An open New York State Department of Environmental Conservation (NYSDEC) spill incident (Spill Number 9800366) located 190 feet west and up-gradient of the Site.

**Summary of the Work Performed under the Remedial Investigation**

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);

2. Installed 13 soil borings from which 26 soil samples were collected for chemical analysis to evaluate soil quality;

3. Installed four permanent and four temporary groundwater monitoring wells throughout the Site to establish groundwater flow direction and collected eight groundwater samples, one from each well, for chemical analysis to evaluate groundwater quality;

4. Installed seven soil vapor probes and collected seven vapor samples for chemical analysis.

5. Performed a geophysical survey to identify remnant buried tank structures and associated piping and provide utility clearance for borings.
Summary of Environmental Findings

1. Elevation of the Site ranges from 24.60 to 26.75 feet BPMD.

2. Depth to groundwater ranges from approximately 18 to 20 feet below grade surface (ft bgs).

3. Groundwater flow is generally from west to east.

4. Bedrock was not encountered in any of the borings performed at the Site.

5. The stratigraphy of the Site, from the surface down, consists of approximately 13 to 19 feet of historic fill containing varying amounts of gravel, cobbles, and brick fragments, underlain by brown fine- to course-grained native sand.

6. Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), or polychlorinated biphenyls (PCBs) were not detected in any soil samples at concentrations that exceed Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs). The following metals were detected in historic fill at concentrations that exceed their respective Unrestricted Use SCOs: arsenic (maximum of 13.1 milligrams per kilograms [mg/kg]), barium (max. of 1,290 mg/kg), copper (max. of 118 mg/kg), lead (max of 650 mg/kg), nickel (max of 44.4 mg/kg), and zinc (max of 550 mg/kg). These metals are constituents of historic fill at the Site.

7. PCBs and SVOCs were not detected in groundwater at concentrations that exceed the New York State 6NYCRR Part 703.5 Class GA Groundwater Quality Standards (GQS). Four VOCs including benzene (1.9 micrograms per liter [µg/l or ppb]), chloroform (27 ppb), tetrachloroethylene (PCE) (10 ppb), and total xylenes (62 ppb) were detected at concentrations that exceeded their respective GQS in at least one sample. VOCs were not detected in Site soils during the RI. Metals including iron (10,800 ppb), lead (72 ppb), magnesium (644,000 ppb), manganese (3,200 ppb), and sodium (105,000 ppb) were detected in groundwater above their respective Class GA GQSs. The source of metals in groundwater appears to be historic fill and/or salt water run-off from the adjacent streets and/or sidewalks.

8. Soil vapor samples identified numerous petroleum related and chlorinated compounds at low to moderate concentrations. VOCs included acetone, chloroform, xylenes, PCE and dichloroethylene. PCE was detected in three vapor samples at 310 µg/m³, 540 µg/m³ and 820 µg/m³. These PCE concentrations require monitoring and/or mitigation as
per Decision Matrix 2 of the New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (October 2006).

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of significant amounts of hazardous waste is not suspected at this Site.
2.0 REMEDIAL ACTION OBJECTIVES

Based on the results of the RI, the following RAOs have been identified for this Site:

Groundwater

- Remove contaminant sources causing impact to groundwater.
- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

Soil

- Prevent direct contact with contaminated soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.
3.0 REMEDIAL ALTERNATIVES ANALYSIS

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

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

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

Two remedial action alternatives are considered in this alternatives analysis. Alternative 1 is a Track 1 alternative that involves removal of all soil impacted above Track 1 Unrestricted Use SCOs. Alternative 2 removes all impacted soil above Track 4 Site-Specific SCOs.
Alternative 1 involves:

- Excavation and removal of soil exceeding Unrestricted Use Track 1 SCOs throughout the site (expected excavation 18 feet to 21 feet below street surface to remove historic fill which extends to depths of 18 feet) and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling; and

- Installation of a vapor barrier beneath the basement foundation and behind foundation sidewalls as part of construction to prevent potential exposure from soil vapor.

Alternative 2 involves:

- Removal of all soils exceeding Track 4 Site-Specific SCOs throughout the Site. This alternative will involve excavation to a minimum depth to 21 feet. End point soil samples will be collected to confirm remaining soil meets Track 4 Site-Specific SCOs;

- Placement of a final cover over the entire Site to eliminate exposure to remaining soil/fill;

- Installation of a vapor barrier beneath the basement foundation and behind foundation sidewalls as part of construction to prevent potential exposure from soil vapor;

- Establishment of use restrictions including prohibitions on the use of groundwater from the Site and prohibitions on sensitive site uses, such as farming or vegetable gardening, to eliminate future exposure pathways;

- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these engineering and institutional controls including the performance of periodic inspections and certification that the controls are performing as they were intended; and

- Placement of a deed restriction to memorialize the remedial action and the Engineering and Institutional Controls to ensure that future owners of the Site continue to maintain these controls as required.
3.1 THRESHOLD CRITERIA

Protection of Public Health and the Environment

This criterion is an evaluation of the remedy’s ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls (EC/IC). Protection of public health and the environment must be achieved for all approved remedial actions.

The proposed remedy is the excavation and off-site disposal of historic fill. Attainment of SCOs will be assessed through post excavation end-point sampling. Excavation to accommodate the proposed cellar grade and removal of historic fill and native soil to achieve the Track 1 SCOs will be incorporated into the planned construction.

Both remedial alternatives would result in removal of native soil and fill with contaminant concentrations above Site Specific SCOs to a depth of 18 to 21 feet below sidewalk grade. In addition, the proposed structure will extend across the entire Site, and all residual soil will be capped with an impermeable surface (i.e., foundation components and the cellar slab). Site development plans include a waterproofing membrane (W.R. Grace & Co. Constructions Products, Inc.’s Preprufe and Bituthene or equivalent) installed underneath the cellar floor slab, which would also constitute a soil vapor barrier. Under Alternative 2, deed restrictions will be placed on property to memorialize these controls.

Both remedial alternatives are consistent with the RAOs and would provide overall protection of public health and the environment in consideration of current and potential future land use by eliminating the following:

- Risk of ingestion exposures or other direct contact with contaminated soil and groundwater;
- Risk of leaching into groundwater and ingestion exposures or direct contact with groundwater with contamination derived from the Site; and
- Potential migration of vapors into the occupied structure and elimination of associated inhalation exposures.
There is minimal potential for contact with groundwater as it will only be encountered at the bottom three-feet of the excavation. There is potential for worker exposure to historic fill and groundwater during remedial activities. For both alternatives, such exposure will be mitigated by use of personal protective equipment (PPE) and implementation of the Construction Health and Safety Plan (CHASP) attached hereto in Appendix B. As such, future exposures to Site-related contaminants will be minimized; resulting in unrestricted future Site use and the Site RAOs will be met.

3.2 BALANCING CRITERIA

Compliance with Standards, Criteria and Guidance (SCGs)

The Track 1 alternative would address the chemical-specific SCGs, as soil/fill in excess of the NYSDEC Part 375 Unrestricted Use SCOs would be removed. Soil/fill excavated from the Site would be managed and disposed in accordance with applicable City, State, and Federal regulations. Compliance with SCGs for soil vapor will also be achieved by installation of vapor barrier as part of construction.

Alternative 2 (Track 4) would achieve compliance with the remedial goals and address the chemical-specific SCGs and RAOs for soil/fill through removal to meet Track 4 Site Specific SCOs. Soil/fill excavated from the Site would be managed and disposed in accordance with applicable city, state, and federal regulations. Compliance with SCGs for soil vapor will also be achieved by installation of vapor barrier as part of construction.

Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) that comply with the applicable SCGs shall be implemented during Site redevelopment under this RAWP. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

Short-term effectiveness and impacts

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their effects on public health and the environment during implementation of the remedial action, including protection of the community,
environmental impacts, time until remedial response objectives are achieved, and protection of workers during remedial actions.

Both Track 1 and Track 4 remedial alternatives would result in similar short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. However, focused attention to means and methods during the remedial action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact of these activities.

Long-term effectiveness and permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs, establishing a composite cover system across the Site, establishing use restrictions, establishing an SMP to ensure long-term management of Institutional Controls (ICs) and Engineering Controls (ECs), and placing a deed restriction to memorialize these controls for the long term. Establishment of an SMP and a deed restriction will ensure that this protection remains effective for the long-term.

Both alternatives would result in removal of soil contamination exceeding the SCOs providing the highest level, most effective, and permanent remedy over the long-term with respect to a remedy for contaminated soil, which will eliminate any migration to groundwater. Potential sources of soil vapor and groundwater contamination will also be eliminated as part of the Track 1 remedy.
Reduction of toxicity, mobility, or volume of contaminated material

This evaluation criterion assesses the remedial alternative’s use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

The Alternative 1 provides the maximum reduction of toxicity, mobility, or volume of contaminated material through the removal of all historic fill and soil exceeding Track 1 Unrestricted Use SCOs.

Alternative 2 will remove most of the impacted soil present on the Site and any remaining soil beneath the new buildings will meet Track 4 Site-Specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on Site.

Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

Both alternatives will utilize standard methods that are commonly available and routinely applied by the industry. They use standard materials and services that are well established technology. The reliability of the remedy is also high. There are no special difficulties associated with any of the activities proposed.

Cost effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site
management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

Long-term costs associated with Alternative 2 are likely higher than Alternative 1 based on implementation of an SMP and placement of a deed restriction as part of Alternative 2.

The Track 1 alternative poses no undo cost burden. Excavation and off-site disposal of historic fill is necessary to accommodate the proposed development. For a site of this size, in situ treatment alternatives to achieve a Track 1 objective are economically prohibitive. In both Alternatives, appropriate public health and environmental protections are achieved.

Community Acceptance

This evaluation criterion addresses community opinion and support for the remedial action. Observations here will be supplemented by public comment received on the RAWP.

Based on the overall goals of the remedial program and initial observations by the project team, the Track 1 alternative should be acceptable to the community. However, as with any remediation or construction project, the temporary impacts during implementation given the extended construction time period and disruption to traffic patterns due to the significantly increased truck traffic may cause some community concerns. This RAWP will be subject to and undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedial action. This public comment will be considered by NYC OER prior to approval of this plan. A Citizen Participation Plan is included as Appendix C.

Land use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State’s Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to
contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The Track 1 or Track 4 alternative will not affect the Site vicinity’s land use. The proposed use is consistent with the existing use and the zoning designation for the Site and surrounding area. Commercial, residential, and mixed-use properties currently surround the Site; the Track 1 alternative provides the highest level of protection for human health and the environment to these areas. Improvement to the current brownfield condition of the property achieved by the Track 1 alternative is consistent with the City’s goals for cleanup of contaminated land and bringing such properties into productive use.

**Sustainability of the Remedial Action**

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC’s sustainability goals defined in *PlaNYC: A Greener, Greater New York*. Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

The Track 1 remedial alternative is neutral in terms of sustainability. Both alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix D.
4.0 REMEDIAL ACTION

4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is the Track 1 Alternative. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the RAOs established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and Performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan;
2. Implementation of a Community Air Monitoring Program (CAMP) for particulates;
3. Establish Track 1 Soil Cleanup Objectives (SCOs);
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking and staking excavation areas;
5. Excavation and removal of soil/fill exceeding SCOs. Excavations will be performed to the depths from 18 feet to 21 feet. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media onsite;
6. Sampling and analysis of excavated media as required by disposal facility(ies);
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills in compliance with applicable local, State and Federal laws and regulations;
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on site;
9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of Track 1 SCOs;

10. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;

11. Installation of a waterproofing/vapor barrier membrane beneath the building slab;

12. Construction and maintenance of an engineered composite cover consisting of a concrete building slab to prevent human exposure to residual soil/fill that may remain under the Site;

13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;

14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;

15. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site (only applicable if a complete Track 1 cleanup is not achieved);

16. If Track 1 is not achieved, submission of an approved SMP in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency (only applicable if a complete Track 1 cleanup is not achieved); and

17. If Track 1 is not achieved, Recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance
of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

### 4.2 Soil Cleanup Objectives and Soil/Fill Management

Track 1 SCOs are proposed for this project. In the event that Track 1 cannot be achieved, Track 4 SCOs, listed below, will be incorporated.

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the attached Soil/Materials Management Plan. The planned excavation spans the entire Site and will extend into native sand.

Track 4 Site-Specific SCOs are proposed for this project. The following Track 4 Site-Specific SCOs will be used:

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Track 4 Site Specific SCOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOCs</td>
<td>Track 2 Restricted Residential SCOs</td>
</tr>
<tr>
<td>Total SVOCs</td>
<td>250 parts per million (ppm)</td>
</tr>
<tr>
<td>Arsenic</td>
<td>23 ppm</td>
</tr>
<tr>
<td>Barium</td>
<td>750 ppm</td>
</tr>
<tr>
<td>Lead</td>
<td>1,200 ppm</td>
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</tbody>
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**Estimated Soil/Fill Removal Quantities**

The estimated quantity of soil/fill expected to be excavated and disposed off-Site is 35,000 tons. Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

**End-Point Sampling**

Removal actions under this plan will be performed in conjunction with remedial end-point sampling. A map of end-point sampling locations will be provided in the RAWP stipulation list. In the event that hotspot removal actions are to be performed in conjunction with remedial end-point sampling, its sampling frequency will consist of the following:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:

   a. For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.

   b. For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.

   c. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.

   d. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to paragraphs a and b above.

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

   New York State Environmental Laboratory Approval Program (ELAP) certified labs will be used for all end-point sample analyses. Labs for end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be analyzed for Target Analyte List (TAL) metals, VOCs and SVOCs. If either light non-aqueous phase liquid (LNAPL) and/or dense non-aqueous phase liquid (DNAPL) are detected, appropriate samples will be collected for characterization and “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.
Quality Assurance/Quality Control

Quality Assurance/Quality Control (QA/QC) sampling will consist of collecting blind field duplicates, and field blanks. Langan will perform a completeness check of the analytical data packages and review QA/QC observations and deficiencies.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or “cold-paks” to maintain a temperature of 4 degrees Celsius.

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

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

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will be used whenever samples are transported to the laboratory for analysis of VOCs. Trip blanks will not be used for samples to be analyzed for metals, SVOCs or pesticides. One blind duplicate sample will be prepared and submitted for analysis for every 20 samples of each matrix.
Import and Reuse of Soils

Import and reuse of soil is not anticipated for this work. If soil import or reuse is required, it will be performed in conformance with the Soil/Materials Management Plan in Appendix E.

4.3 Engineering Controls

The excavation required for the proposed Site development will achieve Track 1 Unrestricted Use SCOs. No engineering controls are required to address residual contamination at the Site. Since the development depth extends below the water table, a water-proofing membrane, which also acts as a vapor barrier, will be incorporated into the foundation design. If Track 1 is not achieved, the following two elements will constitute engineering controls that will be employed in the remedial action to address residual contamination.

Composite Cover System

The entire property will be covered by an engineered permanent cover system comprised of a concrete-building slab beneath the proposed building. The composite cover system is a permanent engineering control for the Site.

Vapor Barrier

Migration of soil vapor will be mitigated by incorporating a seamless waterproofing/vapor barrier system as part of the foundation construction. Site development plans include a waterproofing membrane (W.R. Grace & Co. Constructions Products, Inc.’s Preprufe and Bituthene or equivalent) installed underneath the cellar floor slab, which would also constitute a soil vapor barrier. The RAR will include photographs of the installation process.

4.4 Institutional Controls

The proposed remedy will achieve Track 1 Unrestricted Use SCOs; therefore, no institutional controls will be required. However, if Track 1 Unrestricted Use SCOs are not achieved, ICs will be incorporated in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. ICs are listed below. Long-term employment of EC/ICs will be established in a Declaration of Covenant and
Restrictions (DCR) assigned to the property by the title holder and will be implemented under a site-specific SMP that will be included in the RAR.

Institutional Controls for this remedial action are:

- Recording of an NYC OER-approved DCR with the City Register or county clerk, as appropriate. The DCR will include a description of all ECs and ICs, will summarize the requirements of the SMP, and will note that the property owner and property owner’s successors and assigns must comply with the DCR and the approved SMP. The recorded DCR will be submitted in the RAR. The DCR will be recorded prior to the NYC OER issuance of the Notice of Completion;

- Submittal of a SMP in the RAR for approval by the NYC OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ECs. SMP will require that the property owner and property owner’s successors and assigns will submit to the NYC OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by the NYC OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. The NYC OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted annually and will comply with RCNY §43-1407(l)(3).

- Vegetable gardens and farming on the Site are prohibited;

- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;

- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;

- The Site will be used for restricted residential use and will not be used for a higher level of use (i.e., unrestricted residential) without prior approval by the NYC OER.
4.5 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the RAR and issuance of the Notice of Completion (NOC) for the Remedial Action. The SMP describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by the DCR and this RAWP. Because excavation efforts will remove impacted soil at the Site and achieve Track 1 Unrestricted Use SCOs, an SMP is not anticipated.

An SMP will be implemented under this Remedial Action if Track 1 Unrestricted Use SCOs are not achieved. The SMP describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by the DCR and this RAWP. The SMP is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management is required until terminated in writing by the NYC OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the DCR and the SMP are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Voluntary Cleanup Agreement with the NYC OER. This includes a plan for: (1) implementation of EC’s and ICs; (2) implementation of monitoring programs; (3) operation and maintenance of EC’s; (4) inspection and certification of EC’s; and (5) reporting.

Site management activities, reporting, and EC/IC certification will be scheduled on an periodic basis to be established in the SMP and will be subject to review and modification by the NYC OER. The SMP will be based on a calendar year and certification reports will be due for submission to the NYC OER by March 31 of the year following the reporting period.

4.6 Qualitative Human Health Exposure Assessment

Investigations reported in the RIR are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA).
Known and Potential Sources

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

**Groundwater:** Concentrations of benzene, chloroform, PCE, total xylenes, iron, lead, magnesium, manganese, and sodium exceeded their respective Class GA GQS. A Site source of VOCs was not detected during this RI. The source of metals in groundwater is historic fill and/or salt water run-off from the adjacent streets and/or sidewalks.

**Soil:** Arsenic, barium, copper, lead, nickel, and zinc concentrations exceeded Track 1 SCOs. These metals are constituents of historic fill at the Site. Most of this contamination, however, is confined to the upper surface-depth range (i.e. 0-4’ b.g.).

**Soil vapor:** PCE was detected in soil vapor at concentrations greater than its NYSDOH Air Guidance Value (AGV) of 100 µg/m$^3$. PCE concentrations also exceed the minimum action levels for monitoring and/or mitigating soil vapor intrusion, as per the NYSDOH Decision Matrix 2. A source of PCE in soil vapor was not identified at the Site.

Nature, Extent, Fate and Transport of Contaminants

**Groundwater**

Concentrations of benzene, chloroform, PCE, total xylenes, iron, lead, magnesium, manganese, and sodium in groundwater are within one order of magnitude of their GQSs, within the exception of xylenes and manganese in MW-3 and iron in TMW-2. Metal contaminants in the groundwater arise from historic fill material at the Site. The Site source of VOCs in groundwater has not been identified, and is most likely attributed to an off-site source.

**Soil**

Arsenic, barium, copper, lead, nickel, and zinc soil contamination is limited to the historic fill layer and extends from 0 to 18 feet below grade surface. Contaminant concentrations in soil are within one order of magnitude of their respective SCOs, with the exception of lead detected at a concentration of 650 mg/kg in soil boring SB-5 (17 to 18 ft bgs). Metal concentrations are also persistent in the subsurface. Metal concentrations have relatively lower water solubility and at the observed concentrations do not pose an environmental transport risk.
Soil Vapor

Concentrations of acetone, chloroform, p- & m-xylenes, p-ethyltoluene, PCE, and toluene exceeded NYSDOH AGVs, NYSDOH 2003 Fuel Oil Upper Fence Values, USEPA Base Database 90th Percentile Indoor Air Values, and/or Health Effects Institute 2005 95th Percentile Indoor Air Values; however, PCE was the only contaminant detected at concentrations exceeding NYSDOH AGVs. Considering no VOC concentrations were detected in the soil for the soil vapor impacts observed, the soil vapor impacts are attributed to an unknown off-site source.

Potential Routes of Exposure

Current and future environmental Site conditions indicate no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the Site. Potential exposure pathways may exist during Site development via ingestion, inhalation or dermal exposures to trespassers or Site workers during the remedial action. These potential exposures will be mitigated during construction by preventing access to the Site and through implementation of storm water pollution prevention and dust controls, CAMP, and CHASP.

Existence of Human Health Exposure

An exposure pathway begins with a source and mechanism of contaminant release, resulting in the contamination of a receiving matrix (environmental medium). A complete exposure pathway also requires a point of potential contact with the contaminated matrix (i.e., exposure point), an exposure route (i.e., inhalation, ingestion, or dermal contact), and a receptor population. If an exposure pathway is not complete because it does not include a contaminated matrix, a point of potential contact, an exposure route, or a receptor, then no risk exists.

The source of metals in soil and groundwater will be fully removed during soil excavation for the proposed development; therefore, no pathway to exposure will exist. If there is any remaining residual metals-impacted soil that is not excavated, it will be covered with an impermeable cap (i.e., the proposed development), thereby eliminating the exposure pathway. Additionally, the impermeable cap (i.e., the proposed development) and vapor barrier will eliminate exposure pathways to contaminated groundwater and soil vapor.
**Receptor Populations**

The receptors identified under the proposed remedy include:

- Site workers: adult (remediation and construction workers).
- Temporary worker: adult (utility worker/inspector, subcontractors, sampler/remediation inspector).

The receptors identified under the proposed remedy and future Site use as a commercial development include:

- Adult and child occupants of the building.
- Adult and child patrons of commercial properties.
- Site workers: adult retail and maintenance workers.
- Temporary worker: adult (utility worker/inspector, landscape worker, construction worker).

The identified receptors are believed to be the primary receptors of interest.

**Overall Human Health Exposure Assessment**

The proposed development will consist of the construction of a 6-story retail building. The proposed building will span the entire Site lot and include a cellar level extending to a depth of 18 to 21 feet below the existing grade. Soil/fill material exceeding Part 375 Unrestricted Use SCOs will be removed during Site development, eliminating a threat to human health or the environment. Additionally, the impermeable cap (i.e., the proposed development) and vapor barrier will eliminate threat to human health.

Workers on site during excavation activities may be exposed to hazardous substances from historic fill and/or dust. Excavation for Site development may result in short-term exposure to historic fill by individuals involved in excavation activities involving this media. Although it is possible for contaminated soil to become airborne in the form of fugitive dust during the excavation work, engineering controls will be implemented to mitigate such an exposure. Continuous air monitoring will be conducted during all remedial activities.
5.0 REMEDIAL ACTION MANAGEMENT

5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Albert Tashji Staff Engineer and Jen Armstrong, Health and Safety Officer. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Joel Landes and Michael Burke, respectively.

5.2 Site Security

Site access will be controlled through gated entrances to the fenced property.

5.3 Work Hours

The hours for operation of remedial construction will be from 7:00 a.m. to 5:00 p.m. Monday through Friday. These hours conform to the New York City Department of Buildings construction code requirements or specific variances issued by that agency.

5.4 Construction Health and Safety Plan

The Health and Safety Plan is included in Appendix B. The Site Safety Coordinator will be Jennifer Armstrong. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and United States Occupational Health and Safety Administration (OSHA) worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 Code of Federal Regulations (CFR) 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.
Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the HASP. That document will define the specific project contacts for use in case of emergency.

