

**59-63 NORTH 6<sup>TH</sup> STREET**

**BROOKLYN, NEW YORK**

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# **Remedial Action Work Plan**

**NYC BCP Number: 15CVCP028K**

**OER Project Number: 15EHAZ050K**

**Prepared for:**

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# REMEDIAL ACTION WORK PLAN

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## LIST OF ACRONYMS

| Acronym     | Definition   |
|-------------|--|
| AOC         | Area of Concern  |
| AS/SVE      | Air Sparging/Soil Vapor Extraction   |
| BOA         | Brownfield Opportunity Area  |
| CAMP        | Community Air Monitoring Plan  |
| C/D         | Construction/Demolition  |
| COC         | Certificate of Completion  |
| CQAP        | Construction Quality Assurance Plan  |
| CSOP        | Contractors Site Operation Plan  |
| DCR         | Declaration of Covenants and Restrictions  |
| ECs/ICs     | Engineering and Institutional Controls   |
| HASP        | Health and Safety Plan   |
| IRM         | Interim Remedial Measure   |
| VCA         | Voluntary Cleanup Agreement  |
| MNA         | Monitored Natural Attenuation  |
| NOC         | Notice of Completion   |
| NYC VCP     | New York City Voluntary Cleanup Program  |
| NYC DEP     | New York City Department of Environmental Protection   |
| NYC DOHMH   | New York State Department of Health and Mental Hygiene   |
| NYCRR       | New York Codes Rules and Regulations   |
| NYC OER     | New York City Office of Environmental Remediation  |
| NYS DEC     | New York State Department of Environmental Conservation  |
| NYS DEC DER | New York State Department of Environmental Conservation<br>Division of Environmental Remediation |
| NYS DOH     | New York State Department of Health  |
| NYS DOT     | New York State Department of Transportation  |
| ORC         | Oxygen-Release Compound  |
| OSHA        | United States Occupational Health and Safety<br>Administration                                   |

|       |  |
|-------|--|
| PE    | Professional Engineer                        |
| PID   | Photo Ionization Detector                    |
| QEP   | Qualified Environmental Professional         |
| QHHEA | Qualitative Human Health Exposure Assessment |
| RAOs  | Remedial Action Objectives                   |
| RAR   | Remedial Action Report                       |
| RAWP  | Remedial Action Work Plan or Plan            |
| RCA   | Recycled Concrete Aggregate                  |
| RD    | Remedial Design                              |
| RI    | Remedial Investigation                       |
| RMZ   | Residual Management Zone                     |
| SCOs  | Soil Cleanup Objectives                      |
| SCG   | Standards, Criteria and Guidance             |
| SMP   | Site Management Plan                         |
| SPDES | State Pollutant Discharge Elimination System |
| SVOC  | Semi-Volatile Organic Compound               |
| USGS  | United States Geological Survey              |
| UST   | Underground Storage Tank                     |
| VOC   | Volatile Organic Compound                    |

# CERTIFICATION

I, Andy Marshall, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 59-63 N. 6<sup>th</sup> Street, Brooklyn, NY VCP Site number: 15CVCP028K and OER Project Number 15EHAZ050K.

I, James Cressy am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 59-63 N. 6<sup>th</sup> Street, Brooklyn, NY VCP Site number: 15CVCP028K and OER Project Number 15EHAZ050K.

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.

\_\_\_\_\_  
Name

\_\_\_\_\_  
NYS PE License Number

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date



\_\_\_\_\_  
QEP Name

\_\_\_\_\_  
QEP Signature

\_\_\_\_\_  
Date

## EXECUTIVE SUMMARY

Mr. Rehan Perveez has applied to enroll in the New York City Voluntary Brownfield Cleanup Program (NYC VCP) to investigate and remediate a 7,500-square foot site located at 59-63 North 6<sup>th</sup> Street in Brooklyn, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

### **Site Location and Current Usage**

The Site is located in the Williamsburg section of Brooklyn, New York and is identified as Block 2325 and Lots 27, 28 & 29 on the New York City Tax Map. **Figure 1** is a Site location map. The Site is 7,500-square feet and is bounded by residential buildings to the north, North 6 Street, a commercial building and a restaurant to the south, a residential building to the east, and a mixed-use building to the west. Currently, the Site is a vacant parking lot, containing a one-story cargo-container in the southeastern portion. The property is zoned as M1-2/R6A: Manufacturing/Residential District. The occupancy code with the Department of Finance for the subject property is listed as vacant land. The Little “E” restriction for the subject property is listed as “Hazmat” and, according to CEQR Table 11-3, is based on 55-gallon drums identified at the adjacent E Designation Site 202, Lot 25.

### **Summary of Proposed Redevelopment Plan**

The proposed site redevelopment plan will establish two one-story commercial buildings with cellars that cover the entire footprint of the Site. It will require the excavation of the entire Site to approximately 11 ft bgs. The one-story cell is going to be utilized for storage, while the grade-level will be utilized for commercial uses. There will not be any landscape area. The proposed redevelopment plan is presented in **Figure 3** and **Appendix 2**.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

### **Summary of Environmental Findings**

1. Elevation of the property ranges from approximately 21 to 25 feet mean sea level.
2. Depth to groundwater ranges from approximately 21 to 24 feet at the Site.
3. Groundwater flow is generally towards the east/northeast at the Site.
4. Depth to bedrock is greater than 25 feet at the Site.
5. The stratigraphy of the site, from the surface, consists of generally approximately two feet, and up to seven feet, of fill underlain by natural fine to medium, to fine sand layers to at least 25 feet below ground surface.
6. The soil sampling results were compared to the New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR Part 375 Table 6.8 Soil Cleanup Objectives (SCOs) for Unrestricted Use and Restricted Residential Use SCOs. Soil sampling results indicated two VOCs, acetone (max 100 ug/kg) and methylene chloride (53 ug/kg) exceeded Unrestricted Use SCOs. Several semi-volatile organic compounds (SVOCs) including benz(a)anthracene (max 28,000 ug/kg), benzo(a)pyrene (max 20,000 ug/kg), benzo(b)fluranthene (max 28,000 ug/kg), benzo(k)fluoranthene (max 8,500 ug/kg), chrysene (max 24,000 ug/kg), and indeno(1,2,3-cd)pyrene (max 8,400 ug/kg) exceeded Restricted Residential Use SCOs in shallow soils. All SVOCs were below Unrestricted Use SCOS in deeper soils. One polychlorinated biphenyls (PCB) was detected above Unrestricted Use SCOs: PCB-1260 (270 ug/kg). Two pesticides were detected above Unrestricted Use SCOs, 4,4'-DDE (25 ug/kg) and 4,4'-DDT (40 ug/kg), but were well below Restricted Use SCOs. Several metals including arsenic (max 15.5 mg/kg), barium (max 480 mg/kg), cadmium (max 4.47 mg/kg), chromium (max 58.5 mg/kg), copper (max 135 mg/kg), lead (max 1,230 mg/kg), mercury (max 0.82 mg/kg), nickel (max 37.8 mg/kg), and zinc (max 652 mg/kg) exceeded Unrestricted Use SCOs in shallow soils. Of these, arsenic, barium, cadmium, lead and mercury also exceeded Restricted residential Use SCOs. Only chromium at 36.4 mg/kg exceeded Unrestricted

Use SCOs in one deeper soil sample. Overall, soil chemistry is unremarkable and does not indicate any disposal.

7. Groundwater samples collected during the investigation were compared to NYSDEC Technical & Operational Guidance Series (TOGS) Ambient Water Quality Standards (GQS). Two VOCs, naphthalene (max 8.7 ug/L) and trichloroethene (max 4.3 ug/L), were detected at trace concentrations below their respective GQS. Several SVOCs were detected in all of the groundwater samples exceeding GQS. These included benzo(a)anthracene (max 3.1 ug/L), benzo(a)pyrene (max 2.2 ug/L), (b)fluoranthene (max 3 ug/L), benzo(k)fluoranthene (max 1 ug/L), chrysene (max 3 ug/L), and indeno(1,2,3-cd)pyrene (max 1 ug/L). One PCB was above its detection limit, but below its respective GQS. Pesticides were not detected above their detection limit. Several metals were identified but only aluminium (max 0.31 ug/L), manganese (max 3.98 ug/L), and sodium (max 57.2 ug/L) were detected above their respective GQS.
8. Soil vapor samples collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor results showed a wide range of VOCs at low to moderate concentrations. Most compounds were detected at less than 20  $\mu\text{g}/\text{m}^3$  except for acetone (max. of 750  $\mu\text{g}/\text{m}^3$ ). Petroleum related VOCs (BTEX) ranged from 105  $\mu\text{g}/\text{m}^3$  to 260  $\mu\text{g}/\text{m}^3$ . Chlorinated VOCs, trichloroethane was detected in three of four samples at a maximum concentration of 4  $\mu\text{g}/\text{m}^3$ . Tetrachloroethylene (max. 502  $\mu\text{g}/\text{m}^3$ ) was detected in four of eight samples and ranged from 0.6  $\mu\text{g}/\text{m}^3$  to 502  $\mu\text{g}/\text{m}^3$ . TCA was detected at 21  $\mu\text{g}/\text{m}^3$  and carbontetrachloride was not detected. Concentrations of PCE are elevated and require mitigation per matrix established by NYSDOH.

### **Summary of the Remedy**

The preferred remedial action is Alternative 1, 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 remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial

action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and implementation of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Selection of 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency specified by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted along with the disposal facility approval letter to NYCOER prior to the start of the remedial action.
6. Excavation and removal of soil/fill exceeding Track 1 Unrestricted Use SCOs. For development purposes, the entire footprint of the Site will be excavated to a depth of approximately 11 feet below grade for the new building's cellar level. Approximately 5,400 tons of soil will be excavated and removed from this Site.
7. 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 on-Site.

8. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials as described in Appendix 4.
9. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
10. 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.
11. Collection and analysis of four end-point samples to determine the performance of the remedy with respect to attainment of Unrestricted Use SCOs.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
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. Maintenance of records as described in this RAWP, including waste disposal manifests, clean fill/top soil sampling results, and appropriate health and safety forms and documentation.
16. Submission of a RAR that describe the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and if Track 1 SCOs are not achieved, describes all Engineering and Institutional Controls to be implemented at the Site.

If Track 1 Unrestricted Use SCOs are not achieved, the following construction elements implemented will constitute Engineering and Institutional controls:

17. As part of new development, installation and operation of a passive sub-slab depressurization system.
18. As part of new development, installation of a vapor barrier system below the concrete slab of the building as well as behind foundation walls of the proposed building. The proposed vapor barrier system will be manufactured by Grace Construction Products and will consists of Preprufe 160<sup>®</sup> and 300<sup>®</sup> Florprufe 120<sup>®</sup> and Bituthene<sup>®</sup> 3000/4000, or similar.
19. As part of development, construction and maintenance of an engineered composite cover consisting of 6” concrete building slab to prevent human exposure to residual soil/fill remaining under the Site.
20. If Track 1 SCOs are 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.
21. If Track 1 SCOs are not achieved, the property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

## COMMUNITY PROTECTION STATEMENT

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

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

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

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

**Qualitative Human Health Exposure Assessment.** An important part of the cleanup planning for the Site is the performance of a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). 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 Construction Health and Safety Plan (CHASP) 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 (OSHA). 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 James Cressy and can be reached at 631-616-4000 (o) 631-365-6118 (c).

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

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

**Odor, Dust and Noise Control.** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical cover, 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 onsite Project Manager James Cressy at 631-616-4000 or NYC Office of Environmental Remediation Project Manager Amanda Duchesne at 212-341-2077.

**Quality Assurance.** This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

**Storm-Water Management.** To limit the potential for soil erosion and discharge, this cleanup plan has provisions for storm-water management. The main elements of the storm water management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

**Hours of Operation.** The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation are 7 am to 5 pm during weekdays.

**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 Voluntary Cleanup Program, provides project contact names and numbers, and locations of project documents can be viewed.

**Complaint Management.** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager James Cressy at 631-616-4000, the NYC Office of Environmental Remediation Project Manager Amanda Duchesne at 2-2-341-2077, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

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

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

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

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

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

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

**Truck Routing.** Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the

property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

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

**Long-Term Site Management.** If long-term protection is required after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined in the property's deed or established through a city environmental designation. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

# REMEDIAL ACTION WORK PLAN

## 1.0 SITE BACKGROUND

Mr. Rehan Perveez has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 59-63 North 6<sup>th</sup> Street in the Williamsburg section of Brooklyn, 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, 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 in the Williamsburg section of Brooklyn, New York and is identified as Block 2325 and Lots 27, 28 & 29 on the New York City Tax Map. **Figure 1** is a Site location map. The Site is 7,500-square feet and is bounded by residential buildings to the north, North 6 Street, a commercial building and a restaurant to the south, a residential building to the east, and a mixed-use building to the west. Currently, the Site is a vacant parking lot, containing a one-story cargo-container in the southeastern portion. The property is zoned as M1-2/R6A: Manufacturing/Residential District. The occupancy code with the Department of Finance for the subject property is listed as vacant land. The Little “E” restriction for the subject property is listed as “Hazmat” and, according to CEQR Table 11-3, is based on 55-gallon drums identified at the adjacent E Designation Site 202, Lot 25.

## 1.2 PROPOSED REDEVELOPMENT PLAN

The proposed site redevelopment plan will establish two one-story commercial buildings with cellars that cover the entire footprint of the Site. It will require the excavation of the entire Site to approximately 11 ft bgs. The one-story cell is going to be utilized for storage, while the grade-level will be utilized for commercial uses. There will not be any landscape area. The proposed redevelopment plan is presented in **Figure 3** and **Appendix 2**.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

## 1.3 DESCRIPTION OF SURROUNDING PROPERTY

The current and past usage of the adjoining properties consisted of commercial, industrial, and residential buildings (see existing Phase I ESA in **Appendix 1**). Details of the current adjacent site uses are provided below.

North – a 1- and a 2-story residential building

South (across North 6<sup>th</sup> Street) – a 1-story commercial building and restaurant

East – a 6-story residential building

West – a 2-story mixed use building

**Figure 2** shows the surrounding land usage.

## 1.4 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document called “*Phase II Investigation Report*”, dated August 2014 (RIR).

### **Summary of Past Uses of Site and Areas of Concern**

Historical site usage was residential through 1951. Sometime between 1951 and 1965 the subject property became vacant land and the site usage was changed to a parking lot. City Directory Abstract files, from the Phase I ESA, indicate that the current owner, Mr. Rehan

Perveez, has owned the property since at least 1997, with private individual owners prior to that period.

The on-site and primary off-site RECs are:

- The Little "E" designation for the Hazmat classification of the subject property
- The historical usage of the subject property as a parking lot
- The historical usage of the property to the south for paint manufacturing and chemical storage
- The historical usage of the western adjacent property for chemical storage

### **Summary of the Work Performed under the Phase II Investigation**

GEI performed the following scope of work, the scope of which was approved by the Mayor's Office of Environmental Remediation (MOER):

1. A geophysical survey
2. Six soil borings across the entire project Site, and the collection of 12 soil samples for chemical analysis (one near the surface and one near the planned excavation depth)
3. Three groundwater monitoring wells throughout the Site and the collection of groundwater samples for chemical analysis
4. Four soil vapor probes around the Site perimeter and the collection of four samples for chemical analysis

### **Summary of Environmental Findings**

1. Elevation of the property ranges from approximately 21 to 25 feet mean sea level.
2. Depth to groundwater ranges from approximately 21 to 24 feet at the Site.
3. Groundwater flow is generally towards the east/northeast at the Site.
4. Depth to bedrock is greater than 25 feet at the Site.

5. The stratigraphy of the site, from the surface, consists of generally approximately two feet, and up to seven feet, of fill underlain by natural fine to medium, to fine sand layers to at least 25 feet below ground surface.
  
6. The soil sampling results were compared to the New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR Part 375 Table 6.8 Soil Cleanup Objectives (SCOs) for Unrestricted Use and Restricted Residential Use SCOs. Soil sampling results indicated two VOCs, acetone (max 100 ug/kg) and methylene chloride (53 ug/kg) exceeded Unrestricted Use SCOs. Several semi-volatile organic compounds (SVOCs) including benz(a)anthracene (max 28,000 ug/kg), benzo(a)pyrene (max 20,000 ug/kg), benzo(b)fluoranthene (max 28,000 ug/kg), benzo(k)fluoranthene (max 8,500 ug/kg), chrysene (max 24,000 ug/kg), and indeno(1,2,3-cd)pyrene (max 8,400 ug/kg) exceeded Restricted Residential Use SCOs in shallow soils. All SVOCs were below Unrestricted Use SCOS in deeper soils. One polychlorinated biphenyls (PCB) was detected above Unrestricted Use SCOs: PCB-1260 (270 ug/kg). Two pesticides were detected above Unrestricted Use SCOs, 4,4'-DDE (25 ug/kg) and 4,4'-DDT (40 ug/kg), but were well below Restricted Use SCOs. Several metals including arsenic (max 15.5 mg/kg), barium (max 480 mg/kg), cadmium (max 4.47 mg/kg), chromium (max 58.5 mg/kg), copper (max 135 mg/kg), lead (max 1,230 mg/kg), mercury (max 0.82 mg/kg), nickel (max 37.8 mg/kg), and zinc (max 652 mg/kg) exceeded Unrestricted Use SCOs in shallow soils. Of these, arsenic, barium, cadmium, lead and mercury also exceeded Restricted residential Use SCOs. Only chromium at 36.4 mg/kg exceeded Unrestricted Use SCOs in one deeper soil sample. Overall, soil chemistry is unremarkable and does not indicate any disposal.
  
7. Groundwater samples collected during the investigation were compared to NYSDEC Technical & Operational Guidance Series (TOGS) Ambient Water Quality Standards (GQS). Two VOCs, naphthalene (max 8.7 ug/L) and trichloroethene (max 4.3 ug/L), were detected at trace concentrations below their respective GQS. Several SVOCs were detected in all of the groundwater samples exceeding GQS. These included benzo(a)anthracene (max 3.1 ug/L), benzo(a)pyrene (max 2.2 ug/L), (b)fluoranthene (max 3 ug/L), benzo(k)fluoranthene (max 1 ug/L), chrysene (max 3 ug/L), and

indeno(1,2,3-cd)pyrene (max 1 ug/L). One PCB was above its detection limit, but below its respective GQS. Pesticides were not detected above their detection limit. Several metals were identified but only aluminium (max 0.31 ug/L), manganese (max 3.98 ug/L), and sodium (max 57.2 ug/L) were detected above their respective GQS.

8. Soil vapor samples collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor results showed a wide range of VOCs at low to moderate concentrations. Most compounds were detected at less than 20  $\mu\text{g}/\text{m}^3$  except for acetone (max. of 750  $\mu\text{g}/\text{m}^3$ ). Petroleum related VOCs (BTEX) ranged from 105  $\mu\text{g}/\text{m}^3$  to 260  $\mu\text{g}/\text{m}^3$ . Chlorinated VOCs, trichloroethane was detected in three of four samples at a maximum concentration of 4  $\mu\text{g}/\text{m}^3$ . Tetrachloroethylene (max. 502  $\mu\text{g}/\text{m}^3$ ) was detected in four of eight samples and ranged from 0.6  $\mu\text{g}/\text{m}^3$  to 502  $\mu\text{g}/\text{m}^3$ . TCA was detected at 21  $\mu\text{g}/\text{m}^3$  and carbontetrachloride was not detected. Concentrations of PCE are elevated and require mitigation per matrix established by NYSDOH.

**Table 1** through **Table 3** summarized the laboratory analysis results from the RIR.

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 Remedial Action Objectives (RAOs) have been identified for this Site:

### **Groundwater**

- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

### **Soil**

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from 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 is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). A remedy is then developed based on the following ten criteria:

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

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

**Alternative 1** would involve the following remedial actions:

- Selection of 6 NYCRR Part 703.5 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs);
- Removal of all soil/ fill exceeding Track 1 Unrestricted Use SCOs throughout the site and confirmation that Track 1 SCOs have been achieved with post-excavation endpoint sampling. If soil/fill containing analytes at concentrations above Track 1 SCOs is present

after removal of soil required for construction, additional excavation will be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCOs;

- No Engineering or Institutional Controls are required for a Track 1 cleanup, but a vapor barrier would be installed beneath the basement foundation and behind foundation sidewalls of the new building as a part of development to prevent any potential future exposures from off-Site soil vapor;
- As part of new development, a sub-slab depressurization system will be installed and operated in accordance with NYC Building Code requirements; and
- As part of new development, placement of a final cover consisting of concrete foundation slabs over the entire site.

**Alternative 2** would involve the following remedial actions:

- Establishment of Track 4 site-specific SCOs;
- Removal of all soil/ fill exceeding Track 4 Site Specific SCOs and confirmation that SCOs have been achieved with post-excavation endpoint sampling. Excavation for development purposes would take place to a minimum depth of approximately 11 feet below ground surface, which includes an average of approximately 7 feet of urban fill and 4 feet of soil. Therefore, if soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs;
- Placement of a final cover consisting of concrete foundation slabs over the entire site;
- 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 engineering and institutional controls (EC/ICs) including the

performance of periodic inspections and certification that the controls are performing as they were intended; and

- Maintenance of the Hazardous Materials Restrictive Declaration 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. Registration of the Restrictive Declaration at the NYC Buildings Department.
- As part of new development, construction of a sub-slab depressurization system in accordance with NYC Building Code requirements; and
- Installation of a vapor barrier system beneath the cellar slab and behind all subsurface sidewalls to grade. This construction measure will prevent potential soil vapor intrusion into the new buildings.

### **3.1 THRESHOLD CRITERIA**

#### **Protection of Public Health and the Environment**

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

Alternative 1 – Alternative 1 would be protective of human health and the environment by removing historic fill/soil exceeding Unrestricted Use Track 1 SCOs and groundwater protection standards, thus eliminating potential for exposure to contaminated soil/fill once construction is complete and eliminating the risk of contamination leaching into groundwater. Construction measures, including installation of the sub-slab depressurization system, a waterproofing/vapor barrier and site capping, would further support the remedy.

Alternative 2 – Alternative 2 would achieve comparable protections of human health and the environment by removing most contaminated soil/fill and by ensuring that remaining soil/fill on-site meets Track 4 Site Specific SCOs as well as by placement of Engineering and Institutional

Controls (EC/ICs) on the site. The composite cover system would prevent direct contact with and ingestion of any remaining soil/fill and would limit the risk of contamination leaching into groundwater. The waterproofing membrane/vapor barrier would prevent any contaminants volatilizing from soil or groundwater and entering new dwelling. Implementing ICs including a SMP and maintenance of the “E” designation on the property would ensure that the engineering controls remain intact and protective.

For both alternatives, potential exposure to contaminated soils and groundwater during construction would be minimized by implementing a CHASP, an approved Soil and Materials Management Plan (SMMP) and Community Air Monitoring Plan (CAMP). Potential future migration of off-Site vapors into the new building would be prevented by a passive SSDS as well as, by installing a vapor barrier/waterproofing system beneath the new building’s basement slab and continuing the vapor barrier around foundation walls.

### **3.2. BALANCING CRITERIA**

#### **Compliance with Standards, Criteria and Guidance (SCGs)**

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

Alternative 1 – Alternative 1 would achieve compliance with the remedial goals, chemical specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and groundwater protection standards. Compliance with SCGs for soil vapor would also be achieved by the construction of a sub-slab depressurization system and incorporation of a waterproofing/vapor barrier into the building foundation system.

Alternative 2 – Alternative 2 would achieve compliance with the remedial goals, chemical specific SCGs and RAOs for soil through removal of soil to achieve Track 4 Site Specific SCOs and construction and maintenance of engineering controls on site. Compliance with SCGs for soil vapor would also be achieved by the construction of a sub-slab depressurization system and incorporation of a waterproofing/vapor barrier into the building foundation system. A SMP

would ensure that these controls remained protective for the long term. Compliance with groundwater SCGs would be achieved over the long term by excavation and removal of soil exceeding Track 4 Site Specific SCOs and by restricting use of groundwater.

Health and Safety measures contained in the CHASP and CAMP that comply with the applicable SCGs would be implemented during the site redevelopment in this RAWP. For both alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. United States Occupational Health and Safety Administration (OSHA) requirements for on-site construction safety would also be followed by the site contractors. These measures would protect on-site workers and the surrounding community from exposures 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 alternatives have similar short term impacts during their respective implementation, as each requires excavation of soil/fill material at least 11 feet bgs. Both remedial alternatives would result in similar dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Truck traffic would be routed on the most direct course using major thoroughfares where possible and flaggers would be used to protect pedestrians at site entrances and exits. 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.

Both alternatives would employ appropriate measures to prevent short term impacts, including a CAMP and an SMMP, during all on-site soil disturbance activities and would

minimize the release of contaminants into the environment. Both alternatives provide short term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-site contaminants through employment of CAMP and operational measures to control dust and site vapors. Construction workers operating under appropriate management procedures and a CHASP would be protected from on-site contaminants (personal protective equipment would be worn consistent with the document risk within the respective work zones).

### **Long-term effectiveness and permanence**

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

Alternative 1 – The Track 1 remedy would achieve long-term effectiveness and permanence related to on-site contamination by permanently removing all impacted soil/fill. Removal of on-site contaminant sources would also prevent impacts to groundwater. Construction measures, including installation of a waterproofing/vapor barrier system and construction of a sub-slab depressurization system would prevent potential future migration of soil vapors into the new building.

Alternative 2 – The Track 4 remedy would provide long-term effectiveness by removing the majority of on-site contamination and attaining Track 4 Site Specific SCOs; by establishing Engineering Controls, including a composite cover system and a waterproofing/vapor barrier system; and establishing Institutional Controls, including use restrictions, a SMP, and continuation of the Restrictive Declaration to memorialize these controls for the long term. The SMP will ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and use restrictions continue to be in place and are functioning as they were intended to assure that protections designed into the remedy would provide continued high level of protection in perpetuity.

Both alternatives would result in removal of soil contamination exceeding the SCOs providing a high level, effective and permanent remedy over the long-term with respect to a remedy for contaminated soil, which would minimize or prevent any migration to groundwater.

### **Reduction of toxicity, mobility, or volume of contaminated material**

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

Alternative 1 – The Track 1 remedy would provide the maximum reduction of toxicity, mobility, and volume of contaminated material through the removal of historic fill and soil exceeding Track 1 SCOs.

Alternative 2 – Alternative 2 would remove most of the impacted soil present on the site and remaining soil beneath the composite cover would meet Track 4 Site Specific SCOs. Containment would be used to eliminate exposure to contaminants that remain at the site.

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 would utilize standard methods that are commonly available and routinely applied by the industry. They would use standard materials and services that are well established and administratively and technically feasible. The reliability of each remedy would also high; however, the permanence of the removal effort in Alternative 1 is greater than Alternative 2, which would rely on institutional and engineering controls. 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.

Since historic fill at the Site was found during the RIR to only extend to a depth of up to 2 feet below grade, and the new building requires excavation of the entire Site to a depth of 11 feet, the costs associated with both Alternative 1 and Alternative 2 will likely be the comparable. Under Alternative 1, the site will be remediated to an unrestricted-use level, there are no operations, maintenance, or monitoring costs associated with the proposed remedy. Long-term costs associated with Alternative 2 would be higher than Alternative 1 based on the need to maintain engineering and institutional controls.

The remedial plan creates an approach that combines the remedial action with the redevelopment of the Site, including the construction of the building foundation and subgrade structures. The remedial plan is also cost effective in that it will take into consideration the selection of the most appropriate disposal facilities to reduce transportation and disposal costs during the excavation of historic fill and other soils during the redevelopment of the Site.

### **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, no adverse community opinion is anticipated for either alternative. This RAWP will be subject to a public review under the NYC

VCP and will provide the opportunity for public input on the selected remedial actions. Any public comments related to environmental remediation will be considered by NYC OER prior to approval of this plan.

### **Land use**

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

The current, intended, and reasonably anticipated future land use of the site would be compatible with the selected remedies under both alternatives. The proposed development will include two 1-story commercial buildings with cellars, which will cover the entire site footprint. The reasonably anticipated future use of the site and its surroundings will be documented by the applicant in the NYC VCP application, which will include the following statements:

The proposed redevelopment of the site is compatible with its current zoning and is consistent with recent development patterns. The areas surrounding the site are urban and consist predominantly of multi-story commercial and residential buildings in zoning districts designated for commercial, residential and manufacturing uses. There are no areas zoned for agricultural use in the proximity of the site. The proposed development would create new employment opportunities, living space, and economic and fiscal benefits to the City and State in the form of economic revitalization and tax revenue. The site is accessible to existing infrastructure.