5.5 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells. VOC and particulate concentrations that exceed the CAMP action levels will be reported to the NYC OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 ppm above background for the 15-minute
average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Monitoring for VOCs can be temporarily discontinued during active construction activity if:

- No active excavation of soils is taking place; and

- VOC levels have been evaluated and determined to be no greater than background levels

Monitoring for VOCs can be temporarily discontinued when handling or loading stockpiled soil that has already been subject to visual, olfactory and screening with a photo-ionization detector (PID) during the original excavation under the supervision of a PE/QEP, and the excavated soil did not exhibit gross contamination or elevated PID readings, and the original excavation did not result in elevated VOC levels in the community air. Appropriate segregation measures will be implemented to ensure that a mixing of petroleum impacted soil stockpiles with non-petroleum impacted soil stockpiles does not occur.
Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM10 particulate level is 100 micrograms per cubic meter (mcg/m³) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM10 particulate levels do not exceed 150 mcg/m³ above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM10 particulate levels are greater than 150 mcg/m³ above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 particulate concentration to within 150 mcg/m³ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYC OER personnel to review.

5.6 Agency Approvals

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this RAWP by the NYC OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.
5.7 Site Preparation

Pre-Construction Meeting

NYC OER personnel will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

Mobilization

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Markout Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.
Dewatering

Excavation is anticipated to extend below the groundwater table and will require dewatering. Submersible pumps will be used to extract groundwater from gravel lined sumps in the excavations or a system of well points will be used for groundwater extraction. Extracted groundwater will be conveyed to a storage tank or treatment system. Depending on the selected discharge option, a NYC DEP sewer use permit may be obtained to discharge treated groundwater to the sewer system.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations. Trucks will enter and exit the Site via temporary curb ramps. Direct load out of excavated materials is planned so stockpiling is not anticipated.

Stabilized Construction Entrance

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

Truck Inspection Station

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the NYC VCP Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary.

5.8 Traffic Control

Drivers of trucks leaving the NYC VCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the Site is shown on Figure 4.
5.9 Demobilization

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (e.g., soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

5.10 Reporting and Record Keeping

Daily Reports

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

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.
The frequency of the reporting period may be revised in consultation with the NYC OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to NYC OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the NYC OER project manager by personal communication. Daily reports will be included as an Appendix in the RAR.

**Record Keeping and Photo-Documentation**

Job-site record keeping for all remedial work will be performed. These records will be maintained on-site during the project and will be available for inspection by NYC OER staff. Representative photographs will be taken of the site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

**5.11 Complaint Management**

All complaints from citizens will be promptly reported to the NYC OER. Complaints will be addressed and outcomes will also be reported to the NYC OER in daily reports. Notices to the NYC OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

**5.12 Deviations from the Remedial Action Work Plan**

All changes to the RAWP will be reported to the NYC OER Project Manager and will be documented in daily reports and reported in the RAR. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from the NYC OER noting the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy; and
• Determination that the remedial action with the deviation(s) is protective of public health and the environment.
6.0 REMEDIAL ACTION REPORT

An RAR will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- SMP (if required);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Recorded Declaration of Covenants and Restrictions (if required).
- Reports and supporting material will be submitted in digital form.
Remedial Action Report Certification

The following certification will appear in front of the Executive Summary of the Remedial Action Report. The certification will include the following statements:

I, Joel Landes, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 125th Street and Lenox Avenue Site (13CVCP091M).

I, Michael Burke, am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 125th Street and Lenox Avenue Site (13CVCP091M).

I certify that the OER-approved Remedial Action Work Plan dated SEPTEMBER 2012 and Stipulations in a letter dated MONTH DAY, YEAR, if any were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.
7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 6 month remediation period is anticipated.

<table>
<thead>
<tr>
<th>Schedule Milestone</th>
<th>Weeks from Remedial Action Start</th>
<th>Duration (weeks)</th>
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</thead>
<tbody>
<tr>
<td>OER Approval of RAWP</td>
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<td>-</td>
</tr>
<tr>
<td>Fact Sheet 2 announcing start of remedy</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Mobilization</td>
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<td>1</td>
</tr>
<tr>
<td>Remedial Excavation</td>
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<td>18</td>
</tr>
<tr>
<td>Demobilization</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Submit RAR</td>
<td>28</td>
<td>8</td>
</tr>
</tbody>
</table>
FIGURES
1. BASE MAP IS FROM AN ARCHITECTURAL SURVEY (REF. NO.: M1909-004), PREPARED BY JOSEPH NICOLETTI ASSOCIATES, DATED MAY 23, 2008.
LEGEND:

SUBJECT PROPERTY SITE BOUNDARY

APPROXIMATE GROUNDWATER FLOW DIRECTION

GENERAL NOTES:

1. BACKGROUND IS TAKEN FROM OASIS COMMUNITY MAPS FOR NYC (WWW.OASISNYC.NET/MAP.ASPX)
Travelling Westbound to New Jersey: 40 St or W 41 St to enter Lincoln Tunnel
TABLES
<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Unrestricted Use (^{(1)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>13</td>
</tr>
<tr>
<td>Barium</td>
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</tr>
<tr>
<td>Nickel</td>
<td>30</td>
</tr>
<tr>
<td>Zinc</td>
<td>109</td>
</tr>
</tbody>
</table>

\(^{(1)}\) - Adapted from 6 NYCRR PART 375 Table 375-6.8(a): Unrestricted Use Soil Cleanup Objectives

\(^{(2)}\) - For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.
APPENDIX A

PROPOSED DEVELOPMENT PLANS
SIXTH FLOOR ROOF PLAN
124TH STREET
125TH STREET

FIFTH FLOOR ROOFTOP BELOW
HEAT TOWNER ROOMS
FIFTH FLOOR ROOFTOP BELOW

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

REV # DATE DESCRIPTION
---.--.-- SG10-0142
TJL
SG
A108.00

--- of --
EAST ELEVATION

NORTH ELEVATION

1/8" = 1'-0"
CONSTRUCTION HEALTH AND SAFETY PLAN
FOR
REMEDIAL ACTION WORK PLAN
WEST 125th STREET AND LENOX AVENUE
NEW YORK, NEW YORK

Prepared For:
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NYC Brownfield Cleanup Program
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SECTION 1 HEALTH AND SAFETY PLAN (HASP) SUMMARY

Emergency Contacts

Emergency contacts are listed on Table 1.

Emergency Procedures

Emergency procedures are described in Section 6.

Site Specific Hazards and Training

Site Specific Hazards are described in Section 2.

The Field Safety Officer (FSO) will be responsible for providing site-specific training to all personnel that work at the site. This training will cover the following topics:

- Names of personnel responsible for site safety and health.
- Hazards potentially present at the site.
- Proper use of personal protective equipment.
- Work practices by which the employee can minimize risk from hazards.
- Acute effects of compounds at the site.
- Decontamination procedures.

Personnel will be required to sign and date the Site-Specific Training Form provided in Attachment B prior to working on-site.

General Health and Safety Requirements

Personnel will be required to sign and date the Construction Health and Safety Plan and Work Plan Acceptance Form provided in Attachment B prior to working on-site.

Personnel Protective Equipment

Level D protection will be worn for initial entry on-site and for all activities except as noted in Section 3. Level D protection will consist of:

- Standard work clothes
- Steel-toe safety boots
- Safety glasses or goggles must be worn when splash hazard is present
- Nitrile outer and inner gloves must be worn during all activities requiring contact with soils

- Hard hat

**Modified Level D** protection may be required under conditions where potential contact of the skin or clothes with significant contamination occurs. Modified Level D is the same as Level D but includes Tyvek coveralls and disposable polyethylene overboots.

**Level C** protection, unless otherwise specified in Section 3, will consist of Level D equipment and the following additional equipment:

- Full-face or half-mask air-purifying respirator (APR)
- Combination dust/organic vapor cartridges
- Tyvek coveralls if particulate hazard present
- PE-Coated Tyvek coverall if liquid contamination present
- PVC or nitrile inner and nitrile outer gloves
- 5-minute escape SCBA

Neither Level B nor A protection is expected to be required for this project.

**Air Monitoring**

A summary of the action levels and restrictions is presented on Table 2.
FIGURE 1-HOSPITAL ROUTE PLAN (Harlem Hospital Center)

Site Location: West 125th Street and Lenox Avenue
   New York, New York

Hospital Location: 506 Lenox Avenue, New York, New York 10037
   Main: (212) 939-1340
   Emergency: (212) 939-2250

Destination will be on the right.
# TABLE 1
EMERGENCY CONTACTS

In the event of any situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list below. For emergency situations, contact should first be made with the Field Team Leader (or designee) and the Site Safety Officer, who will notify emergency personnel who will then contact the appropriate response teams. This emergency contacts list must be in an easily accessible location at the site.

<table>
<thead>
<tr>
<th>Emergency Contacts</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Department:</td>
<td>911</td>
</tr>
<tr>
<td>Police:</td>
<td>911</td>
</tr>
<tr>
<td>New York City-Long Island One Call Center:</td>
<td>(800) 272-4480</td>
</tr>
<tr>
<td>(3 day notice required for utility mark-outs)</td>
<td></td>
</tr>
<tr>
<td>Poison Control Center:</td>
<td>(800) 222-1222</td>
</tr>
<tr>
<td>Pollution Toxic Chemical Oil Spills:</td>
<td>(800) 424-8802</td>
</tr>
</tbody>
</table>

**Medical Emergency**

Ambulance Service: 911

Hospital Name: Harlem Hospital Center

Hospital Telephone Number: (212) 939-1340

Hospital Emergency Room Number: (212) 939-2250

Hospital Address: 506 Lenox Ave

New York, New York 10037

Route to Hospital: See Page 3 and 4

Travel Time From Site: 3 minutes

**Langan Contacts**

Principal/Associate: Joel Landes, P.E. (cell) (917) 940-3015

Program Manager: Michael Burke (cell) (347) 633-1923

Health & Safety Officer: Tony Moffa (215) 491-6545

Field Safety Officer: Jen Armstrong (cell) (646) 315-4613

Field Team Leader: Albert Tashji (646) 248-4499
TABLE 2
SUMMARY OF ACTION LEVELS AND RESTRICTIONS

Conditions for Level D:
All areas
- PID readings < 25 ppm
- No visible fugitive dust emissions from site activities

Conditions for Level C:
All areas
- Where PID readings > 25 ppm (sustained for 15 minutes in the breathing zone) to 200 ppm and/or
- Any visible fugitive dust emissions from site activities that disturb contaminated soil.

Neither Level B nor A protection is expected to be required for this project.
SECTION 2 INTRODUCTION

2.1 PURPOSE AND POLICY

The purpose of this site-specific health and safety plan (HASP) is to establish personnel protection standards and mandatory safety practices and procedures for potential encounters with non-hazardous soil or groundwater during construction at the Site. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted during pile installation.

The provisions of the plan are the minimum for all on-site personnel. Contractor and subcontractors are required to prepare and adhere to their own HASP that conforms to this plan at a minimum. All Langan personnel who engage in project activities must be familiar with this plan, comply with its requirements, and sign the Plan Acceptance Form (Attachment B), page number B-5, prior to working on the site. The Plan Acceptance Form must be submitted to the Langan Health and Safety Officer (HSO). In addition to this plan, all work shall be performed in accordance with all applicable federal, state and local regulations.

2.2 SITE DESCRIPTION

The Site is an assemblage of properties on the city block located between 124th Street and 125th Street, Adam C. Powell Boulevard, and Lenox Avenue in Harlem section of the borough of Manhattan, New York. The Site consists of the following addresses: 281-291 Lenox Ave (Block 1909, Lots 29, 129, 30, 31, 32, and 33), 107-113 West 124th Street (Block 1909, Lots 28, 27, 26, 25, and 140), and 108-110 West 125th Street (Block 1909, Lots 38 and 39). Figure 1 shows the Site location. The Site is vacant land encompassing an approximate area of 32,410 square feet. Chain-linked fencing surrounds the Site with a locked gate on West 124th Street. The Site is bound by West 125th Street and a 10-story shopping center to the north, Lenox Avenue and a multi-story residential buildings with ground-level retail space to the east, West 124th Street and a multi-story residential building to the south, and a vacant lot and a 1-story retail building to the west. Beyond adjoining properties, the surrounding area is comprised primarily of multi-story residential and commercial buildings with ground-level retail space and restaurants.

2.3 SCOPE OF WORK

The remediation will consist of the removal of material exceeding 6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives for a Track 1 unrestricted use cleanup under the New York City Voluntary Cleanup Program. Remediation activities will be completed concurrently with the construction redevelopment activity at the Site. Approximately 23,700 cubic yards (cy) of fill material will be excavated. Dewatering may be required.

2.4 LANGAN PROJECT TEAM ORGANIZATION

Table 2.1 describes the responsibilities of Langan personnel associated with this project. The names of principal personnel associated with this project are:
Principal/Associate: Joel Landes, P.E. (cell) (917) 940-3015
Program Manager: Michael Burke (cell) (347) 633-1923
Health & Safety Officer: Tony Moffa (215) 491-6545
Field Safety Officer Jen Armstrong (cell) (646) 315-4613
Field Team Leader Albert Tashji (cell) (646) 248-4499

All Langan personnel have been appropriately trained in first aid and hazardous waste safety procedures, including the operating and fitting of personal protective equipment, and are experienced with the field operations planned for this site.
## TABLE 2.1
### ON-SITE PERSONNEL AND RESPONSIBILITIES

**PROJECT MANAGER** - Assumes total control over site activities. Reports to upper-level management. Has authority to direct response operations.

**Responsibilities:**

- Prepares and organizes the background review of the situation, the Work Plan, the Site Health and Safety Plan, and the field team.
- Obtains permission for site access and coordinates activities with appropriate officials.
- Ensures that the Work Plan is executed and on schedule.
- Briefs the field team on their specific assignments.
- Coordinates with the site Health and Safety Officer (HSO) to ensure that health and safety requirements are met.
- Prepares the final report and support files on the response activities.
- Serves as the liaison with public officials.

**FIELD SAFETY OFFICER (FSO)** - Advises the HSO and Project Manager on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety.

**Responsibilities:**

- Ensures that all necessary Health and Safety Equipment is available on-site. Ensures that all equipment is functional.
- Periodically inspects protective clothing and equipment.
- Ensures that protective clothing and equipment are properly stored and maintained.
- Controls entry and exit at the Access Control Points.
- Coordinates health and safety program activities with the Project HSO.
- Confirms each team member’s suitability for work based on a physician’s recommendation.
Field Safety Officer Responsibilities (continued)

- Monitors the work parties for signs of stress, such as cold exposure, heat stress, and fatigue.

- Implements the Site Health and Safety Plan.

- Conducts periodic inspections to determine if the Site Health and Safety Plan is being followed.

- Enforces the "buddy" system.

- Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.

- Notifies, when necessary, local public emergency officials.

- Coordinates emergency medical care.

- Sets up decontamination lines and the decontamination solutions appropriate for the type of chemical contamination on the site.

- Controls the decontamination of all equipment, personnel, and samples from the contaminated areas.

- Assures proper disposal of contaminated clothing and materials.

- Ensures that all required equipment is available.

- Advises medical personnel of potential exposures and consequences.

- Notifies emergency response personnel by telephone or radio in the event of an emergency.

FIELD TEAM LEADER - Advises the Project Manager on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety. Is directly responsible for the field team and the safety of site operations.
TABLE 2.1 - CONTINUED
ON-SITE PERSONNEL AND RESPONSIBILITIES

Responsibilities:

- Manages field operations.
- Executes the Work Plan and schedule.
- Enforces safety procedures.
- Coordinates with the Site Safety Officer in determining protection level.
- Enforces site control.
- Documents field activities and sample collection.
- Serves as a liaison with public officials.

WORK TEAM – Operators, laborers, samplers. The work party must consist of at least two people.

Responsibilities:

- Safely completes the on-site tasks required to fulfill the Work Plan.
- Complies with Site Safety Plan.
- Notifies Site Safety Officer or supervisor of suspected unsafe condition.
SECTION 3  RISK ANALYSIS

3.1 CHEMICAL HAZARDS

The primary potential chemical hazard is exposure to metals in the soil and chlorinated VOCs in groundwater and soil vapor. Potential contaminants that may be encountered in the soil while conducting intrusive activities at the Site include metals (arsenic, copper, lead, nickel, and zinc), and chlorinated VOCs (tetrachloroethene). Relevant properties of these compounds are outlined in Table 2.2 and Material Safety Data Sheets (MSDS) for these substances are included in Appendix C. Other compounds that may be encountered are site equipment fuels (gasoline, diesel, etc.) that contain volatile components. Dust, odors and organic vapors will be monitored in accordance with the Community Air Monitoring Plan described in Section 4.4.

In addition to the compounds detected onsite, some solvents used in decontamination of equipment are potentially hazardous to human health if they are not used properly. Material Safety Data Sheets for substances that will be used on site are included in Attachment C.

3.2 RADIATION HAZARDS

No radiation hazards are known or expected at the site.

3.3 BIOLOGICAL HAZARDS

3.3.1 Animals

During site operations, animals such as dogs, pigeons, sea gulls, mice, and rats may be encountered. Workers will use discretion and avoid all contact with animals. Bites and scratches from dogs can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis; cryptococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.
### TABLE 2.2
RELEVANT PROPERTIES OF VOLATILES AND METALS KNOWN OR SUSPECTED AT THE SITE

<table>
<thead>
<tr>
<th>Compound (Synonym)</th>
<th>OSHA PEL(^{(1)}) (ppm)</th>
<th>IDLH (ppm)</th>
<th>LEL (%)</th>
<th>Odor Threshold(^{2}) (ppm)</th>
<th>Odor Character</th>
<th>Vapor Pressure (mm Hg)</th>
<th>Physical State</th>
<th>Detectable w/ 10.6 eV lamp PID (I.P. eV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>1</td>
<td>100</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0 (approx)</td>
<td>Noncombustible</td>
<td>NA</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>0.05</td>
<td>100</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0 (approx)</td>
<td>Noncombustible</td>
<td>NA</td>
</tr>
<tr>
<td>Iron</td>
<td>5</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Noncombustible</td>
<td>NA</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>5</td>
<td>500</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0 (approx)</td>
<td>Combustible</td>
<td>NA</td>
</tr>
<tr>
<td>Manganese</td>
<td>5</td>
<td>500</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0 (approx)</td>
<td>Combustible</td>
<td>NA</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>1</td>
<td>10</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0 (approx)</td>
<td>Combustible</td>
<td>NA</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>5</td>
<td>50</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0 (approx)</td>
<td>Combustible</td>
<td>NA</td>
</tr>
<tr>
<td>Benzene</td>
<td>1</td>
<td>500</td>
<td>1.2</td>
<td>NA</td>
<td>NA</td>
<td>75</td>
<td>Combustible</td>
<td>Yes</td>
</tr>
<tr>
<td>Toluene</td>
<td>200</td>
<td>500</td>
<td>1.1</td>
<td>sweet</td>
<td>21</td>
<td>Combustible</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Xylenes</td>
<td>100</td>
<td>900</td>
<td>0.9</td>
<td>NA</td>
<td>NA</td>
<td>7</td>
<td>Combustible</td>
<td>Yes</td>
</tr>
<tr>
<td>Arsenic</td>
<td>0.01</td>
<td>5</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0 (approx)</td>
<td>Noncombustible</td>
<td>NA</td>
</tr>
</tbody>
</table>
### TABLE 2.2
RELEVANT PROPERTIES OF VOLATILES AND METALS KNOWN OR SUSPECTED AT THE SITE

<table>
<thead>
<tr>
<th>Compound (Synonym)</th>
<th>OSHA PEL&lt;sup&gt;(1)&lt;/sup&gt; (ppm)</th>
<th>IDLH (ppm)</th>
<th>LEL (%)</th>
<th>Odor Threshold&lt;sup&gt;(2)&lt;/sup&gt; (ppm)</th>
<th>Odor Character</th>
<th>Vapor Pressure (mm Hg)</th>
<th>Physical State</th>
<th>Detectable w/ 10.6 eV lamp PID (I.P. eV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium</td>
<td>0.5</td>
<td>50</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Low</td>
<td>Noncombustible</td>
<td>NA</td>
</tr>
<tr>
<td>Chloroform</td>
<td>50</td>
<td>500</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>160</td>
<td>Noncombustible</td>
<td>Yes</td>
</tr>
<tr>
<td>PCE</td>
<td>100</td>
<td>150</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>14</td>
<td>Noncombustible</td>
<td>No</td>
</tr>
<tr>
<td>Sodium</td>
<td>2</td>
<td>10</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0</td>
<td>Noncombustible</td>
<td>NA</td>
</tr>
</tbody>
</table>

<sup>(1)</sup> 29 CFR 1910, June 30, 1993 (8-hour Time weighted average unless otherwise specified.)

<sup>(2)</sup> ACGIH 1989 Highest reported value of acceptable odor threshold range.

<sup>(4)</sup> Sponge catalyst may ignite spontaneously in the air.

<sup>(5)</sup> Powder may ignite spontaneously in the air, and can continue burning under water.

<sup>[IDLH]</sup> Immediately dangerous to life or health.

<sup>[CA]</sup> Suspect carcinogen - Minimize all possible exposures.
3.3.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, and spiders, may be present at this site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. In addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis. Personnel that have been bitten or stung by an insect at the Site should notify the HSO or FSO of such immediately. The following is a list of preventive measures:

- Wear proper protective clothing (work boots, socks and light colored pants).
- Field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work, and will have allergy medication on Site.

The HSO or FSO will instruct the project personnel in the recognition and procedures for encountering potentially hazardous insects at the Site.

3.4 PHYSICAL HAZARDS

3.4.1 Explosion

No explosion hazards are expected for the scope of work at this site.

3.4.2 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is $72^\circ$F or above. Table 2.3 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Refer to the Table 2.4 below to assist in assessing when the risk for heat related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained (a regional weather report should suffice). Heat stress monitoring should be performed by the Field Safety Officer, who shall be able to recognize symptoms related to heat stress.
<table>
<thead>
<tr>
<th>Adjusted Temperature(^b)</th>
<th>Normal Work Ensemble(^c)</th>
<th>Impermeable Ensemble</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°F or above (32.2°C) or above</td>
<td>After each 45 min. of work</td>
<td>After each 15 min. of work</td>
</tr>
<tr>
<td>87.5°F (30.8°C-32.2°C)</td>
<td>After each 60 min. of work</td>
<td>After each 30 min. of work</td>
</tr>
<tr>
<td>82.5°F-87.5°F (28.1°C-30.8°C)</td>
<td>After each 90 min. of work</td>
<td>After each 60 min. of work</td>
</tr>
<tr>
<td>77.5°F-82.5°F (25.3°C-28.1°C)</td>
<td>After each 120 min. of work</td>
<td>After each 90 min. of work</td>
</tr>
<tr>
<td>72.5°F-77.5°F (22.5°C-25.3°C)</td>
<td>After each 150 min. of work</td>
<td>After each 120 min. of work</td>
</tr>
</tbody>
</table>

a  For work levels of 250 kilocalories/hour.

b  Calculate the adjusted air temperature (ta adj) by using this equation: \( ta \text{ adj} °F = ta °F + (13 \times \% \text{ sunshine}) \). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c  A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
### Table 2.4 - HEAT INDEX

<table>
<thead>
<tr>
<th>RELATIVE HUMIDITY</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
<th>90</th>
<th>95</th>
<th>100</th>
<th>105</th>
<th>110</th>
<th>115</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>64</td>
<td>69</td>
<td>73</td>
<td>78</td>
<td>83</td>
<td>87</td>
<td>91</td>
<td>95</td>
<td>99</td>
<td>103</td>
<td>107</td>
</tr>
<tr>
<td>10%</td>
<td>65</td>
<td>70</td>
<td>75</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td>95</td>
<td>100</td>
<td>105</td>
<td>111</td>
<td>116</td>
</tr>
<tr>
<td>20%</td>
<td>66</td>
<td>72</td>
<td>77</td>
<td>82</td>
<td>87</td>
<td>93</td>
<td>99</td>
<td>105</td>
<td>112</td>
<td>120</td>
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*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:
1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

Note: Exposure to full sunshine can increase Heat Index values

<table>
<thead>
<tr>
<th>Apparent Temperature</th>
<th>Heat Stress Risk with Physical Activity and/or Prolonged Exposure</th>
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<tr>
<td>90-105</td>
<td>Heat Cramps or Heat Exhaustion Possible</td>
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<tr>
<td>105-130</td>
<td>Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible</td>
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</table>
To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Prickly Heat** (Heat rash)
  - Painful, itchy red rash. Occurs during sweating, on skin covered by clothing.