The proposed use will not cause or increase a disproportionate burden on the community in which the site is located. In addition, temporary short-term project impacts would be mitigated through site management controls and truck traffic controls during remediation activities. Following remediation, the site will meet either Track 1 Unrestricted Use SCOs or Track 4 Site Specific SCOs, both of which are appropriate for its planned commercial and residential use.

The site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The site is located in an urban area with limited proximity to fish or wildlife. Both alternatives would prevent any potential exposure pathways of contaminant migration affecting fish or wildlife. Municipal water supply wells are not present in New York City; therefore, groundwater from the site cannot affect municipal water supply wells or recharge areas. The site does not lie in a Federal Emergency Management Agency (FEMA)-designated flood plain. Both alternatives are equally protective of natural resources and cultural resources.

### **Sustainability of the Remedial Action**

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

The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. New York City Clean Soil Bank program may be utilized for backfill clean soils. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. A complete list of green remedial

activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix 7.

## **4.0 REMEDIAL ACTION**

### **4.1 SUMMARY OF PREFERRED REMEDIAL ACTION**

The preferred remedial action alternative is Alternative 1, 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 remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and implementation of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Selection of 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency specified by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted along with the disposal facility approval letter to NYCOER prior to the start of the remedial action.

6. Excavation and removal of soil/fill exceeding Track 1 Unrestricted Use SCOs. For development purposes, the entire footprint of the Site will be excavated to a depth of approximately 11 feet below grade for the new building's cellar level. Approximately 5,400 tons of soil will be excavated and removed from this Site.
7. 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 on-Site.
8. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials as described in Appendix 4.
9. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
10. 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.
11. Collection and analysis of four end-point samples to determine the performance of the remedy with respect to attainment of Unrestricted Use SCOs.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
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. Maintenance of records as described in this RAWP, including waste disposal manifests, clean fill/top soil sampling results, and appropriate health and safety forms and documentation.
16. Submission of a RAR that describe the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and if Track 1 SCOs are not achieved, describes all Engineering and Institutional Controls to be implemented at the Site.

If Track 1 Unrestricted Use SCOs are not achieved, the following construction elements implemented will constitute Engineering and Institutional controls:

17. As part of new development, installation and operation of a passive sub-slab depressurization system.
18. As part of new development, installation of a vapor barrier system below the concrete slab of the building as well as behind foundation walls of the proposed building. The proposed vapor barrier system will be manufactured by Grace Construction Products and will consists of Preprufe 160<sup>®</sup> and 300<sup>®</sup> Florprufe 120<sup>®</sup> and Bituthene<sup>®</sup> 3000/4000, or similar.
19. As part of development, construction and maintenance of an engineered composite cover consisting of 6” concrete building slab to prevent human exposure to residual soil/fill remaining under the Site.
20. If Track 1 SCOs are 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.

If Track 1 SCOs are not achieved, the property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment

rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

#### 4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

Track 1 Soil Cleanup Objectives (SCOs) are proposed for this project. The SCOs for this Site are listed in NYSDEC 6NYCRR Part 375 Table 6.8(a) Unrestricted Use SCOs and are included in **Table 4**. If Unrestricted Use Track 1 SCOs are not achieved, Track 2 Restricted Residential Use SCOs as listed in 6 NYCRR Part 375, Table 6.8 (b) will be used as amended by following Site Specific Use SCOs:

| <u>Contaminant</u> | <u>Track 4 SCOs</u> |
|--------------------|---------------------|
| Total SVOCs        | 250 ppm             |
| Barium             | 600 ppm             |
| Mercury            | 1.5 ppm             |
| Lead               | 1,000 ppm           |

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in **Appendix 4**. The location of planned excavations is shown in **Figure 5**.

Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Soil and materials management on-site and off-site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan provided in Appendix 4. The location of planned excavations is depicted on in Figure 5.

## **Estimated Soil/Fill Removal Quantities**

The proposed cellar will be constructed to a depth of 10 ft bgs along N. 6<sup>th</sup> Street, and approximately 14 ft bgs along the northern boundary of the Site. Excavation will extend to approximately 11 ft bgs at southern end and 15 ft at northern end to accommodate sub-base material (i.e. gravel for sub-slab depressurization system, etc) below the foundation slab. Bedrock will not be encountered during the excavation. All the soil and fill within the site footprint will be excavated and disposed off-site to accommodate the proposed development. The excavation is expected to result in removal of approximately 3,600 cubic yards of soil.

Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

## **End-Point Sampling**

Removal actions for development purposes under this plan will be performed in conjunction with confirmation soil sampling. Four (4) confirmation samples will be collected from the base of the excavation. Proposed endpoint sampling locations are presented on **Figure 4**.

For comparison to Track 1 SCOs, analytes will include VOCs, SVOC, pesticides, PCBs and metals according to analytical methods described below. For comparison to Track 4 SCOs, analytes will only include trigger compounds and elements established on the Track 4 SCO list.

Hot-spot removal actions, whether established under this RAWP or identified during the remedial program, will be performed in conjunction with post remedial end-point samples to ensure that hot-spots are fully removed. Analytes for end-point sampling will be those parameters that are driving the hot-spot removal action and will be approved by OER. Frequency for hot-spot end-point sample collection is as follows:

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

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

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

4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

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

New York State ELAP certified labs will be used for all confirmation and end-point sample analyses. Labs performing confirmation and end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all confirmation and end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be Confirmation samples will be analyzed for compounds and elements as described above utilizing the following methodology:

Soil analytical methods will include:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;

- Target Analyte List metals; and
- Pesticides/PCBs by EPA Method 8081/8082.

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

### **Quality Assurance/Quality Control**

One duplicate soil sample for each of 20 samples collected will be analyzed to maintain property quality assurance and quality control (QA/QC) and detect any lab artifacts. One duplicate sample will be collected during the endpoint sampling for this project. The duplicate sample will be analyzed for the same parameters as the endpoint samples.

### **Import and Reuse of Soils**

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in **Appendix 4**. No soil is to be imported into the Site for backfill. No onsite soil/fill is expected to be reused /relocated on Site.

## **4.3 ENGINEERING CONTROLS**

Track 1 remedial actions do not require Engineering Controls. If Track 1 SCOs are not achieved, the following Engineering Controls will be employed:

- vapor barrier;
- Composite cover system and
- Sub-slab depressurization system.

### **Composite Cover System**

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of:

- Concrete covered sidewalks
- 6-inch concrete building slabs

**Figure 6** shows the typical design for composite cover system to be used on this Site.

The composite cover system is a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the RAR.

### **Vapor Barrier**

Migration of soil vapor will be mitigated with a combination of building slab and vapor barrier.

As a precaution against potential infiltration of soil vapors into the sub-grade building, a vapor barrier system will be installed between the concrete cellar slab and underlying sub-grade layer, extending along the four walls of the cellar structure from the base of the excavation to surface grade level. The vapor barrier system will have a minimum thickness of 20 mils. As-built vapor barrier drawings, photographs of the installation process, a PE/RA certified letter from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturers certificate of warranty will be submitted with the RAR.

The proposed vapor barrier will be manufactured by Grace Construction Products and will consist of Preprufe 160<sup>®</sup> and 300R<sup>®</sup>, Florprufe 120<sup>®</sup>, and Bituthene<sup>®</sup> 3000/4000, or similar. The extent of the vapor barrier is shown on **Figure 7**. Design diagrams and specifications by the manufacturer stating the types of vapor barrier products to be installed for the project are provided in **Appendix 6**.

A Professional Engineer, licensed by the State of New York, will have primary direct responsibility for overseeing the implementation of the vapor barrier. The Remedial Engineer will oversee and document the waterproofing/vapor barrier installation. The Remedial Action Closure Report will include photographs of the installation process, PE/RA certified letter from

primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturer's certificate of warranty.

### **Sub-Slab Depressurization System**

Migration of soil vapor will be mitigated with the construction of a (active/passive) sub-slab depressurization system.

As part of the development plan, a passive sub-slab depressurization system in accordance with the NYC building code will be constructed in beneath the cellar. The operation of this ventilation system will prevent accumulation of potential soil vapor in the cellar and into the occupied above-grade spaces of the building. The details of the passive sub-slab depressurization system are shown on **Figure 8**.

## **4.4 INSTITUTIONAL CONTROLS**

Track 1 remedial actions do not require Engineering Controls. If Track 1 SCOs are not achieved, Institutional Controls (IC) will be utilized in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below. Long-term employment of EC/ICs will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR.

Institutional Controls for this remedial action are:

- The property will continue to be registered with an E-Designation at the NYC Buildings Department. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ECs. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that

impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determined by OER in the SMP and will comply with RCNY §43-1407(1)(3).

- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- 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 commercial use and will not be used for a higher level of use without prior approval by OER.

#### **4.5 SITE MANAGEMENT PLAN**

Site Management is not required for Track 1 remedial actions. However, if Track 1 SCOs are not achieved, Site Management will be the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Brownfield Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's

and ICs; (2) 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 by OER on a periodic basis to be established in the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 31 of the year following the reporting period.

#### **4.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT**

The objective of the qualitative exposure assessment is to identify potential receptors and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). As part of the VCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

##### **Known and Potential Sources**

###### Soil COCs

- Multiple SVOCs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and indeno(1,2,3-cd)Pyrene, were detected in shallow soils (0-2 ft bgs) at concentrations exceeding the Track 2 Restricted Residential Use SCOs.

- Metals including barium, cadmium, lead and mercury exceeded Restricted residential Use SCOs.
- PCBs and pesticides, including 4,4'-DDE, 4,4'-DDT and PCB-1260, were identified but did not exceed Restricted Residential Use SCOs.

#### Groundwater COCs

- One (1) VOC, naphthalene, exceeded AWQS.
- Six (6) SVOC, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and indeno(1,2,3-cd)Pyrene, exceeded AWQS.
- Three (3) inorganic analytes, aluminum, manganese and sodium, exceeded AWQS.

#### Soil Vapor COCs

- Petroleum related VOCs detected at low levels.
- Chlorinated Tetrachloroethylene was detected in monitoring range established by NYSDOH matrix.

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

The information compiled during the Phase II ESA confirmed the presence of fill material across the site from surface grade to approximate depths of 7 feet bgs. The fill material was principally composed of varying amount of sand with varying amounts of gravel, silt, brick, concrete, wood, and pieces of decomposed mica schist. Laboratory analytical results identified VOCs, SVOCs, and metals at concentrations exceeding Part 375 Unrestricted Use SCOs. In addition, one VOC, six SVOC, and three metals were detected above GQS in groundwater beneath the site. The petroleum related VOCs in soil vapor were detected at low levels and chlorinated tetrachloroethylene was detected in monitoring range levels established by New York State DOH and were not found in any of the on-Site soil or groundwater samples collected.

### Receptor Populations

On-site receptors: The site is currently vacant. Onsite receptors are limited to trespassers and site representatives and visitors granted access to the property. During redevelopment of the site, the on-site potential receptors will include construction workers, site representatives and visitors. Once the site is redeveloped, the on-site potential receptors will include on-site workers and visitors.

Off-site receptors: Potential off-site receptors include adult and child residents, students, workers, pedestrians, trespassers, and cyclists in the area. Potential off-Site receptors within a 0.25-mile radius of the Site include: adult and child residents, and commercial and construction workers, pedestrians, trespassers, and cyclists, based on the following:

1. Commercial Businesses (up to 0.25 mile) – existing and future
2. Residential Buildings (up to 0.25 mile) – existing and future
3. Building Construction/Renovation (up to 0.25 mile) – existing and future
4. Pedestrians, Trespassers, Cyclists (up to .25 mile) – existing and future
5. Schools (up to .25 mile) – existing and future

### Potential Points of Exposure

Current Conditions: The potential for exposure to surficial historic fill is limited under current conditions. Groundwater is marginally contaminated but is not physically exposed at the surface of the site and, because the site is served by the public water supply and groundwater use for potable supply is prohibited, and there is no potential for exposure. As there is currently no structure onsite, accumulation of soil vapor cannot pose an exposure threat.

Construction/Remedial Conditions: Once development activities begin, construction workers will come in direct contact with surface and subsurface soils, as a result of on-site construction and excavation work. On-site construction workers potentially could ingest, inhale or have dermal contact with any exposed soil/fill. Similarly, off-site receptors could be exposed to dust and vapors from excavation activities. During construction, on-site and off-site exposure

to contaminated dust will be addressed through Soil/Materials Management Plan, dust controls and through the implementation of CAMP and CHASPs.

Proposed Future Conditions: Under future remediated conditions, all impacted soil/fill currently present on site will be removed during remedial activities and the property will be fully capped. A vapor barrier system will prevent exposure to potential off-site soil vapors. The site is served by a public water supply, and groundwater is not used at the site for potable supply. There are no plausible off-Site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site under future conditions.

### **Potential Routes of 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. An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

- Ingestion of water, fill, or soil;
- Inhalation of vapors and particulates; and
- Dermal contact with water, fill, soil, or building materials.

### **Overall Human Health Exposure Assessment**

There are no complete exposure pathways (i.e., source, route to exposure, receptor population) for the current condition or for the post-construction condition. There is a potential

complete exposure pathway that requires mitigation during implementation of the remedy. Under current conditions, on-site exposure is limited by a concrete/asphalt cap across the site, and because groundwater is not potable. After the remedial action is complete, there will be no remaining exposure pathways to identified contaminants, as all impacted soil/fill will be removed from the site and the site will be fully capped. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide impervious surface cover cap, and a subsurface vapor barrier system for the building. The vapor barrier will prevent the potential for vapor intrusion and contact with groundwater. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the site that could be impacted or threatened by site contaminants migrating through groundwater. The potentially exposed receptors during remedy implementation are workers on the site and the community adjacent to the site. Complete exposure pathways will be mitigated or eliminated by proper implementation of a Soil/Materials Management Plan, CHASPs, and CAMP. The CHASPs will be prepared by each trade active during site redevelopment and will specify appropriate monitoring and controls required to mitigate/eliminate the pathway between sources and site workers. The CAMP specifies appropriate monitoring and controls required to mitigate/eliminate the pathway between sources and the adjacent community.

## **5.0 REMEDIAL ACTION MANAGEMENT**

### **5.1 PROJECT ORGANIZATION AND OVERSIGHT**

Principal personnel who will participate in the remedial action include Sr. Consultant James Cressy and Sr. Consultant Wenqing Fang. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Mr. Andy Marshall P.E. and Mr. James Cressy QEP.

### **5.2 SITE SECURITY**

Site access will be controlled by a gated entrance into the fenced property.

### **5.3 WORK HOURS**

The hours for operation of remedial construction will be from 7am to 5pm. These hours conform to the New York City Department of Buildings construction code requirements.

### **5.4 CONSTRUCTION HEALTH AND SAFETY PLAN**

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be James Cressy. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

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

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

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

## **5.5 COMMUNITY AIR MONITORING PLAN**

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedances of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

## **VOC Monitoring, Response Levels, and Actions**

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

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

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

## **Particulate Monitoring, Response Levels, and Actions**

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate

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

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ( $\text{mcg}/\text{m}^3$ ) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed  $150 \text{ mcg}/\text{m}^3$  above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than  $150 \text{ mcg}/\text{m}^3$  above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within  $150 \text{ mcg}/\text{m}^3$  of the upwind level and in preventing visible dust migration.

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

## **5.6 AGENCY APPROVALS**

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

## **5.7 SITE PREPARATION**

### **Pre-Construction Meeting**

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

## **Mobilization**

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

## **Utility Marker Layouts, Easement Layouts**

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). 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**

Site will be excavated to 11 ft bgs, while the groundwater table is at approximately 24 ft bgs (according to the Phase II ESA). Therefore, no dewatering activities will be performed for this project.

### **Equipment and Material Staging**

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

### **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.

### **Extreme Storm Preparedness and Response Contingency Plan**

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the enrollee will undertake the following steps for site preparedness prior to the event and response after the event.

#### **Storm Preparedness**

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured

to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from holes, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, haybales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

### **Storm Response**

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Storm-water control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property

owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

### **Storm Response Reporting**

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website ([www.nyc.gov/oer](http://www.nyc.gov/oer)) and will be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the OER project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number. Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

## **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 will be developed upon selection of the disposal facilities.

## 5.9 DEMOBILIZATION

Demobilization will include:

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

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

## 5.10 REPORTING AND RECORD KEEPING

### Daily Reports

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

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

- Photograph of notable Site conditions and activities.

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

### **Record Keeping and Photo-Documentation**

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

### **5.11 COMPLAINT MANAGEMENT**

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

### **5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN**

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

- Reasons for deviating from the approved RAWP;

- Effect of the deviations on overall remedy; and
- Determination that the remedial action with the deviation(s) is protective of public health and the environment.

## 6.0 REMEDIAL ACTION REPORT

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

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Continue registration of the property with an E-Designation by the NYC Department of Buildings.

- 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, Andy Marshall, 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 59-63 N. 6<sup>th</sup> Street, Brooklyn, NY, NYC BCP Number: 15CVCP028K.*

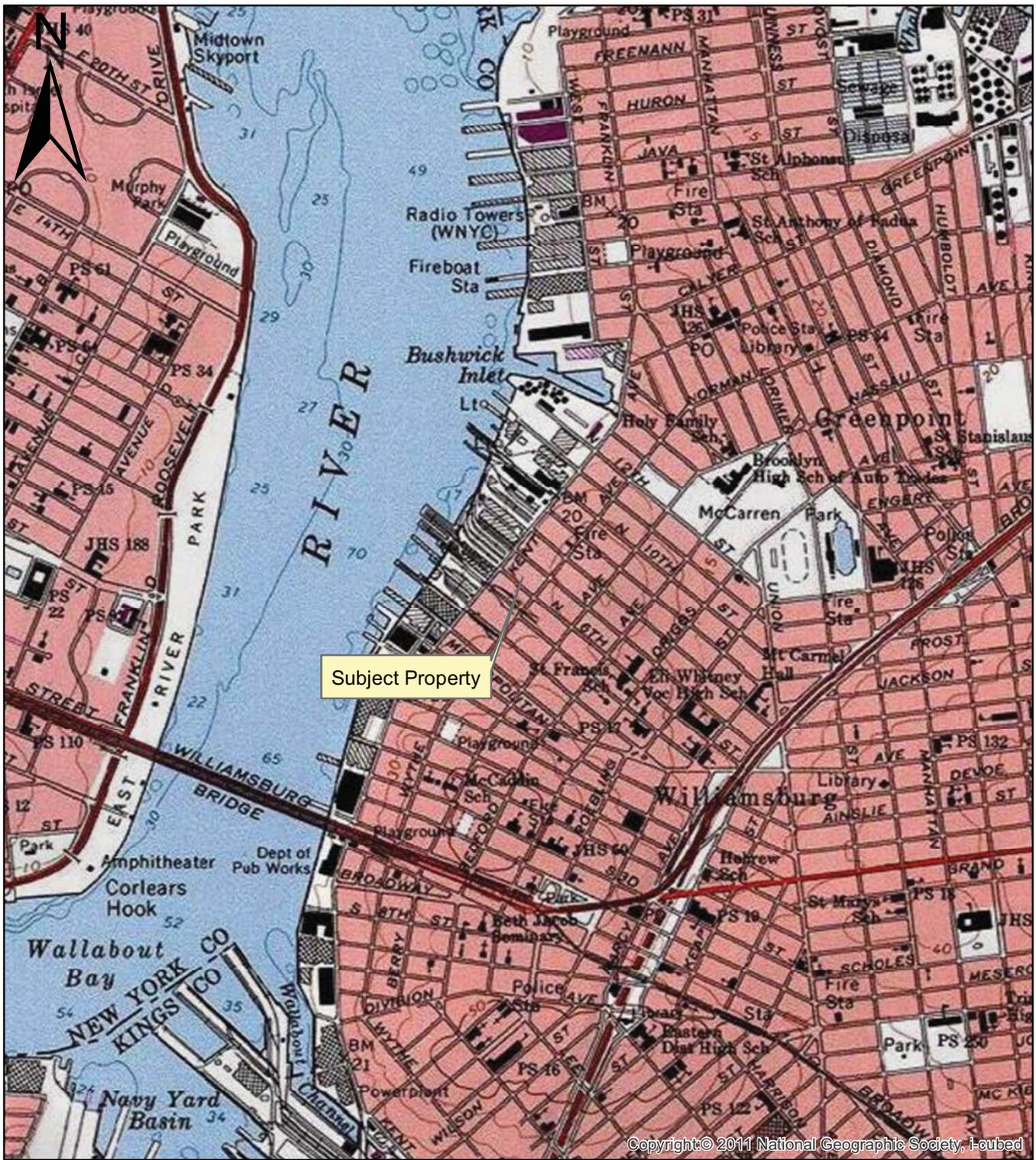
*I, James Cressy, am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 59-63 N. 6<sup>th</sup> Street, Brooklyn, NY, NYC BCP Number: 15CVCP028K..*

*I certify that the OER-approved Remedial Action Work Plan dated September 26, 2014 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

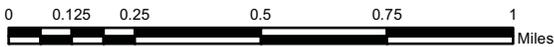
The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 4-month remediation period is anticipated.

| <b>Schedule Milestone</b>     | <b>Weeks from Remedial Action Start</b> | <b>Duration (weeks)</b> |
|-------------------------------|---|-------------------------|
| OER Approval of RAWP          | 0                                       | -                       |
| Mobilization                  | 0                                       | 2                       |
| Remedial Excavation           | 2                                       | 6                       |
| Demobilization                | 8                                       | 2                       |
| Submit Remedial Action Report | 10                                      | 6                       |



USGS 7.5 Minute Quadrangle Topographic Map (2011)

SCALE: 1:24,000

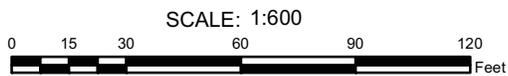


Copyright © 2011 National Geographic Society, Fourbed

|         |        |   |           |             |
|---------|--------|---|-----------|-------------|
| TITLE   |        | SITE MAP                                  |           | Figure No.  |
|         |        |   |           | 01          |
| PROJECT |        | 59-63 N. 6th Street<br>Brooklyn, New York |           | Project No. |
|         |        |   |           | 2014-131    |
|         | DESIGN | WF  | 9-22-2014 |             |
|         | CHECK  |   |           |             |
|         | REVIEW |   |           |             |

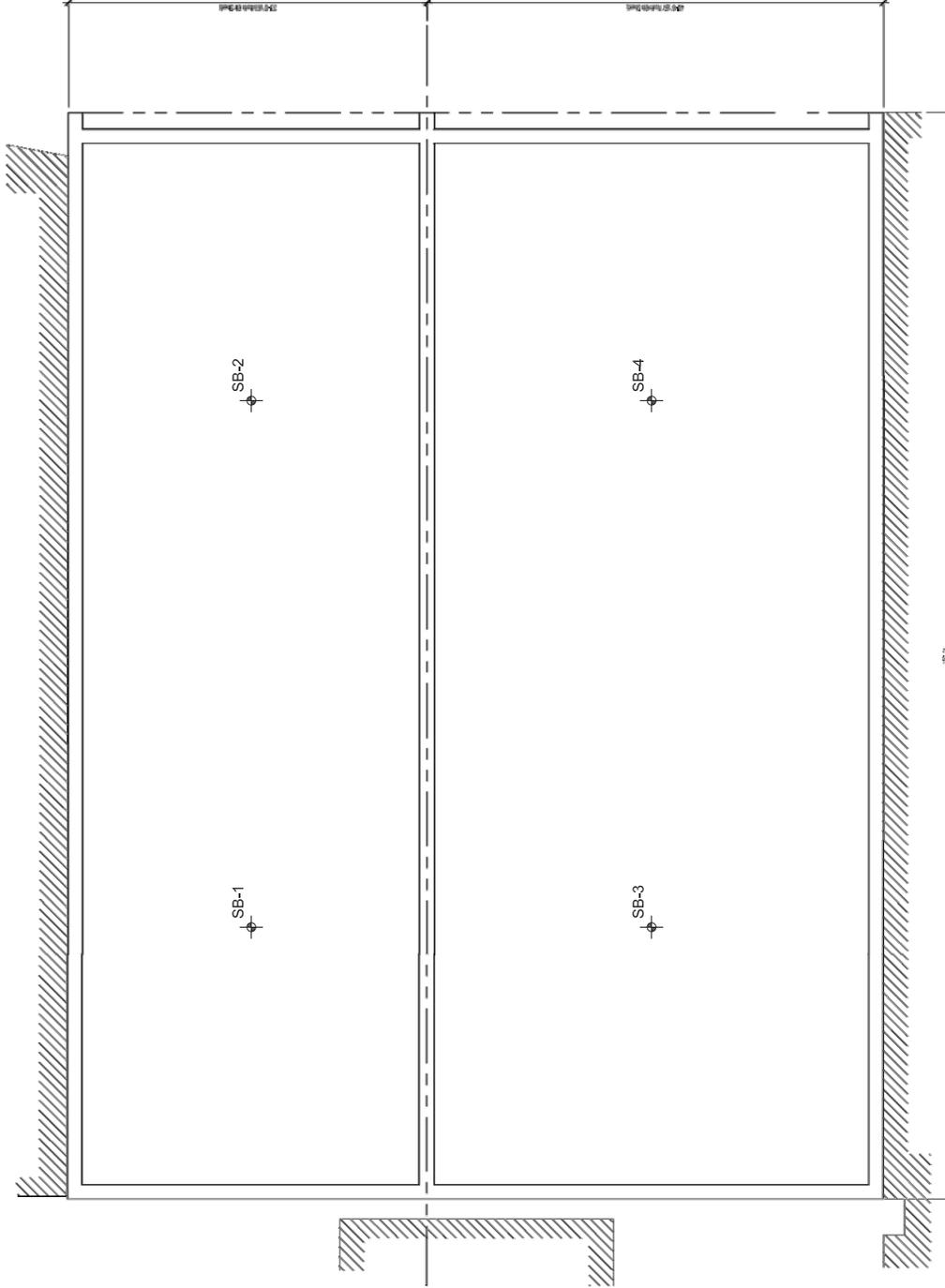


Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



|         |  |    |             |
|---------|--|----|-------------|
| TITLE   | SITE LOCATION MAP                            |    | Figure No.  |
|         |  |    | 02          |
| PROJECT | 59-63 North 6th Street<br>Brooklyn, New York |    | Project No. |
|         |  |    | 2014-131    |
|         | DESIGN                                       | WF | 9-22-2014   |
|         | CHECK  |    |             |
|         | REVIEW                                       |    |             |





Removal actions for development purposes under this plan will be performed in conjunction with confirmation soil sampling. Four (4) confirmation samples will be collected from the base of the excavation.

For comparison to Track 1 SCOs, analytes will include VOCs, SVOC, pesticides, PCBs and metals according to analytical methods described below. For comparison to Track 4 SCOs, analytes will only include trigger compounds and elements established on the Track 4 SCO list.

New York State ELAP certified labs will be used for all confirmation and end-point sample analyses. Labs performing confirmation and end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all confirmation and end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be Confirmation samples will be analyzed for compounds and elements as described above utilizing the following methodology:

Soil analytical methods will include:

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

Note:  
Cellar plan provided by Victor K. Han Architect, P.C.