- **Heat Cramps**
  - Painful spasm of arm, leg or abdominal muscles, during or after work.

- **Heat Exhaustion**

- **Heat Fatigue**
  - Weariness, irritability, loss of skill for fine or precision work. Decreased ability to concentrate. No loss of temperature control.

- **Heat Syncope** (Heat Collapse)
  - Fainting while standing in a hot environment.

- **Heat Stroke**
  - Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. **This is a life threatening condition.**

  Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness.

To monitor the worker, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
  - If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100 beats per minute.

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

  - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6°F.
  
  - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
  
  - Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

**Prevention of Heat Stress** - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker’s body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, id., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy
sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature 50° to 60°F (10° to 16.6°C).
- Provide small disposal cups that hold about four ounces (0.1 liter).
- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat related illness.

### 3.4.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally called frostbite.

**Hypothermia** - Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.

**Frostbite** - Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

**Prevention of Cold-Related Illness** - To prevent cold-related illness:

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors:
- Assure the availability of enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Assure the availability of warm drinks.
- Start (oral) temperature recording at the job site:
  - At the FSO or Field Team Leader’s discretion when suspicion is based on changes in a worker’s performance or mental status.
  - At a worker’s request.
  - As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation).
  - As a screening measure whenever any one worker on the site develops hypothermia.

  Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

3.4.4 Noise

Work activities during the proposed demolition and remediation activities may be conducted at locations with high noise levels from the operation of equipment. Hearing protection will be used as necessary.

3.4.5 Hand and Power Tools

In order to complete the various tasks for the project, personnel will utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Ground Fault Circuit Interrupters (GFCIs) are required for all portable tools.

3.4.6 Slips, Trips and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of surface debris, uneven surfaces, pits, facility equipment, and soil piles contribute to tripping hazards and fall hazards. To the extent possible, all hazards should be identified and marked on the Site, with hazards communicated to all workers in the area.
3.4.7 Utilities (Electrocution and Fire Hazards)

The possibility of encountering underground utilities poses fire, explosion, and electrocution hazards. All excavation work will be preceded by review of available utility drawings and by notification of the subsurface work to the N.Y. One Call Center. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

3.5 TASK HAZARD ANALYSIS

3.5.1 Soil Excavation and Soil Sampling

Excavation and soil sampling activities are inherently dangerous. Special attention should be given to establishing the location of any underground utilities prior to excavating.

Chemical exposure may occur as these activities progress across the site, where workers may be exposed to contaminants in the excavated soils, encountered groundwater, or products used on-site including gasoline, diesel, and motor oil. Also, sampling of both in-situ and stockpiled soils presents similar potential exposure hazard. Activities will be conducted initially in Level D but may be upgraded to Modified Level D. Although not anticipated, there will be a Level C and B contingency should pockets of contaminants be brought to the surface and breathing zone air becomes contaminated.

If evidence of historic or unknown contamination is encountered during remediation activities or other contaminated materials, such as oily materials, high PID readings, etc., the FSO will make a determination of the appropriate level of personnel protection.
SECTION 4 PERSONNEL PROTECTION AND MONITORING

4.1 OSHA TRAINING

All on-site personnel who will be actively involved in excavation activities involving potentially hazardous waste must have completed hazardous waste operations-related training, as required by OSHA Regulations 29 CFR 1910.120. Working involved in non-hazardous materials will not be required to have the 40-hour hazwoper training. All site workers will be required to have OSHA 10-hour Construction Health and Safety certifications. Personnel who completed the 40-hour training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. Documentation of OSHA training for project personnel must be provided to Langan prior to starting work.

4.2 SITE-SPECIFIC TRAINING

The Site Safety Officer will be responsible for developing a site-specific occupational hazard training program and providing training to all personnel that are to work at the site. This training will be conducted prior to starting fieldwork and will consist of the following topics:

- Names of personnel responsible for site safety and health.
- Hazards potentially present at the site.
- Proper use of personal protective equipment.
- Requirements of this HASP.
- Work practices by which the employee can minimize risk from hazards. This may include a specific review of heavy equipment safety, safety during inclement weather, changes in common escape rendezvous point, site security measures, or other site-specific issues that need to be addressed before work begins.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds present at the site.
- Decontamination procedures.

Upon completion of site-specific training, workers will sign the Site-Specific-Training Form provided in Attachment B. A copy of the completed Site-Specific Training Form will be included in the project files for future reference.
4.3 ODOR, VAPOR AND DUST MONITORING AND RESPONSE

4.3.1 Work Zone Area Monitoring

The contractor is responsible for completing their own health and safety plan. General contractor and sub-contractor site worker monitoring will be the responsibility of the respective contractor.

**VOC**

Periodic monitoring for VOCs will be conducted during all ground intrusive activities (i.e., excavation).

**Dust**

Particulate or dust will be monitoring continuously with real-time field instrumentation during earthwork operations. NYSDEC issues a 1989 memorandum on controlling fugitive dust emissions during “ground intrusive activities” (e.g. excavation, drilling). The National Ambient Air Quality Standard for Respirable Particulates, which are defined as particles 10ug (PM10) in diameter or less, is 150 ug/m3. Based on this standard, dust exposure from excavation activities should not exceed 150 ug/m3 above background and monitoring should be within the work area if exceedances of this standard are anticipated.

The NYSDEC defines fugitive dust as particulate matter that is not from a specific source and could include discrete particles, droplets, and solids over a wide range of sizes. Most continuous dust monitors are designed to provide maximum response to PM10 particulate, since these particles are considered respirable.

Based on the air monitoring results, dust suppression may need to be implemented. This could include the following:

- Applying water to the excavation surface
- Wetting equipment
- Spraying work area
- Utilizing alternate work methods
- Implementing site speed restrictions

Background dust monitoring shall be performed prior to the start of the workday. Sampling shall be performed outside of the work zone for a minimum of fifteen
minutes. Sampling shall be performed continuously within the work zone. Monitoring results shall be kept in a logbook and used to initiate additional dust control measures as necessary.

4.4 COMMUNITY AIR MONITORING PLAN (CAMP)

This CAMP was developed in accordance with the NYSDOH Generic Community Air Monitoring Plan.

Particulate Monitoring, Response Levels, and Actions

Dust or particulate concentrations should be monitored continuously at the upwind and downwind perimeters at the site perimeter and active work zones. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM10) and capable of integrating over a period of 15 minutes or less for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities. All readings will be recorded and be available for state personnel review. Corrective action is determined by the following levels:

1. If the downwind PM10 at a site perimeter location is 100 micrograms per cubic meter (µg/m³) greater than background for the 15 minute period of if airborne dust is observed at the site perimeter from excavation activity, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that the downwind PM10 particulate level does not exceed 150 µg/m³ above the upwind level and provided that no visible dust is migrating from the excavation work area.

2. If, after implementing dust suppression techniques, downwind PM10 particulate levels are greater than 150 µg/m³ above the upwind level, work must be stopped and re-evaluation of work activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 particulate concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.

4.4.1 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the hot zone, work activities will be halted or odor controls will be employed, and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume, provided:
• The organic vapor level outside the hot zone is below 1 ppm over background, and

• More frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.

If the organic vapor level is greater than 5 ppm above background at the perimeter of the hot zone, work activities must be shut down or odor controls must be employed. When work shut-down occurs, downwind air monitoring as directed by the Site Health and Safety Officer 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 section.

4.4.2 Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or odor controls must be implemented.

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 hot zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria is exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented.

• Sustained organic vapor levels approaching 5 ppm above background for a period of more than 30 minutes, or

• Organic vapor levels greater than 5 ppm above background for any time period.

4.4.3 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. The local police authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation;
2. 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 Site Health and Safety Officer; and

All Emergency contacts will go into effect as appropriate.

4.5 Summary of Action levels and Restrictions

A PID such as the RaeSystems MiniRae 2000, equipped with a 10.6 eV lamp shall be used to screen for organic vapors. All readings pertain to sustained readings for 15 minutes in the worker breathing zone. The following conditions shall apply to each level of protection.

**Conditions for Level D:**

All areas where PID readings < 25 ppm

**Conditions for Level C:**

- All areas where PID readings > 25 ppm (sustained for 15 minutes in the breathing zone) to 200 ppm

**4.5.1 Level D and Modified Level D**

Level D protection will be worn for initial entry on-site and initially for all activities. Level D protection will consist of:

- Standard work clothes
- Steel-toe safety boots
- Safety glasses (goggles must be worn when splash hazard is present)
- Nitrile gloves must be worn during all activities requiring contact with saturated soils.
- Hard hat (must be worn during all site activities)

Modified Level D is the same as Level D but includes Tyvek coveralls and disposable polyethylene overboots to contact with the skin or clothes if significant contamination is present in subsurface materials.
4.5.2 Level C

The level of personal protection will be upgraded to Level C if the concentration of organic vapors which can be detected with a photoionization detector (PID) in the breathing zone equals or exceeds the specified action limits and the contaminants of concern have characteristic warning properties appropriate for air purifying respirators (e.g. taste, odor). Level C protection will consist of the following equipment:

- Full-face or half-mask air-purifying respirator (APR) or powered air purifier (PAPR), depending on presence and abundance of airborne toxic constituents of concern
- Combination HEPA filter/organic vapor cartridges
- Tyvek coveralls must be worn if particulate hazard present
- PE-coated Tyvek coveralls if liquid contamination present
- Steel-toe safety boots
- Nitrile outer gloves must be worn during all activities requiring contact with saturated soil.
- Hard hat (must be worn during all site activities)

Cartridges will be disposed at the end of each day’s use.

4.5.4 OSHA Requirements for Personal Protective Equipment

All personal protective equipment used during the course of this field investigation must meet the following OSHA standards:

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<th>Type of Protection</th>
<th>Regulation</th>
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<tr>
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ANSI = American National Standards Institute

Based on performance criteria of air purifying respirators, they cannot be worn under the following conditions:

- Oxygen deficiency;
- Immediately Dangerous to Life or Health (IDLH) concentrations;
- High relative humidity; and
- If contaminant levels exceed designated use concentrations.
SECTION 5  WORK ZONES AND DECONTAMINATION

5.1  SITE WORK ZONES

To reduce the spread of hazardous materials by workers from potentially contaminated areas to the clean areas, work zones will be delineated at the site. The flow of personnel between the zones should be controlled. The establishment of the work zones will help ensure that personnel are properly protected against the hazards present where they are working, and ensure that work activities and contamination are confined to the appropriate areas. The work zones described below may be modified in the field depending on field conditions.

5.1.1 Hot Zone

Hot zones will be established within the delineated hazardous lead area in the western portion of the site. Unprotected onlookers should not be located within the hazardous area during intrusive activities. All personnel within the hot zone must don the appropriate levels of personal protection as set forth by the FSO. It is not anticipated that Level C or higher will be required for this site.

All personnel within the hot zone will be required to use the specified level of protection. No food, drink, or smoking will be allowed in the hot or warm zones.

5.1.2 Warm Zone

Should PID action levels be exceeded or obvious indications of contamination (by sight or odor) be encountered, a warm zone will be established and utilized during the field activities. This zone will be established between the hot zone and the cold zone (discussed below), and will include the personnel and equipment necessary for decontamination of equipment and personnel exiting the hot zone. Personnel and equipment in the hot zone must pass through this zone before entering the cold zone. This zone should always be located upwind of the hot zone.

5.1.3 Cold Zone

The cold zone will include the remaining areas of the job site. Break areas and support facilities (include equipment storage and maintenance areas) will be located in this zone. No equipment or personnel will be permitted to enter the cold zone from the hot zone without passing through the decontamination station in the warm zone (if necessitated). Eating, smoking, and drinking will be allowed only in this area.
5.2 DECONTAMINATION

Any water used in decontamination procedures will be placed in containers, temporarily stored on-site, and properly characterized and disposed.

5.2.1 Decontamination of Personnel

Decontamination of personnel will be necessary if Level C or Level B protection is used, which is not anticipated based on previous investigation work completed at the site. Decontamination will not be necessary if only Level D protection is used. However, disposable gloves used during sampling activities should be removed and bagged; personnel should be encouraged to remove clothing and shower as soon as is practicable at the end of the day. All clothing should be machine-washed. All personnel will wash hands and face prior to eating and before and after using the restroom.

5.2.2 Decontamination of Field Equipment

Decontamination of field equipment will be necessary for all equipment in contact with contaminated materials (if encountered). Decontamination activities shall be performed in a designated area lined with polyethylene sheeting designed to collect the decontamination rinse liquid. Equipment to be decontaminated includes, but is not limited to, excavators, sampling and pumping equipment.

5.3 REMEDIAL ACTIVITY-DERIVED WASTE

All PPE related remedial activity-derived waste materials (PPE, decontamination waste) will be placed in labeled containers and appropriately disposed. If encountered, soil from previously unknown hot spot will be kept moist, properly characterized and disposed off-site. Stockpiling of contaminated materials will only occur temporarily and if adequate space exists.
SECTION 6  ACCIDENT PREVENTION AND CONTINGENCY PLAN

6.1  ACCIDENT PREVENTION

6.1.1  Site-Specific Training

All field personnel will receive health and safety training prior to the initiation of any site activities. The site-specific training form provided in Attachment B must be signed, dated, and returned to the Langan Field Safety Officer. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, a regular meeting should be held. Discussion should include:

- Tasks to be performed;
- Time constraints (e.g., rest breaks, cartridge changes);
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals; and
- Emergency procedures.

6.1.2  Vehicles and Heavy Equipment

Working with large motor vehicles and heavy equipment could be a major hazard at this site. Injuries can result from equipment hitting or running over personnel, impacts from flying objects, or overturning of vehicles. Vehicle and heavy equipment design and operation will be in accordance with 29 CFR, Subpart O, 1926.600 through 1926.602. In particular, the following precautions will be utilized to help prevent injuries/accidents.

- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked at the beginning of each shift.
- Large construction motor vehicles will not be backed up unless:
  - The vehicle has a reverse signal alarm audible above the surrounding noise level; or
  - The vehicle is backed up only when an observer signals that it is safe to do so.
• Heavy equipment or motor vehicle cable will be kept free of all nonessential items, and all loose items will be secured.

• Large construction motor vehicles and heavy equipment will be provided with necessary safety equipment (such as seat belts, roll-over protection, emergency shut-off in case of roll-over, backup warning lights and audible alarms).

• Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment or vehicles.

6.2  SPILL CONTROL PLAN

All personnel must take every precaution to minimize the potential for spills during site operations. Any spill shall be reported immediately to the FSO. Spill control apparatus (sorbent materials) will be located on-site. All materials used for the clean up of spills will be containerized and labeled separately from other wastes.

6.3  CONTINGENCY PLAN

6.3.1  Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

• Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site.

• A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

General emergency procedures, and specific procedures for personal injury, chemical exposure and radiation exposure, are described below.

6.3.2  Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure the procedures outlined below should be followed:

• Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via voice and hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.
• Precautions should be taken to avoid exposure of other individuals to the chemical.

• If the chemical is on the individual’s clothing, the chemical should be neutralized or removed if it is safe to do so.

• If the chemical has contacted the skin, the skin should be washed with copious amounts of water.

• In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.

• All chemical exposure incidents must be reported in writing to the Langan Health and Safety Officer. The Field Safety Officer or Field Team Leader is responsible for completing the accident report.

6.3.3 Personal Injury

In case of personal injury at the site, the following procedures should be followed:

• Another team member (buddy) should signal the Field Team Leader that an injury has occurred.

• A field team member trained in first aid can administer treatment to an injured worker.

• The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.

• For less severe cases, the individual can be taken to the site dispensary.

• The Field Team Leader or Field Safety Officer is responsible for making certain that an Accident Report Form is completed. This form is to be submitted to the Langan Health and Safety Officer. Follow-up action should be taken to correct the situation that caused the accident.

• Any incident (near miss, property damage, first aid, medical treatment, etc.) must be reported.

A first-aid kit and blood-born pathogens kit will be kept on-site during the field activities.
6.3.4 Evacuation Procedures

- The Field Team Leader will initiate evacuation procedures by signaling to leave the site.
- All personnel in the work area should evacuate the area and meet in the common designated area.
- All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts or missing persons determined immediately.
- The Field Team Leader will then give further instruction.

6.3.5 Procedures Implemented in the Event of a Major Fire, Explosion, or Emergency

- Notify the paramedics and/or fire department, as necessary;
- Signal the evacuation procedure previously outlined and implement the entire procedure;
- Isolate the area;
- Stay upwind of any fire;
- Keep the area surrounding the problem source clear after the incident occurs;
- Complete accident report for and distribute to appropriate personnel.
ATTACHMENT A

Air Monitoring Equipment Calibration and Maintenance

All monitoring instruments must be calibrated and maintained periodically. Calibration and on-site maintenance records will be kept in the field log book. The operator must understand the limitations and possible sources of errors for each instrument. It is important that the operator checks that the instrument responds properly to the substances it was designed to monitor. Portable air quality monitoring equipment that measures total ionizables present such as the RaeSystems MiniRae 2000 (or equivalent) photoionization detector (PID) must be calibrated at least once each day. Combustible gas/oxygen meters (explosimeter) such as the MSA Model 360 monitor must be calibrated at least once a week. The specific instructions for calibration and maintenance provided for each instrument should be followed.
ATTACHMENT B

Forms for Health and Safety Related Activity

Note: The OSHA Job Safety and Health Protection Poster must be posted prominently during field activities. The following page is an example of the poster to be used in the field. The actual poster must be an 11 inch by 17 inch size version of this page. The OSHA 300 Log of injuries and illnesses is maintained in the home office of each Langan employee.
You Have a Right to a Safe and Healthful Workplace.

IT’S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the OSH Act.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or materials.
- Your employer must post this notice in your workplace.

The Occupational Safety and Health Act of 1970 (OSHA Act) requires employers to provide a safe and healthful workplace for their employees. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA in your area or OSHA office • Atlanta (404) 562-2000 • Boston (617) 555-0100 • Chicago (312) 359-2551 • Dallas (214) 553-5769 • Denver (303) 444-6690 • Kansas City (816) 232-3781 • New York (212) 357-2241 • Philadelphia (215) 861-4000 • San Francisco (415) 975-4671 • Seattle (206) 553-5305. Telephone (TTY) number is 1-877-889-5627. To file a complaint citing to obtain more information on OSHA training and safety programs, visit OSHA’s website at www.osha.gov. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA
www.osha.gov

U.S. Department of Labor • Occupational Safety and Health Administration • OSHA 3165
Langan

ACCIDENT REPORT FORM

(Page 1 of 2)

Project Name: ________________________________

Injured or Ill Employee

1. Name ____________________________________ Social Security #____________________
   (First) (Middle) (Last)
2. Home Address ________________________________________________________________
   (No. and Street) (City or Town) (State and Zip)
3. Age _____ 4. Sex: Male ( ) Female ( )
5. Occupation _________________________________________________________________
   (Specific job title, not the specific activity employee was performing at time of injury)
6. Department _________________________________________________________________
   (Enter name of department in which injured person is employed, even though they
   may have been temporarily working in another department at the time of injury)

Employer

7. Name _________________________________________________________________
8. Mailing Address __________________________________________________________
   (No. and Street) (City or Town) (State and Zip)
9. Location (if different from mailing address): ________________________________

The Accident or Exposure to Occupational Illness

10. Place of accident or exposure _____________________________________________
    (No. and Street) (City or Town) (State and Zip)
11. Was place of accident or exposure on employer's premises? ____ (Yes/No)
12. What was the employee doing when injured? ________________________________

(Be specific - was employee using tools or equipment or handling material?)

13. How did the accident occur? ______________________________________________
    (Describe fully the events that resulted in the injury or occupational illness. Tell what
    happened and how. Name objects and substances involved.

Give details on all factors that led to accident. Use separate sheet if needed)
14. Time of accident: ________________
15. Date of injury or initial diagnosis of occupational illness _____________
16. WITNESS TO ACCIDENT

(Name) (Affiliation) (Phone No.)

(Name) (Affiliation) (Phone No.)

(Name) (Affiliation) (Phone No.)

Occupational Injury or Occupational Illness

17. Describe the injury or illness in detail; indicate part of body affected.

________________________________________________________________________

18. Name the object or substance that directly injured the employee. (For example, object that struck employee; the vapor or poison inhaled or swallowed; the chemical or radiation that irritated the skin; or in cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.)

________________________________________________________________________

19. Did the accident result in employee fatality? ________ (Yes or No)

20. Number of lost workdays ____/restricted workdays _____ resulting from injury or illness?

Other

21. Did you see a physician for treatment? ________ (Yes or No) ________ (Date)

22. Name and address of physician ____________________________________________

(No. and Street) (City or Town) (State and Zip)

23. If hospitalized, name and address of hospital __________________________________

(No. and Street) (City or Town) (State and Zip)

Date of report ___________________ Prepared by ___________________________

Official position ___________________________
Project Health and Safety Plan and Work plan Acceptance Form
(For Langan employees only)

I have read and agree to abide by the contents of the Work Plan and Health and Safety Plan for the following project:

__________________________________________________________________________   __________________________________________________________________
(Project Title)   (Project Number)

Furthermore, I have read and am familiar with the work plan or proposal that describes the field work to be conducted and the procedures to be utilized in the conduct of this work.

Name (print)      Signature         Date
__________________________________________________________________________   __________________________________________________________________
__________________________________________________________________________   __________________________________________________________________
__________________________________________________________________________   __________________________________________________________________
__________________________________________________________________________   __________________________________________________________________
__________________________________________________________________________   __________________________________________________________________
__________________________________________________________________________   __________________________________________________________________
__________________________________________________________________________   __________________________________________________________________
__________________________________________________________________________   __________________________________________________________________

Place in project Health and Safety File as soon as possible
Site-Specific Health and Safety Training
(For all Langan and subcontract employees on site)

I hereby confirm that site-specific health and safety training has been conducted by the site health and safety officer that included:

- Names of personnel responsible for site safety and health
- Safety, health, and other hazards at the site
- Proper use of personal protective equipment
- Work practices by which the employee can minimize risk from hazards
- Safe use of engineering controls and equipment on the site
- Acute effects of compounds at the site
- Decontamination procedures

For the following project:

_________________________________  __________________________________
(Project Title)                                                              (Project Number)

<table>
<thead>
<tr>
<th>Name (print)</th>
<th>Signature</th>
<th>Date</th>
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<tbody>
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Place in project Health and Safety File as soon as possible
ATTACHMENT C

Material Safety Data Sheets

- Arsenic
- Barium
- Chloroform
- Copper
- Iron
- Lead
- Magnesium
- Manganese
- Nickel
- Sodium
- Zinc
- Benzene
- Toluene
- Tetrachloroethene
- Xylenes
- Alconox
- Isobutylene Gas in Air 100ppm
### Section 1 - Product and Company Identification

**ALCONOX**

<table>
<thead>
<tr>
<th>Section 1</th>
<th>Section 9 - Physical &amp; Chemical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2</td>
<td>Section 10 - Stability &amp; Reactivity Data</td>
</tr>
<tr>
<td>Section 3</td>
<td>Section 11 - Toxicological Information</td>
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<tr>
<td>Section 4</td>
<td>Section 12 - Ecological Information</td>
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<td>Section 5</td>
<td>Section 13 - Disposal Considerations</td>
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<td>Section 6</td>
<td>Section 14 - MSDS Transport Information</td>
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<tr>
<td>Section 7</td>
<td>Section 15 - Regulatory Information</td>
</tr>
<tr>
<td>Section 8</td>
<td>Section 16 - Other Information</td>
</tr>
</tbody>
</table>

The information in this document is compiled from information maintained by the United States Department of Defense (DOD). Anyone using this information is solely responsible for the accuracy and applicability of this information to a particular use or situation. Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

**Product Identification:** ALCONOX  
**Date of MSDS:** 08/14/1992  
**Technical Review Date:** 09/28/1992  
**FSC:** 6505  
**NIIN:** 00-839-8894  
**Submitter:** N EN  
**Status Code:** C  
**MFN:** 01  
**Article:** N  
**Kit Part:** N

**Manufacturer's Information**
Manufacturer's Name: ALCONOX INC
Manufacturer's Address1: 215 PARK AVE S
Manufacturer's Address2: NEW YORK, NY 10003
Manufacturer's Country: US
General Information Telephone: 212-473-1300
Emergency Telephone: 212-473-1300
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 17534
Special Project Code: N

Item Description

Item Name: DETERGENT, SURGICAL INSTRUMENT
Item Manager: NK
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue: NK Quantitative Expression: NK
Unit of Issue Quantity: NK
Type of Container:

Contractor Information

Contractor's Name: ALCONOX INC
Contractor's Address1: 9 EAST 40TH STREET, SUITE 200
Contractor's Address2: NEW YORK, NY 10016
Contractor's Telephone: 212-532-4040
Contractor's CAGE: 17534

Section 2 - Composition/Information on Ingredients

Ingredient Name: ALCONOX
Ingredient CAS Number: Ingredient CAS Code: X
RTECS Number: RTECS Code: X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K
% Environmental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT APPLICABLE  ACGIH TLV Code: M  
ACGIH STEL: N/P  ACGIH STEL Code: 
EPA Reporting Quantity: 
DOT Reporting Quantity: 
Ozone Depleting Chemical: 

Section 3 - Hazards Identification, Including Emergency Overview

Health Hazards Acute & Chronic: PROLONGED EXPOSURE TO DUST MAY IRRITATE MUCOUS MEMBRANES.

Signs & Symptoms of Overexposure: 
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure: 
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators: 
Inhalation: YES 
Skin: NO 
Ingestion: NO

Carcenogenicity Indicators
NTP: NO 
IARC: NO 
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures

First Aid: 
EYES: FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MIN. SKIN: FLUSH WITH PLENTY OF WATER. INGEST: DRINK LARGE QTY OF WATER TO DILUTE MATERIAL. GET MED ATTN FOR DISCOMFORT. INHAL: REMOVE TO FRESH AIR. SU PPORT BRTHG (GIVE O*2/ARTF RESP) (FP N).

Section 5 - Fire Fighting Measures

Fire Fighting Procedures: 
WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard: 
NONE.

Extinguishing Media: 
WATER, CARBON DIOXIDE, DRY CHEMICAL, FOAM SAND/Earth.

Flash Point: Flash Point Text: NONE

Autoignition Temperature: 

http://msds.ehs.cornell.edu/msds/msdsdod/a82/m40895.htm
Section 6 - Accidental Release Measures

ALCONOX

Spill Release Procedures:
MATERIAL FOAMES PROFUSELY, SHOVEL & RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.

Section 7 - Handling and Storage

ALCONOX

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection

ALCONOX

Respiratory Protection:
NIOSH/MSHA APPROVED DUST MASK.

Ventilation:
LOCAL EXHAUST: NORMAL.

Protective Gloves:
IMPERVIOUS GLOVES (FP N).

Eye Protection:
CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment:
NOT REQUIRED.

Work Hygenic Practices:
NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information:
NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties

ALCONOX

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point:
Boiling Point Text: N/A

Melting/Freezing Point:
Melting/Freezing Text: N/K

Decomposition Point:
Decomposition Text: N/K

Vapor Pressure:
Vapor Pressure: N/A Vapor Density: N/A

Percent Volatile Organic Content:
Specific Gravity: N/A

Volatile Organic Content Pounds per Gallon:
pH: N/K

Volatile Organic Content Grams per Liter:
Viscosity: N/P

Evaporation Weight and Reference:
NOT APPLICABLE

Solubility in Water:
APPRECIABLE

Appearance and Odor:
WHITE POWDER INTERSPERSED W/CREAM COLORED FLAKES-ODORLESS
Percent Volatiles by Volume: N/A
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
ALCONOX

Stability Indicator: YES
Materials to Avoid:
AVOID STRONG ACIDS.
Stability Condition to Avoid:
NONE.
Hazardous Decomposition Products:
MAY RELEASE CARBON DIOXIDE GAS ON BURNING.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
ALCONOX

Toxicological Information:
N/P

Section 12 - Ecological Information
ALCONOX

Ecological Information:
N/P

Section 13 - Disposal Considerations
ALCONOX

Waste Disposal Methods:
SMALL QTY MAY BE DISPOSED OF IN SEWER. LARGE QTY SHOULD BE DISPOSED OF
ACCORDING TO LOCAL, FEDERAL & STATE REQUIREMENTS FOR NON-HAZARDOUS
DETERGENT.

Section 14 - MSDS Transport Information
ALCONOX

Transport Information:
N/P

Section 15 - Regulatory Information
ALCONOX

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
ALCONOX

http://msds.ehs.cornell.edu/msds/msdsdod/a82/m40895.htm
Other Information:
N/P

HMIS Transportation Information

Product Identification: ALCONOX
Transportation ID Number: 88154
Responsible Party CAGE: 17534
Date MSDS Prepared: 08/14/1992
Date MSDS Reviewed: 02/22/1993
MFN: 02/22/1993
Submitter: N TN
Status Code: C

Container Information
   Unit of Issue: NK
   Container Quantity: NK
   Type of Container:
   Net Unit Weight:

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN Code: ZZZ
Symbols: N/R
DOT PSN Modifier:
Hazard Class: N/R
UN ID Number: N/R
DOT Packaging Group: N/R
Label: N/R
Special Provision(s): N/R
Packaging Exception: N/R
Non Bulk Packaging: N/R
Bulk Packaging: N/R
Maximum Quantity in Passenger Area: N/R
Maximum Quantity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

http://msds.ehs.cornell.edu/msds/msdsdod/a82/m40895.htm 12/16/2005
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information
AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information
Product Identification: ALCONOX
CAGE: 17534
Assigned Individual: N
Company Name: ALCONOX INC
Company PO Box:
Company Street Address1: 9 EAST 40TH STREET, SUITE 200
Company Street Address2: NEW YORK, NY 10016 US
Health Emergency Telephone: 212-473-1300
Label Required Indicator: Y
Date Label Reviewed: 09/18/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/18/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES

http://msds.ehs.cornell.edu/msds/msdsdod/a82/m40895.htm
12/16/2005
Respiratory Protection Indicator: YES
Signal Word: CAUTION
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None

8/8/2002 12:40:10 AM
Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

| Product Name: | Arsenic |
| Catalog Codes: | SLA1006 |
| CAS#: | 7440-38-2 |
| RTECS: | CG0525000 |
| TSCA: | TSCA 8(b) inventory: Arsenic |
| CI#: | Not applicable. |
| Synonym: | Chemical Name: Arsenic |
| Chemical Formula: | As |

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>7440-38-2</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to kidneys, lungs, the nervous system, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures
**Eye Contact:**
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

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

**Serious Skin Contact:** Not available.

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

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

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

**Serious Ingestion:** Not available.

---

**Section 5: Fire and Explosion Data**

<table>
<thead>
<tr>
<th>Flammability of the Product:</th>
<th>May be combustible at high temperature.</th>
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<tbody>
<tr>
<td>Auto-Ignition Temperature:</td>
<td>Not available.</td>
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<tr>
<td>Flash Points:</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flammable Limits:</td>
<td>Not available.</td>
</tr>
<tr>
<td>Products of Combustion:</td>
<td>Some metallic oxides.</td>
</tr>
<tr>
<td>Explosion Hazards in Presence of Various Substances:</td>
<td>Not available.</td>
</tr>
<tr>
<td>Risks of explosion of the product in presence of mechanical impact: Not available.</td>
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<tr>
<td>Risks of explosion of the product in presence of static discharge: Not available.</td>
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</tr>
<tr>
<td>Fire Fighting Media and Instructions:</td>
<td>SMALL FIRE: Use DRY chemical powder.</td>
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<td>LARGE FIRE: Use water spray, fog or foam. Do not use water jet.</td>
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<tr>
<td>Special Remarks on Fire Hazards:</td>
<td>Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.</td>
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<tr>
<td>Special Remarks on Explosion Hazards:</td>
<td>Not available.</td>
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---

**Section 6: Accidental Release Measures**

| Small Spill: | Use appropriate tools to put the spilled solid in a convenient waste disposal container. |
|             |                                        |
| Large Spill:| Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not |
Section 7: Handling and Storage

**Precautions:**
Keep locked up. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

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

Section 8: Exposure Controls/Personal Protection

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

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

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

**Exposure Limits:**
TWA: 0.01 from ACGIH (TLV) [United States] [1995]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 74.92 g/mole

**Color:** Silvery.

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

**Boiling Point:** Not available.

**Melting Point:** Sublimation temperature: 615°C (1139°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 5.72 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.
Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

---

**Section 10: Stability and Reactivity Data**

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Reactive with oxidizing agents, acids, moisture.

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

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

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

**Polymerization:** Will not occur.

---

**Section 11: Toxicological Information**

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 145 mg/kg [Mouse].

**Chronic Effects on Humans:**
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.
Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

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

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

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

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

---

**Section 12: Ecological Information**

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic
Pennsylvania RTK: Arsenic
Massachusetts RTK: Arsenic
TSCA 8(b) inventory: Arsenic


Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed.
R45- May cause cancer.

HMIS (U.S.A.):
Health Hazard: 3
Fire Hazard: 1
Reactivity: 2
Personal Protection: E

National Fire Protection Association (U.S.A.):
Health: 3
Flammability: 1
Reactivity: 2
Specific hazard:
Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

References:
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.

Other Special Considerations: Not available.

Created: 10/09/2005 04:16 PM
Last Updated: 11/06/2008 12:00 PM

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Material Safety Data Sheet
Barium carbonate MSDS

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name:</th>
<th>Barium carbonate</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Catalog Codes:</th>
<th>SLB3556, SLB1225, SLD2545</th>
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<table>
<thead>
<tr>
<th>CAS#:</th>
<th>513-77-9</th>
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</table>

<table>
<thead>
<tr>
<th>RTECS:</th>
<th>CO8600000</th>
</tr>
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<table>
<thead>
<tr>
<th>TSCA:</th>
<th>TSCA 8(b) inventory: Barium carbonate</th>
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</table>

<table>
<thead>
<tr>
<th>CI#:</th>
<th>Not available.</th>
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</table>

<table>
<thead>
<tr>
<th>Synonym:</th>
<th>Barium monocarbonate; Carbonic acid, barium salt.</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Chemical Name:</th>
<th>Barium Carbonate</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Chemical Formula:</th>
<th>BaCO3</th>
</tr>
</thead>
</table>

Contact Information:

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

US Sales: 1-800-901-7247
International Sales: 1-281-441-4400

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium carbonate</td>
<td>513-77-9</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Barium carbonate: ORAL (LD50): Acute: 200 mg/kg [Mouse]. 418 mg/kg [Rat].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: 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. In case of contact, immediately flush eyes with plenty of water for at
least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

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

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

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

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

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

**Serious Ingestion:** Not available.

---

### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

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

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

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

**Explosion Hazards in Presence of Various Substances:**
- Risks of explosion of the product in presence of mechanical impact: Not available.
- Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Non combustible.

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

---

### Section 6: Accidental Release Measures

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

**Large Spill:**
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.
### Section 7: Handling and Storage

**Precautions:**
Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as acids.

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

### Section 8: Exposure Controls/Personal Protection

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

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

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

**Exposure Limits:**
TWA: 0.5 (mg(Ba)/m) from ACGIH (TLV) [United States]
Consult local authorities for acceptable exposure limits.

### Section 9: Physical and Chemical Properties

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

**Odor:** Odorless.

**Taste:** Tasteless.

**Molecular Weight:** 197.34 g/mole

**Color:** Not available.

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

**Boiling Point:** Decomposition temperature: 1300°C (2372°F)

**Melting Point:** 811°C (1491.8°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 4.43 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volutility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.
Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
- Very slightly soluble in cold water.
- Solubility in water: 0.024 g/l; 0.0022 g/l @ 18 deg. C
- Almost insoluble in water.
- Soluble in solution of dilute hydrochloric acid, nitric acid, or acetic acid.
- Soluble in solution of ammoniu chloride or ammoniu nitrate.
- Insoluble in sulfuric acid.
- Soluble in ethanol.

**Section 10: Stability and Reactivity Data**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability</td>
<td>The product is stable.</td>
</tr>
<tr>
<td>Instability Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Conditions of Instability</td>
<td>Incompatible materials</td>
</tr>
<tr>
<td>Incompatibility with various substances</td>
<td>Reactive with acids.</td>
</tr>
<tr>
<td>Corrosivity</td>
<td>Non-corrosive in presence of glass.</td>
</tr>
<tr>
<td>Special Remarks on Reactivity</td>
<td>Contact with acids causes formation of Carbon dioxide gas that may cause suffocation in enclosed spaces.</td>
</tr>
<tr>
<td>Special Remarks on Corrosivity</td>
<td>Not available.</td>
</tr>
<tr>
<td>Polymerization</td>
<td>Will not occur.</td>
</tr>
</tbody>
</table>

**Section 11: Toxicological Information**

<table>
<thead>
<tr>
<th>Route of Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Ingestion.</td>
</tr>
</tbody>
</table>

**Toxicity to Animals:**
- Acute oral toxicity (LD50): 200 mg/kg [Mouse].

**Chronic Effects on Humans:**
- CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

**Other Toxic Effects on Humans:**
- Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

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

**Special Remarks on Chronic Effects on Humans:**
- May cause adverse reproductive effects based on animal test data

**Special Remarks on other Toxic Effects on Humans:**
- Acute Potential Health Effects:
  - Skin: May cause skin irritation.
  - Eyes: May cause eye irritation.
  - Inhalation: May cause respiratory tract irritation. May cause benign pneumoconiosis (baritosis). This is not incapacitating and is usually reversible with cessation of exposure. Inhalation may have similar systemic effects as ingestion since Barium Carbonate is cleared from the lungs into the blood stream.
  - Ingestion: Harmful of swallowed. May affect behavior/central nervous system/peripheral nervous system, gastrointestinal system, respiration, cardiovascular system, and kidneys. Symptoms may include: weakness, nausea, vomiting, diarrhea, hypermotility, excessive salivation, colic, convulsive tremors, giddiness, dilated pupils, increased blood pressure, heart palpitations, hemorrhages in the gastrointestinal tract and kidneys, muscular paralysis, dryness of mouth, thirst, sweating, tingling around the mouth and neck, tightness in the throat, respiratory depression, dysarthria, headaches, muscle twitching, urinary retention, testicular tenderness. May also cause hypokalemia with associated electrocardiogram changes. Serious cases may result in convulsions.
and death.
Chronic Potential Health Effects:
Inhalation: Prolonged inhalation may cause benign pneumoconiosis (baritosis).

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

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

### Section 13: Disposal Considerations

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

### Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

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

### Section 15: Other Regulatory Information

**Federal and State Regulations:** TSCA 8(b) inventory: Barium carbonate

**Other Regulations:**
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

**DSCL (EEC):**
R22- Harmful if swallowed.
S24/25- Avoid contact with skin and eyes.

**HMIS (U.S.A.):**
Health Hazard: 2
Fire Hazard: 0
Reactivity: 0
Personal Protection: E
National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:14 PM

Last Updated: 11/06/2008 12:00 PM

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Material Safety Data Sheet
Benzene MSDS

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name: Benzene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Information:</td>
</tr>
<tr>
<td>Sciencelab.com, Inc.</td>
</tr>
<tr>
<td>14025 Smith Rd.</td>
</tr>
<tr>
<td>Houston, Texas 77396</td>
</tr>
<tr>
<td>CAS#: 71-43-2</td>
</tr>
<tr>
<td>RTECS: CY1400000</td>
</tr>
<tr>
<td>TSCA: TSCA 8(b) inventory: Benzene</td>
</tr>
<tr>
<td>CI#: Not available.</td>
</tr>
<tr>
<td>Synonym: Benzol; Benzine</td>
</tr>
<tr>
<td>Chemical Name: Benzene</td>
</tr>
<tr>
<td>Chemical Formula: C6-H6</td>
</tr>
<tr>
<td>Catalog Codes: SLB1564, SLB3055, SLB2881</td>
</tr>
<tr>
<td>US Sales: 1-800-901-7247</td>
</tr>
<tr>
<td>International Sales: 1-281-441-4400</td>
</tr>
<tr>
<td>CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300</td>
</tr>
<tr>
<td>International CHEMTREC, call: 1-703-527-3887</td>
</tr>
<tr>
<td>For non-emergency assistance, call: 1-281-441-4400</td>
</tr>
</tbody>
</table>

Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>100</td>
</tr>
</tbody>
</table>

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

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC.
MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE].
The substance is toxic to blood, bone marrow, central nervous system (CNS).
The substance may be toxic to liver, Urinary System.
Repeated or prolonged exposure to the substance can produce target organs damage.
Section 4: First Aid Measures

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

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

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

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

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

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

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

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

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

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

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

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

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

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

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

---

**Section 6: Accidental Release Measures**

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

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

---

**Section 7: Handling and Storage**

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

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

---

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

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

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

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

**Exposure Limits:**
Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:**
Aromatic. Gasoline-like, rather pleasant.
(Strong.)

**Taste:** Not available.

**Molecular Weight:** 78.11 g/mole

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

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

**Boiling Point:** 80.1 (176.2°F)

**Melting Point:** 5.5°C (41.9°F)

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

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

**Vapor Pressure:** 10 kPa (@ 20°C)

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

**Volatility:** Not available.

**Odor Threshold:** 4.68 ppm

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

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

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

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

Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.
Conditions of Instability: Heat, ignition sources, incompatibles.

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

Corrosivity: Non-corrosive in presence of glass.

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

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

---

Section 11: Toxicological Information

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

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

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

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

Special Remarks on Toxicity to Animals: Not available.

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

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism,and
urinary system.
Eyes: Causes eye irritation.
Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May
affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and
other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system.

Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

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

### Section 13: Disposal Considerations

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

### Section 14: Transport Information

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

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

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

### Section 15: Other Regulatory Information

**Federal and State Regulations:**
- California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene
- California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value)
- California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene
- Connecticut carcinogen reporting list.: Benzene
- Connecticut hazardous material survey.: Benzene
- Illinois toxic substances disclosure to employee act: Benzene
- Illinois chemical safety act: Benzene
- New York release reporting list: Benzene
- Rhode Island RTK hazardous substances: Benzene
- Pennsylvania RTK: Benzene
- Minnesota: Benzene
- Michigan critical material: Benzene
- Massachusetts RTK: Benzene
- Massachusetts spill list: Benzene
- New Jersey: Benzene
- New Jersey spill list: Benzene
- Louisiana spill reporting: Benzene
- California Director's list of Hazardous Substances: Benzene
TSCA 8(b) inventory: Benzene
SARA 313 toxic chemical notification and release reporting: Benzene
CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

Other Regulations:
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

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

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

HMIS (U.S.A.):
    Health Hazard: 2
    Fire Hazard: 3
    Reactivity: 0
    Personal Protection: h

National Fire Protection Association (U.S.A.):
    Health: 2
    Flammability: 3
    Reactivity: 0

Specific hazard:

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

Section 16: Other Information
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

Last Updated: 11/06/2008 12:00 PM

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Material Safety Data Sheet
Chloroform MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chloroform
Catalog Codes: SLC1888, SLC5044
CAS#: 67-66-3
RTECS: FS9100000
TSCA: TSCA 8(b) inventory: Chloroform
CI#: Not available.
Synonym: Trichloromethane; Methane, trichlor-
Chemical Name: Chloroform
Chemical Formula: CHCl3

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroform</td>
<td>67-66-3</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Chloroform: ORAL (LD50): Acute: 695 mg/kg [Rat]. 36 mg/kg [Mouse]. 820 mg/kg [Guinea pig]. DERMAL (LD50): Acute: >20000 mg/kg [Rabbit]. VAPOR (LC50): Acute: 47702 mg/m 4 hours [Rat].

Section 3: Hazards Identification

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

Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, heart. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.
**Skin Contact:** In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

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

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

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

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

**Serious Ingestion:** Not available.

---

**Section 5: Fire and Explosion Data**

- **Flammability of the Product:** Non-flammable.
- **Auto-Ignition Temperature:** Not applicable.
- **Flash Points:** Not applicable.
- **Flammable Limits:** Not applicable.
- **Products of Combustion:** Not available.
- **Fire Hazards in Presence of Various Substances:** Not applicable.
- **Explosion Hazards in Presence of Various Substances:** Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.
- **Fire Fighting Media and Instructions:** Not applicable.
- **Special Remarks on Fire Hazards:** Not available.
- **Special Remarks on Explosion Hazards:** May explode if it comes in contact with aluminum powder, lithium, perchlorate, pentoxide, bis(dimethylamino)dimethylstannane, potassium, potassium-sodium alloy, sodium (or sodium hydroxide or sodium methoxide), and methanol.

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**Section 6: Accidental Release Measures**

- **Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.
- **Large Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

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**Section 7: Handling and Storage**

- **Precautions:** Do not ingest. Do not breathe gas/fumes/vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as metals, alkalis.
- **Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Sensitive to light. Store in light-resistant containers.
Section 8: Exposure Controls/Personal Protection

**Engineering Controls:** Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the workstation 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: 10 (ppm) [Australia]
- Inhalation TWA: 2 (ppm) from OSHA (PEL) [United States]
- Inhalation STEL: 9.78 (mg/m3) from NIOSH
- Inhalation STEL: 2 (ppm) from NIOSH
- Inhalation TWA: 9.78 (mg/m3) from OSHA (PEL) [United States]
- Inhalation TWA: 10 (ppm) from ACGIH (TLV) [United States] [1999]
- Inhalation TWA: 9.9 (mg/m3) [United Kingdom (UK)]]

Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Pleasant. Sweetish. Etheric. Non-irritating

**Taste:** Burning. Sweet.

**Molecular Weight:** 119.38 g/mole

**Color:** Colorless. Clear

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

**Boiling Point:** 61°C (141.8°F)

**Melting Point:** -63.5°C (-82.3°F)

**Critical Temperature:** 263.33°C (506°F)

**Specific Gravity:** 1.484 (Water = 1)

**Vapor Pressure:** 21.1 kPa (@ 20°C)

**Vapor Density:** 4.36 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 85 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil; log(oil/water) = 2

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

**Dispersion Properties:** Not available.

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

Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials, Light

**Incompatibility with various substances:** Reactive with metals, alkalis.

**Corrosivity:** Non-corrosive in presence of glass.
**Special Remarks on Reactivity:** Light Sensitive. Incompatible with triisopropyl phosphine, acetone, disilane, fluorine, strong bases and reactive metals (aluminum, magnesium in powdered form), light.

**Special Remarks on Corrosivity:** It will attack some forms of plastics, rubber, and coatings.

**Polymerization:** Will not occur.

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### Section 11: Toxicological Information

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

**Toxicity to Animals:** WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 36 mg/kg [Mouse]. Acute dermal toxicity (LD50): >20000 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 47702 mg/m 4 hours [Rat].

**Chronic Effects on Humans:** CARCINOGENIC EFFECTS: Classified + (Proven) by NIOSH. Classified A3 (Proven for animal) by ACGIH, 2B (Possible for human) by IARC. Classified 2 (Some evidence) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, heart.

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

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

**Special Remarks on Chronic Effects on Humans:** May affect genetic material (possible mutagen) and cause adverse reproductive effects (embryotoxicity and fetotoxicity) Suspected carcinogen (tumorigenic) and teratogen based on animal data. Human: passes the placental barrier, detected in maternal milk.