**Legend**  
 End Point Sampling Location

|                                       |                               |  |    |
|---------------------------------------|-------------------------------|--|----|
| <b>TITLE:</b> End-Point Sampling Plan |                               | 56-62 North 6th Street, Long Island City, New York |    |
| <b>DRAWN BY:</b> MF                   | <b>REVISION DATE:</b>         | <b>PROJECT No.:</b> 2014-131                       |    |
| <b>CHECKED BY:</b> JC                 | <b>REVISION DATE:</b> 2/14/14 | <b>FIGURE No.:</b>                                 |    |
| <b>DATE:</b> 5/20/14                  | <b>APPROVED BY:</b>           | <b>FIGURE No.:</b>                                 | 04 |
| <b>SCALE:</b> 1/8" = 1'               | <b>FILE NAME:</b>             |  |    |





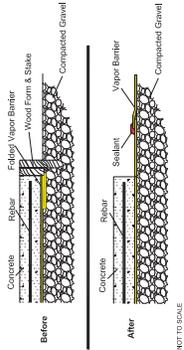




**VAPOR BARRIER CONSTRUCTION NOTES:**

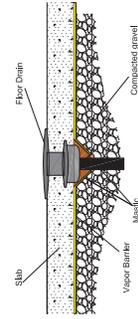
- Vapor barrier membrane to be approved by the project design engineer. Membrane shall at a minimum be a Class A Vapor Barrier (ASTM E 1745) and with a minimum thickness of 20 mils. The slab-side of the membrane shall have qualities to allow bonding with the poured concrete. In no case shall membrane contain recycled plastic product or have a permeance of greater than 0.04 Perms. Manufacturers samples and cut sheets shall be submitted to the design engineer for approval prior to delivery to site.
- Vapor barrier materials to be stored in a clean, dry area or per manufacturer's instructions. Materials to be protected during handling and installation to prevent damage.
- Prepare subsoil as specified by project architect, geotechnical engineer or structural engineer, or in accordance with ACI 302.1R-04 Section 4.1 Install vapor retarder membrane over leveled and compacted 3/4" 2B pea gravel, or an equivalent approved by design engineer. Gravel to be no more than 1-inch in diameter, with no sharp aggregate or projections. Do not begin installation until unacceptable conditions have been corrected.
- Installation shall be in accordance with manufacturer's instructions, ASTM E 1643-98 (2005), best industry practices, and all applicable federal, state, and local codes. Membrane to be unrolled with the longest dimension parallel to the direction of the pour. Membrane to be installed with smooth side facing down and concrete-bonding side facing up. Succeeding sheets should be accurately positioned to overlap the adjacent sheet by a minimum of 6 inches. Lap membrane over footings and seal to foundation wall. Ensure there are no discontinuities in vapor and seal to foundation wall. There are no discontinuities in vapor retarder at seams and penetrations. Laps to be sealed with double-sided asphaltic tape, mastic or equivalent sealant with permeance of 0.3 perms or less approved by the design engineer. Ensure membrane surfaces to receive sealant are clean and dry.
- Protect membrane from damage during installation of reinforcing steel and utilities, and during placement of concrete slab.
- No penetrations shall be made except for reinforcing steel, foundations/pile caps, and permanent utilities. Vapor barrier to be inspected for holes or other damage. Small holes to be patched with mastic or approved equivalent, or per manufacturer's instructions. Larger holes to be patched with additional cut-out sections of membrane and sealed on all four sides, or per manufacturer's instructions. All allowed penetrations shall be sealed per manufacturer's instructions. Design engineer must be allowed to inspect final installation prior to pouring slab with sufficient lead-time for the contractor to implement required changes.
- Place concrete within 30 days of vapor barrier installation.

**Construction Joint Application for Large Slabs Placed in Stages**



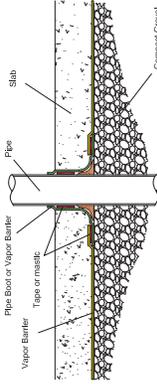
NOT TO SCALE

**Membrane Interaction with Floor Drain**



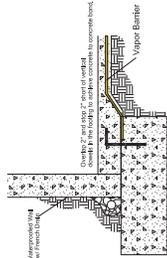
NOT TO SCALE

**Membrane Interaction with Pipe Penetration**



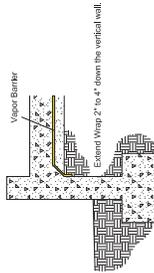
NOT TO SCALE

**Membrane Termination Onto Footing just Short of Rebar Dowels**



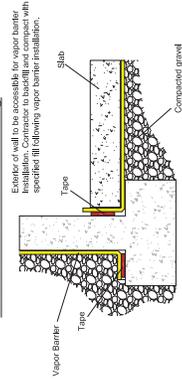
NOT TO SCALE

**Membrane Termination Onto Below Slab Wall Footing**



NOT TO SCALE

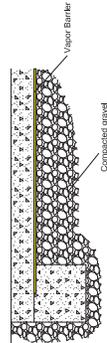
**Membrane Termination Onto Outside Cellar Wall Footing**



NOT TO SCALE

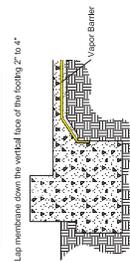
**Membrane Termination Between Footer and Slab Necessitating Concrete Bond**

Overlap the vapor barrier as far as necessary to ensure that it remains continuous across the joint. Seal the joint with mastic or equivalent sealant for that it provides a suitable boundary of concrete to concrete.



NOT TO SCALE

**Membrane Termination Onto Exterior Wall Footing**



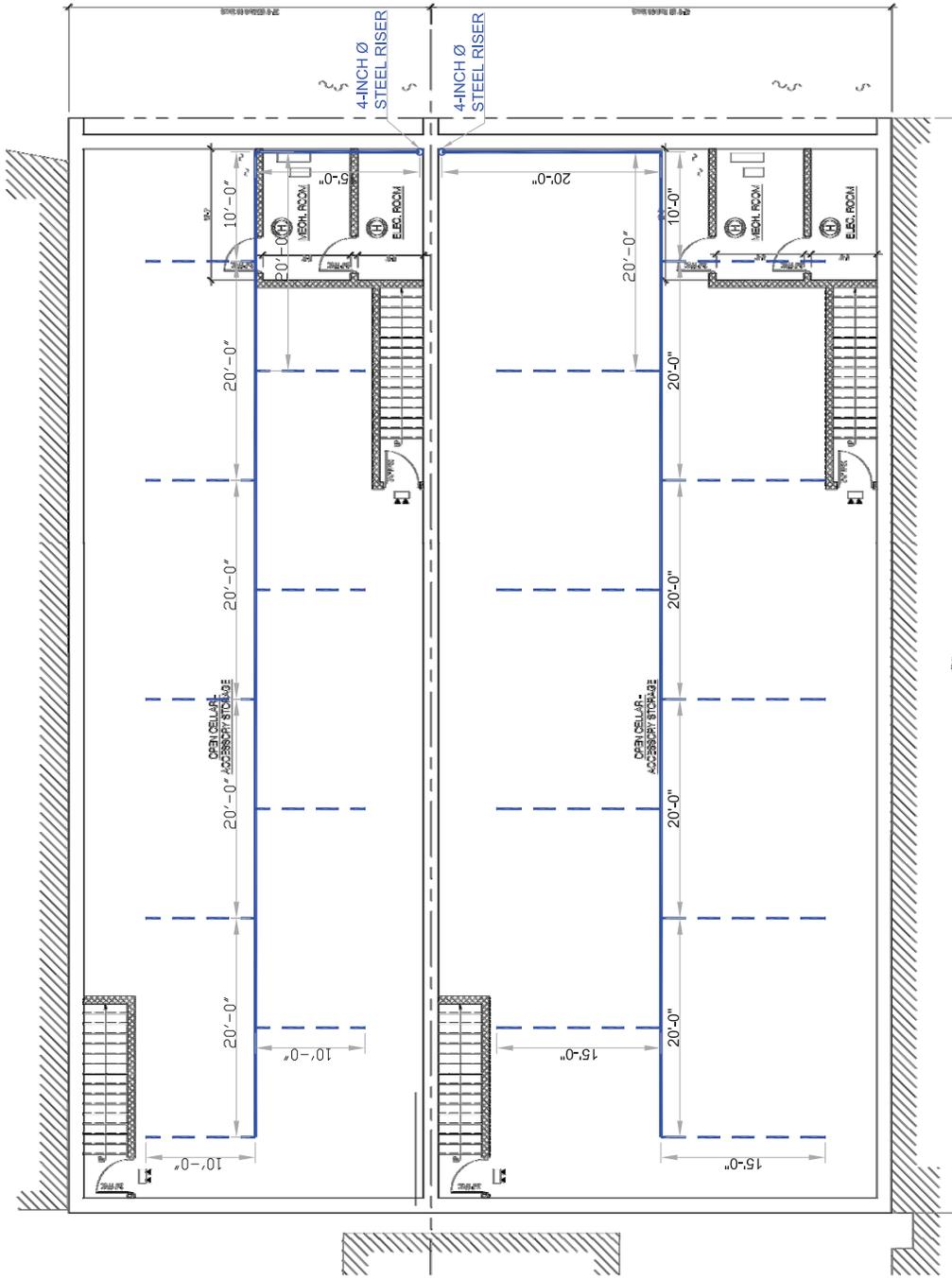
NOT TO SCALE

**TITLE: Vapor Barrier Diagram**

|  |                  |                |           |
|--|------------------|----------------|-----------|
| 59-63 North 6th Street, Long Island City, New York |                  | PROJECT No.    |           |
| DRAWN BY: JIC                                      | DESIGNED BY: JIC | REVISION DATE: | 2014-1-13 |
| CHECKED BY: JIC                                    | DATE: 1-23-2014  | APPROVED BY:   |           |
| SCALE: Not To Scale                                | FILE NAME:       | Figure No.     | 07        |



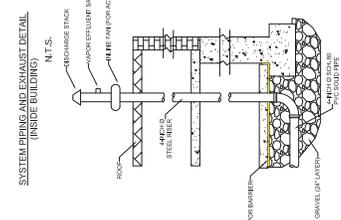
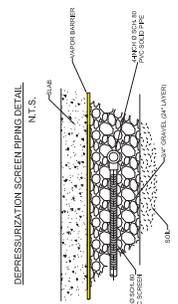
85 Canal Street, 11th Floor, New York, NY 10013



Note:  
Cellar plan provided by Victor K. Han Architect, P.C.

Legend

- SCH. 80 3-INCH PVC SCREEN
- SCH. 80 4-INCH PVC SOLID PIPE



SUBMEMBRANE DEPRESSURIZATION SYSTEM CONSTRUCTION NOTES:

1. PROPOSED LOCATIONS OF DEPRESSURIZATION SYSTEM RISER PIPES TO BE VERIFIED BY ARCHITECT.
2. PREPARE SUBSOIL AS SPECIFIED BY PROJECT GEOTECHNICAL OR STRUCTURAL ENGINEER, OR IN ACCORDANCE WITH ACT 302, IRAM SECTION 4.1, PLACE, LEVEL, AND COMPACT GRAVEL BED SURROUNDING RISER PIPES TO BE NO MORE THAN 1/2 INCH IN DIAMETER, WITH NO S&P, AGGREGATE, LEVEL GRAVEL BED TO ELEVATION OF BOTTOM OF PVC PIPING TO BE INSTALLED.
3. 3-INCH DIAMETER SCHEDULE 80 SLOTTED PVC SCREEN SHALL BE INSTALLED 1 FOOT BENEATH THE BUILDING SLAB BACKFILL AND COMPACT OVER SUPPORTED SCREEN WITH CLEAN 3/4-INCH PEA GRAVEL. TOTAL DEPTH OF COMPACTED GRAVEL SURROUNDING PIPING SHALL BE MINIMUM 18 INCHES. RISER PIPES SHALL BE INSTALLED WITH VAPOR EFFLUENT SAMPLING PORTS SHALL BE INSTALLED ON THE RISERS. THE RISERS SHALL RAISE AT LEAST 3 FEET ABOVE THE ROOF. RAIN CAPS SHALL BE INSTALLED ON THE ROOF AT THE END OF THE RISERS.
4. PVC PIPING TO BE NEW, CLEAN SLOTTED SCREEN AND SOLID PIPE. 20-FOOT LENGTHS OF PIPE SHALL BE USED. RISER PIPES SHALL BE INSTALLED WITH VAPOR EFFLUENT SAMPLING PORTS. RISER PIPE AND FITTINGS FOR THE VERTICAL STACK TO BE PRIME AND PAINTED WITH WEATHER RESISTANT PAINT. A MINIMUM OF TWO UNIONS SHALL BE INSTALLED ON THE STACK PIPE TO PROVIDE FOR FUTURE MODIFICATION.
5. PLUMBING, PRIMING, GROUTING, FASTENING, AND SUPPORTING PVC AND STEEL PIPES, SCREENS, RISERS, AND FITTINGS TO BE CONDUCTED IN ACCORDANCE WITH EXISTING PROJECT PLANS AND ALL APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES.
6. CONTRACTOR SHALL STORE MATERIALS IN A CLEAN AND DRY AREA, AND SHALL PROTECT MATERIALS FROM DAMAGE DURING HANDLING AND INSTALLATION.

|  |   |
|--|---|
| <b>TITLE:</b> Sub-Slab Depressurization System<br>56-62 North 6th Street, Long Island City, New York |   |
| <b>DRAWN BY:</b> WF<br><b>CHECKED BY:</b> JC<br><b>DATE:</b> 5-8-2014<br><b>SCALE:</b> 1/8" = 1'     | <b>PROJECT No.:</b> 2014-131<br><b>REVISION DATE:</b><br><b>APPROVED BY:</b><br><b>FIGURE No.:</b> 08 |