**Special Remarks on other Toxic Effects on Humans:** Acute Potential Health Effects: Skin: Causes skin irritation and may cause chemical burns. Eye: Causes eye irritation, burning pain and reversible injury to corneal epithelium. Inhalation: Causes irritation of the respiratory system (mucous membranes). May affect behavior/Nervous system (CNS depressant, fatigue, dizziness, nervousness, giddiness, euphoria, loss of coordination and judgement, weakness, hallucinations, muscle contraction/spasticity, general anesthetic, spastic paralysis, headache), anorexia (neurological and gastrointestinal symptoms resembling chronic alcoholism), and possibly coma and death. May affect the liver, kidneys and gastrointestinal tract (nausea, vomiting). Ingestion: Causes gastrointestinal tract irritation (nausea, vomiting). May affect the liver, urinary system (kidneys), respiration, behavior/nervous system (symptoms similar to inhalation), and heart. Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect the liver (hepatitis, jaundice, hepatocellular necrosis), metabolism (weight loss), respiration (fibrosis, pneumoconiosis), behavior/central nervous system (symptoms similar to acute inhalation), blood, musculoskeletal system, and kidneys. Ingestion: Prolonged or repeated ingestion may affect the liver, kidneys, metabolism (weight loss), endocrine system (spleen), blood (changes in cell count).

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### Section 12: Ecological Information

**Ecotoxicity:** Ecotoxicity in water (LC50): 43.8 mg/l 96 hours [Trout].

**BOD5 and COD:** Not available.

**Products of Biodegradation:** Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

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

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### Section 13: Disposal Considerations

**Waste Disposal:** Waste must be disposed of in accordance with federal, state and local environmental control regulations.
Section 14: Transport Information

**DOT Classification:** CLASS 6.1: Poisonous material.

**Identification:** Chloroform UNNA: UN1888 PG: III

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

Section 15: Other Regulatory Information

**Federal and State Regulations:** California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Chloroform California prop. 65 (no significant risk level): Chloroform: 0.02 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Chloroform New York release reporting list: Chloroform Rhode Island RTK hazardous substances: Chloroform Pennsylvania RTK: Chloroform Massachusetts RTK: Chloroform New Jersey: Chloroform California Director’s List of Hazardous Substances (8 CCR 339): Chloroform Tennessee: Chloroform TSCA 8(b) inventory: Chloroform TSCA 8(d) H and S data reporting: Chloroform: effective: 6/1/87; sunset: 6/1/97 SARA 302/304/311/312 extremely hazardous substances: Chloroform SARA 313 toxic chemical notification and release reporting: Chloroform CERCLA: Hazardous substances.: Chloroform: 10 lbs. (4.536 kg)

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

**Other Classifications:**

**WHMIS (Canada):** CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):** R20/22- Harmful by inhalation and if swallowed. R38- Irritating to skin. R40- Possible risks of irreversible effects. S36/37- Wear suitable protective clothing and gloves.

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

- **Health Hazard:** 2
- **Fire Hazard:** 0
- **Reactivity:** 0
- **Personal Protection:** h

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

- **Health:** 2
- **Flammability:** 0
- **Reactivity:** 0
- **Specific hazard:**

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

Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:16 PM

**Last Updated:** 11/01/2010 12:00 PM
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# Material Safety Data Sheets

**Division of Facilities Services**

**DOD Hazardous Material Information (ANSI Format)**

*For Cornell University Convenience Only*

## 101/102/110 COPPER/COPPER ALLOYS

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## Section 1 - Product and Company Identification

**101/102/110 COPPER/COPPER ALLOYS**

**Product Identification:** 101/102/110 COPPER/COPPER ALLOYS  
**Date of MSDS:** 09/01/1989  
**Technical Review Date:** 08/18/1993  
**FSC:** 3439  
**NIIN:** LIIN: 00F029170  
**Submitter:** F BT  
**Status Code:** C  
**MFN:** 01  
**Article:** N  
**Kit Part:** N

[http://msds.ehs.cornell.edu/msds/msdsdod/a263/m131161.htm](http://msds.ehs.cornell.edu/msds/msdsdod/a263/m131161.htm)
Manufacturer's Information

Manufacturer's Name: ANSONIA COPPER & BRASS INC
Post Office Box: 109
Manufacturer's Address1: 75 LIBERTY ST
Manufacturer's Address2: ANSONIA, CT 06401
Manufacturer's Country: US
General Information Telephone: 203-732-6600/800-521-17038
Emergency Telephone: 203-732-6600/800-521-1703
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 40518
Special Project Code: N

Preparer Information

Preparer's Name: ANSONIA COPPER & BRASS INC
Preparer's Address1: 75 LIBERTY ST
Preparer's Address2: ANSONIA, CT 06401
Preparer's CAGE: 40518
Assigned Individual: N

Contractor Information

Contractor's Name: ANSONIA COPPER & BRASS INC
Contractor's Address1: 75 LIBERTY ST
Contractor's Address2: ANSONIA, CT 06401
Contractor's Telephone: 203-732-6600/800-521-17038
Contractor's CAGE: 40518

Section 2 - Composition/Information on Ingredients

101/102/110 COPPER/COPPER ALLOYS

Ingredient Name: COPPER (DUST & MIST), BRONZE POWDER
Ingredient CAS Number: 7440-50-8 Ingredient CAS Code: M
RTECS Number: GL5325000 RTECS Code: M
% Text: 100
% Environmental Weight:
Other REC Limits: 1 MG(CU)/M3 (DUST)
OSHA PEL: 0.1 MG(CU)/M3 (FUME) OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.2 MG/M3 (FUME) ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Health Hazards Acute & Chronic: RESPIRATORY TRACT IRRITATION, METAL FUME FEVER, EYE IRRITATION. LEAD INTOXICATION INCLUDING KIDNEY DISEASE, ANEMIA, NERVOUS DISORDERS, REPRODUCTIVE EFFECTS, BIRTH DEFECTS & KIDNEY CANCER. COPPER FUMES CAUSES METAL FUME FEVER, SKIN/HAIR DISCOLORATION, KERATINIZATION OF HANDS/FEET SOLES, & RESPIRATORY TRACT IRRITATION.

Signs & Symptoms of Overexposure:
METAL FUME FEVER SYMPTOMS INCLUDE: SWEET OR METALLIC TASTE IN MOUTH, DRYNESS & IRRITATION OF THROAT, COUGH, SHORTNESS OF BREATH, CHEST PAIN, NAUSEA, VOMITING, WEAKNESS, FATIGUE, MUSCLE & JOINT PAIN, C HILLS, SWEATING & FEVER. COPPER: METALLIC TASTE IN MOUTH & NAUSEA. SEE SUPP.

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: N/K

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcinogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

First Aid:
EYES: FLUSH W/WATER. SKIN: VACUUM OFF EXCESS DUST. WASH W/SOAP & WATER.
INHALATION: REMOVE TO FRESH AIR. METAL FUME FEVER MAY BE TREATED SYMPTOMATICALLY. INGESTION: OBTAIN MEDICAL ATTENTION IF LARGE QUANTITIES HAVE BEEN INGESTED. OBTAIN MEDICAL ATTENTION IN ALL CASES.
Section 5 - Fire Fighting Measures
101/102/110 COPPER/COPPER ALLOYS

Fire Fighting Procedures:
SOLID MASSIVE FORM ISN'T COMBUSTIBLE. WEAR SELF-CONTAINED BREATHING APPARATUS & PROTECTIVE CLOTHING. WHEN IN DUST FORM USE DRY CHEMICAL/SAND.

Unusual Fire or Explosion Hazard:
FIRE & EXPLOSION HAZARDS ARE MODERATE WHEN MATERIAL IS IN THE FORM OF DUST & EXPOSED TO HEAT, FLAMES, CHEMICAL REACTION OR IN CONTACT W/POWDERFUL OXIDIZERS.

Extinguishing Media:
N/K
Flash Point: Flash Point Text: N/R

Autoignition Temperature:
  Autoignition Temperature Text: N/A
  Lower Limit(s): N/R
  Upper Limit(s): N/R

Section 6 - Accidental Release Measures
101/102/110 COPPER/COPPER ALLOYS

Spill Release Procedures:
LARGE QUANTITIES OF DUST: VACUUM/WET SWEEP. LIQUIDS W/SOLID METAL: EVACUATE AREA. ABSORB W/VERMICULATE/DRY SAND/SIMILAR MATERIAL.

Section 7 - Handling and Storage
101/102/110 COPPER/COPPER ALLOYS

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
101/102/110 COPPER/COPPER ALLOYS

Respiratory Protection:
USE NIOSH/OSHA APPROVED RESPIRATORY PROTECTION IF EXPOSURE EXCEEDS THE PEL/TLV LIMITS.

Ventilation:
LOCAL EXHAUST/MECHANICAL (GENERAL): REQUIRED IF DUST/FUME CREATED IN HANDLING OR WORKING ON THIS MATERIAL

Protective Gloves:
REQUIRED FOR MELT/GRIND/CUT/WELD JOBS

Eye Protection:
SAFETY GLASSES W/SIDE SHIELDS

Other Protective Equipment:
GRINDING OPERATIONS MAY REQUIRED FACE SHIELDS. MELTING/WELDING REQUIRE FACE SHIELDS W/SPECIALTY TINTED GLASS.

Work Hygenic Practices:
USE GOOD PERSONAL HYGIENE. WASH HANDS BEFORE
EATING/DRINKING/SMOKING/LEAVING WORK AFTER CONTACT W/METAL DUST OR FUME.

Supplemental Health & Safety Information: UNDER NORMAL CONDITIONS THE SOLID ALLOY PRESENTS NO SIGNIFICANT HEALTH HAZARDS. PROCESSING OF THE ALLOY BY DUST/FUME PRODUCING OPERATION (GRINDING/BUFFING/HEATING/WELDING) MAY RESULT IN POTENTIAL FOR EXPOSURE TO AIRBORNE METAL PARTICULATES/FUME.

Section 9 - Physical & Chemical Properties
101/102/110 COPPER/COPPER ALLOYS

H C C:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: N/R
Melting/Freezing Point: Melting/Freezing Text: 1500-2260F
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/R Vapor Density: N/R
Percent Volatile Organic Content:
Specific Gravity: 7.4-9
Volatile Organic Content Pounds per Gallon:
 pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/R
Solubility in Water: INSOLUBLE
Appearance and Odor: SILVER OR YELLOW TO RED SOLID
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
101/102/110 COPPER/COPPER ALLOYS

Stability Indicator: YES
Materials to Avoid:
STRONG ACIDS, BASES & OXIDERS. MAY REACT VIOLENTLY W/WATER. MERCURY, AMMONIA & ACETYLENE.
Stability Condition to Avoid:
HEAT, FLAMES
Hazardous Decomposition Products:
METAL FUME
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/K

Section 11 - Toxicological Information
101/102/110 COPPER/COPPER ALLOYS

Toxicological Information:
N/P

Section 12 - Ecological Information
101/102/110 COPPER/COPPER ALLOYS
Section 13 - Disposal Considerations
101/102/110 COPPER/COPPER ALLOYS

Waste Disposal Methods:
MAXIMIZE PRODUCT RECOVERY FOR REUSE OR RECYCLING. CONDITIONS MAY CAUSE THIS MATERIAL TO BECOME A SOLID HAZARDOUS WASTE. SOLID WASTE LEACHATE TESTING MAY INDICATE THE NEED FOR PROPERLY PERMITTED DISPOSAL IN ACCORDANCE W/FEDERAL, STATE, & LOCAL LAWS.

Section 14 - MSDS Transport Information
101/102/110 COPPER/COPPER ALLOYS

Transport Information:
N/P

Section 15 - Regulatory Information
101/102/110 COPPER/COPPER ALLOYS

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
101/102/110 COPPER/COPPER ALLOYS

Other Information:
N/P

HAZCOM Label Information

Product Identification: 101/102/110 COPPER/COPPER ALLOYS
CAGE: 40518
Assigned Individual: N
Company Name: ANSONIA COPPER & BRASS INC
Company PO Box: 
Company Street Address1: 75 LIBERTY ST
Company Street Address2: ANSONIA, CT 06401 US
Health Emergency Telephone: 203-732-6600/800-521-1703
Label Required Indicator: N
Date Label Reviewed: 08/18/1993
Status Code: C
Manufacturer's Label Number: N/R
Date of Label: 08/18/1993
Year Procured: N/K
Organization Code: N
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

8/8/2002 3:59:36 PM
# Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)**

For Cornell University Convenience Only

## 14253 IRON 25 MG/L AS IRON

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## Section 1 - Product and Company Identification

**14253 IRON 25 MG/L AS IRON**

**Product Identification:** 14253 IRON 25 MG/L AS IRON  
**Date of MSDS:** 05/10/1990  
**Technical Review Date:** 09/05/1991  
**FSC:** 6810  
**NIIN:** 00F018312  
**Submitter:** F BT  
**Status Code:** C  
**MFN:** 01  
**Article:** N  
**kit Part:** N

[http://msds.ehs.cornell.edu/msds/msdsdod/a241/m120344.htm](http://msds.ehs.cornell.edu/msds/msdsdod/a241/m120344.htm) 8/3/2006
Manufacturer's Information

Manufacturer's Name: HACH COMPANY
Post Office Box: 907
Manufacturer's Address1: N/K
Manufacturer's Address2: Ames, IA 50010
Manufacturer's Country: NK
General Information Telephone: (800) 227-4224
Emergency Telephone: (800) 227-4224
Emergency Telephone: (800) 227-4224
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 4T252
Special Project Code: N

Preparer Information

Preparer's Name: HACH COMPANY
Post Office Box: 907
Preparer's Address1: 100 Dayton RD.
Preparer's Address2: Ames, IA 50010
Preparer's CAGE: 4T252
Assigned Individual: N

Contractor Information

Contractor's Name: HACH COMPANY
Post Office Box: 389
Contractor's Address1: 5600 Lindbergh Dr
Contractor's Address2: Loveland, CO 80539-8902
Contractor's Telephone: 970-669-3050/800-227-4224
Contractor's CAGE: 91224

Contractor Information

Contractor's Name: HACH COMPANY
Post Office Box: 907
Contractor's Address1: 100 Dayton RD.
Contractor's Address2: Ames, IA 50010
Contractor's Telephone: 800-227-4224
Contractor's CAGE: 4T252

Section 2 - Composition/Information on Ingredients

14253 IRON 25 MG/L AS IRON

Ingredient Name: Ferrous Chloride (SARA III)
Ingredient CAS Number: 7758-94-3 Ingredient CAS Code: M
RTECS Number: NO5400000 RTECS Code: M
=WT: =WT Code:

Ingredient Name: HYDROGEN CHLORIDE (HYDROCHLORIC ACID) (SARA III)
Ingredient CAS Number: 7647-01-0 Ingredient CAS Code: M
RTECS Number: MW4025000 RTECS Code: M

Ingredient Name: WATER, H2O
Ingredient CAS Number: 7732-18-5 Ingredient CAS Code: M
RTECS Number: ZC0110000 RTECS Code: M
Section 3 - Hazards Identification, Including Emergency Overview

14253 IRON 25 MG/L AS IRON

Health Hazards Acute & Chronic: SKIN/EYES: IRRITATION. PRACTICALLY NON-TOXIC.

Signs & Symptoms of Overexposure: 
SKIN/EYES: IRRITATION. PRACTICALLY NON-TOXIC.

Medical Conditions Aggravated by Exposure: 
N/K

LD50 LC50 Mixture: N/K

Route of Entry Indicators: 
Inhalation: NO
Skin: YES
Ingestion: NO

Carcinogenicity Indicators 
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures

14253 IRON 25 MG/L AS IRON

First Aid: 
EYES/SKIN: FLUSH WITH PLenty OF WATER. INGESTION: GIVE LARGE QUANTITIES OF WATER OR MILK. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures
14253 IRON 25 MG/L AS IRON

Fire Fighting Procedures:
N/R

Unusual Fire or Explosion Hazard:
N/K

Extinguishing Media:
N/R

Flash Point: Flash Point Text: N/R

Autoignition Temperature:
  Autoignition Temperature Text: N/A
  Lower Limit(s): N/R
  Upper Limit(s): N/R

Section 6 - Accidental Release Measures

Spill Release Procedures:
COVER CONTAMINATED SURFACES W/SODA ASH OR SODIUM BICARBONATE. MIX & ADD WATER IF NECESSARY. USE LITMUS PAPER TO MAKE SURE PH OF SLURRY IS NEUTRAL OR ADD NEUTRALIZER UNTIL MIXTURE STOPS BUBBLING. SCOOP UP THE SLURRY/WASH DOWN THE DRAIN W/EXCESS WATER.

Section 7 - Handling and Storage

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection

Respiratory Protection:
N/K

Ventilation:
ADEQUATE

Protective Gloves:
DISPOSABLE

Eye Protection: SAFETY GLASSES

Other Protective Equipment: N/K

Work Hygenic Practices: WASH THOROUGHLY AFTER HANDLING.

Supplemental Health & Safety Information: METAL CORROSIVITY: ALUMINUM: 0.078 IN/YR. STEEL 0.123 IN/YR.

Section 9 - Physical & Chemical Properties

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: 212F
Melting/Freezing Point: N/R
Decomposition Point: N/K
Vapor Pressure: N/K
Vapor Density: N/K
Percent Volatile Organic Content:
Specific Gravity: 0.99
Volatile Organic Content Pounds per Gallon:
pH: 1.1
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: MISCIBLE
Appearance and Odor: CLEAR, COLORLESS, LIQUID
Percent Volatiles by Volume: N/K
Corrosion Rate: SEE SUPP

Section 10 - Stability & Reactivity Data
14253 IRON 25 MG/L AS IRON

Stability Indicator: YES
Materials to Avoid:
HYDROXIDES
Stability Condition to Avoid:
HEAT, EVAPORATION
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/K

Section 11 - Toxicological Information
14253 IRON 25 MG/L AS IRON

Toxicological Information:
N/P

Section 12 - Ecological Information
14253 IRON 25 MG/L AS IRON

Ecological Information:
N/P

Section 13 - Disposal Considerations
14253 IRON 25 MG/L AS IRON

Waste Disposal Methods:
DISPOSE OF IN ACCORDANCE W/LOCAL, STATE, & FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information
14253 IRON 25 MG/L AS IRON
Transport Information:
N/P

Section 15 - Regulatory Information
14253 IRON 25 MG/L AS IRON

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
14253 IRON 25 MG/L AS IRON

Other Information:
N/P

HAZCOM Label Information

Product Identification: 14253 IRON 25 MG/L AS IRON
CAGE: 4T252
Assigned Individual: N
Company Name: HACH COMPANY
Company PO Box: 907
Company Street Address1: 100 DAYTON RD.
Company Street Address2: Ames, IA 50010 US
Health Emergency Telephone: (800) 227-4224
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

8/8/2002 8:32:51 AM
1. Chemical Product and Company Identification

BOC Gases, Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ  07974

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (908) 464-8100
TELEPHONE NUMBER: (905) 501-1700

CHEMTREC (800) 424-9300
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

PRODUCT NAME: ISOBUTYLENE
CHEMICAL NAME: Isobutylene
COMMON NAMES/SYNONYMS: 2-Methylpropene, Isobutene
TDG (Canada) CLASSIFICATION: 2.1
WHMIS CLASSIFICATION: A, B1, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>% VOLUME</th>
<th>PEL-OSHA1</th>
<th>TLV-ACGIH2</th>
<th>LD50 or LC50 Route/Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isobutylene</td>
<td>99.0 to 99.8</td>
<td>Simple Asphyxiant</td>
<td>Simple Asphyxiant</td>
<td>LC50 620 mg/m³/3H (rat)</td>
</tr>
<tr>
<td>FORMULA: C4H8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS: 115-11-7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTECS #: UD0890000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
2 As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW
This product does not contain oxygen and may cause asphyxia if released in a confined area. Simple hydrocarbons can cause irritation and central nervous system depression at high concentrations. flammable.

ROUTE OF ENTRY:

<table>
<thead>
<tr>
<th></th>
<th>Skin Contact</th>
<th>Skin Absorption</th>
<th>Eye Contact</th>
<th>Inhalation</th>
<th>Ingestion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

MSDS: G-53
Revised: 6/7/96
HEALTH EFFECTS:

<table>
<thead>
<tr>
<th>Exposure Limits</th>
<th>Irritant</th>
<th>Sensitization</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Teratogen: No
Reproductive Hazard: No
Mutagen: No

Synergistic Effects: None Reported

Carcinogenicity: -- NTP: No  IARC: No  OSHA: No

EYE EFFECTS:
Irritation may occur.

SKIN EFFECTS:
None anticipated as product is a gas at room temperature.

INGESTION EFFECTS:
Ingestion is unlikely.

INHALATION EFFECTS:
Product is relatively nontoxic. Simple hydrocarbons can irritate the eyes, mucous membranes and respiratory system at high concentrations.

Inhalation of high concentrations may cause dizziness, disorientation, incoordination, narcosis, nausea or narcotic effects.

This product may displace oxygen if released in a confined space. Maintain oxygen levels above 19.5% at sea level to prevent asphyxiation.

Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

NFPA HAZARD CODES | HMIS HAZARD CODES | RATINGS SYSTEM
---|---|---
Health: 1 | Health: 1 | 0 = No Hazard
Flammability: 4 | Flammability: 4 | 1 = Slight Hazard
Reactivity: 0 | Reactivity: 0 | 2 = Moderate Hazard

3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures

EYES:
Never introduce oil or ointment into the eyes without medical advice! If pain is present, refer the victim to an ophthalmologist for further treatment and follow up.

SKIN:
PRODUCT NAME: ISOBUTYLENE

Remove contaminated clothing and wash affected area with soap and water. If irritation persists, seek medical attention.

INGESTION:
Not normally required. Seek immediate medical attention.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO PRODUCT. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given assisted (artificial) respiration and supplemental oxygen. Further treatment should be symptomatic and supportive.

5. Fire Fighting Measures

<table>
<thead>
<tr>
<th>Conditions of Flammability: Flammable liquid and vapor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash point: -105 °F (-76 °C)</td>
</tr>
<tr>
<td>Method: Closed Cup</td>
</tr>
<tr>
<td>Autoignition Temperature: 869 °F (465 °C)</td>
</tr>
<tr>
<td>LEL(%): 1.8</td>
</tr>
<tr>
<td>UEL(%): 9.6</td>
</tr>
<tr>
<td>Hazardous combustion products: Carbon monoxide, Carbon dioxide</td>
</tr>
<tr>
<td>Sensitivity to mechanical shock: None</td>
</tr>
<tr>
<td>Sensitivity to static discharge: Not Available</td>
</tr>
</tbody>
</table>

FIRE AND EXPLOSION HAZARDS:
Isobutylene is heavier than air and may travel a considerable distance to an ignition source. Isobutylene is a flammable gas! Keep away from open flame and other sources of ignition. Do not allow smoking in storage areas or when handling.

EXTINGUISHING MEDIA:
Water, carbon dioxide, dry chemical.

FIRE FIGHTING INSTRUCTIONS:
If possible, stop the flow of gas with a remote valve. Use water spray to cool fire exposed containers. If fire is extinguished and flow of gas is continued, increase ventilation to prevent a build up of a flammable/explosive atmosphere. Extinguish sources of ignition.

Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above the liquid level with remote monitors. Limit the number of personnel in proximity to the fire. Evacuate surrounding areas to at least 3000 feet in all directions.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. Increase ventilation to prevent build up of a flammable/explosive atmosphere. Extinguish all sources of ignition! If leak is in user’s equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.
7. Handling and Storage

Earth bond and ground all lines and equipment associated with the product system. Electrical equipment should be non-sparking and explosion proof.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure (<250 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Post "No Smoking" signs in storage or use areas.

For additional recommendations consult Compressed Gas Association Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>% VOLUME</th>
<th>PEL-OSHA²</th>
<th>TLV-ACGIH³</th>
<th>LD₅₀ or LC₅₀ Route/Species</th>
</tr>
</thead>
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<td>99.0 to 99.8</td>
<td>Simple Asphyxiant</td>
<td>Simple Asphyxiant</td>
<td>LC₅₀ 620 mg/m³/3H (rat)</td>
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<tr>
<td>FORMULA: C₄H₈</td>
<td></td>
<td></td>
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<td>CAS: 115-11-7</td>
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<td>RTECS #: UD0890000</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
2 As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
3 As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:
Use local exhaust to prevent accumulation. Use general ventilation to prevent build up of flammable concentrations. May use hood with forced ventilation when handling small quantities. If product is handled routinely where the potential for leaks exists, all electrical equipment must be rated for use in potentially flammable atmospheres. Consult the National Electrical Code for details.

EYE/FACE PROTECTION:
Safety goggles or glasses.

SKIN PROTECTION:
Protective gloves made of plastic or rubber.
RESPIRATORY PROTECTION:
Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:
Safety shoes, safety shower, eyewash.

9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state (gas, liquid, solid)</td>
<td>Gas</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure at 70°F</td>
<td>39</td>
<td>psia</td>
</tr>
<tr>
<td>Vapor density at STP (Air = 1)</td>
<td>1.98</td>
<td></td>
</tr>
<tr>
<td>Evaporation point</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Boiling point</td>
<td>19.5</td>
<td>°F</td>
</tr>
<tr>
<td></td>
<td>-6.9</td>
<td>°C</td>
</tr>
<tr>
<td>Freezing point</td>
<td>-220.6</td>
<td>°F</td>
</tr>
<tr>
<td></td>
<td>-140.3</td>
<td>°C</td>
</tr>
<tr>
<td>pH</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Specific gravity</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Oil/water partition coefficient</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Solubility (H2O)</td>
<td>Insoluble</td>
<td></td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Odor and appearance</td>
<td>A colorless gas with an unpleasant odor similar to that of burning coal.</td>
<td></td>
</tr>
</tbody>
</table>

10. Stability and Reactivity

STABILITY:
Stable

CONDITIONS TO AVOID (STABILITY):
None

INCOMPATIBLE MATERIALS:
Oxidizers
HAZARDOUS DECOMPOSITION PRODUCTS:
Carbon monoxide

11. Toxicological Information

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

No chronic effects data given in the Registry of Toxic Effects of Chemical Substances (RTECS) or Sax, Dangerous Properties of Industrial Materials, 7th ed.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>United States DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROPER SHIPPING NAME:</td>
<td>Isobutylene</td>
<td>Isobutylene</td>
</tr>
<tr>
<td>HAZARD CLASS:</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>IDENTIFICATION NUMBER:</td>
<td>UN 1055</td>
<td>UN 1055</td>
</tr>
<tr>
<td>SHIPPING LABEL:</td>
<td>FLAMMABLE GAS</td>
<td>FLAMMABLE GAS</td>
</tr>
</tbody>
</table>

15. Regulatory Information

Isobutylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard
Fire Hazard
Sudden Release of Pressure Hazard

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.
DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).
# Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)**

For Cornell University Convenience Only

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### 100 PPM ISOBUTYLENE IN AIR

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**Section 1 - Product and Company Identification**

**100 PPM ISOBUTYLENE IN AIR**

**Product Identification**: 100 PPM ISOBUTYLENE IN AIR  
**Date of MSDS**: 06/04/1989  
**Technical Review Date**: 07/28/2000  
**FSC**: NIIN: EMPTY  
**Submitter**: D DG  
**Status Code**: A  
**MFN**: 01  
**Article**: N  
**Kit Part**: N
Manufacturer's Information

Manufacturer's Name: LIQUID AIR CORP ALPHAGAZ DIVISION
Manufacturer's Address1: 2121 N CALIFORNIA BLVD
Manufacturer's Address2: WALNUT CREEK, CA 94596
Manufacturer's Country: US
General Information Telephone: 510-977-6500
Emergency Telephone: 800-231-1366
Emergency Telephone: 800-231-1366
MSDS Preparer's Name: N/P
Chemtec Telephone: (800)424-9300
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 42568

Contractor Information

Contractor's Name: LIQUID AIR CORP ALPHAGAZ DIVISION
Contractor's Address1: 2121 N CALIFORNIA BLVD
Contractor's Address2: WALNUT CREEK, CA 94596
Contractor's Telephone: 510-977-6500
Contractor's CAGE: 42568

Section 2 - Composition/Information on Ingredients

100 PPM ISOBUTYLENE IN AIR

Ingredient Name: AIR
Ingredient CAS Number: Ingredient CAS Code: X
RTECS Number: RTECS Code: X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: UNK
% Environmental Weight:
Other REC Limits: N/P
OSHA PEL: N/P OSHA PEL Code:
OSHA STEL: N/P OSHA STEL Code:
ACGIH TLV: N/P ACGIH TLV Code:
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:
Section 3 - Hazards Identification, Including Emergency Overview

100 PPM ISOBUTYLENE IN AIR

Health Hazards Acute & Chronic: AMOUNT OF ISO-BUTYLENE IN MIXTURE SHOULDN'T PRESENT ANY SYMPTOMS OF TOXICITY IF THIS MIXTURE IS BREATHED. AIR IS NONTOXIC & NECESSARY TO SUPPORT LIFE. INHALATION OF AIR IN HIGH PRESSURE ENVIRO-MEN SUCH AS UNDERWATER DIVING, CAISSONS OR HYPERBARIC CHAMBERS CAN RESULT IN SYMPTOMS SIMILAR TO OVEREXPOSURE TO PURE OXYGEN. THESE INCLUDE TINGLING OF FINGERS & TOES, ABNORMAL SENSATIONS, IMPAIRED COORDINATION & CONFUSION. DECOMPRESSION SICKNESS PAINS OR BENDS ARE POSSIBLE FOLLOWING RAPID DECOMPRESSION. HI PRESSURE EFFECTS (GREATER THAN 2 ATMOSPHERES OF OXYGEN) ARE ON CENTRAL NERVOUS SYSTEM. IMPROPER DECOMPRESSION RESULT IN ACCUMULATION OF NITROGEN IN BLOOD.

Signs & Symptoms of Overexposure:
INHALATION OF AIR IN HIGH PRESSURE ENVIRONMENT SUCH AS UNDERWATER DIVING, CAISSONS OR HYPERBARIC CHAMBERS CAN RESULT IN SYMPTOMS SIMILAR TO OVEREXPOSURE TO PURE OXYGEN. THESE INCLUDE TINGLING OF FINGERS AND TOES, ABNORMAL SENSATIONS, IMPAIRED COORDINATION & CONFUSION. DECOMPRESSION SICKNESS PAINS OR BENDS ARE POSSIBLE FOLLOWING RAPID DECOMPRESSION.

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P
Route of Entry Indicators:
Inhalation: YES
Skin: N/P
Ingestion: N/P

Carcinogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NEITHER ISOBUTYLENE OR AIR ARE LISTED IN IARC, NTP, OR BY OSHA AS A CARCINOGEN OR POTENTIAL CARCINOGEN.

Section 4 - First Aid Measures
100 PPM ISOBUTYLENE IN AIR

First Aid:
Facilities or practices at which air is breathed in a high pressure environment should be prepared to deal with the illnesses associated with decompression (bends or caisson disease). Decompression equipment may be required.

Section 5 - Fire Fighting Measures
100 PPM ISOBUTYLENE IN AIR

Fire Fighting Procedures:
N/A
Unusual Fire or Explosion Hazard:
Compressed air at high pressures will accelerate the burning of materials to a greater rate than they burn at atmospheric pressure.
Extinguishing Media:
Nonflammable gas.
Flash Point: Flash Point Text: N/A

Autoignition Temperature:
Autoignition Temperature Text: N/P
Lower Limit(s): N/A
Upper Limit(s): N/A

Section 6 - Accidental Release Measures
100 PPM ISOBUTYLENE IN AIR

Spill Release Procedures:
N/A

Section 7 - Handling and Storage
100 PPM ISOBUTYLENE IN AIR

Handling and Storage Precautions:
Other Precautions:

### Section 8 - Exposure Controls & Personal Protection

**100 PPM ISOBUTYLENE IN AIR**

- **Respiratory Protection:** N/A
- **Ventilation:** N/A
- **Protective Gloves:** ANY MATERIAL.
- **Eye Protection:** SAFETY GOGGLES OR GLASSES
- **Other Protective Equipment:** SAFETY SHOES.
- **Work Hygenic Practices:** N/P
- **Supplemental Health & Safety Information:** CONTD OTHER INFO:(RUST FORMATION). CONC OF SO2, CL2, SALT, ETC IN THE MOISTURE ENHANCES THE RUSTING OF METALS IN THIS MIXTURE. ADDN RECOMMENDATIONS CONSULT L’AIR LIQUIDE’S ENCYLOPEDIA DE GAZ OR COMPRESSED GAS ASSOC PAMPHLET P-1.

### Section 9 - Physical & Chemical Properties

**100 PPM ISOBUTYLENE IN AIR**

- **HCC:** G3
- **NRC/State License Number:**
- **Net Property Weight for Ammo:**
- **Boiling Point:** =-194.4°C, -317.9°F  **Boiling Point Text:**
- **Melting/Freezing Point:** Melting/Freezing Text: N/A
- **Decomposition Point:** Decomposition Text: N/P
- **Vapor Pressure:** >220.4°F  **Vapor Density:** 1.200 KG/M 3
- **Percent Volatile Organic Content:**
- **Specific Gravity:** N/P
- **Volatile Organic Content Pounds per Gallon:**
- **pH:** N/P
- **Volatile Organic Content Grams per Liter:**
- **Viscosity:** N/P
- **Evaporation Weight and Reference:** N/P
- **Solubility in Water:** BUNSEN COEFF = 0.0183
- **Appearance and Odor:** COLORLESS GAS WITH POSSIBLE VERY SLIGHT OLEFINIC ODOR
- **Percent Volatiles by Volume:** N/P
- **Corrosion Rate:** N/P

### Section 10 - Stability & Reactivity Data

**100 PPM ISOBUTYLENE IN AIR**

- **Stability Indicator:** YES
- **Materials to Avoid:** NONE
- **Stability Condition to Avoid:** N/A
- **Hazardous Decomposition Products:** NONE
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/A

Section 11 - Toxicological Information
100 PPM ISOBUTYLENE IN AIR

Toxicological Information:
HIGH PRESSURE EFFECTS (GREATER THAN 2 ATMOSPHERES OF OXYGEN) ARE ON THE CENTRAL NERVOUS SYSTEM. IMPROPER DECOMPRESSION RESULTS IN THE ACCUMULATION OF NITROGEN IN THE BLOOD. LIQUID DENSITY AT BOILING POINT: 54.70 LB/FT3 (876.21 KG/M3). FREEZING POINT: N/A, BUBBLE POINT AT 1 ATM. = -317.8°F (-194.35°C).

Section 12 - Ecological Information
100 PPM ISOBUTYLENE IN AIR

Ecological Information:
N/P

Section 13 - Disposal Considerations
100 PPM ISOBUTYLENE IN AIR

Waste Disposal Methods:
N/A

Section 14 - MSDS Transport Information
100 PPM ISOBUTYLENE IN AIR

Transport Information:
COMPRESSED GAS, N.O.S., NONFLAMMABLE GAS, UN 1956.

Section 15 - Regulatory Information
100 PPM ISOBUTYLENE IN AIR

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
100 PPM ISOBUTYLENE IN AIR

Other Information:
CONTD OTHER PRECAUT: PROTECT CYL FROM PHYSICAL DMG. STORE IN COOL DRY WELL-VENTILATED AREA AWAY FROM HEAVILY TRAFFICKED AREAS & EMERGENCY EXITS. DON'T ALLOW TEMP WHERE CYL STORED TO EXCEED 130°F (53°C). CYL SHOULD BE STORED UPRIGHT & FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. FULL & EMPTY CYL SHOULD BE SEGREGATED. USE A 1ST IN-1ST OUT INVENTORY SYSTEM TO PREVENT FULL CYL BEING STORED FOR EXCESSIVE PERIODS OF TIME.
MIXTURE IS DRY ITS NONCORROSIVE & MAY BE USED W/ALL MATLS OF
CONSTRUCTION. MOISTURE CAUSES METAL OXIDES WHICH ARE FORMED W/AIR TO BE
HYDRATED SO THAT THEY INCR IN VOLUME & LOSE THEIR PROTECTIVE ROLE (CONT'D
SUPPLEMENT

HMIS Transportation Information

Product Identification: 100 PPM ISOBUTYLENE IN AIR
Transportation ID Number: 154224
Responsible Party CAGE: 42568
Date MSDS Prepared: 06/04/1989
Date MSDS Reviewed: 07/28/2000
MFN: 07/28/2000
Submitter: D DG
Status Code: A

Container Information
   Unit of Issue: NK
   Container Quantity: NK
   Type of Container: 
   Net Unit Weight: UNK

Article without MSDS: N
Technical Entry NOS Shipping Number: 100PPM ISOBUTYLENE IN AIR.
Radioactivity: 
Form: 
Net Explosive Weight: 
Coast Guard Ammunition Code: 
Magnetism: 
AF MMAC Code: 
DOD Exemption Number: N/A
Limited Quantity Indicator: N
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: N

Department of Transportation Information

DOT Proper Shipping Name: COMPRESSED GASES, N.O.S.
DOT PSN Code: DQQ
Symbols: G
DOT PSN Modifier: 
Hazard Class: 2.2
UN ID Number: UN1956
DOT Packaging Group: 
Label: NONFLAMMABLE GAS
Special Provision(s): B13
Packaging Exception: 
Non Bulk Packaging: 302,305
Bulk Packaging: 314,315
Maximum Quantity in Passenger Area: 75 KG

http://msds.ehs.cornell.edu/msds/M SDS DOD/A 484/M 241643.htm
Maximum Quantity in Cargo Area: 150 KG
Stow in Vessel Requirements: A
Requirements Water/Sp/Other:

IMO Detail Information
IMO Proper Shipping Name: COMPRESSED GAS, N.O.S.
IMO PSN Code: EQH
IMO PSN Modifier:
IMDG Page Number: 2124
UN Number: 1956
UN Hazard Class: 2(2.2)
IMO Packaging Group: -
Subsidiary Risk Label: -
EMS Number: -
Medical First Aid Guide Number: 620

IATA Detail Information
IATA Proper Shipping Name: COMPRESSED GAS, N.O.S. *
IATA PSN Code: HDO
IATA PSN Modifier:
IATA UN Id Number: 1956
IATA UN Class: 2.2
Subsidiary Risk Class:
UN Packaging Group:
IATA Label: NON-FLAMMABLE GAS
Packaging Note for Passengers: 200
Maximum Quantity for Passengers: 75KG
Packaging Note for Cargo: 200
Maximum Quantity for Cargo: 150KG
Exceptions:

AFI Detail Information
AFI Proper Shipping Name: COMPRESSED GAS, N.O.S.
AFI Symbols: *
AFI PSN Code: HDO
AFI PSN Modifier:
AFI UN Id Number: UN1956
AFI Hazard Class: 2.2
AFI Packing Group: N/A
AFI Label:
Special Provisions: P5

HAZCOM Label Information
Product Identification: 100 PPM ISOBUTYLENE IN AIR
CAGE: 42568
Assigned Individual: N
Company Name: LIQUID AIR CORP ALPHAGAZ DIVISION
Company PO Box:
Company Street Address1: 2121 N CALIFORNIA BLVD
Company Street Address2: WALNUT CREEK, CA 94596 US
Health Emergency Telephone: 800-231-1366
Label Required Indicator: Y
Date Label Reviewed: 07/28/2000
Status Code: A
Manufacturer's Label Number:
Date of Label:
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: NO
Signal Word: CAUTION
Health Hazard: Slight
Contact Hazard: None
Fire Hazard: None
Reactivity Hazard: None

8/9/2002 10:46:43 AM
**HAZARD SUMMARY**
- Magnesium dust or fume can affect you when breathed in.
- Contact can irritate the skin and eyes.
- Breathing Magnesium dust can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.
- Repeated exposure to the dust can cause Magnesium to accumulate in the body. This will cause an upset stomach.

**IDENTIFICATION**
Magnesium is a light, silvery-white metal. It is an essential trace element. It is used in making structural parts, diecast auto parts, missiles, precision instruments, optical mirrors, flash bulbs and flares, pyrotechnics, and batteries.

**REASON FOR CITATION**
- Magnesium is on the Hazardous Substance List because it is cited by DOT and NFPA.
- Definitions are provided on page 5.

**HOW TO DETERMINE IF YOU ARE BEING EXPOSED**
The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
- If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

**WORKPLACE EXPOSURE LIMITS**
No occupational exposure limits have been established for Magnesium. This does not mean that this substance is not harmful. Safe work practices should always be followed.

**WAYS OF REDUCING EXPOSURE**
- Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- Wear protective work clothing.
- Wash thoroughly immediately after exposure to Magnesium.
- Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Magnesium to potentially exposed workers.
This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Metal, metal compounds and alloys are often used in “hot” operations in the workplace. These may include, but are not limited to, welding, brazing, soldering, plating, cutting, and metallizing. At the high temperatures reached in these operations, metals often form metal fumes which have different health effects and exposure standards than the original metal or metal compound and require specialized controls. Your workplace can be evaluated for the presence of particular fumes which may be generated. Consult the appropriate New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheets.

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HEALTH HAZARD INFORMATION

Acute Health Effects
The following acute (short-term) health effects may occur immediately or shortly after exposure to Magnesium:

* Magnesium dust can irritate the eyes and skin.
* Breathing Magnesium dust can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.

Chronic Health Effects
The following chronic (long-term) health effects can occur at some time after exposure to Magnesium and can last for months or years:

Cancer Hazard
* According to the information presently available to the New Jersey Department of Health and Senior Services, Magnesium has not been tested for its ability to cause cancer in animals.

Reproductive Hazard
* According to the information presently available to the New Jersey Department of Health and Senior Services, Magnesium has not been tested for its ability to affect reproduction.

Other Long-Term Effects
* Repeated exposure to the dust can cause Magnesium to accumulate in the body. This will cause an upset stomach.

MEDICAL

Medical Testing
There is no special test for this chemical. However, if illness occurs or overexposure is suspected, medical attention is recommended.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider:
(1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

* Where possible, automatically transfer Magnesium from drums or other storage containers to process containers.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by Magnesium should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Magnesium.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with Magnesium, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted Magnesium, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where Magnesium is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.
* Use a vacuum to reduce dust during clean-up. DO NOT DRY SWEEP.
PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing
* Avoid skin contact with Magnesium. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection
* Wear impact resistant eye protection with side shields or goggles.

Respiratory Protection
IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* NIOSH has established new testing and certification requirements for negative pressure, air purifying, particulate filter and filtering facepiece respirators. The filter classifications of dust/mist/fume, paint spray or pesticide prefilters, and filters for radon daughters, have been replaced with the N, R, and P series. Each series has three levels of filtering efficiency: 95%, 99%, and 99.9%. Check with your safety equipment supplier or your respirator manufacturer to determine which respirator is appropriate for your facility.
* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect Magnesium, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.

HANDLING AND STORAGE

* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 292-5677 (fax)

Web address:  http://www.state.nj.us/health/ehoh/odisweb/

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.
DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that releases energy under certain conditions.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.
Common Name: MAGNESIUM  
DOT Number:  UN 1869  
UN 1418 (powder)  
NAERG Code:  138  
CAS Number:  7439-95-4

<table>
<thead>
<tr>
<th>Hazard rating</th>
<th>NJDHSS</th>
<th>NFPA</th>
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<tbody>
<tr>
<td>FLAMMABILITY</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>REACTIVITY</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**FIRE HAZARDS**

* Magnesium is a COMBUSTIBLE SOLID or a FLAMMABLE POWDER.  
* Use dry sand, MetL-X powder or graphite powder, soda ash, Class D extinguishers or talc to extinguish fires.  
* DO NOT USE water, CO₂, foam or dry chemical extinguishers.  
* POISONOUS GASES ARE PRODUCED IN FIRE.  
* FIRE MAY RESTART AFTER IT HAS BEEN EXTINGUISHED.  
* POWDERS FORM EXPLOSIVE MIXTURES WITH AIR.  
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

**SPILLS AND EMERGENCIES**

If Magnesium is spilled, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill until clean-up is complete.  
* Remove all ignition sources.  
* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.  
* Ventilate area of spill or leak after clean-up is complete.  
* Keep Magnesium out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.  
* It may be necessary to contain and dispose of Magnesium as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.  
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

**HANDLING AND STORAGE** (See page 3)

**FIRST AID**

In NJ, for POISON INFORMATION call 1-800-764-7661

**Eye Contact**

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

**Skin Contact**

* Remove contaminated clothing. Wash contaminated skin with soap and water.

**Breathing**

* Remove the person from exposure.  
* Transfer promptly to a medical facility.

**PHYSICAL DATA**

**Water Solubility**: Insoluble and Reactive

**OTHER COMMONLY USED NAMES**

Chemical Name: Magnesium

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FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300  
NJDEP HOTLINE: (609) 292-7172

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NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES  
Right to Know Program  
PO Box 368, Trenton, NJ 08625-0368  
(609) 984-2202

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Not intended to be copied and sold for commercial purposes.
## NIOSH Pocket Guide to Chemical Hazards

### Manganese compounds and fume (as Mn)

<table>
<thead>
<tr>
<th>Mn (metal)</th>
<th>CAS 7439-96-5 (metal)</th>
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<tr>
<td>RTECS</td>
<td>OO9275000 (metal)</td>
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<tr>
<td>DOT ID &amp; Guide</td>
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### Synonyms & Trade Names

Manganese metal: Colloidal manganese, Manganese-55

Synonyms of other compounds vary depending upon the specific manganese compound.

### Exposure Limits

<table>
<thead>
<tr>
<th>IDLH 500 mg/m³ (as Mn) See:</th>
<th>Conversion</th>
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**Physical Description**

A lustrous, brittle, silvery solid.

- **MW:** 54.9
- **BP:** 3564°F
- **MLT:** 2271°F
- **Sol:** Insoluble
- **VP:** 0 mmHg (approx)
- **IP:** NA
- **F.I.P.:** NA
- **U.E.L.:** NA
- **L.E.L.:** NA

Metal: Combustible Solid

### Incompatibilities & Reactivities

Oxidizers [Note: Will react with water or steam to produce hydrogen.]

### Measurement Methods

NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G

See: NMMAM or OSHA Methods

### Personal Protection & Sanitation

- **Skin:** No recommendation
- **Eyes:** No recommendation
- **Wash skin:** No recommendation
- **Remove:** No recommendation
- **Change:** No recommendation

### First Aid

- **Breathing:** Respiratory support
- **Swallow:** Medical attention immediately

### Respirator Recommendations

**NIOSH**

- **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. [Click here](http://www.cdc.gov/niosh/npgd0379.html) 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

- **Up to 50 mg/m³:**
  - (APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

- **Up to 50 mg/m³:**
  - (APF = 25) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](http://www.cdc.gov/niosh/npgd0379.html) for information on selection of N, R, or P filters.