**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID                       | NY-Res. | NY-UnRestricted | B-1 (0-2 FT)<br>8/8/2014 | B-1 (10-12 FT)<br>8/8/2014 | B-2 (0-2 FT)<br>8/8/2014 | B-2 (10-12 FT)<br>8/8/2014 | B-3 (0-2 FT)<br>8/8/2014 | B-3 (10-12 FT)<br>8/8/2014 |
|---------------------------------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|
| <b>Compound</b>                 |         |                 |                          |                            |                          |                            |                          |                            |
| <b>Miscellaneous/Inorganics</b> |         |                 |                          |                            |                          |                            |                          |                            |
| Percent Solid                   |         |                 | 86                       | 90                         | 77                       | 88                         | 85                       | 88                         |
| Total Cyanide                   | 27      | 27              | < 0.58                   | < 0.56                     | < 0.65                   | < 0.57                     | < 0.59                   | < 0.57                     |
| <b>Metals, Total</b>            |         |                 |                          |                            |                          |                            |                          |                            |
| Aluminum                        |         |                 | 14,600                   | 8,610                      | 15,400                   | 7,910                      | 8,150                    | 7,140                      |
| Antimony                        |         |                 | < 3.5                    | < 3.5                      | < 4.2                    | < 4.1                      | < 4.0                    | < 3.4                      |
| Arsenic                         | 16      | 13              | 3.2                      | < 0.7                      | 3.5                      | 2.4                        | 3.2                      | < 0.7                      |
| Barium                          | 350     | 350             | 73.2                     | 49.7                       | 49.1                     | 20.7                       | 137                      | 40.9                       |
| Beryllium                       | 14      | 7.2             | 0.58                     | 0.49                       | 0.37                     | 0.51                       | 0.44                     | 0.46                       |
| Cadmium                         | 2.5     | 2.5             | < 0.35                   | < 0.35                     | < 0.42                   | < 0.41                     | < 0.34                   | < 0.34                     |
| Calcium                         |         |                 | 1,540                    | 733                        | 1,160                    | 773                        | 2,750                    | 768                        |
| Chromium                        |         | 30              | 17.6                     | 22.8                       | 20.8                     | 15                         | 20.9                     | 19.3                       |
| Cobalt                          |         | 50              | 7.34                     | 9.27                       | 6.56                     | 6.13                       | 8.26                     | 8.98                       |
| Copper                          | 270     | 50              | 13.5                     | 16.8                       | 21.3                     | 12.8                       | 27.7                     | 15.5                       |
| Iron                            |         | 63              | 18,400                   | 30,600                     | 17,500                   | 15,900                     | 23,100                   | 25,700                     |
| Lead                            | 400     |                 | 109                      | 7.89                       | 20.7                     | 5.13                       | 206                      | 6.29                       |
| Magnesium                       | 2,000   | 1,600           | 2,340                    | 1,990                      | 2,980                    | 1,990                      | 1,870                    | 1,670                      |
| Manganese                       | 0.81    | 0.18            | 7.94                     | 525                        | 172                      | 206                        | 544                      | 417                        |
| Mercury                         | 140     | 30              | 0.25                     | < 0.06                     | < 0.09                   | < 0.07                     | < 0.07                   | < 0.07                     |
| Nickel                          |         |                 | 12.4                     | 12.9                       | 13.4                     | 10.8                       | 14.2                     | 11.4                       |
| Potassium                       | 36      | 3.9             | 7.98                     | 1,680                      | 1,170                    | 1,100                      | 1,260                    | 1,410                      |
| Selenium                        | 36      | 2               | < 1.4                    | < 1.4                      | < 1.7                    | < 1.6                      | < 1.6                    | < 1.4                      |
| Silver                          |         |                 | < 0.35                   | < 0.35                     | < 0.42                   | < 0.41                     | < 0.40                   | < 0.34                     |
| Sodium                          |         |                 | 68.8                     | 49                         | 44                       | 37.9                       | 67.6                     | 47.6                       |
| Thallium                        |         |                 | < 3.2                    | < 3.1                      | < 3.7                    | < 3.7                      | < 3.6                    | < 3.0                      |
| Vanadium                        |         |                 | 25.8                     | 36.1                       | 32.4                     | 21.8                       | 33.7                     | 33.1                       |
| Zinc                            | 2,200   | 109             | 47.3                     | 42.3                       | 33.9                     | 24.3                       | 126                      | 58.9                       |
| <b>PCBs By SW 8062</b>          |         |                 |                          |                            |                          |                            |                          |                            |
| PCB-1016                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| PCB-1221                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| PCB-1232                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| PCB-1242                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| PCB-1248                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| PCB-1254                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| PCB-1260                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| PCB-1262                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| PCB-1268                        | 1,000   | 100             | < 75                     | < 74                       | < 84                     | < 74                       | < 78                     | < 75                       |
| <b>Volatiles by SW 8260</b>     |         |                 |                          |                            |                          |                            |                          |                            |
| 1,1,1,2-Tetrachloroethane       | 100,000 | 680             | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,1,1-Trichloroethane           |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,1,2,2-Tetrachloroethane       |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,1,2-Trichloroethane           |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID<br>Sampling Date  | NY-Res. | NY-UnRestricted | B-1 (0-2 FT)<br>8/8/2014 | B-1 (10-12 FT)<br>8/8/2014 | B-2 (0-2 FT)<br>8/8/2014 | B-2 (10-12 FT)<br>8/8/2014 | B-3 (0-2 FT)<br>8/8/2014 | B-3 (10-12 FT)<br>8/8/2014 |
|-----------------------------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|
| Compound                    |         |                 |                          |                            |                          |                            |                          |                            |
| 1,1-Dichloroethane          | 19,000  | 270             | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,1-Dichloroethene          | 100,000 | 330             | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,1-Dichloropropene         |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2,3-Trichlorobenzene      |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2,3-Trichloropropane      |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2,4-Trichlorobenzene      |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2,4-Trimethylbenzene      | 47,000  | 3,600           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2-Dibromo-3-chloropropane |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2-Dibromoethane           |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2-Dichlorobenzene         | 100,000 | 1,100           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2-Dichloroethane          | 2,300   | 20              | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,2-Dichloropropane         |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,3,5-Trimethylbenzene      | 47,000  | 8,400           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,3-Dichloropropane         | 17,000  | 2,400           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,3-Dichlorobenzene         |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 1,4-Dichlorobenzene         |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 2,2-Dichloropropane         | 9,800   | 1,800           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 2-Chlorotoluene             |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 2-Hexanone                  |         |                 | < 29                     | < 28                       | < 32                     | < 28                       | < 29                     | < 28                       |
| 2-Isopropyltoluene          |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 4-Chlorotoluene             |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| 4-Methyl-2-pentanone        |         |                 | < 29                     | < 28                       | < 32                     | < 28                       | < 29                     | < 28                       |
| Acetone                     | 100,000 | 50              | < 29                     | 56                         | < 32                     | < 28                       | < 29                     | 55                         |
| Acrylonitrile               |         |                 | < 12                     | < 11                       | < 13                     | < 11                       | < 12                     | < 11                       |
| Benzene                     | 2,900   | 60              | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Bromobenzene                |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Bromochloromethane          |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Bromodichloromethane        |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Bromoform                   |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Bromomethane                |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Carbon Disulfide            |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Carbon tetrachloride        | 1,400   | 760             | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Chlorobenzene               | 100,000 | 1,100           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Chloroethane                |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Chloroform                  | 10,000  | 370             | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Chloromethane               |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| cis-1,2-Dichloroethene      | 59,000  | 250             | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| cis-1,3-Dichloropropene     |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Dibromochloromethane        |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Dibromomethane              |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Dichlorodifluoromethane     |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Ethylbenzene                |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Hexachlorobutadiene         | 30,000  | 1,000           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Isopropylbenzene            |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| m&p-Xylene                  |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID                       | NY-Res. | NY-UnRestricted | B-1 (0-2 FT)<br>8/8/2014 | B-1 (10-12 FT)<br>8/8/2014 | B-2 (0-2 FT)<br>8/8/2014 | B-2 (10-12 FT)<br>8/8/2014 | B-3 (0-2 FT)<br>8/8/2014 | B-3 (10-12 FT)<br>8/8/2014 |
|---------------------------------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|
| <b>Compound</b>                 |         |                 |                          |                            |                          |                            |                          |                            |
| Methyl Ethyl Ketone             | 100,000 | 120             | < 29                     | < 29                       | < 32                     | < 28                       | < 29                     | < 28                       |
| Methyl t-butyl ether (MTBE)     | 62,000  | 930             | < 12                     | < 11                       | < 13                     | < 11                       | < 12                     | < 11                       |
| Methylene chloride              | 51,000  | 50              | 29                       | 12                         | 8.7                      | 13                         | 21                       | 10                         |
| Naphthalene                     |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| n-Butylbenzene                  | 100,000 | 12,000          | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| n-Propylbenzene                 | 100,000 | 3,900           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| o-Xylene                        |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| p-Isopropyltoluene              |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| sec-Butylbenzene                | 100,000 | 11,000          | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Styrene                         |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| tert-Butylbenzene               | 100,000 | 5,900           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Tetrachloroethene               | 5,500   | 1,300           | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Tetrahydrofuran (THF)           |         |                 | < 12                     | < 11                       | < 13                     | < 11                       | < 12                     | < 11                       |
| Toluene                         |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Total Xylenes                   |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| trans-1,2-Dichloroethene        | 100,000 | 260             | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| trans-1,3-Dichloropropene       |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| trans-1,4-dichloro-2-butene     |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Trichloroethene                 | 10,000  | 470             | < 12                     | < 11                       | < 13                     | < 11                       | < 12                     | < 11                       |
| Trichlorofluoromethane          |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Trichlorotrifluoroethane        |         |                 | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| Vinyl chloride                  | 210     | 20              | < 5.8                    | < 5.6                      | < 6.5                    | < 5.7                      | < 5.9                    | < 5.7                      |
| <b>Semivolatiles By SW 8270</b> | ug/Kg   | ug/Kg           | ug/Kg                    | ug/Kg                      | ug/Kg                    | ug/Kg                      | ug/Kg                    | ug/Kg                      |
| 1,2,4,5-Tetrachlorobenzene      |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 1,2,4-Trichlorobenzene          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 1,2-Dichlorobenzene             |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 1,2-Diphenylhydrazine           |         |                 | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |
| 1,3-Dichlorobenzene             |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 1,4-Dichlorobenzene             |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2,4,5-Trichlorophenol           |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2,4,6-Trichlorophenol           |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2,4-Dichlorophenol              |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2,4-Dimethylphenol              |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2,4-Dinitrophenol               |         |                 | < 610                    | < 580                      | < 690                    | < 590                      | < 620                    | < 600                      |
| 2,4-Dinitrotoluene              |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2,6-Dinitrotoluene              |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2-Chloronaphthalene             |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2-Chlorophenol                  |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2-Methylnaphthalene             |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2-Methylphenol (o-cresol)       | 100,000 | 330             | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 2-Nitroaniline                  |         |                 | < 610                    | < 580                      | < 690                    | < 590                      | < 620                    | < 600                      |
| 2-Nitrophenol                   |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 3&4-Methylphenol (m&p-cresol)   |         |                 | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |
| 3,3'-Dichlorobenzidine          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 3-Nitroaniline                  |         |                 | < 610                    | < 580                      | < 690                    | < 590                      | < 620                    | < 600                      |
| 4,6-Dinitro-2-methylphenol      |         |                 | < 1100                   | < 1100                     | < 1300                   | < 1100                     | < 1100                   | < 1100                     |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID<br>Sampling Date  | Compound | NY-Res. | NY-UnRestricted | B-1 (0-2 FT)<br>8/8/2014 | B-1 (10-12 FT)<br>8/8/2014 | B-2 (0-2 FT)<br>8/8/2014 | B-2 (10-12 FT)<br>8/8/2014 | B-3 (0-2 FT)<br>8/8/2014 | B-3 (10-12 FT)<br>8/8/2014 |
|-----------------------------|----------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|
| 4-Bromophenyl phenyl ether  |          |         |                 | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |
| 4-Chloro-3-methylphenol     |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 4-Chloroaniline             |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 4-Chlorophenyl phenyl ether |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| 4-Nitroaniline              |          |         |                 | < 610                    | < 580                      | < 690                    | < 590                      | < 620                    | < 600                      |
| 4-Nitrophenol               |          |         |                 | < 1100                   | < 1100                     | < 1300                   | < 1100                     | < 1100                   | < 1100                     |
| Acenaphthene                | 100,000  |         | 20,000          | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Acenaphthylene              | 100,000  |         | 100,000         | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Acetophenone                |          |         |                 | < 1100                   | < 1100                     | < 1300                   | < 1100                     | < 1100                   | < 1100                     |
| Aniline                     |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Anthracene                  | 100,000  |         | 100,000         | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Benz(a)anthracene           | 1,000    |         | 1,000           | 820                      | < 250                      | < 300                    | < 260                      | 2,800                    | < 260                      |
| Benzidine                   |          |         |                 | < 450                    | < 430                      | < 520                    | < 440                      | < 470                    | < 450                      |
| Benzo(a)pyrene              | 1,000    |         | 1,000           | 740                      | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Benzo(b)fluoranthene        | 1,000    |         | 1,000           | 1,000                    | < 250                      | < 300                    | < 260                      | 2,600                    | < 260                      |
| Benzo(ghi)perylene          | 100,000  |         | 100,000         | 460                      | < 250                      | < 300                    | < 260                      | 3,300                    | < 260                      |
| Benzo(k)fluoranthene        | 1,000    |         | 800             | 300                      | < 250                      | < 300                    | < 260                      | 1,100                    | < 260                      |
| Benzoic acid                |          |         |                 | < 1100                   | < 1100                     | < 1300                   | < 1100                     | < 1200                   | < 1100                     |
| Benzyl butyl phthalate      |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Bis(2-chloroethoxy)methane  |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Bis(2-chloroethyl)ether     |          |         |                 | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |
| Bis(2-chloroisopropyl)ether |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Bis(2-ethylhexyl)phthalate  |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Carbazole                   |          |         |                 | < 570                    | < 540                      | < 650                    | < 550                      | < 590                    | < 560                      |
| Chrysene                    | 1,000    |         | 1,000           | 880                      | < 250                      | < 300                    | < 260                      | 2,900                    | < 260                      |
| Dibenz(a,h)anthracene       | 330      |         | 330             | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Dibenzofuran                |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Diethyl phthalate           |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Dimethyl phthalate          |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Di-n-butylphthalate         |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Di-n-octylphthalate         |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Fluoranthene                | 100,000  |         | 100,000         | 1,800                    | < 250                      | < 300                    | < 260                      | 6,100                    | < 260                      |
| Fluorene                    | 100,000  |         | 30,000          | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Hexachlorobenzene           |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Hexachlorobutadiene         |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Hexachlorocyclopentadiene   |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Hexachloroethane            |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Indeno(1,2,3-cd)pyrene      | 500      |         | 500             | 380                      | < 250                      | < 300                    | < 260                      | 1,100                    | < 260                      |
| Isophorone                  |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Naphthalene                 | 100,000  |         | 12,000          | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| Nitrobenzene                |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| N-Nitrosodimethylamine      |          |         |                 | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |
| N-Nitrosodi-n-propylamine   |          |         |                 | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |
| N-Nitrosodiphenylamine      |          |         |                 | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |
| Pentachloronitrobenzene     |          |         |                 | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |
| Pentachlorophenol           | 2,400    |         | 800             | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |
| Phenanthrene                | 100,000  |         | 100,000         | 830                      | < 250                      | < 300                    | < 260                      | 3,800                    | < 260                      |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID<br>Sampling Date         | Compound | NY-Res. | NY-UnRestricted | B-1 (0-2 FT)<br>8/8/2014 | B-1 (10-12 FT)<br>8/8/2014 | B-2 (0-2 FT)<br>8/8/2014 | B-2 (10-12 FT)<br>8/8/2014 | B-3 (0-2 FT)<br>8/8/2014 | B-3 (10-12 FT)<br>8/8/2014 |  |
|------------------------------------|----------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|--|
| Phenol                             |          | 100,000 | 330             | < 270                    | < 250                      | < 300                    | < 260                      | < 270                    | < 260                      |  |
| Pyrene                             |          | 100,000 | 100,000         | < 1,600                  | < 250                      | < 300                    | < 260                      | 5,600                    | < 280                      |  |
| Pyridine                           |          |         |                 | < 380                    | < 360                      | < 430                    | < 370                      | < 390                    | < 380                      |  |
| <b>Pesticides - Soil By SW8081</b> |          |         |                 |                          |                            |                          |                            |                          |                            |  |
| 4,4'-DDD                           |          | 2,600   | ug/Kg           | < 2.7                    | < 2.6                      | < 3.0                    | < 2.7                      | < 2.8                    | < 2.7                      |  |
| 4,4'-DDE                           |          | 1,800   | 3.3             | < 2.7                    | < 2.6                      | < 3.0                    | < 2.7                      | < 2.8                    | < 2.7                      |  |
| 4,4'-DDT                           |          | 1,700   | 3.3             | < 2.7                    | < 2.6                      | < 3.0                    | < 2.7                      | < 2.8                    | < 2.7                      |  |
| a-BHC                              |          | 97      | 20              | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| a-Chlordane                        |          | 910     | 94              | < 3.8                    | < 3.7                      | < 4.2                    | < 3.7                      | < 3.9                    | < 3.7                      |  |
| Aldrin                             |          | 19      | 5               | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| b-BHC                              |          | 72      | 36              | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| Chlordane                          |          |         |                 | < 23                     | < 22                       | < 25                     | < 22                       | < 23                     | < 22                       |  |
| d-BHC                              |          | 100,000 | 40              | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| Dieldrin                           |          | 39      | 5               | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| Endosulfan I                       |          | 4,800   | 2,400           | < 3.8                    | < 3.7                      | < 4.2                    | < 3.7                      | < 3.9                    | < 3.7                      |  |
| Endosulfan II                      |          | 4,800   | 2,400           | < 3.8                    | < 3.7                      | < 4.2                    | < 3.7                      | < 3.9                    | < 3.7                      |  |
| Endosulfan sulfate                 |          | 4,800   | 2,400           | < 3.8                    | < 3.7                      | < 4.2                    | < 3.7                      | < 3.9                    | < 3.7                      |  |
| Endrin                             |          | 2,200   | 14              | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| Endrin aldehyde                    |          |         |                 | < 3.8                    | < 3.7                      | < 4.2                    | < 3.7                      | < 3.9                    | < 3.7                      |  |
| Endrin ketone                      |          |         |                 | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| g-BHC                              |          | 280     | 100             | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| g-Chlordane                        |          |         |                 | < 3.8                    | < 3.7                      | < 4.2                    | < 3.7                      | < 3.9                    | < 3.7                      |  |
| Heptachlor                         |          | 420     | 42              | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| Heptachlor epoxide                 |          |         |                 | < 1.9                    | < 1.8                      | < 2.1                    | < 1.8                      | < 1.9                    | < 1.9                      |  |
| Methoxychlor                       |          |         |                 | < 7.5                    | < 7.4                      | < 8.4                    | < 7.4                      | < 7.8                    | < 7.5                      |  |
| Toxaphene                          |          |         |                 | < 190                    | < 180                      | < 210                    | < 180                      | < 190                    | < 190                      |  |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID                       | NY-Res. | NY-UnRestricted | B-4 (0-2 FT)<br>8/8/2014 | B-4 (10-12 FT)<br>8/8/2014 | B-5 (0-2 FT)<br>8/8/2014 | B-5 (10-12 FT)<br>8/8/2014 | B-6 (0-2 FT)<br>8/8/2014 | B-6 (10-12 FT)<br>8/8/2014 |
|---------------------------------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|
| <b>Sampling Date</b>            |         |                 |                          |                            |                          |                            |                          |                            |
| <b>Compound</b>                 |         |                 |                          |                            |                          |                            |                          |                            |
| <b>Miscellaneous/Inorganics</b> |         |                 |                          |                            |                          |                            |                          |                            |
| Percent Solid                   |         |                 | 79                       | 80                         | 82                       | 79                         | 89                       | 88                         |
| Total Cyanide                   | 27      | 27              | 2.09                     | < 0.52                     | < 0.61                   | < 0.58                     | < 0.56                   | < 0.57                     |
| <b>Metals, Total</b>            |         |                 |                          |                            |                          |                            |                          |                            |
| Aluminum                        |         |                 | 8,790                    | 11,700                     | 14,000                   | 6,980                      | 8,760                    | 7,550                      |
| Antimony                        |         |                 | 5.8                      | < 3.8                      | < 3.8                    | < 3.9                      | 5.4                      | < 3.8                      |
| Arsenic                         | 16      | 13              | 15.5                     | 2.1                        | 5.6                      | < 0.8                      | 5.4                      | < 0.8                      |
| Barium                          | 350     | 350             | 480                      | 80.5                       | 116                      | 46.6                       | 186                      | 32.4                       |
| Beryllium                       | 14      | 7.2             | 0.56                     | 0.73                       | 0.51                     | 0.4                        | 0.42                     | 0.57                       |
| Cadmium                         | 2.5     | 2.5             | 4.47                     | < 0.38                     | < 0.38                   | < 0.38                     | 2.74                     | < 0.38                     |
| Calcium                         |         |                 | 5,220                    | 1,530                      | 1,550                    | 732                        | 1,550                    | 789                        |
| Chromium                        |         | 30              | 48.9                     | 36.4                       | 22.1                     | 16.4                       | 58.5                     | 21.1                       |
| Cobalt                          |         |                 | 9.3                      | 13.7                       | 6.49                     | 8.18                       | 6.99                     | 9.45                       |
| Copper                          | 270     | 50              | 135                      | 38.7                       | 36.7                     | 13.6                       | 30.3                     | 19.4                       |
| Iron                            |         |                 | 24,000                   | 38,900                     | 22,500                   | 20,600                     | 19,100                   | 29,100                     |
| Lead                            | 400     | 63              | 1,230                    | 9.09                       | 96.9                     | 5.64                       | 293                      | 8.54                       |
| Magnesium                       |         |                 | 2,030                    | 3,170                      | 2,670                    | 2,000                      | 2,030                    | 1,650                      |
| Manganese                       | 2,000   | 1,600           | 316                      | 688                        | 258                      | 396                        | 293                      | 507                        |
| Mercury                         | 0.81    | 0.18            | 0.82                     | < 0.08                     | 1.04                     | < 0.08                     | 0.44                     | < 0.08                     |
| Nickel                          | 140     | 30              | 37.8                     | 19.2                       | 14                       | 9.91                       | 16.3                     | 11.8                       |
| Potassium                       |         |                 | 793                      | 1,600                      | 1,150                    | 1,390                      | 994                      | 1,330                      |
| Selenium                        | 36      | 3.9             | < 1.5                    | < 1.5                      | < 1.5                    | < 1.5                      | < 1.3                    | < 1.5                      |
| Silver                          | 36      | 2               | < 1.0                    | < 0.38                     | < 0.38                   | < 0.39                     | < 1.0                    | < 0.38                     |
| Sodium                          |         |                 | 221                      | 67                         | 67.4                     | 61.7                       | 51.1                     | 44                         |
| Thallium                        |         |                 | < 3.5                    | < 3.4                      | < 3.4                    | < 3.5                      | < 3.0                    | < 3.4                      |
| Vanadium                        |         |                 | 80.6                     | 56.9                       | 30.6                     | 30.3                       | 30.5                     | 39.3                       |
| Zinc                            | 2,200   | 109             | 538                      | 60.2                       | 88.7                     | 34.6                       | 652                      | 38.7                       |
| <b>PCBs By SW 8062</b>          |         |                 |                          |                            |                          |                            |                          |                            |
| PCB-1016                        | 1,000   | 100             | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| PCB-1221                        | 1,000   | 100             | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| PCB-1232                        | 1,000   | 100             | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| PCB-1242                        | 1,000   | 100             | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| PCB-1248                        | 1,000   | 100             | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| PCB-1254                        | 1,000   | 100             | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| PCB-1260                        | 1,000   | 100             | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| PCB-1262                        |         |                 | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| PCB-1268                        |         |                 | < 82                     | < 82                       | < 81                     | < 84                       | < 74                     | < 74                       |
| <b>Volatiles by SW 8260</b>     |         |                 |                          |                            |                          |                            |                          |                            |
| 1,1,1,2-Tetrachloroethane       | ug/Kg   | ug/Kg           | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,1,1-Trichloroethane           | 100,000 | 680             | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,1,2,2-Tetrachloroethane       |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,1,2-Trichloroethane           |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID<br>Sampling Date  | NY-Res. | NY-UnRestricted | B-4 (0-2 FT)<br>8/8/2014 | B-4 (10-12 FT)<br>8/8/2014 | B-5 (0-2 FT)<br>8/8/2014 | B-5 (10-12 FT)<br>8/8/2014 | B-6 (0-2 FT)<br>8/8/2014 | B-6 (10-12 FT)<br>8/8/2014 |
|-----------------------------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|
| Compound                    |         |                 |                          |                            |                          |                            |                          |                            |
| 1,1-Dichloroethane          | 19,000  | 270             | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,1-Dichloroethene          | 100,000 | 330             | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,1-Dichloropropene         |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2,3-Trichlorobenzene      |         |                 | < 320                    | < 320                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2,3-Trichloropropane      |         |                 | < 320                    | < 320                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2,4-Trichlorobenzene      |         |                 | < 320                    | < 320                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2,4-Trimethylbenzene      | 47,000  | 3,600           | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2-Dibromo-3-chloropropane |         |                 | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2-Dibromoethane           |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2-Dichlorobenzene         | 100,000 | 1,100           | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2-Dichloroethane          | 2,300   | 20              | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,2-Dichloropropane         |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,3,5-Trimethylbenzene      | 47,000  | 8,400           | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,3-Dichlorobenzene         | 17,000  | 2,400           | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,3-Dichloropropane         |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 1,4-Dichlorobenzene         |         |                 | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 2,2-Dichloropropane         |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 2-Chlorotoluene             | 9,800   | 1,800           | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 2-Hexanone                  |         |                 | < 32                     | < 31                       | < 30                     | < 32                       | < 28                     | < 28                       |
| 2-Isopropyltoluene          |         |                 | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 4-Chlorotoluene             |         |                 | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| 4-Methyl-2-pentanone        |         |                 | < 32                     | < 31                       | < 30                     | < 32                       | < 28                     | < 28                       |
| Acetone                     | 100,000 | 50              | < 32                     | 75                         | 100                      | < 28                       | < 28                     | 51                         |
| Acrylonitrile               |         |                 | < 13                     | < 13                       | < 12                     | < 13                       | < 11                     | < 11                       |
| Benzene                     | 2,900   | 60              | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Bromobenzene                |         |                 | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Bromochloromethane          |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Bromodichloromethane        |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Bromoform                   |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Bromomethane                |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Carbon Disulfide            |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Carbon tetrachloride        | 1,400   | 760             | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Chlorobenzene               | 100,000 | 1,100           | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Chloroethane                |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Chloroform                  | 10,000  | 370             | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Chloromethane               |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| cis-1,2-Dichloroethene      | 59,000  | 250             | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| cis-1,3-Dichloropropene     |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Dibromochloromethane        |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Dibromomethane              |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Dichlorodifluoromethane     |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Ethylbenzene                |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Hexachlorobutadiene         | 30,000  | 1,000           | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| Isopropylbenzene            |         |                 | < 320                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |
| m&p-Xylene                  |         |                 | < 6.3                    | < 6.3                      | < 6.1                    | < 6.3                      | < 5.6                    | < 5.7                      |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID                       | NY-Res. | NY-UnRestricted | B-4 (0-2 FT) 8/8/2014 | B-4 (10-12 FT) 8/8/2014 | B-5 (0-2 FT) 8/8/2014 | B-5 (10-12 FT) 8/8/2014 | B-6 (0-2 FT) 8/8/2014 | B-6 (10-12 FT) 8/8/2014 |
|---------------------------------|---------|-----------------|-----------------------|-------------------------|-----------------------|-------------------------|-----------------------|-------------------------|
| <b>Compound</b>                 |         |                 |                       |                         |                       |                         |                       |                         |
| Methyl Ethyl Ketone             | 100,000 | 120             | < 32                  | < 31                    | < 30                  | < 32                    | < 28                  | < 28                    |
| Methyl t-butyl ether (MTBE)     | 62,000  | 930             | < 13                  | < 13                    | < 12                  | < 13                    | < 11                  | < 11                    |
| Methylene chloride              | 51,000  | 50              | 53                    | 22                      | 33                    | 11                      | 13                    | 13                      |
| Naphthalene                     |         |                 | < 320                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| n-Butylbenzene                  | 100,000 | 12,000          | < 320                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| n-Propylbenzene                 | 100,000 | 3,900           | < 320                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| o-Xylene                        |         |                 | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| p-Isopropyltoluene              |         |                 | < 320                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| sec-Butylbenzene                | 100,000 | 11,000          | < 320                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| Styrene                         | 100,000 | 5,900           | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| tert-Butylbenzene               | 100,000 | 1,300           | < 320                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| Tetrachloroethene               | 5,500   | 1,300           | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| Tetrahydrofuran (THF)           |         |                 | < 13                  | < 13                    | < 12                  | < 13                    | < 11                  | < 11                    |
| Toluene                         | 100,000 | 700             | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| Total Xylenes                   |         | 260             | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| trans-1,2-Dichloroethene        | 100,000 | 190             | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| trans-1,3-Dichloropropene       |         |                 | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| trans-1,4-dichloro-2-butene     |         |                 | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| Trichloroethene                 | 10,000  | 470             | < 6.3                 | < 13                    | < 12                  | < 13                    | < 11                  | < 11                    |
| Trichlorofluoromethane          |         |                 | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| Trichlorotrifluoroethane        |         |                 | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| Vinyl chloride                  | 210     | 20              | < 6.3                 | < 6.3                   | < 6.1                 | < 6.3                   | < 5.6                 | < 5.7                   |
| <b>Semivolatiles By SW 8270</b> | ug/Kg   | ug/Kg           | ug/Kg                 | ug/Kg                   | ug/Kg                 | ug/Kg                   | ug/Kg                 | ug/Kg                   |
| 1,2,4,5-Tetrachlorobenzene      |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 1,2,4-Trichlorobenzene          |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 1,2-Dichlorobenzene             |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 1,2-Diphenylhydrazine           |         |                 | < 2100                | < 410                   | < 400                 | < 410                   | < 370                 | < 370                   |
| 1,3-Dichlorobenzene             |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 1,4-Dichlorobenzene             |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2,4,5-Trichlorophenol           |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2,4,6-Trichlorophenol           |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2,4-Dichlorophenol              |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2,4-Dimethylphenol              |         |                 | < 3400                | < 660                   | < 640                 | < 650                   | < 600                 | < 600                   |
| 2,4-Dinitrotoluene              |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2,6-Dinitrotoluene              |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2-Chloronaphthalene             |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2-Chlorophenol                  |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2-Methylnaphthalene             |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2-Methylphenol (o-cresol)       | 100,000 | 330             | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 2-Nitroaniline                  |         |                 | < 3400                | < 660                   | < 640                 | < 650                   | < 600                 | < 600                   |
| 3,3'-Dichlorobenzidine          |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 3,4-Methylphenol (m&p-cresol)   |         |                 | < 2100                | < 410                   | < 400                 | < 410                   | < 370                 | < 370                   |
| 3-Nitroaniline                  |         |                 | < 1500                | < 290                   | < 280                 | < 290                   | < 260                 | < 260                   |
| 4,6-Dinitro-2-methylphenol      |         |                 | < 6100                | < 1200                  | < 640                 | < 650                   | < 600                 | < 600                   |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID<br>Sampling Date  | Compound | NY-Res. | NY-UnRestricted | B-4 (0-2 FT)<br>8/8/2014 | B-4 (10-12 FT)<br>8/8/2014 | B-5 (0-2 FT)<br>8/8/2014 | B-5 (10-12 FT)<br>8/8/2014 | B-6 (0-2 FT)<br>8/8/2014 | B-6 (10-12 FT)<br>8/8/2014 |
|-----------------------------|----------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|
| 4-Bromophenyl phenyl ether  |          |         |                 | < 2100                   | < 410                      | < 400                    | < 410                      | < 370                    | < 370                      |
| 4-Chloro-3-methylphenol     |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| 4-Chloroaniline             |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| 4-Chlorophenyl phenyl ether |          |         |                 | < 3400                   | < 660                      | < 640                    | < 660                      | < 600                    | < 600                      |
| 4-Nitroaniline              |          |         |                 | < 6100                   | < 1200                     | < 1200                   | < 1200                     | < 1100                   | < 1100                     |
| 4-Nitrophenol               |          |         |                 | 1,900                    | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Acenaphthene                | 100,000  | 20,000  | 100,000         | 3,300                    | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Acenaphthylene              | 100,000  | 100,000 | 100,000         | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Acetophenone                |          |         |                 | < 6100                   | < 1200                     | < 1200                   | < 1200                     | < 1100                   | < 1100                     |
| Aniline                     |          |         |                 | 7,800                    | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Anthracene                  | 100,000  | 100,000 | 100,000         | 28,000                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Benz(a)anthracene           | 1,000    | 1,000   | 1,000           | < 2500                   | < 500                      | < 480                    | < 490                      | < 450                    | < 450                      |
| Benzidine                   |          |         |                 | 20,000                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Benzo(a)pyrene              | 1,000    | 1,000   | 1,000           | 28,000                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Benzo(b)fluoranthene        | 1,000    | 1,000   | 1,000           | 8,000                    | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Benzo(g,h,i)perylene        | 100,000  | 100,000 | 100,000         | 8,500                    | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Benzo(k)fluoranthene        | 1,000    | 800     | 800             | < 6100                   | < 1200                     | < 1200                   | < 1200                     | < 1100                   | < 1100                     |
| Benzoic acid                |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Benzyl butyl phthalate      |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Bis(2-chloroethoxy)methane  |          |         |                 | < 2100                   | < 410                      | < 400                    | < 410                      | < 370                    | < 370                      |
| Bis(2-chloroethyl)ether     |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Bis(2-chloroisopropyl)ether |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Bis(2-ethylhexyl)phthalate  |          |         |                 | 4,500                    | < 620                      | < 600                    | < 610                      | < 560                    | < 560                      |
| Carbazole                   |          |         |                 | 24,000                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Chrysene                    | 1,000    | 1,000   | 1,000           | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Dibenz(a,h)anthracene       | 330      | 330     | 330             | 2,000                    | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Dibenzofuran                |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Diethyl phthalate           |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Dimethylphthalate           |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Di-n-butylphthalate         |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Di-n-octylphthalate         |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Fluoranthene                | 100,000  | 100,000 | 100,000         | 76,000                   | < 290                      | < 280                    | < 290                      | 330                      | < 260                      |
| Fluorene                    | 100,000  | 100,000 | 30,000          | 3,200                    | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Hexachlorobenzene           |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Hexachlorobutadiene         |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Hexachlorocyclopentadiene   |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Hexachloroethane            |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Indeno(1,2,3-cd)pyrene      | 500      | 500     | 500             | 8,400                    | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Isophorone                  |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Naphthalene                 | 100,000  | 12,000  | 12,000          | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Nitrobenzene                |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| N-Nitrosodimethylamine      |          |         |                 | < 2100                   | < 410                      | < 400                    | < 410                      | < 370                    | < 370                      |
| N-Nitrosodi-n-propylamine   |          |         |                 | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| N-Nitrosodiphenylamine      |          |         |                 | < 2100                   | < 410                      | < 400                    | < 410                      | < 370                    | < 370                      |
| Pentachloronitrobenzene     |          |         |                 | < 2100                   | < 410                      | < 400                    | < 410                      | < 370                    | < 370                      |
| Pentachlorophenol           | 2,400    | 800     | 800             | < 2100                   | < 410                      | < 400                    | < 410                      | < 370                    | < 370                      |
| Phenanthrene                | 100,000  | 100,000 | 100,000         | 45,000                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |

**Table 1. Soil Sample Analytical Results**

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, New York

| Sample ID<br>Sampling Date         | Compound | NY-Res. | NY-UnRestricted | B-4 (0-2 FT)<br>8/8/2014 | B-4 (10-12 FT)<br>8/8/2014 | B-5 (0-2 FT)<br>8/8/2014 | B-5 (10-12 FT)<br>8/8/2014 | B-6 (0-2 FT)<br>8/8/2014 | B-6 (10-12 FT)<br>8/8/2014 |
|------------------------------------|----------|---------|-----------------|--------------------------|----------------------------|--------------------------|----------------------------|--------------------------|----------------------------|
| Phenol                             |          | 100,000 | 330             | < 1500                   | < 290                      | < 280                    | < 290                      | < 260                    | < 260                      |
| Pyrene                             |          | 100,000 | 100,000         | < 2100                   | < 290                      | < 280                    | < 410                      | 280                      | < 260                      |
| Pyridine                           |          |         |                 |                          |                            |                          |                            |                          |                            |
| <b>Pesticides - Soil By SW8081</b> |          |         |                 |                          |                            |                          |                            |                          |                            |
| 4,4'-DDD                           |          | ug/Kg   | ug/Kg           | ug/Kg                    | ug/Kg                      | ug/Kg                    | ug/Kg                      | ug/Kg                    | ug/Kg                      |
| 4,4'-DDE                           | 2,600    | < 3.0   | < 3.0           | < 3.0                    | < 3.0                      | < 2.9                    | < 3.0                      | < 2.7                    | < 2.7                      |
| 4,4'-DDT                           | 1,800    | < 3.0   | < 3.0           | < 3.0                    | < 3.0                      | < 2.9                    | < 3.0                      | 25                       | < 2.7                      |
| a-BHC                              | 1,700    | 14      |                 |                          |                            |                          |                            | 40                       | < 2.7                      |
| a-Chlordane                        | 97       | < 2.1   | < 2.1           | < 2.1                    | < 2.1                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| Aldrin                             | 910      | < 4.1   | < 4.1           | < 4.1                    | < 4.1                      | < 4.0                    | < 4.2                      | < 3.7                    | < 3.7                      |
| b-BHC                              | 19       | < 2.1   | < 2.1           | < 2.1                    | < 2.1                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| Chlordane                          | 72       | < 5.0   | < 5.0           | < 5.0                    | < 5.0                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| d-BHC                              | 100,000  | < 25    | < 25            | < 25                     | < 25                       | < 24                     | < 25                       | < 22                     | < 22                       |
| Dieldrin                           | 39       | < 6.0   | < 6.0           | < 6.0                    | < 6.0                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| Endosulfan I                       | 4,800    | < 2.1   | < 2.1           | < 2.1                    | < 2.1                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| Endosulfan II                      | 4,800    | < 4.1   | < 4.1           | < 4.1                    | < 4.1                      | < 4.0                    | < 4.2                      | < 3.7                    | < 3.7                      |
| Endosulfan sulfate                 | 4,800    | < 4.1   | < 4.1           | < 4.1                    | < 4.1                      | < 4.0                    | < 4.2                      | < 3.7                    | < 3.7                      |
| Endrin                             | 2,200    | < 25    | < 25            | < 25                     | < 25                       | < 4.0                    | < 4.2                      | < 3.7                    | < 3.7                      |
| Endrin aldehyde                    |          | < 2.1   | < 2.1           | < 2.1                    | < 2.1                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| Endrin ketone                      |          | < 4.1   | < 4.1           | < 4.1                    | < 4.1                      | < 4.0                    | < 4.2                      | < 3.7                    | < 3.7                      |
| g-BHC                              | 280      | < 30    | < 30            | < 30                     | < 30                       | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| g-Chlordane                        |          | < 2.1   | < 2.1           | < 2.1                    | < 2.1                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| Heptachlor                         |          | < 4.1   | < 4.1           | < 4.1                    | < 4.1                      | < 4.0                    | < 4.2                      | < 3.7                    | < 3.7                      |
| Heptachlor epoxide                 | 420      | < 5.0   | < 5.0           | < 5.0                    | < 5.0                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| Methoxychlor                       |          | < 2.1   | < 2.1           | < 2.1                    | < 2.1                      | < 2.0                    | < 2.1                      | < 1.9                    | < 1.8                      |
| Toxaphene                          |          | < 8.2   | < 8.2           | < 8.2                    | < 8.2                      | < 8.1                    | < 8.4                      | < 7.4                    | < 7.4                      |

**NOTES:**

mg/Kg = milligrams per kilogram  
ug/Kg = micrograms per kilogram  
Regulatory Exceedences are shaded

**Table 2. Groundwater Analytical Results**  
**Phase II Investigation**  
**59-63 North 6th Street**  
**Brooklyn, New York**

| Sample ID<br>Sampling Date<br>Compound | TOGS-WQ/GA | GW-1<br>8/11/2014 | GW-2<br>8/11/2014 | GW-3<br>8/11/2014 |
|--|------------|-------------------|-------------------|-------------------|
| <b>Miscellaneous/Inorganics (mg/L)</b> |            |                   |                   |                   |
| Total Cyanide                          | 0.2        | 0.03              | < 0.01            | < 0.01            |
| <b>Metals, Total (mg/L)</b>            |            |                   |                   |                   |
| Aluminum                               | 0.1        | 579               | 288               | 223               |
| Aluminum (Dissolved)                   | 0.1        | 0.13              | 0.31              | 0.15              |
| Antimony                               | 0.003      | < 0.003           | < 0.003           | < 0.003           |
| Antimony (Dissolved)                   | 0.003      | < 0.003           | < 0.003           | < 0.003           |
| Arsenic                                | 0.025      | 0.498             | 0.151             | 0.156             |
| Arsenic (Dissolved)                    | 0.025      | < 0.004           | < 0.004           | < 0.004           |
| Barium                                 | 1          | 9.96              | 3.39              | 2.23              |
| Barium (Dissolved)                     | 1          | 0.049             | 0.053             | 0.045             |
| Beryllium                              | 0.003      | 0.031             | 0.015             | 0.012             |
| Beryllium (Dissolved)                  | 0.003      | < 0.001           | < 0.001           | < 0.001           |
| Cadmium                                | 0.005      | 0.017             | 0.016             | 0.009             |
| Cadmium (Dissolved)                    | 0.005      | < 0.001           | < 0.001           | < 0.001           |
| Calcium                                |            | 881               | 342               | 90                |
| Calcium (Dissolved)                    |            | 71.3              | 111               | 107               |
| Chromium                               | 0.05       | 2.66              | 1.29              | 0.711             |
| Chromium (Dissolved)                   | 0.05       | < 0.001           | < 0.001           | < 0.001           |
| Cobalt                                 |            | 0.7               | 0.329             | 0.204             |
| Cobalt (Dissolved)                     |            | 0.001             | 0.004             | 0.005             |
| Copper                                 | 0.2        | 2.16              | 0.963             | 0.573             |
| Copper (Dissolved)                     | 0.2        | < 0.005           | < 0.005           | 0.008             |
| Iron                                   | 0.3        | 1,400             | 714               | 550               |
| Iron (Dissolved)                       | 0.3        | 0.093             | 0.082             | 0.11              |
| Lead                                   | 0.025      | 9.29              | 3.81              | 0.207             |
| Lead (Dissolved)                       | 0.025      | < 0.002           | < 0.002           | < 0.002           |
| Magnesium                              | 35         | 228               | 110               | 94                |
| Magnesium (Dissolved)                  | 35         | 9.94              | 18.5              | 21.7              |
| Manganese                              | 0.3        | 56.5              | 25.5              | 31.5              |
| Manganese (Dissolved)                  | 0.3        | 0.823             | 3.98              | 3.5               |
| Mercury                                | 0.0007     | 0.0008            | < 0.0002          | < 0.0002          |
| Mercury (Dissolved)                    | 0.0007     | < 0.0002          | < 0.0002          | < 0.0002          |
| Nickel                                 | 0.1        | 1.38              | 0.673             | 0.539             |
| Nickel (Dissolved)                     | 0.1        | 0.004             | 0.009             | 0.011             |
| Potassium                              |            | 117               | 45.5              | 31.7              |
| Potassium (Dissolved)                  |            | 8.1               | 10.3              | 11.5              |
| Selenium                               | 0.01       | < 0.01            | 0.011             | < 0.01            |
| Selenium (Dissolved)                   | 0.01       | < 0.002           | < 0.005           | < 0.010           |
| Silver                                 | 0.05       | < 0.005           | < 0.001           | < 0.001           |
| Silver (Dissolved)                     | 0.05       | < 0.001           | < 0.001           | < 0.001           |
| Sodium                                 | 20         | 49.6              | 45.8              | 56.4              |
| Sodium (Dissolved)                     | 20         | 55.8              | 51.4              | 57.2              |
| Thallium                               | 0.0005     | < 0.0005          | < 0.0005          | < 0.0005          |
| Thallium (Dissolved)                   | 0.0005     | < 0.0005          | < 0.0005          | < 0.0005          |
| Vanadium                               |            | 1.59              | 0.695             | 0.444             |
| Vanadium (Dissolved)                   |            | < 0.002           | < 0.002           | < 0.002           |
| Zinc                                   | 5          | 7.65              | 3.33              | 1.11              |
| Zinc (Dissolved)                       | 5          | 0.003             | 0.021             | 0.006             |
| <b>PCBs By 608/ 8082 (ug/L)</b>        |            |                   |                   |                   |
| PCB-1016                               | 0.09       | 0.067             | < 0.053           | < 0.050           |
| PCB-1221                               | 0.09       | < 0.058           | < 0.053           | < 0.050           |
| PCB-1232                               | 0.09       | < 0.058           | < 0.053           | < 0.050           |
| PCB-1242                               | 0.09       | < 0.058           | < 0.053           | < 0.050           |
| PCB-1248                               | 0.09       | < 0.058           | < 0.053           | < 0.050           |
| PCB-1254                               | 0.09       | < 0.058           | < 0.053           | < 0.050           |
| PCB-1260                               | 0.09       | < 0.058           | < 0.053           | < 0.050           |
| PCB-1262                               |            | < 0.058           | < 0.053           | < 0.050           |
| PCB-1268                               |            | < 0.058           | < 0.053           | < 0.050           |
| <b>Volatiles By SW8260 (ug/L)</b>      |            |                   |                   |                   |
| 1,1,1,2-Tetrachloroethane              | 5          | < 1.0             | < 1.0             | < 1.0             |
| 1,1,1-Trichloroethane                  | 5          | < 1.0             | < 1.0             | < 1.0             |
| 1,1,2,2-Tetrachloroethane              | 5          | < 0.50            | < 0.50            | < 0.50            |
| 1,1,2-Trichloroethane                  | 1          | < 1.0             | < 1.0             | < 1.0             |
| 1,1-Dichloroethane                     | 5          | < 1.0             | < 1.0             | < 1.0             |
| 1,1-Dichloroethene                     | 5          | < 1.0             | < 1.0             | < 1.0             |
| 1,1-Dichloropropene                    | 5          | < 1.0             | < 1.0             | < 1.0             |
| 1,2,3-Trichlorobenzene                 |            | < 1.0             | < 1.0             | < 1.0             |