- **Up to 50 mg/m³:**
  - (APF = 25) 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 500 mg/m³**

(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. [Click here](http://www.cdc.gov/niosh/npg/npgd0379.html) for information on selection of N, R, or P filters. Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](http://www.cdc.gov/niosh/npg/npgd0379.html)

<table>
<thead>
<tr>
<th><strong>Exposure Routes</strong></th>
<th>inhalation, ingestion</th>
</tr>
</thead>
</table>

**Symptoms** Manganese; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage

**Target Organs** respiratory system, central nervous system, blood, kidneys

See also: [INTRODUCTION](http://www.cdc.gov/niosh/npg/npgd0379.html)  See ICSC CARD: 0174  See MEDICAL TESTS: 0131

[NIOSH Home](http://www.cdc.gov/niosh/npg/npgd0379.html)  [NIOSH Search](http://www.cdc.gov/niosh/npg/npgd0379.html)  [Site Index](http://www.cdc.gov/niosh/npg/npgd0379.html)  [Topic List](http://www.cdc.gov/niosh/npg/npgd0379.html)  [Contact Us](http://www.cdc.gov/niosh/npg/npgd0379.html)
Material Safety Data Sheet
Styrene (monomer) MSDS

Section 1: Chemical Product and Company Identification

Product Name: Styrene (monomer)
Catalog Codes: SLS2512, SLU1027
CAS#: 100-42-5
RTECS: WL3675000
TSCA: TSCA 8(b) inventory: Styrene (monomer)
CI#: Not available.
Synonym: Vinylbenzene
Chemical Formula: C8H8

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Styrene (monomer)</td>
<td>100-42-5</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Styrene (monomer): ORAL (LD50): Acute: 2650 mg/kg [Rat]. 316 mg/kg [Mouse]. VAPOR (LC50): Acute: 12000 ppm 4 hour(s) [Rat]. 9500 ppm 4 hour(s) [Mouse].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified 2B (Possible for human.) by IARC. A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to the nervous system, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. 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:**
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

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

**Serious Inhalation:** Not available.

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

**Serious Ingestion:** Not available.

---

**Section 5: Fire and Explosion Data**

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 490°C (914°F)

**Flash Points:**
- CLOSED CUP: 31.1°C (88°F) (Cleveland)
- OPEN CUP: 36.7°C (98.1°F) (TAG)

**Flammable Limits:**
- LOWER: 1.1%
- UPPER: 6.1%

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

**Fire Hazards in Presence of Various Substances:**
Flammable in presence of open flames and sparks. Slightly flammable to flammable in presence of heat.

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**
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 locked up. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

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. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

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

Personal Protection:
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: 50 STEL: 100 (ppm) TWA: 213 STEL: 426 (mg/m3) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Clear viscous liquid.)
Odor: Sweetish. Aromatic.
Taste: Not available.
Molecular Weight: 104.14 g/mole
Color: Colorless.
pH (1% soln/water): Not available.
Boiling Point: 145.2°C (293.4°F)
Melting Point: -30.6°C (-23.1°F)
Critical Temperature: Not available.
Specific Gravity: 0.906 (Water = 1)
Vapor Pressure: 4.5 mm of Hg (@ 20°C)
Vapor Density: 3.59 (Air = 1)
Volatile: Not available.
Odor Threshold: 0.1 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:** Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:**
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 316 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 9500 ppm 4 hour(s) [Mouse].

**Chronic Effects on Humans:**
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified 2B (Possible for human.) by IARC. A4 (Not classifiable for human or animal.) by ACGIH. The substance is toxic to the nervous system, upper respiratory tract.

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

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

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

**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:  Styrene monomer, inhibited  UN2055 PG: III

Special Provisions for Transport:  Marine Pollutant

---

Section 15: Other Regulatory Information

Federal and State Regulations:


Other Classifications:

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

DSCL (EEC):

HMIS (U.S.A.):

    Health Hazard: 2
    Fire Hazard: 3
    Reactivity: 0
    Personal Protection: h

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

    Health: 2
    Flammability: 3
    Reactivity: 2
    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 06:40 PM

Last Updated: 06/09/2012 12:00 PM

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Product ID: NICKEL
MSDS Date: 02/01/1995
FSC: 9650
NIIN: 00N093372
Status Code: A
MSDS Number: CJXVZ

--- Responsible Party ---
Company Name: BELMONT METALS INC
Address: 330 BELMONT AVE
City: BROOKLYN
State: NY
ZIP: 11207
Info Phone Num: 718-342-4900
Emergency Phone Num: 718-342-4900
Resp. Party Other MSDS Num.: 9002
CAGE: 70774

--- Contractor Identification ---
Company Name: BELMONT METALS INC
Address: 330 BELMONT AVE
Box: City: BROOKLYN
State: NY
ZIP: 11207
Phone: 718-342-4900
Contract Num: N00406-99-P-F82
CAGE: 70774

--- Composition/Information on Ingredients ---
Ingrid Name: NICKEL
CAS: 7440-02-0
RTECS #: QR5950000
> Wt: 99.9
OSHA PEL: 1 MG/M3
ACGIH TLV: 1 MG/M3

--- Hazards Identification ---
Routes of Entry: Inhalation: YES  Skin: YES  Ingestion: YES
Reports of Carcinogenicity: NTP: YES  IARC: YES  OSHA: NO
Health Hazards Acute and Chronic: INHALATION: SEE BELOW. INGESTION: MAY CAUSE IRRITATION OF STOMACH LINING. EYE: MAY CAUSE IRRITATION OF THE EYES. SKIN CONTACT/ABSORPTION: MAY CAUSE SKIN IRRITATION. SIGNS AND SYMPTOMS ASSOCIATED WITH EXPOSURE OVER TLV: NO ACUTE RESPIRATORY REACTION OR CONCLUSIVE CHRONIC EFFECTS FROM EXPOSURE TO NICKEL METAL HAVE BEEN OBSERVED BY PROPER INDUSTRIAL HYGIENE MAINTENANCE WORKING ATMOSPHERE AT CONCENTRATIONS BELOW THE RECOMMENDED TLV. OVERHEATING OF ALLOY CAN PRODUCE METAL FUMES AND OXIDES. MACHINING OPERATIONS SUCH AS GRINDING, SAWING, BUFFING CAN GENERATE AIRBORNE PARTICULATE IN THE WORK AREA. THE EXPOSURE LEVELS (EFTS OF OVEREXP)
TO THESE & OTHER OPERATIONS. CEILING LIMITS (C): ELEMENTS W/CEILING LIMITS (C) ARE AS FLOLLOWS: NONE: FOLLOWING ARE SYMPTOMS OF OVEREXPOSURE TO VARIOUS INGREDIENTS: NICKEL: MOST COMMON AILMENT ARISING FROM CONTACT W/NICKEL/ITS COMPOUNDS IS ALLERGIC DERMATITIS KNOWN AS "NICKEL ITCH" WHICH USUALLY OCCURS WHEN SKIN IS MOIST. GENERALLY NICKEL & MOST SALTS OF NICKEL DO NOT CAUSE SYSTEMIC POISONING. IARC HAS DETERMINED THAT THERE IS AT LEAST LIMITED EVIDENCE THAT NICKEL AND CERTAIN NICKEL COMPOUNDS MAY BE HUMAN CARCINOGENS. (SUPDAT)

Medical Cond Aggravated by Exposure: NOT APPLICABLE.

================================= First Aid Measures =========================

First Aid: INHALATION: REMOVE TO FRESH AIR. CONSULT A PHYSICIAN.
INGESTION: INDUCE VOMITING IF PATIENT IS CONSCIOUS. CONSULT A PHYSICIAN. EYE CONTACT: FLUSH WITH COPIOUS QUANTITIES OF WATER FOR AT LEAST 15 MINUTES. SKIN CONTACT: WASH WELL WITH SOAP AND WATER. SKIN ABSORPTION: NOT APPLICABLE.

================================= Fire Fighting Measures =====================

Lower Limits: N.A.
Upper Limits: N.A.
Extinguishing Media: CO₂, SAND, DRY CHEMICAL. DO NOT USE WATER.
Fire Fighting Procedures: USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT.
Unusual Fire/Explosion Hazard: DO NOT USE WATER MOLTEN METAL WILL EXPLODE ON CONTACT WITH WATER.

================================= Accidental Release Measures =================

Spill Release Procedures: ANY NORMAL CLEAN UP PROCEDURE IS APPLICABLE.

================================= Handling and Storage ========================

Handling and Storage Precautions: THIS PRODUCT MUST BE HANDLED ACCORDING TO THE SIZE, SHAPE AND QUANTITY OF MATERIAL INVOLVED. SOLID METAL MAY REQUIRE USE OF HOISTS CRANES ETC. POWDERS SHOULD BE MOVED OR TRANSPORTED TO MINIMIZE SPILL OR RELEASE POTENTIAL. IN SOLID FORM THIS MATERIAL POSES NO SPECIAL STORAGE PROBLEMS.
Other Precautions: DO NOT STORE ADJACENT TO MINERAL ACIDS. FINE METAL POWDER SHOULD BE KEPT AWAY FROM FLAMES AND SOURCES OF IGNITION.

================================= Exposure Controls/Personal Protection ==

Respiratory Protection: NIOSH APPROVED RESPIRATOR FOR DUSTS AND FUMES.
Ventilation: PROVIDE GENERAL AND/OR LOCAL VENTILATION IF NECESSARY TO MAINTAIN CONCENTRATIONS BELOW TLV'S.
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: ANSI APPROVED CHEMICAL WORKERS GOGGLES.
Other Protective Equipment: ANSI APPROVED EYE WASH AND DELUGE SHOWER.
Supplemental Safety and Health
EFTS OF OVEREXP: SEVERAL NICKEL COMPOUNDS ARE CARCINOGENIC TO LABORATORY ANIMALS BY VARIOUS ROUTES OF ENTRY.

================================= Physical/Chemical Properties =================

Boiling Pt.: 2732.2°C, 4950°F
Decomp Temp.: 1451.7°C, 2645°F
Vapor Pres:N.A.
Vapor Density:N.A.
Spec Gravity:8.90
Evaporation Rate & Reference:N.A.
Solubility in Water:NEGLIGIBLE
Appearance and Odor:SILVERY GRAY METAL; NO ODOR.
Percent Volatiles by Volume:N.A.

=================  Stability and Reactivity Data  =================

Stability Indicator/Materials to Avoid:YES
REACTS WITH MINERAL ACIDS TO LIBERATE HYDROGEN.
Stability Condition to Avoid:STORAGE NEAR MINERAL ACIDS.
Hazardous Decomposition Products:EVOLVED HYDROGEN MAY BECOME AN
EXPLOSION HAZARD.

====================  Disposal Considerations  ====================

Waste Disposal Methods:DISPOSE OF IN ACCORDANCE WITH STATE, FEDERAL AND
LOCAL REGULATIONS.

===================  MSDS Transport Information  ===================

Transport Information:DOT REGULATED: NO. DOT PROPER SHIPPING NAME: NOT
APPLICABLE. DOT HAZARD CLASS: NOT APPLICABLE. DOT NUMBER: NOT
APPLICABLE.

=====================  Regulatory Information  =====================

SARA Title III Information:NICKEL IS SUBJECT TO THE REPORTING
REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENT
Federal Regulatory Information:RCRA REGULATED: NO. RCRA NUMBER: NOT
APPLICABLE. CERCLA (SUPERFUND) REPORTABLE QUANTITY: NOT APPLICABLE.

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particular situation.
# DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

## Section 1 - Product and Company Identification

<table>
<thead>
<tr>
<th>Product Identification:</th>
<th>PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of MSDS:</td>
<td>12/09/1985</td>
</tr>
<tr>
<td>Technical Review Date:</td>
<td>10/26/1988</td>
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<td>FSC:</td>
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<td>Submitter:</td>
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<td>Article:</td>
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<td>Kit Part:</td>
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</table>

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## Section 9 - Physical & Chemical Properties

## Section 10 - Stability & Reactivity Data

## Section 11 - Toxicological Information

## Section 12 - Ecological Information

## Section 13 - Disposal Considerations

## Section 14 - MSDS Transport Information

## Section 15 - Regulatory Information

## Section 16 - Other Information

[http://msds.ehs.cornell.edu/msds/msdsdod/a221/m110105.htm](http://msds.ehs.cornell.edu/msds/msdsdod/a221/m110105.htm)
Manufacturer's Information

Manufacturer's Name: WESCO ELECTRICAL CO
Post Office Box: N/K
Manufacturer's Address1: 201 MUNSON ST
Manufacturer's Address2: GREENVILLE, MA 01301-9605
Manufacturer's Country: NK
General Information Telephone: (413) 774-4358
Emergency Telephone: (413) 774-4358
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 12673
Special Project Code: N

Preparer Information

Preparer's Name: WESCO ELECTRICAL
Preparer's Address1: 201 MUNSON ST
Preparer's Address2: GREENVILLE, MA 01301
Preparer's CAGE: 12673
Assigned Individual: N

Contractor Information

Contractor's Name: WESCO ELECTRICAL
Contractor's Address1: 201 MUNSON ST
Contractor's Address2: GREENVILLE, MA 01301
Contractor's Telephone: (413) 774-4358
Contractor's CAGE: 12673

Section 2 - Composition/Information on Ingredients

Ingredient Name: LEAD (SARA III)
Ingredient CAS Number: 7439-92-1 Ingredient CAS Code: M
RTECS Number: OF7525000 RTECS Code: M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 99.9%
% Environmental Weight:

http://msds.ehs.cornell.edu/msds/msdsdod/a221/m110105.htm 12/6/2005
**Other REC Limits:** N/K
**OSHA PEL:** 0.05 MG/M3; 1910.1025 **OSHA PEL Code:** M
**OSHA STEL:** N/P **OSHA STEL Code:**
**ACGIH TLV:** 0.15 MG/M3; DUST 9192 **ACGIH TLV Code:** M
**ACGIH STEL:** N/P **ACGIH STEL Code:**
**EPA Reporting Quantity:** 1 LB
**DOT Reporting Quantity:** 1 LB
**Ozone Depleting Chemical:** N

---

### Section 3 - Hazards Identification, Including Emergency Overview

**PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD**

**Health Hazards Acute & Chronic:** Irritating to the respiratory system, skin, & eyes. Weakness, vomiting, loss of appetite, uncoordination, convulsions, stupor, coma.

**Signs & Symptoms of Overexposure:**
If left untreated: weakness, insomnia, hypertension, irritation to skin & eye, anemia, metallic taste, constipation, headache, muscle & joint pain, neuromuscular dysfunction, paralysis, encephalopathy. Lead & its inorganic compounds are neurotoxins which may produce peripheral neuropathy.

**Medical Conditions Aggravated by Exposure:**
N/K

**LD50 LC50 Mixture:** N/K

**Route of Entry Indicators:**
- Inhalation: YES
- Skin: YES
- Ingestion: YES

**Carcinogenicity Indicators**
- NTP: NO
- IARC: NO
- OSHA: NO

**Carcinogenicity Explanation:** NONE

---

### Section 4 - First Aid Measures

**PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD**

**First Aid:**
- Eyes: Flush with copious quantities of water. Get medical attention.
- Skin: Wash thoroughly with soap & water. Get medical attention.
- Inhalation: Remove from exposure. Get medical attention.
- Ingestion: Get medical attention.

---

### Section 5 - Fire Fighting Measures

**PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD**

---

http://msds.ehs.cornell.edu/msds/msdsdod/a221/m110105.htm

12/6/2005
Fire Fighting Procedures:
WEAR SELF-CONTAINED BREATHING APPARATUS (SCBA) AND FULL PROTECTIVE CLOTHING.

Unusual Fire or Explosion Hazard:
MOLTEN METALS PRODUCE FUME, VAPOR & DUST THAT MAY BE TOXIC & RESPIRATORY IRRITANTS.

Extinguishing Media:
DRY CHEMICAL, CO2. DON'T USE WATER ON FIRES WHERE MOLTEN METAL IS PRESENT.

Flash Point: Flash Point Text: N/R

Autoignition Temperature:
  Autoignition Temperature Text: N/A
  Lower Limit(s): N/R
  Upper Limit(s): N/R

Section 6 - Accidental Release Measures
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Spill Release Procedures:
DUST MATERIAL SHOULD BE VACUUMED, OR WET SWEPT WHERE VACUUMING ISN'T FEASIBLE. PARTICULATE MATTER SHOULD BE STORED IN DRY CONTAINERS FOR LATER DISPOSAL. DON'T USE COMPRESSED AIR OR DRY SWEETING AS A MEANS OF CLEANING.

Section 7 - Handling and Storage
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Respiratory Protection:
N/K

Ventilation:
PROVIDE LOCAL EXHAUST VENTILATION TO KEEP Protective Gloves:
SHOULD BE WORN

Eye Protection: FACE SHIELD, GOGGLES

Other Protective Equipment: COVERALLS, FULL BODY CLOTHING, HAT, SAFETY BOOTS, & SHOES SHOULD BE PROTECTED FROM CONTAMINATION WITH THIS PRODUCT.

Work Hygienic Practices: ALWAYS EXERCISE NORMAL, GOOD PERSONAL HYGIENE PRIOR TO SMOKING OR EATING.

Supplemental Health & Safety Information: N/P

Section 9 - Physical & Chemical Properties
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD
Section 10 - Stability & Reactivity Data

**Stability Indicator:** YES

**Materials to Avoid:** CAN REACT VIGOROUSLY WITH STRONG OXIDIZING AGENTS & THIS PRODUCT MAY LIBERATE HYDROGEN GAS.

**Stability Condition to Avoid:** N/R

**Hazardous Decomposition Products:** HIGH TEMPERATURES MAY PRODUCE HEAVY METAL FUME, VAPOR & DUST.

**Hazardous Polymerization Indicator:** NO

**Conditions to Avoid Polymerization:** N/R

Section 11 - Toxicological Information

**Toxicological Information:** N/P

Section 12 - Ecological Information

**Ecological Information:** N/P

Section 13 - Disposal Considerations

**Waste Disposal Methods:** DISPOSE OF TOXIC SUBSTANCES & HAZARDOUS WASTES IN ACCORDANCE WITH LOCAL, STATE & FEDERAL REGULATIONS.
Section 14 - MSDS Transport Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Transport Information:
N/P

Section 15 - Regulatory Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Other Information:
N/P

HAZCOM Label Information

Product Identification: PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD
CAGE: 12673
Assigned Individual: N
Company Name: WESCO ELECTRICAL
Company PO Box:
Company Street Address1: 201 MUNSON ST
Company Street Address2: GREENVILLE, MA 01301 NK
Health Emergency Telephone: (413) 774-4358
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

8/8/2002 8:01:05 A M
TETRACHLOROETHYLENE

1. Product Identification
   
   **Synonyms:** ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon dichloride; carbon bichloride
   
   **CAS No.:** 127-18-4
   
   **Molecular Weight:** 165.83
   
   **Chemical Formula:** $\text{Cl}_2\text{C} = \text{CCl}_2$
   
   **Product Codes:**
   
   J.T. Baker: 9218, 9360, 9453, 9465, 9469
   
   Mallinckrodt: 1933, 8058

2. Composition/Information on Ingredients
   
<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No</th>
<th>Per cent</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrachloroethylene</td>
<td>127-18-4</td>
<td>99 - 100%</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3. Hazards Identification
   
   **Emergency Overview**

   **WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.**

   **SAF-T-DATA® Ratings** (Provided here for your convenience)

   - Health Rating: 2: Moderate (Poison)
   - Flammability Rating: 0: None
   - Reactivity Rating: 1: Slight
   - Contact Rating: 2: Moderate (Life)
   - Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
   - Storage Color Code: Blue (Health)

   **Potential Health Effects**

   **Inhalation:**
   
   Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.

   **Ingestion:**

   Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhea, headache, and dizziness.

   **Skin Contact:**

   Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.

   **Eye Contact:**

   Causes irritation, redness, and pain.
**4. First Aid Measures**

**Inhalation:**
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**Ingestion:**
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Skin Contact:**
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

**Eye Contact:**
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

**Note to Physician:**
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

**5. Fire Fighting Measures**

**Fire:**
Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapor generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapors are heavier than air and collect in low-lying areas.

**Explosion:**
Not considered to be an explosion hazard. Containers may explode when involved in a fire.

**Fire Extinguishing Media:**
Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.

**Special Information:**
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

**6. Accidental Release Measures**

Ventilate area of leak or spill. 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. Neutralize with alkaline material (soda ash, lime), then 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. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

**7. Handling and Storage**

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

**8. Exposure Controls/Personal Protection**

**Airborne Exposure Limits:**
- OSHA Permissible Exposure Limit (PEL):
  - 100 ppm (TWA), 200 ppm (ceiling),
  - 300 ppm/5min/3-hour (max)
- ACGIH Threshold Limit Value (TLV):
  - 25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen

**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation: A Manual of Recommended Practices*, most recent edition, for details.

**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.

**Skin Protection:**

http://www.jtbaker.com/msds/englishhtml/t0767.htm
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Ethereal odor.

Solubility:
0.015 g in 100 g of water.

Specific Gravity:
1.62 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
121C (250F)

Melting Point:
-19C (-2F)

Vapor Density (Air=1):
5.7

Vapor Pressure (mm Hg):
18 @ 25C (77F)

Evaporation Rate (BuAc=1):
0.33 (trichloroethylene = 1)

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.

Conditions to Avoid:
Moisture, light, heat and incompatibles.

11. Toxicological Information

Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 4100 ppm/6H; investigated as a tumorigen, mutagen, reproductive effector.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>NTP Known</th>
<th>Carcinogen</th>
<th>IARC Category</th>
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<tbody>
<tr>
<td>Tetrachloroethylene (127-18-4)</td>
<td>No</td>
<td>Yes</td>
<td>2A</td>
</tr>
</tbody>
</table>

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:
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. This material is expected to be toxic to aquatic life.

13. Disposal Considerations
14. Transport Information

**Domestic (Land, D.O.T.)**

Proper Shipping Name: TETRACHLOROETHYLENE  
Hazard Class: 6.1  
UN/NA: UN1897  
Packing Group: III  
Information reported for product/size: 4L

**International (Water, I.M.O.)**

Proper Shipping Name: TETRACHLOROETHYLENE  
Hazard Class: 6.1  
UN/NA: UN1897  
Packing Group: III  
Information reported for product/size: 4L

**International (Air, I.C.A.O.)**

Proper Shipping Name: TETRACHLOROETHYLENE  
Hazard Class: 6.1  
UN/NA: UN1897  
Packing Group: III  
Information reported for product/size: 4L

15. Regulatory Information

--- Chemical Inventory Status - Part 1

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<thead>
<tr>
<th>Ingredient</th>
<th>TSCA</th>
<th>EC</th>
<th>Japan</th>
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--- Chemical Inventory Status - Part 2

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<th>NDSL</th>
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<td>No</td>
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--- Federal, State & International Regulations - Part 1

<table>
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<th>Ingredient</th>
<th>RQ</th>
<th>TPQ</th>
<th>List</th>
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<tr>
<td>Tetrachloroethylene (127-18-4)</td>
<td>No</td>
<td>No</td>
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--- Federal, State & International Regulations - Part 2

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<tr>
<th>Ingredient</th>
<th>CERCLA</th>
<th>261.33</th>
<th>8(d)</th>
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<tr>
<td>Tetrachloroethylene (127-18-4)</td>
<td>100</td>
<td>U210</td>
<td>No</td>
</tr>
</tbody>
</table>

--- Chemical Weapons Convention: | No | TSCA 12(b): | No | CDTA: | No |
--- SARA 311/312: | Acute: | Yes | Chronic: | Yes | Fire: | No | Pressure: | No |
--- Reactivity: | No | (Pure / Liquid) |

**WARNING:**  
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

**Australian Hazchem Code:** 2[Z]  
**Poison Schedule:** None allocated.  

**WHMIS:**  
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

**NFPA Ratings:**  
Health: 2  
Flammability: 0  
Reactivity: 0

**Label Hazard Warning:**  
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and...
duration of exposure.

Label Precautions:
- Do not get in eyes, on skin, or on clothing.
- Do not breathe vapor or mist.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.

Label First Aid:
- If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:
- Laboratory Reagent.

Revision Information:
- No Changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. Mallinckrodt Baker, Inc. makes no representations or warranties, either express or implied, including without limitation any warranties of merchantability, fitness for a particular purpose with respect to the information set forth herein or the product to which the information refers. Accordingly, Mallinckrodt Baker, Inc. will not be responsible for damages resulting from use of or reliance upon this information.

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)
Material Safety Data Sheet
Sodium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium
Catalog Codes: SLS3505
CAS#: 7440-23-5
RTECS: VY0686000
TSCA: TSCA 8(b) inventory: Sodium
CI#: Not applicable.
Synonym: Natrium
Chemical Name: Sodium
Chemical Formula: Na
Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>7440-23-5</td>
<td>100</td>
</tr>
</tbody>
</table>

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

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Hazardous in case of skin contact (permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
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. 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:**
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

**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:** 115°C (239°F)

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

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

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**
Flammable solid. Moisture reactive material. SMALL FIRE: Obtain advice on use of water. Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Do not use water jet.