**Table 2. Groundwater Analytical Results**  
**Phase II Investigation**  
**59-63 North 6th Street**  
**Brooklyn, New York**

| Sample ID<br>Sampling Date<br>Compound | TOGS-WQ/GA | GW-1<br>8/11/2014 | GW-2<br>8/11/2014 | GW-3<br>8/11/2014 |
|--|------------|-------------------|-------------------|-------------------|
| 1,2,3-Trichloropropane                 | 0.04       | < 1.0             | < 1.0             | < 1.0             |
| 1,2,4-Trichlorobenzene                 |            | < 1.0             | < 1.0             | < 1.0             |
| 1,2,4-Trimethylbenzene                 | 5          | < 1.0             | < 1.0             | < 1.0             |
| 1,2-Dibromo-3-chloropropane            | 0.04       | < 1.0             | < 1.0             | < 1.0             |
| 1,2-Dibromoethane                      | 0.0006     | < 1.0             | < 1.0             | < 1.0             |
| 1,2-Dichlorobenzene                    |            | < 1.0             | < 1.0             | < 1.0             |
| 1,2-Dichloroethane                     | 0.6        | < 0.60            | < 0.60            | < 0.60            |
| 1,2-Dichloropropane                    | 1          | < 1.0             | < 1.0             | < 1.0             |
| 1,3,5-Trimethylbenzene                 | 5          | < 1.0             | < 1.0             | < 1.0             |
| 1,3-Dichlorobenzene                    | 3          | < 1.0             | < 1.0             | < 1.0             |
| 1,3-Dichloropropane                    | 5          | < 1.0             | < 1.0             | < 1.0             |
| 1,4-Dichlorobenzene                    |            | < 1.0             | < 1.0             | < 1.0             |
| 2,2-Dichloropropane                    | 5          | < 1.0             | < 1.0             | < 1.0             |
| 2-Chlorotoluene                        | 5          | < 1.0             | < 1.0             | < 1.0             |
| 2-Hexanone                             | 50         | < 5.0             | < 5.0             | < 5.0             |
| 2-Isopropyltoluene                     | 5          | < 1.0             | < 1.0             | < 1.0             |
| 4-Chlorotoluene                        | 5          | < 1.0             | < 1.0             | < 1.0             |
| 4-Methyl-2-pentanone                   |            | < 5.0             | < 5.0             | < 5.0             |
| Acetone                                | 50         | < 25              | < 25              | < 25              |
| Acrylonitrile                          | 5          | < 5.0             | < 5.0             | < 5.0             |
| Benzene                                | 1          | < 0.70            | < 0.70            | < 0.70            |
| Bromobenzene                           | 5          | < 1.0             | < 1.0             | < 1.0             |
| Bromochloromethane                     | 5          | < 1.0             | < 1.0             | < 1.0             |
| Bromodichloromethane                   | 50         | < 0.50            | < 0.50            | < 0.50            |
| Bromoform                              | 50         | < 1.0             | < 1.0             | < 1.0             |
| Bromomethane                           | 5          | < 1.0             | < 1.0             | < 1.0             |
| Carbon Disulfide                       |            | < 5.0             | < 5.0             | < 5.0             |
| Carbon tetrachloride                   | 5          | < 1.0             | < 1.0             | < 1.0             |
| Chlorobenzene                          | 5          | < 1.0             | < 1.0             | < 1.0             |
| Chloroethane                           | 5          | < 1.0             | < 1.0             | < 1.0             |
| Chloroform                             | 7          | < 1.0             | < 1.0             | < 1.0             |
| Chloromethane                          | 5          | < 1.0             | < 1.0             | < 1.0             |
| cis-1,2-Dichloroethene                 | 5          | < 1.0             | < 1.0             | < 1.0             |
| cis-1,3-Dichloropropene                | 0.4        | < 0.40            | < 0.40            | < 0.40            |
| Dibromochloromethane                   | 50         | < 0.50            | < 0.50            | < 0.50            |
| Dibromomethane                         | 5          | < 1.0             | < 1.0             | < 1.0             |
| Dichlorodifluoromethane                | 5          | < 1.0             | < 1.0             | < 1.0             |
| Ethylbenzene                           | 5          | < 1.0             | < 1.0             | < 1.0             |
| Hexachlorobutadiene                    | 0.5        | < 0.40            | < 0.40            | < 0.40            |
| Isopropylbenzene                       | 5          | < 1.0             | < 1.0             | < 1.0             |
| m&p-Xylene                             |            | < 1.0             | < 1.0             | < 1.0             |
| Methyl ethyl ketone                    | 50         | < 5.0             | < 5.0             | < 5.0             |
| Methyl t-butyl ether (MTBE)            |            | < 1.0             | < 1.0             | < 1.0             |
| Methylene chloride                     | 5          | < 1.0             | < 1.0             | < 1.0             |
| Naphthalene                            | 10         | 8.7               | 5.7               | < 1.0             |
| n-Butylbenzene                         | 5          | < 1.0             | < 1.0             | < 1.0             |
| n-Propylbenzene                        | 5          | < 1.0             | < 1.0             | < 1.0             |
| o-Xylene                               | 5          | < 1.0             | < 1.0             | < 1.0             |
| p-Isopropyltoluene                     | 5          | < 1.0             | < 1.0             | < 1.0             |
| sec-Butylbenzene                       | 5          | < 1.0             | < 1.0             | < 1.0             |
| Styrene                                | 5          | < 1.0             | < 1.0             | < 1.0             |
| tert-Butylbenzene                      | 5          | < 1.0             | < 1.0             | < 1.0             |
| Tetrachloroethene                      | 5          | < 1.0             | < 1.0             | < 1.0             |
| Tetrahydrofuran (THF)                  | 50         | < 2.5             | < 2.5             | < 2.5             |
| Toluene                                | 5          | < 1.0             | < 1.0             | < 1.0             |
| Total Xylenes                          | 5          | < 1.0             | < 1.0             | < 1.0             |
| trans-1,2-Dichloroethene               | 5          | < 1.0             | < 1.0             | < 1.0             |
| trans-1,3-Dichloropropene              | 0.4        | < 0.40            | < 0.40            | < 0.40            |
| trans-1,4-dichloro-2-butene            | 5          | < 5.0             | < 5.0             | < 5.0             |
| Trichloroethene                        | 5          | < 1.0             | 4.3               | 2.6               |
| Trichlorofluoromethane                 | 5          | < 1.0             | < 1.0             | < 1.0             |
| Trichlorotrifluoroethane               | 5          | < 1.0             | < 1.0             | < 1.0             |
| Vinyl chloride                         | 2          | < 1.0             | < 1.0             | < 1.0             |

**Table 2. Groundwater Analytical Results**  
**Phase II Investigation**  
**59-63 North 6th Street**  
**Brooklyn, New York**

| Sample ID<br>Sampling Date<br>Compound      | TOGS-WQ/GA | GW-1<br>8/11/2014 | GW-2<br>8/11/2014 | GW-3<br>8/11/2014 |
|---|------------|-------------------|-------------------|-------------------|
| <b>Semivolatiles By SW8270 (SIM) (ug/L)</b> |            |                   |                   |                   |
| 1,2,4,5-Tetrachlorobenzene                  |            | < 0.50            | < 0.56            | < 0.51            |
| Acenaphthene                                | 20         | 0.64              | 0.12              | < 0.05            |
| Acenaphthylene                              |            | 0.25              | 0.06              | < 0.05            |
| Anthracene                                  | 50         | 1.4               | 0.21              | 0.04              |
| Benz(a)anthracene                           | 0.002      | 3.1               | 0.4               | 0.07              |
| Benzo(a)pyrene                              |            | 2.2               | 0.26              | < 0.02            |
| Benzo(b)fluoranthene                        | 0.002      | 3                 | 0.4               | 0.05              |
| Benzo(ghi)perylene                          |            | 1.1               | < 0.56            | < 0.51            |
| Benzo(k)fluoranthene                        | 0.002      | 1                 | 0.12              | 0.02              |
| Bis(2-ethylhexyl)phthalate                  | 5          | 3                 | 4.9               | 3.4               |
| Chrysene                                    | 0.002      | 3                 | 0.38              | 0.05              |
| Dibenz(a,h)anthracene                       |            | < 0.02            | < 0.02            | < 0.02            |
| Fluoranthene                                | 50         | 7.7               | 1                 | 0.14              |
| Hexachlorobenzene                           | 0.04       | < 0.04            | < 0.04            | < 0.04            |
| Hexachlorobutadiene                         | 0.5        | < 0.50            | < 0.5             | < 0.5             |
| Hexachloroethane                            | 5          | < 0.50            | < 0.56            | < 0.51            |
| Indeno(1,2,3-cd)pyrene                      | 0.002      | 1                 | 0.12              | < 0.02            |
| Nitrobenzene                                | 0.4        | < 0.10            | < 0.11            | < 0.10            |
| Pentachloronitrobenzene                     |            | < 0.10            | < 0.11            | < 0.10            |
| Pentachlorophenol                           | 1          | < 0.80            | < 0.89            | < 0.82            |
| Phenanthrene                                | 50         | 6.6               | 1.1               | < 0.05            |
| Pyrene                                      | 50         | 6                 | 0.78              | 0.11              |
| Pyridine                                    | 50         | < 0.50            | < 0.56            | < 0.51            |
| <b>Semivolatiles By SW8270 (ug/L)</b>       |            |                   |                   |                   |
| 1,2,4-Trichlorobenzene                      |            | < 5.0             | < 5.0             | < 5.0             |
| 1,2-Dichlorobenzene                         |            | < 2.5             | < 2.5             | < 2.5             |
| 1,2-Diphenylhydrazine                       |            | < 5.0             | < 5.0             | < 5.0             |
| 1,3-Dichlorobenzene                         | 3          | < 2.5             | < 2.5             | < 2.5             |
| 1,4-Dichlorobenzene                         |            | < 2.5             | < 2.5             | < 2.5             |
| 2,4,5-Trichlorophenol                       | 1          | < 1.0             | < 1.0             | < 1.0             |
| 2,4,6-Trichlorophenol                       | 1          | < 1.0             | < 1.0             | < 1.0             |
| 2,4-Dichlorophenol                          | 5          | < 1.0             | < 1.0             | < 1.0             |
| 2,4-Dimethylphenol                          | 1          | < 1.0             | < 1.0             | < 1.0             |
| 2,4-Dinitrophenol                           | 5          | < 1.0             | < 1.0             | < 1.0             |
| 2,4-Dinitrotoluene                          | 5          | < 5.0             | < 5.0             | < 5.0             |
| 2,6-Dinitrotoluene                          | 5          | < 5.0             | < 5.0             | < 5.0             |
| 2-Chloronaphthalene                         | 10         | < 5.0             | < 5.0             | < 5.0             |
| 2-Chlorophenol                              | 1          | < 1.0             | < 1.0             | < 1.0             |
| 2-Methylnaphthalene                         |            | < 5.0             | < 5.0             | < 5.0             |
| 2-Methylphenol (o-cresol)                   | 1          | < 1.0             | < 1.0             | < 1.0             |
| 2-Nitroaniline                              | 5          | < 5.0             | < 5.0             | < 5.0             |
| 2-Nitrophenol                               | 1          | < 1.0             | < 1.0             | < 1.0             |
| 3&4-Methylphenol (m&p-cresol)               |            | < 10              | < 10              | < 10              |
| 3,3'-Dichlorobenzidine                      | 5          | < 5.0             | < 5.0             | < 5.0             |
| 3-Nitroaniline                              | 5          | < 5.0             | < 5.0             | < 5.0             |
| 4,6-Dinitro-2-methylphenol                  | 1          | < 1.0             | < 1.0             | < 1.0             |
| 4-Bromophenyl phenyl ether                  |            | < 5.0             | < 5.0             | < 5.0             |
| 4-Chloro-3-methylphenol                     | 1          | < 1.0             | < 1.0             | < 1.0             |
| 4-Chloroaniline                             | 5          | < 5.0             | < 5.0             | < 5.0             |
| 4-Chlorophenyl phenyl ether                 |            | < 1.0             | < 1.0             | < 1.0             |
| 4-Nitroaniline                              | 5          | < 5.0             | < 5.0             | < 5.0             |
| 4-Nitrophenol                               | 1          | < 1.0             | < 1.0             | < 1.0             |
| Acetophenone                                |            | < 5.0             | < 5.0             | < 5.0             |
| Aniline                                     | 5          | < 5.0             | < 5.0             | < 5.0             |
| Benzidine                                   | 5          | < 5               | < 5               | < 5               |
| Benzoic acid                                |            | < 50              | < 50              | < 50              |
| Benzyl butyl phthalate                      | 50         | < 5.0             | < 5.0             | < 5.0             |
| Bis(2-chloroethoxy)methane                  | 5          | < 5.0             | < 5.0             | < 5.0             |
| Bis(2-chloroethyl)ether                     | 1          | < 1.0             | < 1.0             | < 1.0             |
| Bis(2-chloroisopropyl)ether                 |            | < 5.0             | < 5.0             | < 5.0             |
| Carbazole                                   |            | < 5.0             | < 5.0             | < 5.0             |
| Dibenzofuran                                |            | < 5.0             | < 5.0             | < 5.0             |
| Diethyl phthalate                           | 50         | < 5.0             | < 5.0             | < 5.0             |
| Dimethylphthalate                           | 50         | < 5.0             | < 5.0             | < 5.0             |
| Di-n-butylphthalate                         | 50         | < 5.0             | < 5.0             | < 5.0             |
| Di-n-octylphthalate                         | 50         | < 5.0             | < 5.0             | < 5.0             |

**Table 2. Groundwater Analytical Results**  
**Phase II Investigation**  
**59-63 North 6th Street**  
**Brooklyn, New York**

| Sample ID<br>Sampling Date<br>Compound | TOGS-WQ/GA | GW-1<br>8/11/2014 | GW-2<br>8/11/2014 | GW-3<br>8/11/2014 |
|--|------------|-------------------|-------------------|-------------------|
| Fluorene                               | 50         | < 5.0             | < 5.0             | < 5.0             |
| Hexachlorocyclopentadiene              | 5          | < 5.0             | < 5.0             | < 5.0             |
| Isophorone                             | 50         | < 5.0             | < 5.0             | < 5.0             |
| Naphthalene                            | 10         | < 5.0             | < 5.0             | < 5.0             |
| N-Nitrosodimethylamine                 |            | < 5.0             | < 5.0             | < 5.0             |
| N-Nitrosodi-n-propylamine              |            | < 5.0             | < 5.0             | < 5.0             |
| N-Nitrosodiphenylamine                 | 50         | < 5.0             | < 5.0             | < 5.0             |
| Phenol                                 | 1          | < 1.0             | < 1.0             | < 1.0             |
| <b>Pesticides By SW8081 (ug/L)</b>     |            |                   |                   |                   |
| 4,4' -DDD                              | 0.3        | < 0.010           | < 0.030           | < 0.050           |
| 4,4' -DDE                              | 0.2        | < 0.010           | < 0.027           | < 0.050           |
| 4,4' -DDT                              | 0.2        | < 0.010           | < 0.030           | < 0.050           |
| a-BHC                                  | 0.01       | < 0.005           | < 0.050           | < 0.025           |
| Alachlor                               | 0.5        | < 0.075           | < 0.80            | < 0.075           |
| Aldrin                                 |            | < 0.002           | < 0.016           | < 0.002           |
| b-BHC                                  | 0.04       | < 0.005           | < 0.053           | < 0.005           |
| Chlordane                              | 0.05       | < 0.030           | < 0.30            | < 0.30            |
| d-BHC                                  | 0.04       | < 0.025           | < 0.050           | < 0.025           |
| Dieldrin                               | 0.004      | < 0.035           | < 0.15            | < 0.002           |
| Endosulfan I                           |            | < 0.10            | < 0.11            | < 0.050           |
| Endosulfan II                          |            | < 0.050           | < 0.050           | < 0.050           |
| Endosulfan Sulfate                     |            | < 0.050           | < 0.050           | < 0.050           |
| Endrin                                 |            | < 0.030           | < 0.050           | < 0.050           |
| Endrin Aldehyde                        | 5          | < 0.050           | < 0.53            | < 0.050           |
| Endrin ketone                          | 5          | < 0.060           | < 0.53            | < 0.050           |
| g-BHC (Lindane)                        | 0.05       | < 0.025           | < 0.050           | < 0.025           |
| Heptachlor                             | 0.04       | < 0.020           | < 0.050           | < 0.025           |
| Heptachlor epoxide                     | 0.03       | < 0.005           | < 0.050           | < 0.025           |
| Methoxychlor                           | 35         | < 0.10            | < 1.1             | < 0.10            |
| Toxaphene                              | 0.06       | < 0.20            | < 2.0             | < 1.0             |

**NOTES:**

mg/L = milligrams per Liter

ug/L = micrograms per liter

Regulatory Exceedences are shaded

Table 3: Soil Vapor Analytical Results

Phase II Investigation  
59-63 North 6th Street  
Brooklyn, NY

| Sample ID                           | SV-2          |           | SV-4      |           | SV-1      |           | SV-3      |           |
|-------------------------------------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                                     | Sampling Date | 8/11/2014 | 8/11/2014 | 8/11/2014 | 8/11/2014 | 8/11/2014 | 8/11/2014 | 8/11/2014 |
| <b>Volatiles (ug/m<sup>3</sup>)</b> |               |           |           |           |           |           |           |           |
| 1,1,1,2-Tetrachloroethane           | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,1,1-Trichloroethane               | 3.05          | 1         | 8.67      | 1         | 21        | 1         | 2.89      | 1         |
| 1,1,2,2-Tetrachloroethane           | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,1,2-Trichloroethane               | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,1-Dichloroethane                  | 9.5           | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,1-Dichloroethene                  | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,2,4-Trichlorobenzene              | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,2,4-Trimethylbenzene              | 36.4          | 1         | 7.27      | 1         | 37.5      | 1         | 25.7      | 1         |
| 1,2-Dibromoethane(EDB)              | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,2-Dichlorobenzene                 | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,2-Dichloroethane                  | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,2-dichloropropane                 | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,2-Dichlorotetrafluoroethane       | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,3,5-Trimethylbenzene              | 9.28          | 1         | 2.11      | 1         | 10.7      | 1         | 7.37      | 1         |
| 1,3-Butadiene                       | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,3-Dichlorobenzene                 | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,4-Dichlorobenzene                 | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 1,4-Dioxane                         | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 2-Hexanone(MBK)                     | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| 4-Ethyltoluene                      | 9.38          | 1         | 1.92      | 1         | 8.3       | 1         | 6.29      | 1         |
| 4-Isopropyltoluene                  | 1.81          | 1         | < 1.00    | 1         | 1.86      | 1         | 1.32      | 1         |
| 4-Methyl-2-pentanone(MIBK)          | 1.31          | 1         | 1.39      | 1         | < 1.00    | 1         | 4.79      | 1         |
| Acetone                             | 144           | 1         | 750       | 1         | 129       | 1         | 266       | 1         |
| Acrylonitrile                       | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Benzene                             | 2.74          | 1         | 6.51      | 1         | 1.92      | 1         | 10.5      | 1         |
| Benzyl chloride                     | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Bromodichloromethane                | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Bromoform                           | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Bromomethane                        | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Carbon Disulfide                    | 4.39          | 1         | 2.05      | 1         | 2.61      | 1         | 140       | 1         |
| Carbon Tetrachloride                | 0.251         | 0.25      | 0.566     | 0.25      | 0.377     | 0.25      | 0.692     | 0.25      |
| Chlorobenzene                       | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Chloroethane                        | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Chloroform                          | 1.17          | 1         | < 1.00    | 1         | 9.56      | 1         | < 1.00    | 1         |
| Chloromethane                       | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Cis-1,2-Dichloroethene              | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| cis-1,3-Dichloropropene             | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Cyclohexane                         | 1.79          | 1         | 3.85      | 1         | < 1.00    | 1         | 3.47      | 1         |
| Dibromochloromethane                | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Dichlorodifluoromethane             | 1.14          | 1         | 1.78      | 1         | 1.53      | 1         | < 1.00    | 1         |
| Ethanol                             | 27.1          | 1         | 31.6      | 1         | 6.52      | 1         | 6.5       | 1         |
| Ethyl acetate                       | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Ethylbenzene                        | 12.5          | 1         | 7.12      | 1         | 19.1      | 1         | 23.7      | 1         |
| Heptane                             | 6.22          | 1         | 15.3      | 1         | 7.04      | 1         | 14.9      | 1         |
| Hexachlorobutadiene                 | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Hexane                              | 5.88          | 1         | 13.8      | 1         | 2.96      | 1         | 11.9      | 1         |
| Isopropylalcohol                    | 4.79          | 1         | 14.2      | 1         | 2.68      | 1         | 4.25      | 1         |
| Isopropylbenzene                    | 1.08          | 1         | < 1.00    | 1         | 1.52      | 1         | 1.52      | 1         |
| m,p-Xylene                          | 55.5          | 1         | 24.1      | 1         | 78.1      | 1         | 79.4      | 1         |
| Methyl Ethyl Ketone                 | 7.72          | 1         | 29.5      | 1         | 7.87      | 1         | 18.8      | 1         |
| Methyl tert-butyl ether(MTBE)       | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Methylene Chloride                  | < 1.00        | 1         | 1.22      | 1         | 1.7       | 1         | 1.11      | 1         |
| n-Butylbenzene                      | 2.58          | 1         | < 1.00    | 1         | 2.41      | 1         | 1.92      | 1         |
| o-Xylene                            | 20.6          | 1         | 8.64      | 1         | 27.7      | 1         | 27.3      | 1         |
| Propylene                           | 43.5          | 1         | 13        | 1         | 1.38      | 1         | 32.2      | 1         |
| sec-Butylbenzene                    | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Styrene                             | 2.21          | 1         | < 1.00    | 1         | 2.81      | 1         | 2.3       | 1         |
| Tetrachloroethene                   | 6.64          | 0.25      | 0.61      | 0.25      | 502       | 0.25      | 3.66      | 0.25      |
| Tetrahydrofuran                     | 7.1           | 1         | 35.4      | 1         | 5.89      | 1         | 31.2      | 1         |
| Toluene                             | 51.2          | 1         | 59.1      | 1         | 71.6      | 1         | 120       | 1         |
| Trans-1,2-Dichloroethene            | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| trans-1,3-Dichloropropene           | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Trichloroethene                     | 0.967         | 0.25      | < 0.25    | 0.25      | 4.03      | 0.25      | 2.42      | 0.25      |
| Trichlorofluoromethane              | 13            | 1         | 2.58      | 1         | 2.58      | 1         | 4.88      | 1         |
| Trichlorotrifluoroethane            | < 1.00        | 1         | < 1.00    | 1         | < 1.00    | 1         | < 1.00    | 1         |
| Vinyl Chloride                      | < 0.25        | 0.25      | < 0.25    | 0.25      | < 0.25    | 0.25      | < 0.25    | 0.25      |

**Table 4: Soil Cleanup Objectives**

| Parameters                            | CAS Number | Track 1 Unrestricted | Track 2 Restricted Residential | Site Specific Soil Cleanup Objectives |
|---------------------------------------|------------|----------------------|--------------------------------|---------------------------------------|
| <b>Metals</b>                         |            |                      |                                |                                       |
| Arsenic                               | 7440-38-2  | 13 <sup>c</sup>      | 16 <sup>f</sup>                |                                       |
| Barium                                | 7440-39-3  | 350 <sup>c</sup>     | 400                            | 600                                   |
| Beryllium                             | 7440-41-7  | 7.2                  | 72                             |                                       |
| Cadmium                               | 7440-43-9  | 2.5 <sup>c</sup>     | 4.3                            |                                       |
| Chromium, hexavalent <sup>e</sup>     | 18540-29-9 | 1 <sup>b</sup>       | 110                            |                                       |
| Chromium, trivalent <sup>e</sup>      | 16065-83-1 | 30 <sup>c</sup>      | 180                            |                                       |
| Copper                                | 7440-50-8  | 50                   | 270                            |                                       |
| Total Cyanide <sup>e, f</sup>         |            | 27                   | 27                             |                                       |
| Lead                                  | 7439-92-1  | 63 <sup>c</sup>      | 400                            | 1000                                  |
| Manganese                             | 7439-96-5  | 1600 <sup>c</sup>    | 2,000 <sup>f</sup>             |                                       |
| Total Mercury                         |            | 0.18 <sup>c</sup>    | 0.81 <sup>j</sup>              | 1.5                                   |
| Nickel                                | 7440-02-0  | 30                   | 310                            |                                       |
| Selenium                              | 7782-49-2  | 3.9 <sup>c</sup>     | 180                            |                                       |
| Silver                                | 7440-22-4  | 2                    | 180                            |                                       |
| Zinc                                  | 7440-66-6  | 109 <sup>c</sup>     | 10,000 <sup>d</sup>            |                                       |
| <b>PCBs/Pesticides</b>                |            |                      |                                |                                       |
| 2,4,5-TP Acid (Silvex) <sup>f</sup>   | 93-72-1    | 3.8                  | 100 <sup>a</sup>               |                                       |
| 4,4'-DDE                              | 72-55-9    | 0.0033 <sup>b</sup>  | 8.9                            |                                       |
| 4,4'-DDT                              | 50-29-3    | 0.0033 <sup>b</sup>  | 7.9                            |                                       |
| 4,4'-DDD                              | 72-54-8    | 0.0033 <sup>b</sup>  | 13                             |                                       |
| Aldrin                                | 309-00-2   | 0.005 <sup>c</sup>   | 0.097                          |                                       |
| alpha-BHC                             | 319-84-6   | 0.02                 | 0.48                           |                                       |
| beta-BHC                              | 319-85-7   | 0.036                | 0.36                           |                                       |
| Chlordane (alpha)                     | 5103-71-9  | 0.094                | 4.2                            |                                       |
| delta-BHC <sup>g</sup>                | 319-86-8   | 0.04                 | 100 <sup>a</sup>               |                                       |
| Dibenzofuran <sup>f</sup>             | 132-64-9   | 7                    | 59                             |                                       |
| Dieldrin                              | 60-57-1    | 0.005 <sup>c</sup>   | 0.2                            |                                       |
| Endosulfan I <sup>d, f</sup>          | 959-98-8   | 2.4                  | 24 <sup>i</sup>                |                                       |
| Endosulfan II <sup>d, f</sup>         | 33213-65-9 | 2.4                  | 24 <sup>i</sup>                |                                       |
| Endosulfan sulfate <sup>d, f</sup>    | 1031-07-8  | 2.4                  | 24 <sup>i</sup>                |                                       |
| Endrin                                | 72-20-8    | 0.014                | 11                             |                                       |
| Heptachlor                            | 76-44-8    | 0.042                | 2.1                            |                                       |
| Lindane                               | 58-89-9    | 0.1                  | 1.3                            |                                       |
| Polychlorinated biphenyls             | 1336-36-3  | 0.1                  | 1                              |                                       |
| <b>Semivolatile organic compounds</b> |            |                      |                                | 250                                   |
| Acenaphthene                          | 83-32-9    | 20                   | 100 <sup>a</sup>               |                                       |
| Acenaphthylene <sup>f</sup>           | 208-96-8   | 100 <sup>a</sup>     | 100 <sup>a</sup>               |                                       |
| Anthracene <sup>f</sup>               | 120-12-7   | 100 <sup>a</sup>     | 100 <sup>a</sup>               |                                       |
| Benz(a)anthracene <sup>f</sup>        | 56-55-3    | 1 <sup>c</sup>       | 1 <sup>f</sup>                 |                                       |
| Benzo(a)pyrene                        | 50-32-8    | 1 <sup>c</sup>       | 1 <sup>f</sup>                 |                                       |
| Benzo(b)fluoranthene <sup>f</sup>     | 205-99-2   | 1 <sup>c</sup>       | 1 <sup>f</sup>                 |                                       |
| Benzo(g,h,i)perylene <sup>f</sup>     | 191-24-2   | 100                  | 100 <sup>a</sup>               |                                       |
| Benzo(k)fluoranthene <sup>f</sup>     | 207-08-9   | 0.8 <sup>c</sup>     | 3.9                            |                                       |
| Chrysene <sup>f</sup>                 | 218-01-9   | 1 <sup>c</sup>       | 3.9                            |                                       |
| Dibenz(a,h)anthracene <sup>f</sup>    | 53-70-3    | 0.33 <sup>b</sup>    | 0.33 <sup>e</sup>              |                                       |
| Fluoranthene <sup>f</sup>             | 206-44-0   | 100 <sup>a</sup>     | 100 <sup>a</sup>               |                                       |
| Fluorene                              | 86-73-7    | 30                   | 100 <sup>a</sup>               |                                       |
| Indeno(1,2,3-cd)pyrene <sup>f</sup>   | 193-39-5   | 0.5 <sup>c</sup>     | 0.5 <sup>f</sup>               |                                       |
| m-Cresol <sup>f</sup>                 | 108-39-4   | 0.33 <sup>b</sup>    | 100 <sup>a</sup>               |                                       |
| Naphthalene <sup>f</sup>              | 91-20-3    | 12                   | 100 <sup>a</sup>               |                                       |
| o-Cresol <sup>f</sup>                 | 95-48-7    | 0.33 <sup>b</sup>    | 100 <sup>a</sup>               |                                       |

**Table 4: Soil Cleanup Objectives**

| Parameters                            | CAS Number | Track 1 Unrestricted | Track 2 Restricted Residential | Site Specific Soil Cleanup Objectives |
|---------------------------------------|------------|----------------------|--------------------------------|---------------------------------------|
| p-Cresol <sup>f</sup>                 | 106-44-5   | 0.33 <sup>b</sup>    | 100 <sup>a</sup>               |                                       |
| Pentachlorophenol                     | 87-86-5    | 0.8 <sup>b</sup>     | 6.7                            |                                       |
| Phenanthrene <sup>f</sup>             | 85-01-8    | 100                  | 100 <sup>a</sup>               |                                       |
| Phenol                                | 108-95-2   | 0.33 <sup>b</sup>    | 100 <sup>a</sup>               |                                       |
| Pyrene <sup>f</sup>                   | 129-00-0   | 100                  | 100 <sup>a</sup>               |                                       |
| Volatile organic compounds            |            |                      |                                |                                       |
| 1,1,1-Trichloroethane <sup>f</sup>    | 71-55-6    | 0.68                 | 100 <sup>a</sup>               |                                       |
| 1,1-Dichloroethane <sup>f</sup>       | 75-34-3    | 0.27                 | 26                             |                                       |
| 1,1-Dichloroethene <sup>f</sup>       | 75-35-4    | 0.33                 | 100 <sup>a</sup>               |                                       |
| 1,2-Dichlorobenzene <sup>f</sup>      | 95-50-1    | 1.1                  | 100 <sup>a</sup>               |                                       |
| 1,2-Dichloroethane                    | 107-06-2   | 0.02 <sup>c</sup>    | 3.1                            |                                       |
| cis -1,2-Dichloroethene <sup>f</sup>  | 156-59-2   | 0.25                 | 100 <sup>a</sup>               |                                       |
| trans-1,2-Dichloroethene <sup>f</sup> | 156-60-5   | 0.19                 | 100 <sup>a</sup>               |                                       |
| 1,3-Dichlorobenzene <sup>f</sup>      | 541-73-1   | 2.4                  | 49                             |                                       |
| 1,4-Dichlorobenzene                   | 106-46-7   | 1.8                  | 13                             |                                       |
| 1,4-Dioxane                           | 123-91-1   | 0.1 <sup>b</sup>     | 13                             |                                       |
| Acetone                               | 67-64-1    | 0.05                 | 100 <sup>b</sup>               |                                       |
| Benzene                               | 71-43-2    | 0.06                 | 4.8                            |                                       |
| n-Butylbenzene <sup>f</sup>           | 104-51-8   | 12                   | 100 <sup>a</sup>               |                                       |
| Carbon tetrachloride <sup>f</sup>     | 56-23-5    | 0.76                 | 2.4                            |                                       |
| Chlorobenzene                         | 108-90-7   | 1.1                  | 100 <sup>a</sup>               |                                       |
| Chloroform                            | 67-66-3    | 0.37                 | 49                             |                                       |
| Ethylbenzene <sup>f</sup>             | 100-41-4   | 1                    | 41                             |                                       |
| Hexachlorobenzene <sup>f</sup>        | 118-74-1   | 0.33 <sup>b</sup>    | 1.2                            |                                       |
| Methyl ethyl ketone                   | 78-93-3    | 0.12                 | 100 <sup>a</sup>               |                                       |
| Methyl tert-butyl ether <sup>f</sup>  | 1634-04-4  | 0.93                 | 100 <sup>a</sup>               |                                       |
| Methylene chloride                    | 75-09-2    | 0.05                 | 100 <sup>a</sup>               |                                       |
| n - Propylbenzene <sup>f</sup>        | 103-65-1   | 3.9                  | 100 <sup>a</sup>               |                                       |
| sec-Butylbenzene <sup>f</sup>         | 135-98-8   | 11                   | 100 <sup>a</sup>               |                                       |
| tert-Butylbenzene <sup>f</sup>        | 98-06-6    | 5.9                  | 100 <sup>a</sup>               |                                       |
| Tetrachloroethene                     | 127-18-4   | 1.3                  | 19                             |                                       |
| Toluene                               | 108-88-3   | 0.7                  | 100 <sup>a</sup>               |                                       |
| Trichloroethene                       | 79-01-6    | 0.47                 | 21                             |                                       |
| 1,2,4-Trimethylbenzene <sup>f</sup>   | 95-63-6    | 3.6                  | 52                             |                                       |
| 1,3,5-Trimethylbenzene <sup>f</sup>   | 108-67-8   | 8.4                  | 52                             |                                       |
| Vinyl chloride <sup>f</sup>           | 75-01-4    | 0.02                 | 0.9                            |                                       |
| Xylene (mixed)                        | 1330-20-7  | 0.26                 | 100 <sup>a</sup>               |                                       |

Note: all units are mg/Kg (ppm)

Track 1 Soil Cleanup Objectives (SCOs) are proposed for this project. If Unrestricted Use Track 1 SCOs are not achieved, Track 2 Restricted Residential Use SCOs will be used as amended by Site Specific Use SCOs:

## **Appendix 3**

### **Citizen Participation Plan**

The NYC Office of Environmental Remediation and Mr. Rehan Perveez have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, Mr. Rehan Perveez will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Amanda Duchesne, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 341-2077.

**Project Contact List.** OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project

manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at [brownfields@cityhall.nyc.gov](mailto:brownfields@cityhall.nyc.gov).

**Repositories.** A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. Mr. Rehan Perveez will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Greenpoint Library

107 Norman Avenue, Brooklyn, New York

Tel: (718) 349-8504

Monday and Tuesday: 10:00 AM to 6:00 PM

Wednesday and Thursday: 1:00 PM to 8:00 PM

Friday: 10:00 AM to 6:00 PM

Saturday: 10:00 AM to 5:00 PM

Sunday: Closed

And at:

NYC Office of Environmental Remediation

[www.nyc.gov/oer](http://www.nyc.gov/oer)

**Digital Documentation.** NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

**Identify Issues of Public Concern.**

There are no issues of public concern.

**Public Notice and Public Comment.** Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with

descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by Mr. Rehan Perveez, reviewed and approved by OER prior to distribution and mailed by Mr. Rehan Perveez. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

**Citizen Participation Milestones.** Public notice and public comment activities occur at several steps during a typical NYC 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 OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

## **Appendix 4**

### **SOIL/MATERIALS MANAGEMENT PLAN**

#### **1.1 Soil Screening Methods**

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

#### **1.2 Stockpile Methods**

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

### **1.3 Characterization of Excavated Materials**

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

### **1.4 Materials Excavation, Load-Out and Departure**

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

## **1.5 Off-Site Materials Transport**

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes will be developed once the disposal facility is selected. 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 Brooklyn, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with

disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RAR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

## **1.7 Materials Reuse On-Site**

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed in **Table 4**. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed. There is no expected on-site reused material for this project.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

## **1.8 Demarcation**

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

## **1.9 Import of Backfill Soil from Off-Site Sources**

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in **Table 4**.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

### **Source Screening and Testing**

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that

the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

### **1.10 Fluids Management**

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

### **1.11 Storm-water Pollution Prevention**

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated

sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

### **1.12 Contingency Plan**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

### **1.13 Odor, Dust and Nuisance Control**

#### **Odor Control**

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying the Remedial Action Report.

## **Dust Control**

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

## **Other Nuisances**

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

## **Appendix 5**

### **Construction Health and Safety Plan**

# Construction Health and Safety Plan

---

**October 20, 2014**

**Subject Property:**

59-63 North 6<sup>th</sup> Street  
Brooklyn, New York  
NYC Tax Map Designation: Block 2325; Lot 27, 28 & 29

**Prepared for:**

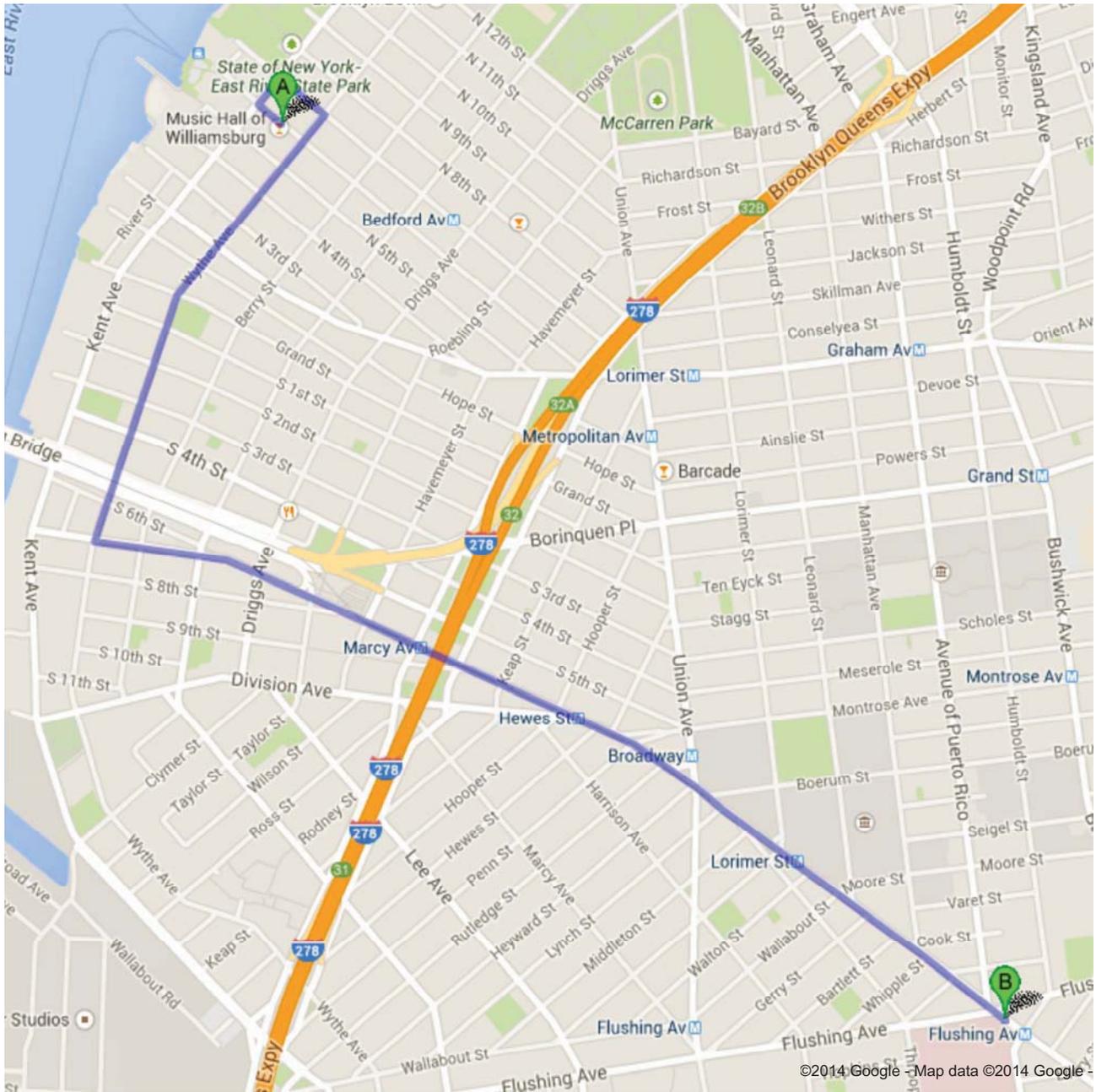
Rehan Perveez  
c/o Victor K, Han, RA, AIA  
151-19 Bayside Avenue  
Flushing, NY 11354

**Prepared by:**

Cider Environmental  
89 Cabot Court, Unit N  
Hauppauge, NY 11788



**Directions to Woodhull Medical Center**  
760 Broadway, Brooklyn, NY 11206  
2.4 mi – about 9 mins





59 N 6th St, Brooklyn, NY 11249

1. Head **northwest** on **N 6th St** toward **Kent Ave**

go 236 ft  
total 236 ft



2. Take the 1st right onto **Kent Ave**

go 259 ft  
total 495 ft



3. Take the 1st right onto **N 7th St**

go 449 ft  
total 0.2 mi



4. Take the 1st right onto **Wythe Ave**

About 3 mins

go 0.7 mi  
total 0.9 mi



5. Turn left onto **Broadway**

Destination will be on the right  
About 5 mins

go 1.5 mi  
total 2.4 mi



**Woodhull Medical Center**

760 Broadway, Brooklyn, NY 11206

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2014 Google

Directions weren't right? Please find your route on [maps.google.com](https://maps.google.com) and click "Report a problem" at the bottom left.

**Construction HEALTH AND SAFETY PLAN**

**Client:** Mr. Rehan Perveez c/o Victor K. Han, RA, AIA  
**Project:** NYC OER E-Designated Site Redevelopment  
**Activities:** Soil/fill excavation, trucking and disposal; Installation of vapor barrier, sub-slab depressurization system and cover system.  
**Location:** 59-63 North 6<sup>th</sup> Street, Brooklyn, New York  
**Chemical Hazards:** Volatile Organic Compounds, Semi-Volatile Organic Compounds, Metals, Pesticides, Polychlorinated Biphenyls  
**Prepared By:** Cider Environmental, LLC

**Date:** October 20, 2014

**Client Contact**

| <b>Title</b>          | <b>Name</b>   | <b>Telephone</b> |
|-----------------------|---------------|------------------|
| Client Representative | Victor K. Han | 718-746-1022     |

**Cider Key Personnel**

| <b>Title</b>                  | <b>Name</b>  | <b>Telephone</b> |
|-------------------------------|--------------|------------------|
| Project Manager:              | Wenqing Fang | (631) 616-4000   |
| Site Health & Safety Officer: | James Cressy | (631) 365-6118   |

CIDER ENVIRONMENTAL, LLC DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION BY A TRAINED HEALTH AND SAFETY SPECIALIST.

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## 1 Introduction

### 1.1 Purpose

This Construction Health and Safety Plan (CHASP) has been developed to comply with the regulations under Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1025. It addresses foreseeable activities associated with the site work activities to be conducted at 59-63 North 6th Street, Brooklyn, New York (herein referred to as the "Site" or "Subject Property". See **Figure 1** for site location).

This CHASP establishes personnel protection standards and mandatory safety practices and procedures. Additionally, it assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at known or suspected hazardous waste sites.

Cider personnel involved with inspection of site work activities which involve the displacement of soil and/or material or dewatering of excavations in the identified Area of Concern (AOC) during the proposed development shall comply with the requirements of this CHASP. All personnel engaged in onsite activities will read this document carefully and complete the Field Personal Review (**Section 11**). Contractors and subcontractors work in identified AOC will provide their own CHASP (equal or more stringent than the Cider CHASP) and are solely responsible for their own workers Health and Safety and providing a safe working environment in accordance with all applicable federal, state and local requirements. Each Subcontractor will have a designated Site Health and Safety Coordinator who will be responsible for ensuring that the designated procedures are implemented in the field. The level of protection and the procedures specified in this CHASP represent the minimum health and safety requirements to be observed by site personnel. Should an employee find himself or herself in a potentially hazardous situation, the employee will immediately discontinue the hazardous procedures(s) and either personally effect appropriate preventative or corrective measures, or immediately notify the Project Manager of the nature of the hazard. In the event of an immediately dangerous or life threatening situation, the employee always has "stop work" authority.

### 1.2 Site Condition

The Site is located in the Williamsburg section of Brooklyn, New York and is identified as Block 2325 and Lots 27, 28 & 29 on the New York City Tax Map. The Site is 7,500-square feet and is bounded by residential buildings to the north, North 6 Street, a commercial building and a restaurant to the south, a residential building to the east, and a mixed use building to the west. Currently, the Site is a vacant parking lot, containing a one-story cargo-container in the southeastern portion. The property is zoned as

M1-2/R6A: Manufacturing/Residential District. The occupancy code with the Department of Finance for the subject property is listed as vacant land. The Little "E" restriction for the subject property is listed as "Hazmat" and, according to CEQR Table 11-3, is based on 55-gallon drums identified at the adjacent E Designation Site 202, Lot 25.

### 1.3 Scope of Work

The site work activities which will require the oversight by Cider include the following scope and will include the completion of:

- Excavation of the entire Site to approximately 11 feet bgs.
- Transport the excavated soil/fill for off-site disposal.
- Installation of sub-slab depressurization system.
- Installation of vapor barrier system.
- Installation of a covering system.

Details of the scopes of work to be completed are provided within the Phase II Work Plan, dated July 2013 prepared by Cider Environmental.

## 2 Project Team and Responsibilities

### 2.1 Project Manager

The Project Manager will be responsible for implementing the project and obtaining any necessary personnel or resources for the completion of the project. Specific duties will include:

- Coordinating the activities of all construction and Remedial Personnel, to include informing them of the required Personal Protective Equipment (PPE) and insuring their signature acknowledging this CHASP;
- Selecting a Site Health and Safety Officer and field personnel for the work to be undertaken on site;
- Ensuring that the tasks assigned are being completed as planned and on schedule;
- Providing authority and resources to ensure that the Site Health and Safety Officer is able to implement and manage safety procedures;
- Preparing reports and recommendations about the project to clients and affected personnel;
- Ensuring that all persons allowed to enter the site are made aware of the potential hazards associated with the substances known or suspected to be on site, and are knowledgeable as to the on-site copy of the specific CHASP;
- Ensuring that the Site Health and Safety Officer is aware of all of the provisions of this CHASP and is instructing all personnel on site about the safety practices and emergency procedures defined in the plan;
- Serving as liaison with public officials where there is no Public Affairs official designated.

### 2.2 Site Health and Safety Officer

The Site Health and Safety Officer shall be responsible for the implementation of the CHASP on site. Specific duties will include:

- Monitoring the compliance of construction and environmental remediation activities personnel (field personnel) for the routine and proper use of the PPE that has been designated for each task;
- Routinely inspecting PPE and clothing to ensure that it is in good condition and is being stored and maintained properly;
- Stopping work on the site or changing work assignments or procedures if any operation threatens the health and safety of workers or the public;
- Monitoring personnel who enter and exit the site and all controlled access points.
- Reporting any signs of fatigue, work-related stress, or chemical exposures to the Project Manager;

- Dismissing field personnel from the site if their actions or negligence endanger themselves, co-workers, or the public, and reporting the same to the Project Manager;
- Reporting any accidents or violations of the CHASP plan to the Project Manager and documenting the same for the project in the records;
- Knowing emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire and police departments;
- Ensuring that all project-related personnel have signed the personnel agreement and acknowledgments form contained in this CHASP;
- Coordinate upgrading and downgrading PPE as necessary due to changes in exposure levels, monitoring results, weather, and other site conditions;
- Perform air monitoring with approved instruments in accordance with requirements stated in this CHASP.

### 3 Hazard Analysis and Control Measures

This section presents an assessment of the general, chemical, physical and biological hazards that may be encountered during the tasks specified under this CHASP.

#### 3.1 General Hazard Assessment

A general hazard assessment was conducted for the required field work described in Section 1.3 and the following potential hazards have been identified:

- Inhalation of volatile contaminants;
- Skin and eye contact with contaminants;
- Ingestion of contaminants;
- Inhalation of dusts impacted with semi-volatile, metals and PCB contaminants;
- Physical hazards associated with the use of heavy equipment;
- Excavation hazards;
- Tripping hazards;
- Noise exposure;
- Heat stress (depending on weather conditions);
- Cold exposure (depending on weather conditions);
- Flammable hazards;
- Electrical hazards; and,
- Use of personal protective equipment.

Specific chemical, physical and biological hazards are discussed below. Mitigation and controls will include as needed work procedures, work/rest regiment, dust control measures, personal protective equipment, and respiratory protection as appropriate.

#### 3.2 Chemical Exposure Hazards

The following chemical hazard evaluation is based on the previous environmental investigation of the site. The evaluation has been conducted to identify chemicals/ materials that potentially may be present at the site, and to ensure that work activities, personnel protection, and emergency response are consistent with the specific contaminants that potentially could be encountered.

##### 3.2.1 Chemical Hazard Exposure Routes

Potential hazards and their exposure routes include:

- Inhalation of organic vapors due to the presence of volatile organic compounds from diesel-powered equipment.
- Inadvertent ingestion of potentially toxic substances via hand to mouth contact or deliberate ingestion of materials inadvertently contaminated with potentially toxic materials. Included in this list are polycyclic aromatic hydrocarbons (PAHs), pesticides and metals.
- Dermal exposure and possible percutaneous (skin) absorption of certain lipophilic (readily absorbed through the skin) PAHs and pesticides.
- Skin and eye contact with contaminants at the site and decontamination activities.

### *3.2.2 Control of Exposure to Chemical Hazards*

To protect potentially exposed personnel the following procedures and protocols will be adopted and used as needed: work procedures will be adhered to, work zones will be established, dust control will be utilized, respirators (if required) and personal protective equipment will be worn, area air monitoring will be conducted during times of disturbance of the impacted fill material. Strict personnel decontamination procedures will be followed.

## 3.3 Physical Hazards

### *3.3.1 Explosion and Fire*

#### 3.3.1.1 Flammable Vapors

The presence of flammable vapors can pose a potential fire and health hazard. Hazard reduction procedures include monitoring the ambient air with an oxygen/LEL meter (combustible gas indicator). If the LEL reading exceeds 20%, all work will stop and employees will leave the site immediately and contact the fire department.

#### 3.3.1.2 High Oxygen Levels

Atmospheres that contain a level of oxygen greater than 23% pose an extreme fire hazard (the usual ambient oxygen level is approximately 20.5%). All personnel encountering atmospheres that contain a level of oxygen greater than 23% must evacuate the site immediately and must notify the Fire Department.

#### 3.3.1.3 Fire Prevention

During equipment operation, periodic vapor concentration measurements should be taken with an explosimeter or combustimeter. If at any time the vapor concentrations exceed 20% of the lower explosive limit (LEL), then the Site Health and Safety Officer should immediately shut down all operations.

Only approved safety cans will be used to transport and store flammable liquids. All gasoline and diesel-driven engines requiring refueling must be shut down and allowed to cool prior to filling.

Smoking is not allowed during any operations within the work area in which petroleum products or solvents in free-floating, dissolved, or vapor forms, or other flammable liquids may be present.

No open flame or spark is allowed in any area containing petroleum products or other flammable liquids.

### *3.3.2 Vehicular Traffic*

All employees will be required to wear a fluorescent safety vest at all times while on site. In addition, supplemental traffic safety equipment use can be exercised when warranted by specific task.

Supplemental equipment can be items such as cones, flags, barricades, and/or caution tape. Drivers of waste transportation vehicles will only exit vehicles in designated areas within the Support Zone. During this time, drivers will only be allowed to inspect the placement of waste loads and cover their trailers.

### *3.3.3 Noise Hazards*

Hearing protection shall be provided to the employees where sound pressure levels exceed 85 dB.

Hearing protection shall be worn where sound pressure levels in areas and/or on equipment exceeds 90 dB. Typical heavy excavation operations have been monitored with a sound level meter and indicate that hearing protection is required for all personnel while engaged in this action.

### *3.3.4 Safe Material Handling*

Skin and eye contact with impacted soil/fill may occur during excavation, handling and decontamination activities. Nitrile gloves and approved safety glasses must be worn to prevent exposure to the associated contaminants. Employees working at or near (within ten feet of) excavation fronts could be required to wear respiratory protection. If necessary, all associated activities will be performed pursuant to 29 C.F.R. § 1910 Parts 1926.134 (a)(2) and 1926.55.

### *3.3.5 Heat Stress Hazards*

Heat stress may occur even in moderate temperature areas and may present any or all of the following:

- Heat Rash. Result of continuous exposure to heat, humid air, and chafing clothes. Heat rash is uncomfortable and decreases the ability to tolerate heat.
- Heat Cramps. Result of the inadequate replacement of body electrolytes lost through perspiration. Signs include severe spasms and pain in the extremities and abdomen.
- Heat Exhaustion. Result of increased stress on the vital organs of the body in the effort to meet the body's cooling demands. Signs include shallow breathing; pale, cool, moist skin; profuse sweating; and dizziness.

- Heat Stroke. Result of overworked cooling system. Heat stroke is the most serious form of heat stress. Body surfaces must be cooled and medical help must be obtained immediately to prevent severe injury and/or death. Signs include red, hot, dry skin, absence of perspiration, nausea, dizziness and confusion, strong, rapid pulse that could lead to coma or death.

#### Heat Stress Prevention

- Replace body fluids (water and electrolytes) lost through perspiration. Solutions may include a 0.1% salt and water solution or commercial mixes such as "Gatorade". Employees must be encouraged to drink more than the amount required in order to satisfy thirst.
- Use cooling devices to aid the natural body ventilation. Cooling occurs through evaporation of perspiration and limited body contact with heat-absorbing protective clothing. Utilize fans and air conditioners to assist in evaporation. Long, cotton underwear is suggested to absorb perspiration and limit any contact with heat-absorbing protective clothing (i.e., coated Tyvek suits).
- Conduct non-emergency response activities in the early morning or evening during very hot weather.
- Provide shelter against heat and direct sunlight to protect personnel. Take breaks in shaded areas.
- Rotate workers utilizing protective clothing during hot weather.
- Establish a work regime that will provide adequate rest periods, with personnel working in shifts.