**Special Remarks on Fire Hazards:** When heated to decomposition it emits toxic fumes.

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

---

**Section 6: Accidental Release Measures**

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

**Large Spill:**
Flammable solid that, in contact with water, emits flammable gases. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

---

**Section 7: Handling and Storage**

**Precautions:**
Keep under inert atmosphere. Keep container dry. Do not breathe dust. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, moisture.
Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

## Section 8: Exposure Controls/Personal Protection

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

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

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

**Exposure Limits:** Not available.

## Section 9: Physical and Chemical Properties

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

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 22.99 g/mole

**Color:** Silvery.

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

**Boiling Point:** 881.4°C (1618.5°F)

**Melting Point:** 97.8°C (208°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.97 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

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

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

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water, hot water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.
Instability Temperature: Not available.
Conditions of Instability: Not available.
Incompatibility with various substances: Highly reactive with oxidizing agents, acids, moisture. The product reacts violently with water to emit flammable but non toxic gases.
Corrosivity: Not available.
Special Remarks on Reactivity: Not available.
Special Remarks on Corrosivity: Not available.
Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

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

Special Remarks on Toxicity to Animals: Not available.
Special Remarks on Chronic Effects on Humans: Not available.
Special Remarks on other Toxic Effects on Humans: Material is destructive to tissue of the mucous membranes and upper respiratory tract.

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 4.3: Material that emits flammable gases on contact with water.

Identification: Sodium : UN1428 PG: I

Special Provisions for Transport: Not available.
Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Sodium Massachusetts RTK: Sodium TSCA 8(b) inventory: Sodium CERCLA: Hazardous substances: Sodium


Other Classifications:
WHMIS (Canada): CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R17- Spontaneously flammable in air. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):
  Health Hazard: 3
  Fire Hazard: 3
  Reactivity: 2
  Personal Protection: E

National Fire Protection Association (U.S.A.):
  Health: 3
  Flammability: 3
  Reactivity: 2

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

Section 16: Other Information

References:

Other Special Considerations: Not available.

Created: 10/09/2005 06:28 PM
Last Updated: 06/09/2012 12:00 PM

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Material Safety Data Sheet
Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene
Catalog Codes: SLT2857, SLT3277
CAS#: 108-88-3
RTECS: XS5250000
TSCA: TSCA 8(b) inventory: Toluene
CI#: Not available.
Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol
Chemical Name: Toluene
Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

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<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>100</td>
</tr>
</tbody>
</table>

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

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.
Section 4: First Aid Measures

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

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

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

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

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

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

**Serious Ingestion:** Not available.

Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

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

**Flash Points:** CLOSED CUP: 4.444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

**Flammable Limits:** LOWER: 1.1% UPPER: 7.1%

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

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

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**
Flammable liquid, insoluble in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog.

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

**Special Remarks on Explosion Hazards:**
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididion; dinitrogen tetraoxide;
concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgClO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

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

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

Section 7: Handling and Storage

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

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

Section 8: Exposure Controls/Personal Protection

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

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

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

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

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.
Odor: Sweet, pungent, Benzene-like.
Taste: Not available.
**Molecular Weight:** 92.14 g/mole

**Color:** Colorless.

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

**Boiling Point:** 110.6°C (231.1°F)

**Melting Point:** -95°C (-139°F)

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

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

**Vapor Pressure:** 3.8 kPa (@ 25°C)

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

**Odor Threshold:** 1.6 ppm

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

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

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

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

---

**Section 10: Stability and Reactivity Data**

**Stability:** The product is stable.

**Instability Temperature:** Not available.

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

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

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

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

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

**Polymerization:** Will not occur.

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**Section 11: Toxicological Information**

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.
Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 636 mg/kg [Rat].
Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit].
Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

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

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

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

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

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

Section 12: Ecological Information

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

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may
arise.

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

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

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**Section 13: Disposal Considerations**

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

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**Section 14: Transport Information**

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

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

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

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**Section 15: Other Regulatory Information**

**Federal and State Regulations:**
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene
California prop. 65 (no significant risk level): Toluene: 7 mg/day (value)
California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value)
California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene
Connecticut hazardous material survey.: Toluene
Illinois toxic substances disclosure to employee act: Toluene
Illinois chemical safety act: Toluene
New York release reporting list: Toluene
Rhode Island RTK hazardous substances: Toluene
Pennsylvania RTK: Toluene
Florida: Toluene
Minnesota: Toluene
Michigan critical material: Toluene
Massachusetts RTK: Toluene
Massachusetts spill list: Toluene
New Jersey: Toluene
New Jersey spill list: Toluene
Louisiana spill reporting: Toluene
California Director's List of Hazardous Substances.: Toluene
TSCA 8(b) inventory: Toluene
TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92
SARA 313 toxic chemical notification and release reporting: Toluene
CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

**Other Regulations:**
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):**
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).
DSCL (EEC):
R11- Highly flammable.
R20- Harmful by inhalation.
S16- Keep away from sources of ignition - No smoking.
S25- Avoid contact with eyes.
S29- Do not empty into drains.
S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):
Health Hazard: 2
Fire Hazard: 3
Reactivity: 0
Personal Protection: h

National Fire Protection Association (U.S.A.):
Health: 2
Flammability: 3
Reactivity: 0
Specific hazard:

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

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 11/06/2008 12:00 PM

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Section 1 - Product and Company Identification

Product Identification: XYLENE
Date of MSDS: 01/01/1987 Technical Review Date: 06/26/1999
FSC: 6810 NIIN: 00-584-4071
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N
Manufacturer's Information

Manufacturer's Name: PHIPPS PRODUCTS CORP
Manufacturer's Address1: 186 LINCOLN ST SUITE 502
Manufacturer's Address2: BOSTON, MA 02111-2403
Manufacturer's Country: US
General Information Telephone: NONE
Emergency Telephone: NONE
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 86511
Special Project Code: N

Item Description

Item Name: XYLENE, TECHNICAL
Item Manager: S9G
Specification Number: 81345-ASTM D 846
Type/Grade/Class: NONE
Unit of Issue: QT
Unit of Issue Quantity: G
Type of Container: GLASS

Contractor Information

Contractor's Name: PHIPPS PRODUCTS CORP
Contractor's Address1: 186 LINCOLN ST SUITE 502
Contractor's Address2: BOSTON, MA 02111-2403
Contractor's Telephone: OUT OF BUSINESS
Contractor's CAGE: 86511

Section 2 - Composition/Information on Ingredients

Ingredient Name: XYLENES (O-, M-, P- ISOMERS) (SARA III)
Ingredient CAS Number: 1330-20-7 Ingredient CAS Code: M
RTECS Number: ZE2100000 RTECS Code: M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Environmental Weight: 
Other REC Limits: N/P 
OSHA PEL: 100 PPM/150 STEL OSHA PEL Code: M 
OSHA STEL: OSHA STEL Code: 
ACGIH TLV: 100 PPM/150STEL;9192 ACGIH TLV Code: M 
ACGIH STEL: N/P ACGIH STEL Code: 
EPA Reporting Quantity: 1000 LBS 
DOT Reporting Quantity: 1000 LBS 
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview

XYLENE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
IRRITATING RESPIRATORY TRACT.MAY CAUSE DIZZINESS, UNCONSCIOUSNESS, OR COMA.

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC 50 Mixture: N/P

Route of Entry Indicators:
Inhalation: N/P 
Skin: N/P 
Ingestion: N/P 

Carcinogenicity Indicators
NTP: N/P 
IARC: N/P 
OSHA: N/P 

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures

XYLENE

First Aid:
INHALE: REMOVE TO FRESH AIR, GIVE CPR/O*2 IF NEED; EYES/SKIN: FLUSH W LG AMTS H*2O FOR 15 MIN; INGEST: RINSE MOUTH; GET MEDICAL ATTENTION FOR EYES, BREATHING DIFFICULTY, OR OTHER SYMPTOMS OF OVEREXPOSURE.

Section 5 - Fire Fighting Measures

XYLENE

Fire Fighting Procedures:
USE NIOSH APPROVED SCBA TO FIGHT FIRES. COOL CNTNRS W.WATER
Unusual Fire or Explosion Hazard: 

12/16/2005
KEEP AWAY FROM HEAT AND OPEN FLAME. CLOSED CONTAINERS MAY EXPLODE IF EXPOSED TO EXTREME HEAT.

Extinguishing Media:
DRY CHEMICAL, CO₂, FOAM.

Flash Point: Flash Point Text: 28°C/82°F (T.C.C.)

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): 1.1
Upper Limit(s): 

Section 6 - Accidental Release Measures
XYLENE

Spill Release Procedures:
ISOLATE FROM SOURCE OF IGNITION. USE PERSONAL PROTECTION EQUIPMENT. COLLECT LEAKING LIQUID IN A SEALABLE CONTAINER, ABSORB SPILLED LIQUID IN SAND OR INERT ABSORBENT AND RECOVER IT FOR FURTHER DISPOSAL.

Section 7 - Handling and Storage
XYLENE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
XYLENE

Respiratory Protection:
USE NIOSH APPROVED RESPIRATOR XYLENE, IF IN EXCESS OF TLV.

Ventilation:
PROVIDE MECHAN(GEN/LOCAL EXHAUST) VENT TO MAINTN Protective Gloves:
IMPERVIOUS

Eye Protection:
SAFETY/ CHEM GOGGLES

Other Protective Equipment:
FULL PROTECTIVE CLOTHING, SAFETY SHOWER, EYE WASH STATION

Work Hygienic Practices: N/P

Supplemental Health & Safety Information:
MSDS DATED 5/19/83

Section 9 - Physical & Chemical Properties
XYLENE

HCC: F 3
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 139°C/283°F
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: 9.5 Vapor Density: 9.5
Percent Volatile Organic Content:  
Specific Gravity: 0.870  
Volatile Organic Content Pounds per Gallon: N/P  
Viscosity: N/P  
Evaporation Weight and Reference: 11.0 (ETHER=1)  
Solubility in Water: NEGLIGIBLE  
Appearance and Odor: CLEAR, WATER LIKE LIQUID  
Percent Volatiles by Volume: 100  
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
XYLENE

Stability Indicator: YES  
Materials to Avoid: STRONG OXIDIZERS.  
Stability Condition to Avoid: EXTREME HEAT.  
Hazardous Decomposition Products: INCOMPLETE COMBUSTION MAY GIVE CO AND/OR CO2.  
Hazardous Polymerization Indicator: NO  
Conditions to Avoid Polymerization: NONE SPECIFIED BY THE MFR.

Section 11 - Toxicological Information
XYLENE

Toxicological Information: N/P

Section 12 - Ecological Information
XYLENE

Ecological Information: N/P

Section 13 - Disposal Considerations
XYLENE

Waste Disposal Methods: CONSULT LOCAL AUTHORITIES. DISPOSAL MUST BE IAW LOCAL, STATE AND FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information
XYLENE

Transport Information: N/P

Section 15 - Regulatory Information
SARA Title III Information:
N/P

Federal Regulatory Information:
N/P

State Regulatory Information:
N/P

Section 16 - Other Information

Other Information:
N/P

HMIS Transportation Information

Product Identification: XYLENE
Transportation ID Number: 78109
Responsible Party CAGE: 86511
Date MSDS Prepared: 01/01/1987
Date MSDS Reviewed: 07/19/1988
MFN: 07/19/1988
Submitter: D DG
Status Code: C

Container Information
Unit of Issue: QT
Container Quantity: G
Type of Container: GLASS
Net Unit Weight:

Article without MSDS: N
Technical Entry NOS Shipping Number: XYLOL
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information
DOT Proper Shipping Name: XYLENES
DOT PSN Code: PWS
Symbols:

http://msds.ehs.cornell.edu/msds/msdsdod/a63/m31225.htm
12/16/2005
DOT PSN Modifier:
Hazard Class: 3
UN ID Number: UN1307
DOT Packaging Group: III
Label: FLAMMABLE LIQUID
Special Provision(s): B1,T1
Packaging Exception: 150
Non Bulk Packaging: 203
Bulk Packaging: 242
Maximum Quantity in Passenger Area: 60 L
Maximum Quantity in Cargo Area: 220 L
Stow in Vessel Requirements: A
Requirements Water/Sp/Other:

IMO Detail Information
IMO Proper Shipping Name: XYLOLS
IMO PSN Code: PPN
IMO PSN Modifier:
IMDG Page Number: SEE 3292
UN Number: 1307
UN Hazard Class: 3.2
IMO Packaging Group: II
Subsidiary Risk Label: -
EMS Number: 3-07
Medical First Aid Guide Number: 310

IATA Detail Information
IATA Proper Shipping Name: XYLENES
IATA PSN Code: ZPL
IATA PSN Modifier:
IATA UN Id Number: 1307
IATA UN Class: 3
Subsidiary Risk Class:
UN Packaging Group: III
IATA Label: FLAMMABLE LIQUID
Packaging Note for Passengers: 309
Maximum Quantity for Passengers: 60L
Packaging Note for Cargo: 310
Maximum Quantity for Cargo: 220L
Exceptions:

AFI Detail Information
AFI Proper Shipping Name: XYLENES
AFI Symbols:
AFI PSN Code: ZPL
AFI PSN Modifier:
AFI UN Id Number: UN1307
AFI Hazard Class: 3
AFI Packing Group: III
AFI Label:
Special Provisions: P5
Back Pack Reference: A 7.3

HAZCOM Label Information
Product Identification: XYLENE

http://msds.ehs.cornell.edu/msds/msdsdod/a63/m31225.htm 12/16/2005
CAGE: 86511
Assigned Individual: N
Company Name: PHIPPS PRODUCTS CORP
Company PO Box:
Company Street Address1: 186 LINCOLN ST SUITE 502
Company Street Address2: BOSTON, MA 02111-2403 US
Health Emergency Telephone:
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

8/7/2002 11:32:48 PM
Product ID: ZINC METAL
MSDS Date: 12/31/1985
FSC: 9650
NIIN: 00N056501
MSDS Number: BWGBT

--- Responsible Party ---
Company Name: E I DU PONT DE NEMOURS & CO INC
Address: 1007 MARKET ST
City: WILMINGTON
State: DE
ZIP: 19898
Country: US
Info Phone Num: 800-962-9919
Emergency Phone Num: 800-424-9300 (CHEMTREC)
CAGE: B0589

--- Contractor Identification ---
Company Name: E I DU PONT DE NEMOURS & CO INC
Address: RAKETSTRAAT, 100, RUE DE LA Fusee
City: BRUSSEL
Country: BE
Phone: 32-(0)15-401.505
CAGE: B0589
Company Name: E.I. DUPONT DE NEMOURS & CO
Address: 1007 MARKET STREET
Box: City: WILMINGTON
State: DE
ZIP: 19898
Country: US
Phone: 800-441-7515; 800-441-9442
CAGE: 18873

--- Composition/Information on Ingredients ---
Ingred Name: ZINC (SARA III)
CAS: 7440-66-6
RTECS #: ZG8600000
OSHA PEL: 10 MG/M3
ACGIH TLV: 10 MG/M3
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

--- Hazards Identification ---
LD50 LC50 Mixture: LD50 (MICE) = 15 MG/KG (INTERPERITONEAL)
Routes of Entry: Inhalation: NO Skin: NO Ingestion: YES
Reports of Carcinogenicity: NTP: NO IARC: NO OSHA: NO
Health Hazards Acute and Chronic: TOXIC IF INGESTED.
Explanation of Carcinogenicity: NOT RELEVANT
Effects of Overexposure: SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure: NONE SPECIFIED BY MANUFACTURER.

--- First Aid Measures ---
First Aid: INGEST: CALL MD IMMEDIATELY. INHAL: REMOVE TO FRESH AIR.
SUPPORT BREATHING (GIVE OXYGEN/ ARTIFICIAL RESPIRATION). EYES:
IMMEDIATELY FLUSH W/POTABLE WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD. SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. CALL MD.

===================== Fire Fighting Measures ======================
Extinguishing Media: DRY CHEMICAL.
Fire Fighting Procedures: USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT. NO SPECIAL PROCEDURES.
Unusual Fire/Explosion Hazard: EXPLOSIVE IF HIGH LEVELS OF DUST EXPOSED TO FIRE.

================== Accidental Release Measures ==================
Spill Release Procedures: NO SPECIAL PROCEDURES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

====================== Handling and Storage ======================
Handling and Storage Precautions: NO SPECIAL PROCEDURES.
Other Precautions: NONE SPECIFIED BY MANUFACTURER.

=============== Exposure Controls/Personal Protection ===============
Respiratory Protection: NONE. USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN.
Ventilation: LOCAL EXHAUST.
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: ANSI APPROVED SAFETY GLASSES.
Other Protective Equipment: NONE SPECIFIED BY MANUFACTURER.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health NONE SPECIFIED BY MANUFACTURER.

================= Physical/Chemical Properties ==================
Boiling Pt: B.P. Text: 1665F, 907C
Melt/Freeze Pt: M.P/F.P Text: 788F, 420C
Vapor Press: 1 @ 487C
Spec Gravity: 7.13
Evaporation Rate & Reference: 0
Solubility in Water: INSOLUBLE
Appearance and Odor: BLUISH-WHITE METAL.
Percent Volatiles by Volume: 0

================ Stability and Reactivity Data =================
Stability Indicator/Materials to Avoid: YES NONE.
Stability Condition to Avoid: NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products: NONE.

================ Disposal Considerations ==================
Waste Disposal Methods: SEPARATE FROM ACIDIC SOLUTIONS. DISPOSE OF BY MEANS AS TO COMPLY WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS OR CONTACT AN APPROVED AND LICENSED DISPOSAL AGENCY.

Disclaimer (provided with this information by the compiling agencies):
This information is formulated for use by elements of the Department of

of Defense. The United States of America in no manner whatsoever, expressly or implied, warrants this information to be accurate and disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.
ATTACHMENT D

Standard Safe Work Practices

1) Eating, drinking, chewing tobacco, smoking and carrying matches or lighters is prohibited in a contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.

2) Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., ground, etc.).

3) All field crew members should make use of their senses to alert them to potentially dangerous situations in which they should not become involved; i.e., presence of strong and irritating or nauseating odors.

4) Prevent, to the extent possible, spills. In the event that a spillage occurs, contain liquid if possible.

5) Field crew members shall be familiar with the physical characteristics of investigations, including:
   * Communication
   * Hot zone (areas of known or suspected contamination)
   * Site access
   * Nearest water sources

6) All wastes generated during activities on-site should be disposed of as directed by the project manager or his on-site representative.

7) Employees shall follow procedures to avoid at-risk behaviors that could result in an incident.
APPENDIX C
CITIZEN PARTICIPATION PLAN
CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and 125th and Lenox LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program (VCP). This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, 125th and Lenox LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (NYC OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to NYC OER’s project manager assigned to this Site, Michael Burke, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

**Project Contact List.** NYC OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by NYC OER’s project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.
Repositories. A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. 125th and Lenox LLC will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Address: Harlem Library

9 West 124th Street

New York, New York 10027

Phone: 212.348.5620

Hours of Operation: Sunday – Closed

Monday and Wednesday – 11 a.m. to 6 p.m.

Tuesday and Thursday – 12 p.m. to 7 p.m.

Friday and Saturday – 10 a.m. to 7 p.m.

Digital Documentation. NYC NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

Public Notice and Public Comment. Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by NYC OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by 125th and Lenox LLC, reviewed and approved by NYC OER prior to distribution and mailed by 125th and Lenox LLC. Public comment is solicited in public notices for all work plans developed under the NYC VCP. Final review of all work plans by NYC OER will consider all public comments. Approval will not be granted until the public comment period has been completed.
Citizen Participation Milestones. Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued. These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

  Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by NYC OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

  Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

  Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.
Flow Chart For NYC Brownfield Cleanup Program (NYC BCP)

Application Process

- Applicant submits NYC BCP Application
  - Including: Remedial Investigation Report, Draft Remedial Action Work Plan
  - Fact Sheet announcing Receipt of Application (for 30 days comment period)

  - Application completeness review by OER
    - Application returned to applicant for modification
      - Site Eligibility Determination by OER
        - Yes: OER notifies Applicant of acceptance to NYC BCP
        - No: OER notifies Applicant of Rejection from LBCP

    - OER notifies NYSDEC

    - OER Executes Agreement
      - Yes: CER approves RAWP
      - No: NYC BCP Enrollee Applies For BIG Program Cleanup Grant

Cleanup Process

- Fact Sheet announcing the approval of RAWP and start of cleanup
- Cleanup is performed
  - Track 1: Notice of Completion
  - Track 2 to 4: Green Property Certification
- Register deed restrictions
- Fact Sheet announcing completion of remedy, Remedial Action Report and the Notice of Completion
SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

**Reuse of Clean, Recyclable Materials.** Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the Remedial Action Report (RAR).

**Reduce Consumption of Virgin and Non-Renewable Resources.** Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

**Reduced Energy Consumption and Promotion of Greater Energy Efficiency.** Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the RAR. Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

**Conversion to Clean Fuels.** Use of clean fuel improves NYC’s air quality by reducing harmful emissions.
An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

**Recontamination Control.** Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

**Storm-water Retention.** Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC’s sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

**Linkage with Green Building.** Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

**Paperless Brownfield Cleanup Program.** 125th and Lenox LLC is participating in OER’s Paperless Voluntary Cleanup Program. Under this program, submission of
electronic documents will replace submission of hard copies for the review of project
documents, communications and milestone reports.

**Low-Energy Project Management Program.** 125th and Lenox LLC is participating in NYC OER’s low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

**Trees and Plantings.** Trees and other plantings provide habitat and add to NYC’s environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.
APPENDIX E

SOIL/MATERIALS MANAGEMENT PLAN
SOIL/MATERIALS MANAGEMENT PLAN

1.1 SOIL SCREENING METHODS

Visual, olfactory and photoionization detector (PID) soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional (QEP) and will be reported in the Remedial Action Report (RAR). Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

1.2 STOCKPILE METHODS

Excavated soil from suspected areas of contamination (e.g., hot spots, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by the New York City Office of Environmental Remediation (NYC OER). Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

1.3 CHARACTERIZATION OF EXCAVATED MATERIALS

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.
1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The professional engineer (PE)/QEP overseeing the remedial action will:

- Oversee remedial work and the excavation and load-out of excavated material;
- Ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- Ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this Remedial Action Work Plan (RAWP);
- Ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- Ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- Ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior NYC OER approval.

1.5 OFF-SITE MATERIALS TRANSPORT

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.
Outbound truck transport routes are shown in Figure 4. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 MATERIALS DISPOSAL OFF-SITE

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in Manhattan, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The RAR will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RAR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization
sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

1.7 MATERIALS REUSE ON-SITE

Soil and fill that is derived from the property that meets the soil cleanup objectives (SCO) established in this plan may be reused on Site. The SCOs for on-Site reuse are listed in Table 1. ‘Reuse on-Site’ means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the New York City Voluntary Cleanup Program (NYC VCP) agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

1.8 DEMARCATION

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.
This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet NYC OER-approved backfill and cover soil quality objectives for this Site.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

**Source Screening and Testing**

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:
- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

RCA will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

### 1.10 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City’s discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.
Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a State Pollutant Discharge Elimination System (SPDES) permit issued by New York State Department of Environmental Conservation (NYSDEC).

1.11 STORM-WATER POLLUTION PREVENTION

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYC OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer’s recommendations will be followed for replacing silt fencing damaged due to weathering.

1.12 CONTINGENCY PLAN

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to NYC OER’s Project Manager. Petroleum spills will be reported to the NYSDEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to NYC OER. Chemical analytical testing will be performed for Target Analyte List (TAL) metals, Target Compound List (TCL) volatiles and semi-volatiles, TCL pesticides and polychlorinated biphenyls (PCBs), as appropriate.
1.13 ODOR, DUST AND NUISANCE CONTROL

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYC OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP’s certifying the RAR.

Dust Control

Dust control during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. NYC OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP’s responsible for certifying the Remedial Action Report.
Other Nuisances

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.