#### 3.3.6 Cold Exposure Hazards

Work schedules will be adjusted to provide sufficient rest periods in a heated area for warming up during operations conducted in cold weather. Also, thermal protective clothing such as wind and/or moisture resistant outerwear is recommended to be worn.

If work is performed continuously in the cold at or below -7 °C (20 °F), including wind chill factor, heated warming shelters (tents, cabins, company vehicles, rest rooms, etc.) shall be made available nearby and the worker should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, irritability, or euphoria, are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing shall be removed and the remainder of the clothing loosened to permit sweat evaporation. A change of dry work clothing shall be provided as necessary to prevent workers from returning to their work with wet clothing.

Dehydration, or the loss of body fluids, occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities.

Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of a diuretic and circulatory effect.

### 3.4 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals and insects. As the potential for exposure to blood born pathogens during site investigation is anticipated to be low, a Blood Born Pathogen Exposure Plan (BBPEP) is not required

#### 3.4.1 *Animals*

During site operations, animals such as dogs, cats, pigeons, mice, and rats may be encountered. Workers shall use discretion and avoid all contact with animals. Bites and scratches from dogs and cats 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.

#### 3.4.2 *Insects*

Insects, including bees, wasps, hornets, mosquitoes, spiders, and ticks may be present at the 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.

## 4 Personnel Training

### 4.1 Pre-assignment and OSHA Training

All Cider personnel that will be in direct contact (that is hand digging, sampling, processing) with the native soil/fill materials must complete an initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course and, where necessary, a current eight hour refresher course (as required annually after initial 40-hour training completion). Personnel that will not be in direct contact with native soil/fill materials are only required to prove they have read and understood the procedures presented in this CHASP.

The Site Health and Safety Officer will conduct an on-site training meeting for all personnel and observers that could potentially be exposed to the native soil/fill material during construction activities. Training meetings will be provided routinely for any new project personnel. This program will cover specific health and safety equipment and protocols and potential problems inherent to each project operation. The Site Health and Safety Officer will be present for any activities being performed that will involve the handling of soil/fill during construction activities to provide supervision on exposure reduction. This may include insuring the use of proper PPE and air quality monitoring.

### 4.2 Respirator Requirements

#### 4.2.1 *Respirator Requirements and Fit Testing*

The OSHA respiratory protection standard, 29 CFR 1910.134, under paragraph (f)(2), requires fit testing for all employees using tight fitting respirators including filtering facepiece respirator. The fit test must be performed before the respirator is used and must be repeated at least annually and whenever a different respirator facepiece is used or a change in the employee's physical condition could affect the respirator fit.

The user seal check is a separate requirement under paragraph (g)(1)(iii) and must be performed each time the employee dons the respirator. Employers must adhere to the recommendations of the respirator's manufacturer; different manufacturers recommend different procedures.

#### 4.2.2 *Medical Surveillance*

OSHA requires a medical evaluation to determine whether each employee required to wear a respirator is physically able to wear a respirator and perform the work. This evaluation can be a medical examination or an evaluation of employee responses to the OSHA Respirator Medical Evaluation Questionnaire located in Appendix C of the Respiratory Protection Standard. Either method must be performed by a physician or other licensed healthcare professional.

## 5 Personal Protective Equipment

### 5.1 Levels of Protection

PPE must protect workers from the specific hazards they are likely to encounter on site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and, (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards.

Based on anticipated site conditions and the proposed work activities to be performed at the Site, modified Level D Protection will be used. The upgrading/downgrading of these levels of protection will be based on continuous air monitoring results. The levels of protection are described below.

#### • Level D Protection

- a) Safety glasses w/ sideshields or chemical splash goggles
- b) Safety boots/shoes (toe-protected)
- c) Hard hat
- d) Long sleeve work shirt and work pants
- e) Nitrile gloves
- f) Hearing protection (as needed)
- g) Reflective traffic vest

#### • Level D Protection (Modified)

- a) Safety glasses w/ sideshields or chemical splash goggles
- b) Safety boots/shoes (toe-protected)
- c) Disposable chemical-resistant boot covers
- d) Coveralls (polycoated Tyvek or equivalent to be worn when contact with wet contaminated soil, groundwater, or non-aqueous phase liquids is anticipated)
- e) Hard hat
- f) Long sleeve work shirt and work pants
- g) Nitrile gloves
- h) Hearing protection (as needed)
- i) Reflective traffic vest

#### • Level C Protection

- a) Full face-piece, air-purifying, cartridge\*-equipped, NIOSH-approved respirator [\*combo cartridge P100/OV/CL/HC/SD/CD/HS (escape)]

- b) Inner (latex) and outer (nitrile) chemical-resistant glove
- c) Chemical-resistant safety boots/shoes (toe-protected)
- d) Disposable chemical-resistant boot covers
- e) Hard hat
- f) Long sleeve work shirt and work pants
- g) Coveralls (Tyvek or equivalent, poly-coated Tyvek will be worn when contact, or anticipated contact with wet contaminated soils, groundwater, and/or non-aqueous phase liquids (NAPL) is anticipated )
- h) Hearing protection (as needed)
- i) Reflective traffic vest

## 5.2 Respirator Fit-Test

All Cider personnel and subcontractors performing site work who could be exposed to hazardous substances at the work site are in possession of a full face-piece, air-purifying respirator and have been successfully quantitative fittested within the past year.

## 5.3 Respirator Cartridge Change-Out Schedule

Respiratory protection is required to be worn when certain action levels are reached. A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.
- Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short the time period was the previous day they were used.

## 6 Air Monitoring Program

During site investigation/remediation, the air in work areas will be sampled periodically (on the site and at the property lines) for the presence of contaminants. Levels of organic vapors in the ambient air will be monitored during the fieldwork to ensure that appropriate levels of respiratory protection are employed at all times. Additionally, the testing will be performed to determine if changes to this plan are warranted to protect workers and the environment.

During site work involving disturbance of impacted fill material, real time air monitoring will be conducted for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). A photoionization detector (PID) and/or flame ionization detector (FID) will be used to monitor concentrations of VOCs at personnel breathing-zone height. Dust monitoring will be accomplished with an aerosol monitor. Air monitoring will be the responsibility of the Site Health and Safety Officer or designee. Air monitoring will be conducted approximately every 30 minutes during ground intrusive activities in the AOC on the project site. All manufacturers' instructions for instrumentation and calibration will be available onsite. Subcontractors' air monitoring plans must be equal or more stringent as the Cider plan.

### 6.1 Organic Compounds

Monitoring with a PID, such as a MiniRAE 2000 (11.7v) or equivalent will occur during intrusive work in the AOCs. Colorimetric Indicator Tubes for benzene may be used as backup for the PID, if measurements remain above background monitor every 2 hours. The Field Supervisor will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (odors, visible gases, appearance of drill cuttings, etc.) since the last measurement. Instrument action levels for monitored gases are:

| <b>Photoionization Detector (PID)</b>                                    |   |
|--|---|
| <b>Concentrations (in ppm)</b>   | <b>Level of PPE Required/Action Required</b>                                  |
| < 15 ppm within AOC zone   | Level D   |
| > 15 ppm (initial)   | Stop work. Resume work once readings are below 15 ppm.                        |
| > 15 ppm and < 30 ppm (steady state condition) within breathing zone     | Level C/Initiate Perimeter Monitoring   |
| > 30 ppm (steady state condition) within AOC zone                        | Stop Work / Suppress Emissions / Evacuate and reevaluate.                     |
| >5 ppm above background for the 15-minute average at downwind perimeter. | Stop Work/ Re-evaluate.   |
| >5ppm and <25 ppm downwind perimeter of AOC Zone                         | Stop Work / Take corrective actions to abate emissions. Resume work if <5 ppm |
| >25 ppm at perimeter of work area  | Stop work.  |

\*PID readings are taken at personnel breathing zone height using a 10.2V lamp PID or equivalent.

## 6.2 SVOCs, PCBs, Pesticides, and Metals

Based upon the site history, there is a potential for the soils to contain PAHs, PCBs, pesticides and metals. During invasive procedures which have the potential for creating airborne dust, such as excavation of dry soils, a real time airborne dust monitor such as a Mini-Ram should be used to monitor for air particulates. The Site Health and Safety Officer will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (appearance of visible dust) since the last measurement. Instrument action levels for dust monitoring are:

| <i>Real Time Particulate Detection Meter</i>  |  |
|---|--|
| <b>Concentration (mg/m<sup>3</sup>)</b>   | <b>Level of PPE Required/Action Required</b>   |
| > 0.100 mg/m <sup>3</sup> above BKD (steady state condition) at perimeter of AOC zone for 15-minutes or visible dust. | Stop Work / Implement dust control / Continue dust monitoring if dust levels are less than 150 mg/m <sup>3</sup> |
| > 0.150 mg/m <sup>3</sup> above BKD (following dust suppression measures)   | Stop Work / implement dust control, continue work once levels are <150 mg/m <sup>3</sup>                         |

\*BKD = Background concentration

## 6.3 Noise Monitoring

As a standard work practice, hearing protection will be worn within the area that exceeds 85 dBA created by any loud machinery as a precaution. Hearing protection is required and should be used in designated areas of the site as indicated by the posted signs. If there is a reasonable possibility that workers may be exposed to an 8-hour time-weighted average exceeding 85 Dba specifically as a result of conducting the required tasks, noise monitoring will be conducted using a sound level meter. Work areas or tasks which pose an exposure risk greater than 85 dBA will require hearing protection.

The New York City Department of Environmental Protection (NYCDEP) has initiated construction noise rules effective 1 July 2007. Contractors employing construction equipment such as vacuum excavators, drill rigs, and jackhammers, are required by the rules to have noise mitigation plans. These plans will be available on site. Noise mitigation measures may include mufflers, etc. Boring activities will occur during daytime hours only to minimize noise disturbance to the community. In addition, no vehicles will idle for more than three minutes when not in use.

#### 6.4 Monitoring Equipment Calibration and Maintenance

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages of the field book. All instruments shall be calibrated before and after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response. All instruments shall be operated in accordance with the manufacturers' specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on site by the Site Health and Safety Officer for reference.

#### 6.5 Determination of Background Levels

Background (BKD) levels for VOCs and dust will be established prior to intrusive activities within the AOC at an upwind location. A notation of BKD levels will be referenced in the daily monitoring log. BKD levels are a function of prevailing conditions. BKD levels will be taken in an appropriate upwind location as determined by the Site Health and Safety Officer.

## 7 Work Zone and Decontamination

### 7.1 Work Zone Definition

Work and support areas shall be established based on ambient air data and proposed work sites. They shall be established in order to contain contamination within the smallest areas possible and shall ensure that each employee has the proper PPE for the area or zone in which work is to be performed.

#### 7.1.1 Exclusion Zone

It is within this zone that the excavation or environmental remediation activities such as tank abandonment operations are performed. No one shall enter this zone unless the appropriate PPE is donned. The location of this zone will change as the construction-related excavation activities are performed.

#### 7.1.2 Contaminant Reduction Zone

It is within this zone that the decontamination process is undertaken. Personnel and their equipment must be adequately decontaminated before leaving this zone for the support zone. This zone will be set up between the EZ and the site boundary.

#### 7.1.3 Support Zone

The support zone is considered to be uncontaminated; as such, protective clothing and equipment are not required but should be available for use in emergencies. All equipment and materials are stored and maintained within this zone. Protective clothing is put on within the SZ before entering the EZ or the CRZ. The SZ will be established in a safe environment at least 50 feet away from the EZ.

### 7.2 Decontamination

In general, decontamination involves scrubbing with a detergent water solution followed by clean water rinses. All disposable items shall be disposed of in a dry container. Certain parts of contaminated respirators, such as harness assemblies and leather or cloth components, are difficult to decontaminate. If grossly contaminated, they may have to be discarded. Rubber components can be soaked in detergent and water and scrubbed with a brush. In addition to being contaminated, all respirators, non-disposable protective clothing, and other personal articles must be sanitized or replaced before they can be used again if they become soiled from exhalation, body oils, and perspiration. The manufacturer's instructions should be followed in sanitizing the respirator masks.

The Site Health and Safety Officer will be responsible for the proper maintenance, decontamination, and sanitizing of any respirator equipment that may be used on-site.

The following procedures have been established to provide site personnel with minimum guidelines for proper decontamination. Personnel leaving the point of operations designated as the EZ must follow these minimum procedures. The decontamination process shall take place within the contaminant reduction zone.

#### *7.2.1 Minimum Decontamination Procedure*

Personnel leaving the point of operations should remove or change outer gloves. At a minimum, boots shall be cleaned of all accumulated soil/fill. Outer boots must be properly washed where gross contamination is evident or disposed of. If Tyvek suits are being utilized, they should be removed or changed. Personnel should remove the Tyvek suits so that the inner clothing does not come in contact with any contaminated surfaces. After Tyvek removal, personnel shall remove and discard outer Nitrile gloves. Personnel shall then remove the respirator, where applicable. Respirators shall be disinfected between uses with towelettes or other sanitary methods. Potable water, at a minimum, will be present so that site personnel can thoroughly wash hands and face after leaving the point of operations.

The Site Health and Safety Officer will monitor decontamination procedures to ensure their effectiveness. Modifications of the decontamination procedure may be necessary as determined by the Site Health and Safety Officer's observations.

#### *7.2.2 Hand-Held Equipment Decontamination*

Hand-held equipment includes all monitoring instruments as stated earlier, samples, hand tools, and notebooks. The hand-held equipment is dropped at the first decontamination station to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the CRZ. To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident. Sampling equipment, hand tools, etc. will be cleaned with non-phosphorous soap to remove any potentially contaminated soil, and rinsed with deionized water. All decontamination fluids will be containerized and stored on-site pending waste characterization sampling and appropriate off-site disposal.

#### *7.2.3 Heavy Equipment Decontamination*

Equipment traversing the site and exiting the site will be subjected to a decontamination protocol. At a minimum the protocol will consist of an inspection of the truck fenders, tires and mud flaps for accumulated soil/fill, and removal of all accumulations using hand tools (brush, broom and scrapers). If deemed necessary by the Site Health and Safety Officer, this inspection will be performed over a thirty by

fifteen foot area that has been filled with ¾ inch crushed recycled concrete aggregate to facilitate the removal of soil/fill accumulations from the tires, and to immobilize soil/fill removed from the truck body. Additionally, all trucks hauling waste will be required to be covered prior to exiting the site.

#### *7.2.4 Emergency Decontamination*

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination and wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment.

If the injured person can be moved, he/she will be decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury), provisions shall be made to ensure that emergency response personnel will be able to respond to the victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exist, such as with open excavation, this area will be covered with polyethylene sheeting to eliminate any potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent data.

## 8 General Safety and Health Provisions

### 8.1 Safety Practices / Standing Orders

The following are important safety precautions that will be enforced during work activities.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activity.
- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garments are removed.
- No excessive facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory protection equipment. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator. Fit testing shall be performed prior to respirator use to ensure the wearer obtains a proper seal.
- Contact with potentially contaminated surfaces should be avoided whenever possible. One should not walk through puddles; kneel on the ground; lean, sit, or place equipment on drums, containers, vehicles, or the ground.
- Medicine and alcohol can potentiate the effect from exposure to certain compounds. Prescribed drugs and alcoholic beverages should not be consumed by personnel involved in the project.
- Personnel and equipment in the work areas should be minimized, consistent with effective site operations.
- Work areas for various operational activities should be established.
- Procedures for leaving the work area must be planned and implemented prior to going to the site. Work areas and decontamination procedures must be established on the basis of prevailing site conditions.
- Respirators will be issued for the exclusive use of one worker and will be cleaned and disinfected after each use.
- Safety gloves and boots shall be taped to the disposable, chemical-protective suits as necessary.
- All unsafe equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.
- Noise mufflers or earplugs may be required for all site personnel working around heavy equipment. This requirement will be at the discretion of the Site Health and Safety Officer. Disposable, form-fitting plugs are preferred.
- Cartridges for air-purifying respirators in use will be changed daily at a minimum.

## 8.2 Buddy System

Site personnel will employ the buddy system when working under certain circumstances, such as enclosed spacing. Under the buddy system, each site worker is responsible for monitoring the well-being of another worker. No one will work alone when the buddy system is implemented. At no time will fewer than two employees be present at the site if activities are underway.

## 8.3 Site Communications Plan

Mobile telephone and/or two-way radios will be used to communicate between the work parties on the site. The following standard hand signals will be used in case of failure of radio communication:

- Hands on top of head = Need assistance
- Thumbs up = OK, I am alright, I understand
- Thumbs down = No, negative

Personnel in the Contaminated Zone should remain in constant radio communication or within sight of the project team leader. Any failure of radio communication will require the team leader to evaluate whether personnel should leave the zone.

## 9 Emergency Response / Contingency Plan

### 9.1 Pre-Emergency Planning

In order to properly prepare for emergencies, Material Safety Data Sheets (MSDS) will be maintained on-site for the type of contaminants to which workers may be exposed. The MSDS for potential chemicals to be encountered at the Site are presented in **Appendix D**.

In the event a suspected or known hazardous substance or substance container is encountered during site activities, a contingency plan will be triggered.

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

### 9.2 Emergency Contact Information

In the event of an accident or emergency situation, emergency procedures will be executed. Said procedures can and will be executed by the first person to observe an accident or emergency situation. The Site Health and Safety Officer will be notified about the situation immediately after emergency procedures are implemented.

#### 9.2.1 Utility Emergencies / Initiating Subsurface Investigation Work

Where necessary, utility markouts will be called in via the one call center or to the individual entities listed below.

|                                 |                |                         |
|---------------------------------|----------------|-------------------------|
| <i>Mark Out One-Call Center</i> | 1-800-272-4480 | No-Cuts                 |
| <i>Gas Company:</i>             | 718-643-4050   | Keyspan/Con Edison      |
| <i>Telephone Company:</i>       | 516-661-6000   | Bell Atlantic / Verizon |
| <i>Electric Company:</i>        | 718-643-4050   | Keyspan/Con Edison      |

#### 9.2.2 Emergency Contacts

| <b>ORGANIZATION</b>        | <b>CONTACT</b> | <b>TELEPHONE</b> |
|----------------------------|----------------|------------------|
| New York City Police       |                | 911              |
| New York City Fire         |                | 911              |
| Cider Project Manager      | Wenqing Fang   | 631-790-3338     |
| National Response Center   |                | 800-424-8802     |
| Center For Disease Control |                | 404-488-4100     |

|   |                  |                              |
|---|------------------|------------------------------|
| Chemtrec                                  |                  | 800-424-9300                 |
| TSCA Hotline                              |                  | 202-554-1404                 |
| RCRA Hotline                              |                  | 800-424-9346                 |
| CDC                                       | (DAY)<br>(NIGHT) | 404-452-4100<br>404-329-2888 |
| Bureau Of Alcohol, Tobacco & Firearms     |                  | 800-424-9555<br>202-566-7777 |
| National Response Center                  |                  | 800-424-8802                 |
| Pesticide Information Service             |                  | 800-424-9346                 |
| Bureau Of Explosives, A.A. Railways       |                  | 202-835-9500                 |
| Federal Express - Hazardous Material Info |                  | 901-922-1666                 |

### 9.3 Contingency Plan

If an unknown substance or substance container is encountered during site activities, the following contingency plan will be triggered.

- The Site Health and Safety Officer, Project Manager and Field Operations Leader will be notified and an Exclusion Zone (the aerial extent of which will be determined by the above safety staff) will be established.
- All staff will be evacuated from the Exclusion Zone.
- Air monitoring will be conducted down-wind of the Exclusion Zone.
- The NYSDEC, as well as any other Government regulatory agency whose need may be prompted by the particular situation, will be notified.
- Upon arrival of the NYSDEC or Government regulatory agency representative(s), site control will transfer to the appropriate Government personnel.

It may be possible that a situation could develop site emergency could necessitate the evacuation of all personnel from the site. If such a situation develops, an audible alarm shall be given for site evacuation (consisting of an air horn). Personnel shall evacuate the site in a calm and controlled fashion and regroup at a predetermined location. The route of evacuation will be dependent on wind direction, severity, type of incident, etc. The site must not be re-entered until back-up help, monitoring equipment, and/or personal protective equipment are on hand and the appropriate regulatory agencies have been notified.

### 9.4 Emergency Medical Treatment Procedures

All injuries, no matter how slight, will be reported to the site safety supervisor immediately. The safety supervisor will complete an accident report for all incidents.

Some injuries, such as severe lacerations or burns, may require immediate treatment. Unless required due to immediate danger, seriously injured persons should not be moved without direction from attending medical personnel.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance.

**Nearest hospital:**

**Woodhull Hospital Emergency Center**

**760 Broadway**

**Brooklyn, New York**

**(718) 963-8422**

*(Directions from site to hospital can be found on **Figure 2**, Attached to the front of this plan)*

*9.4.1 Standard Procedures for Injury*

1. Notify the Site Health and Safety Officer, Project Manager, and the proper regulatory agency of all accidents, incidents, and near emergency situations.
2. If the injury is minor, trained personnel should proceed to administer appropriate first aid.
3. Telephone for ambulance/medical assistance if necessary. Whenever possible, notify the receiving hospital of the nature of physical injury or chemical overexposure. If no phone is available, transport the person to the nearest hospital.
4. When transporting an injured person to a hospital, bring this Health and Safety Plan with the attached MSDS to assist medical personnel with diagnosis and treatment.

*9.4.2 Chemical Overexposure*

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the MSDS will be followed, when necessary.

- SKIN AND EYE: Use copious amounts of soap and water from eye-wash kits and portable hand wash stations.
- CONTACT: Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Skin shall also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs. Affected items of clothing shall also be removed from contact with skin.

Providing wash water and soap will be the responsibility of each individual contractor or subcontractor on-site.

## 9.5 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site and notification of the Cider Project Manager. Portable fire extinguishers will be provided at the work zone. The extinguishers located in the various locations should also be identified prior to the start of work. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.

## 9.6 Significant Vapor Release

Based on the proposed tasks, the potential for a significant vapor is low. However, if a release occurs, the following steps will be taken:

- Move all personnel to an upwind location. All non-essential personnel shall evacuate.
- Upgrade to Level C Respiratory Protection.
- Downwind perimeter locations shall be monitored for volatile organics..
- If the release poses a potential threat to human health or the environment in the community, the Emergency Coordinator shall notify the Cider Project Manager.
- Local emergency response coordinators will be notified.

## 9.7 Adverse Weather Conditions

In the event of adverse weather conditions, the Site Health and Safety Officer will determine if work will continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

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

- Earthquakes.
- Other major incidents.

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

## 9.8 First Aid

A first aid kit and an emergency eyewash will be available on-site. Field crews, when performing field operations, will carry portable first aid kits that include emergency eye wash stations.

## 10 Recordkeeping

### 10.1 Employer's First Report of Injury

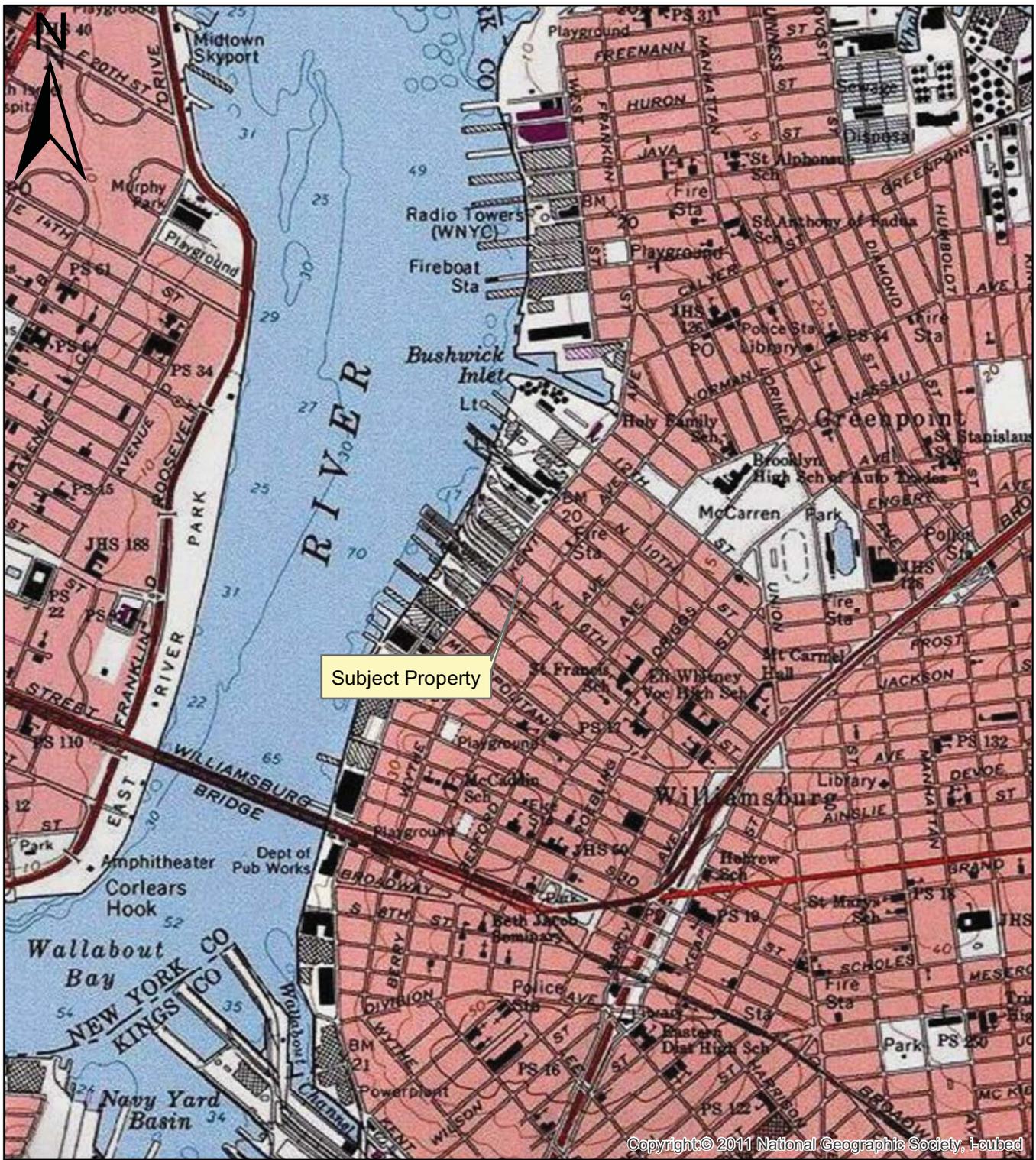
The site safety supervisor for all accidents involving work injury at the site will complete this form (**Appendix A**). Follow-up procedures will include investigation of each accident or near-miss by the safety supervisor to assure that no similar accidents occur in the future.

### 10.2 Injuries and Illnesses Form (OSHA 200)

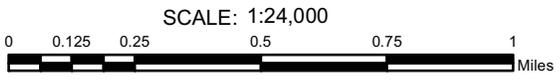
All occupational injuries and illnesses that are required to be recorded under the Occupational Safety and Health Act will be registered on OSHA Form 200 (see **Appendix B**). The site safety supervisor will record occupational injuries and illnesses within 48 hours of occurrence, as required by statute.



## **FIGURES**



USGS 7.5 Minute Quadrangle Topographic Map (2011)



|         |        |   |           |             |
|---------|--------|---|-----------|-------------|
| TITLE   |        | SITE MAP                                  |           | Figure No.  |
|         |        |   |           | 01          |
| PROJECT |        | 59-63 N. 6th Street<br>Brooklyn, New York |           | Project No. |
|         |        |   |           | 2014-131    |
|         | DESIGN | WF  | 9-22-2014 |             |
|         | CHECK  |   |           |             |
|         | REVIEW |   |           |             |

## **APPENDIX A**

Accident Report Form



# Cider Environmental

89 Cabot Court, Unit N, Hauppauge NY | P: (631) 616-4000 | F: (631) 980-7972

E-mail: jcressy@ciderenvironmental.com | Website: www.CiderEnvironmental.com

## ACCIDENT REPORT FORM

Employee(s) name(s): \_\_\_\_\_  
\_\_\_\_\_

Time & date of accident/incident: \_\_\_\_\_

Job title(s) and department(s): \_\_\_\_\_  
\_\_\_\_\_

Supervisor/lead person: \_\_\_\_\_

Witnesses: \_\_\_\_\_  
\_\_\_\_\_

Brief description of the accident or incident: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Indicate body part affected:

Did the injured employee(s) see a doctor? ( ) Yes ( ) No

If yes, did you file an employer's portion of a worker's compensation form? ( ) Yes ( ) No

Did the injured employee(s) go home during their work shift? ( ) Yes ( ) No

If yes, list the date and time injured employee(s) left job(s): \_\_\_\_\_  
\_\_\_\_\_

Supervisor's Comments: \_\_\_\_\_  
\_\_\_\_\_

What could have been done to prevent this accident/incident? \_\_\_\_\_  
\_\_\_\_\_

Have the unsafe conditions been corrected? ( ) Yes ( ) No

If yes, what has been done? \_\_\_\_\_  
\_\_\_\_\_

If no, what needs to be done? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Employer or Supervisor's signature: \_\_\_\_\_

Date: \_\_\_\_\_

Additional comments/notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## **APPENDIX B**

OSHA Form 200-Occupational Injuries & Illnesses

**Log and Summary of Occupational Injuries and illnesses**

**NOTE:** This form is required by Public Law 91-596 and must be kept in the establishment for 5 years. Failure to maintain and post can result in issuance of citations and assessment of penalties. (See posting requirements on the other side of form)

**RECORDABLE CASES:** You are required to record information about every occupational death; every nonfatal occupational illness; and those nonfatal occupational injuries which involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid)  
(See definitions on the other side of form)

| Case or File Number  | Date of Injury or Onset of Illness | Employee's Name  | Occupation   | Department   | Description of Injury or Illness   |
|--|------------------------------------|--|--|--|--|
| Enter a nonduplicating number which will facilitate comparison with supplementary records. | Enter<br>Mo/Day                    | Enter first name or initial, middle initial, last name | Enter regular job title, not activity employee was performing when injury occurred or at onset of illness. In the absence of a formal title, enter a brief description of the employee's duties. | Enter department in which the employee is regularly employed or a description of normal workplace to which employee is assigned, even though temporarily working in another department at the time of injury or illness. | Enter a brief description of the injury or illness and indicate the part or parts of the body affected.<br><br>Typical entries for this column might be: Amputation of 1st joint right forefinger; Strain of lower back; Contact dermatitis on both hands; Electrocutation - body. |
| (A)  | (B)                                | (C)  | (D)  | (E)  | (F)  |
| PREVIOUS PAGE TOTALS =>  |                                    |  |  |  |  |
| TOTALS (Instructions on other side of form) =>   |                                    |  |  |  |  |
| OSHA No. 200   |                                    |  |  |  |  |

U.S. Department of Labor



For Calendar Year \_\_\_\_\_ of \_\_\_\_\_ Page: \_\_\_\_\_ of \_\_\_\_\_

Form Approved  
O.M.B. No. 1218-0176  
See OMB Disclosure  
Statement on reverse.

Company Name \_\_\_\_\_  
Establishment Name \_\_\_\_\_  
Establishment Address \_\_\_\_\_  
Extent of and Outcome of Injury \_\_\_\_\_  
Type, Extent of, and Outcome of Illness \_\_\_\_\_

| Injury Related<br>Enter Date of death.<br>mm/dd/yy | Injuries with Lost Workdays   |   |                                     | Injuries Without Lost Workdays                   |  | Fatalities<br>Illness Related<br>Enter DATE of death, mm/dd/yy | Nonfatal Illnesses                                     |   |  | Illnesses without Lost Workdays<br>Enter a CHECK if no entry was made in columns 8 or 9 |  |     |     |     |      |      |      |      |  |
|--|---|---|-------------------------------------|--|--|--|--|---|--|---|--|-----|-----|-----|------|------|------|------|--|
|  | Enter a Check if injury involves DAYS away from work or restricted work activity or both. | Enter a Check if injury involves DAYS away from work. | Enter number of DAYS away from work | Enter number of DAYS of restricted work activity | Enter a Check if no entry was made in column 1 or 2 but the injury is recordable as defined above. |  | Enter a Check if illness involves DAYS away from work. | Enter a Check if illness involves DAYS away from work, or DAYS of restricted work activity or both. | Enter a Check if illness involves DAYS away from work. |   | Enter number of DAYS of restricted work activity |     |     |     |      |      |      |      |  |
| (1)  | (2)   | (3)   | (4)                                 | (5)  | (6)  | (8)  | (a)  | (b)   | (c)  | (d)   | (e)  | (f) | (g) | (9) | (10) | (11) | (12) | (13) |  |
|  |   |   |                                     |  |  |  | Occupational Skin Disorder or Disease                  |   |  |   |  |     |     |     |      |      |      |      |  |
|  |   |   |                                     |  |  |  | Dust Disease of the lungs                              |   |  |   |  |     |     |     |      |      |      |      |  |
|  |   |   |                                     |  |  |  | Respiratory Conditions due to toxic agents             |   |  |   |  |     |     |     |      |      |      |      |  |
|  |   |   |                                     |  |  |  | Poisoning (systemic effects of toxic materials)        |   |  |   |  |     |     |     |      |      |      |      |  |
|  |   |   |                                     |  |  |  | Disorders due to physical agents                       |   |  |   |  |     |     |     |      |      |      |      |  |
|  |   |   |                                     |  |  |  | Disorders associated with repeated trauma              |   |  |   |  |     |     |     |      |      |      |      |  |
|  |   |   |                                     |  |  |  | All other occupational illnesses                       |   |  |   |  |     |     |     |      |      |      |      |  |

Certification of Annual Summary Totals by: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

POST ONLY THIS PORTION OF THE LAST PAGE NO LATER THAN FEBRUARY 1

OSHA 200

## OMB DISCLOSURE STATEMENT

Public reporting burden for this collection of information is estimated to vary from 4 to 30 (time in minutes) per response with an average of 15 (time in minutes) per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments regarding this estimate or any other aspect of this information collection, including suggestions for reducing this burden, please send them to the OSHA Office of Statistics, Room N-3644, 200 Constitution Avenue, N.W. Washington, D.C. 20210

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### Instructions for OSHA No. 200

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#### I. Log and Summary of Occupational Injuries and Illnesses

Each employer who is subject to the recordkeeping requirements of the Occupational Safety and Health Act of 1970 must maintain for each establishment, a log of all recordable occupational injuries and illnesses. This form (OSHA No. 200) may be used for that purpose. A substitute for the OSHA No. 200 is acceptable if it is as detailed, easily readable, and understandable as the OSHA No. 200.

Enter each recordable case on the log within six (6) workdays after learning of its occurrence. Although other records must be maintained at the establishment to which they refer, it is possible to prepare and maintain the log at another location, using data processing equipment if desired. If the log is prepared elsewhere, a copy updated to within 45 calendar days must be present at all times in the establishment.

Logs must be maintained and retained for five (5) years following the end of the calendar year to which they relate. Logs must be available (normally at the establishment) for inspection and copying by representatives of the Department of Labor, or the Department of Health and Human Services, or States accorded jurisdiction under the Act. Access to the log is also provided to employees, former employees and their representatives.

#### II. Changes in Extent of or Outcome of Injury or Illness

If, during the 5-year period the log must be retained, there is a change in an extent and outcome of an injury or illness which affects entries in columns 1, 2, 6, 8, 9, or 13, the first entry should be lined out and a new entry made. For example, if an injured employee at first required only medical treatment but later lost workdays away from work, the check in column 6 should be lined out and checks entered in columns 2 and 3 and the number of lost workdays entered in column 4.

In another example, if an employee with an occupational illness lost workdays, returned to work, and then died of the illness, any entries in columns 9 through 12 would be lined out and the date of death entered in column 8.

The entire entry for an injury or illness should be lined out if later found to be nonrecordable. For example, an injury which is later determined not to be work related, or which was initially thought to involve medical treatment but later was determined to have involved only first aid.

#### III. Posting Requirements

A copy of the totals and information following the total line of the last page for the year, must be posted at each establishment in the place or places where notices to employees are customarily posted. This copy must be posted no later than February 1 and must remain in place until March 1. Even though there were no injuries or illnesses during the year, zeros must be entered on the totals line, and the form posted.

The person responsible for the annual summary totals shall certify that the totals are true and complete by signing at the bottom of the form.

#### IV. Instructions for Completing Log and Summary of Occupational injuries and illnesses

##### Column A - CASE OR FILE NUMBER. Self Explanatory

##### Column B - DATE OF INJURY OR ONSET OF ILLNESS

For occupational injuries, enter the date of the work accident which resulted in the injury. For occupational illnesses, enter the date of initial diagnosis of illness, or, if absence from work occurred before diagnosis, enter the first day of the absence attributable to the illness which was later diagnosed or recognized.

##### Columns C through F - Self Explanatory

##### Columns 1 and 8 - INJURY OR ILLNESS-RELATED DEATHS - Self Explanatory

##### Columns 2 and 9 - INJURIES OR ILLNESSES WITH LOST WORKDAYS - Self Explanatory

Any injury which involves days away from work, or days of restricted work activity, or both, must be recorded since it always involves one or more of the criteria for recordability.

### Columns 3 and 10 - INJURIES OR ILLNESSES INVOLVING DAYS AWAY FROM WORK - Self Explanatory

#### Columns 4 and 11 - LOST WORKDAYS -- DAYS AWAY FROM WORK.

Enter the number of workdays (consecutive or not) on which the employee would have worked but could not because of occupational injury or illness. The number of lost workdays should not include the day of injury or onset of illness or any days on which the employee would not have worked even though able to work. NOTE: For employees not having a regularly scheduled shift, such as certain truck drivers, construction workers, farm labor, casual labor, part-time employees, etc., it may be necessary to estimate the number of lost workdays. Estimates of lost workdays shall be based on prior work history of the employee AND days worked by employees, not ill or injured, working in the department and/or occupation of the ill or injured employee.

#### Columns 5 and 12 - LOST WORKDAYS -- DAYS OF RESTRICTED WORK ACTIVITY.

Enter the number of workdays (consecutive or not) on which because of injury or illness:

- (1) the employee was assigned to another job on a temporary basis, or
- (2) the employee worked at a permanent job less than full time, or
- (3) the employee worked at a permanently assigned job but could not perform all duties normally connected with it.

The number of lost workdays should not include the day of injury or onset of illness or any days on which the employee would not have worked even though able to work.

### Columns 6 and 13 - INJURIES OR ILLNESSES WITHOUT LOST WORKDAYS - Self Explanatory

#### Columns 7a through 7g - TYPE OF ILLNESS. Enter a check in only *one* column for each illness.

TERMINATION OR PERMANENT TRANSFER - Place an asterisk to the right of the entry in columns 7a through 7g (type of illness) which represented a termination of employment or permanent transfer.

#### V. Totals

Add number of entries in columns 1 and 8.

Add number of checks in columns 2, 3, 6, 7, 9, 10 and 13.

Add number of days in columns 4, 5, 11 and 12.

Yearly totals for each column (1-13) are required for posting. Running or page totals may be generated at the discretion of the employer.

In an employee's loss of workdays is continuing at the time the totals are summarized, estimate the number of future workdays the employee will lose and add that estimate to the workdays already lost and include this figure in the annual totals. No further entries are to be made with respect to such cases in the next year's log.

#### VI. Definitions

OCCUPATIONAL INJURY is any injury such as a cut, fracture, sprain, amputation, etc. which results from a work accident or from an exposure involving a single incident in the work environment. NOTE: Conditions resulting from animal bites, such as insect or snake bites or from one-time exposure to chemicals, are considered to be injuries.

OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact.

The following listing gives the categories of occupational illnesses and disorders that will be utilized for the purpose of classifying recordable illnesses. For purposes of information, examples of each category are given. These are typical examples, however, and are not to be considered the complete listing of the types of illnesses and disorders that are to be counted under each category.

7a. Occupational Skin Diseases or Disorders. Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; chrome ulcers; chemical burns or inflammation, etc.

7b. Dust Diseases of the Lungs (Pneumoconioses). Examples: Silicosis, asbestosis and other asbestos-related diseases, coal worker's pneumoconioses, byssinosis, siderosis, and other pneumoconioses.

7c. Respiratory Conditions Due to Toxic Agents. Examples: Pneumonitis, pharyngitis, rhinitis or acute congestion due to chemicals, dusts, gases, or fumes; farmer's lung; etc.

7d. Poisoning (Systemic Effects of Toxic Materials). Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals; poisoning by

carbon monoxide, hydrogen sulfide, or other gases; poisoning by benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays such as parathion, lead arsenate; poisoning by other chemicals such as formaldehyde, plastics, and resins; etc.

7e. Disorders Due to Physical Agents (Other than Toxic Materials). Examples: Heatstroke, sunstroke, heat exhaustion, and other effects of environmental heat, freezing, frostbite, and effects of exposure to low temperatures; caisson disease; effects of ionizing radiation (isotopes, X-rays, radium); effects of nonionizing radiation (welding flash, ultraviolet rays, microwaves, sunburn); etc.

7f. Disorders Associated with Repeated Trauma. Examples: Noise-induced hearing loss; synovitis, tenosynovitis, and bursitis. Raynaud's phenomena; and other conditions due to repeated motion, vibration, or pressure.

7g. All Other Occupational Illnesses. Examples: Anthrax, brucellosis, infectious hepatitis, malignant and benign tumors, food poisoning, histoplasmosis, coccidioidomycosis, etc.

MEDICAL TREATMENT includes treatment (other than first aid) administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does NOT include first aid treatment (one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care) even though provided by a physician or registered professional personnel.

ESTABLISHMENT: A single physical location where business is conducted or where services or industrial operations are performed (for example: a factory, mill, store, hotel, restaurant, movie theater, farm, ranch, bank, sales office, warehouse, or central administrative office). Where distinctly separate activities are performed at a single physical location, such as construction activities operated from the same physical locations as a lumber yard, each activity shall be treated as a separate establishment.

For firms engaged in activities which may be physically dispersed, such as agriculture; construction; transportation; communications and electric, gas, and sanitary services, records may be maintained at a place to which employees report each day.

Records for personnel who do not primarily report or work at a single establishment, such as traveling salesmen, technicians, engineers, etc., shall be maintained at the location from which they are paid or the base from which personnel operate to carry out their activities.

WORK ENVIRONMENT is comprised of the physical location, equipment, materials processed or used, and the kinds of operations performed in the course of an employee's work, whether on or off the employer's premises.

**Occupational Safety and Health Administration**  
**Supplementary Record of**  
**Occupational Injuries and Illnesses**

U.S. Department of Labor



This form is required by Public Law 91-596 and must be kept in the establishment for 5 years.  
 Failure to maintain can result in the issuance of citations and assessment of penalties.

Case or File No.

Form Approved  
 O.M.B. No. 1218-0176

**Employer**

1. Name

2. Mail address (No. and street, city or town, State, and zip code)

3. Location, if different from mail address

See OMB Disclosure  
 Statement on reverse.

**Injured or Ill Employee**

4 Name (First, middle, and last)

Social Security No.

5. Home address (No. and street, city or town, State, and zip code)

6. Age

7. Sex (Check one)

Male

Female

8. Occupation (Enter regular job title, not the specific activity he was performing at the time of injury.)

9. Department (Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury.)

**The Accident or Exposure to Occupational Illness**

If accident or exposure occurred on employer's premises, give address of plant or establishment in which it occurred. Do not indicate department or division within the plant or establishment.  
 If accident occurred outside employer's premises at an identifiable address, give that address. If it occurred on a public highway or at any other place which cannot be identified by number and street, please provide place references locating the place of injury as accurately as possible.

10. Place of accident or exposure (No. and street, city or town, State, and zip code)

11. Was place of accident or exposure on employer's premises?

Yes

No

12. What was the employee doing when injured? (Be specific. If he was using tools or equipment or handling material, name them and tell what he was doing with them.)

13. How did the accident occur? (Describe fully the events which resulted in the injury or occupational illness. Tell what happened and how it happened. Name any objects or substances involved and tell how they were involved. Give full details on all factors which led or contributed to the accident. Use separate sheet for additional space.)

**Occupational Injury or Occupational Illness**

14. Describe the injury or illness in detail and indicate the part of body affected. (E.g., amputation of right index finger at second joint; fracture of ribs; lead poisoning; dermatitis of left hand, etc.)

15. Name the object or substance which directly injured the employee. (For example, the machine or thing he struck against or which struck him; the vapor or poison he inhaled or swallowed; the chemical or radiation which irritated his skin; or in cases of strains, hernias, etc., the thing he was lifting, pulling, etc.)

16. Date of injury or initial diagnosis of occupational illness

17. Did employee die? (Check one)

Yes

No

**Other**

18. Name and address of physician

19. If hospitalized, name and address of hospital

Date of report

Prepared by

Official position

## **SUPPLEMENTARY RECORD OF OCCUPATIONAL INJURIES AND ILLNESSES**

To supplement the Log and Summary of Occupational Injuries and Illnesses (OSHA No. 200), each establishment must maintain a record of each recordable occupational injury or illness. Worker's compensation, insurance, or other reports are acceptable as records if they contain all facts listed below or are supplemented to do so. If no suitable report is made for other purposes, this form (OSHA No. 101) may be used or the necessary facts can be listed on a separate plain sheet of paper. These records must also be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health and Human Services, and States accorded jurisdiction under the Act. The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

Such records must contain at least the following facts:

- 1) About the employer - name, mail address, and location if different from mail address.
- 2) About the injured or ill employee - name, social security number, home address, age, sex, occupation, and department.
- 3) About the accident or exposure to occupational illness - place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.
- 4) About the occupational injury or illness - description of the injury or illness, including part of the body affected, name of the object or substance which directly injured the employee; and date of injury or diagnosis of illness.
- 5) Other - name and address of physician; if hospitalized, name and address of hospital, date of report; and name and position of person preparing the report.

SEE *DEFINITIONS* ON THE BACK OF OSHA FORM 200.

### **OMB DISCLOSURE STATEMENT**

Public reporting burden for this collection of information is estimated to average 20 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments regarding this estimate or any other aspect of this information collection, including suggestions for reducing this burden, please send them to the OSHA Office of Statistics, Room N3644, 200 Constitution Avenue, NW, Washington, DC 20210

**DO NOT SEND THE COMPLETED FORM TO THE OFFICE SHOWN ABOVE**

## **APPENDIX C**

Air Monitoring and Instrument Calibration Sheet

## **APPENDIX D**

Material Safety Data Sheet

10.1.1 Pesticides & PCB's Pesticides

ENVIRONMENTAL RESOURCE ASSOCIATES -- PESTICIDES & PCB'S PESTICIDS -- 6810-00F030787

===== Product Identification =====

Product ID:PESTICIDES & PCB'S PESTICIDS  
MSDS Date:09/30/1987  
FSC:6810  
NIIN:00F030787  
MSDS Number: BSLVW  
=== Responsible Party ===  
Company Name:ENVIRONMENTAL RESOURCE ASSOCIATES  
Address:5540 MARSHALL ST  
City:ARVADA  
State:CO  
ZIP:80002-3108  
Country:US  
Info Phone Num:303-431-8454  
Emergency Phone Num:303-431-8454  
Preparer's Name:DANIEL THAU TEITELBAUM  
CAGE:1R664

=== Contractor Identification ===

Company Name:ENVIRONMENTAL RESOURCE ASSOCIATES  
Address:5540 MARSHALL STREET  
Box:City:ARVADA  
State:CO  
ZIP:80002  
Country:US  
Phone:303-431-8454  
CAGE:1R664

===== Composition/Information on Ingredients =====

Ingred Name:LINDANE, G-BHC, CYCLOHEXANE,1,2,3,4,5,6-HEXACHLORO  
(SUSPECTED HUMAN CARCINOGEN)  
CAS:58-89-9  
RTECS #:GV4900000  
OSHA PEL:0.5 MG/CUM (SKIN)  
ACGIH TLV:0.5 M/CUM (SKIN)  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

Ingred Name:METHOXYCHLOR  
CAS:72-43-5  
RTECS #:KJ3675000  
OSHA PEL:15 MG/CUM  
ACGIH TLV:10 MG/CUM  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

Ingred Name:METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE) (CHLOROTHENE NU),  
AEROTHANE TT, CHLOROTHENE

CAS:71-55-6

RTECS #:KJ2975000

Other REC Limits:450 PPM STEL

OSHA PEL:350 PPM

ACGIH TLV:1910 MG/CUM

EPA Rpt Qty:1000 LBS

DOT Rpt Qty:1000 LBS

Ozone Depleting Chemical:1

Ingred Name:METHANOL (METHYL ALCOHOL), COLUMBIAN SPIRITS

CAS:67-56-1

RTECS #:PC1400000

Fraction by Wt: 99.2%

Other REC Limits:200 PPM

OSHA PEL:260 MG/CUM

ACGIH TLV:262 MG/CUM (SKIN)

EPA Rpt Qty:5000 LBS

DOT Rpt Qty:5000 LBS

Ingred Name:POLYCHLORINATED BIPHENYL, PCB, AROCLOR 1016 (CL 41%)

CAS:12674-11-2

RTECS #:TQ1351000

Other REC Limits:0.001 MG/CUM NIOSH

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:CHLORODIPHENYL (42% CL), PCB, POLYCHLORINATED BIPHENYL,  
AROCHLOR 1242

CAS:53469-21-9

RTECS #:TQ1356000

Other REC Limits:0.001 MG/CUM NIOSH

OSHA PEL:1 MG/CUM

ACGIH TLV:1 MG/CUM

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:POLYCHLORINATED BIPHEYNL, PCB, AROCLOR 1248, (CL 48%)

CAS:12672-29-6

RTECS #:TQ1358000

Other REC Limits:0.001 MG/CUM NIOSH

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:CHLORODIPHENYL (54% CL), PCB, AROCLOR 1254, POLYCHLORINATED  
BIPHENYL (SUSPECTED HUMAN CARCINOGEN)

CAS:11097-69-1

RTECS #:TQ1360000

Other REC Limits:0.001 MG/CUM NIOSH

OSHA PEL:0.5 MG/CUM (SKIN)

ACGIH TLV:0.5 MG/CUM (SKIN)

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:POLYCHLORINATED BIPHENYL, PCB, AROCLOR 1260, (CL 60%)  
CARCINOGEN BY NTP & IARC.

CAS:11096-82-5

RTECS #:TQ1362000

Other REC Limits:0.001 MG/CUM NIOSH

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:ALDRIN

CAS:309-00-2

RTECS #:IO2100000

OSHA PEL:0.25 MG/CUM

ACGIH TLV:0.25 MG/CUM (SKIN)

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:CHLORDANE (SUSPECTED HUMAN CARCINOGEN)

CAS:57-74-9

RTECS #:PB9800000

Other REC Limits:0.5 MG/CUM (SKIN)

OSHA PEL:0.5 MG/CUM

ACGIH TLV:0.5 MG/CUM

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:DDT ISOMERS (DICHLORODIPHENYL-TRICHLOROETHANE) (SUSPECTED  
HUMAN CARCINOGEN)

CAS:50-29-3

RTECS #:KJ3325000

ACGIH TLV:1 MG/CUM (SKIN)

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:1,1,1-TRICHLORO-2- O-CHLOROPHENYL!-2- P-CHLOROPHENYL!ETHANE

CAS:789-02-6

RTECS #:KH7910000

Ingred Name:4,4'-DDE

CAS:72-55-9

RTECS #:KV9450000

Other REC Limits:1 MG/CUM

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:ETHYLENE,

1,1-DICHLORO-2-(O-CHLOROPHENYL)-2-(P-CHLOROPHENYL)-

CAS:3424-82-6

RTECS #:KV9454000

Ingred Name:4,4'-DDD

CAS:72-54-8

RTECS #:KI0700000  
Other REC Limits:1 MG/CUM  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

Ingred Name:1-CHLORO-2-(2,2-DICHLORO-1-(4-CHLOROPHENYL)ETHYL)BENZENE  
CAS:53-19-0  
RTECS #:KH7880000

Ingred Name:DIELDRIN (SUSPECTED HUMAN CARCINOGEN)  
CAS:60-57-1  
RTECS #:IO1750000  
OSHA PEL:0.25 MG/CUM (SKIN)  
ACGIH TLV:0.25 MG/CUM (SKIN)  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

Ingred Name:ENDRIN  
CAS:72-20-8  
RTECS #:IO1575000  
OSHA PEL:0.1 MG/CUM  
ACGIH TLV:0.1 MG/CUM (SKIN)  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

Ingred Name:ENDOSULFAN  
CAS:115-29-7  
RTECS #:RB9275000  
ACGIH TLV:0.1 MG/CUM  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

Ingred Name:HEPTACHLOR  
INTENDED CHANGE (IC)  
CAS:76-44-8  
RTECS #:PC0700000  
OSHA PEL:0.5 MG/CUM (SKIN)  
ACGIH TLV:0.5 MG/CUM (SKIN) A2  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

Ingred Name:HEPTACHLOR EPOXIDE;  
1,4,5,6,7,8,8-HEPTACHLORO-2,3-EPOXY-3A,4,7,7A-TETRAHYDRO-4,7  
CAS:1024-57-3  
RTECS #:PB9450000  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

Ingred Name:HEXACHLORO BENZENE  
CAS:118-74-1  
RTECS #:DA2975000  
EPA Rpt Qty:10 LBS  
DOT Rpt Qty:10 LBS

=====  
===== Hazards Identification =====

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES  
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:YES  
Health Hazards Acute and Chronic:PRIMARY IRRITANT. IRRITATES & DAMAGES ALL TISSUES. MAY CAUSE LIVER, KIDNEY & LUNG DAMAGE, CARDIAC ARRYTHMIA. MAY SENSITIZE THE HEART TO EPINEPHRINE. SKIN: ALLERGIC DERMATITIS OR CHLORACNE. MAY CAUSE C ANCKER IN HUMANS. MAY CAUSE ACIDOSIS & BLINDNESS.  
Explanation of Carcinogenicity:SEE INGREDIENTS  
Effects of Overexposure:SKIN: RED, DRY, SCALY, CRACKING & WEEPING. INHALATION: COUGHING, WHEEZING. INGESTION: JAUNDICE, NAUSEA, VOMITING, UREMIA & ACIDOSIS.  
Medical Cond Aggravated by Exposure:DERMATITIS, LIVER DISEASE, KIDNEY DISEASE

=====  
===== First Aid Measures =====

First Aid:INHALATION: REMOVE TO FRESH AIR. BE PREPARED TO DO CPR.  
INGESTION: GIVE SYRUP OF IPECAC 60CC W/180CC WATER. SKIN: WASH W/WATER. OBTAIN MEDICAL ATTENTION IN ALL CASES.

=====  
===== Fire Fighting Measures =====

Flash Point Method:TOC  
Flash Point:15.5C  
Extinguishing Media:DRY CHEMICAL, CO2, ALCOHOL FOAM  
Fire Fighting Procedures:IF LARGE AMOUNTS INVOLVED IN FIRE, USE SELF-CONTAINED BREATHING APPARATUS & WET DOWN TO KEEP FROM EXPLODING. USE WATER MIST OR ALCOHOL FOAM.  
Unusual Fire/Explosion Hazard:MAY FORM CO, PHOSGENE, & CARBONYL BROMIDE IN FIRE.

=====  
===== Accidental Release Measures =====

Spill Release Procedures:DAM UP & ABSORB. VENTILATE AREA. CALL CLEANUP TEAM. DON'T WASH TO DRAINS.

=====  
===== Handling and Storage =====

Handling and Storage Precautions:AVOID FREEZING, BREAKAGE. STORE AWAY FROM INCOMPATIBLE MATERIALS.  
Other Precautions:HANDLE W/CARE. MATERIAL CONTAINS CARCINOGENS.

=====  
===== Exposure Controls/Personal Protection =====

Respiratory Protection:USE ORGANIC VAPOR CARTRIDGE, FULL FACE-PIECE, SELF-CONTAINED OR AIR-SUPPLIED RESPIRATOR  
Ventilation:USE IN HOOD  
Protective Gloves:VITON OR NEOPRENE  
Eye Protection:SPLASH GOGGLES  
Other Protective Equipment:LABORATORY COAT, CLOSE SHOES

Supplemental Safety and Health  
EACH SAMPLE WILL CONTAIN BETWEEN THREE & EIGHT PESTICIDES & ONE OR TWO  
AROCLORS.

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:64.5C  
Vapor Density:1.11  
Spec Gravity:0.792  
Solubility in Water:COMPLETE  
Appearance and Odor:CLEAR, COLORLESS LIQUID W/ORGANIC ODOR

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES  
CHROMIC ANHYDRIDE, IODINE, ETHANOL, MERCURIC OXIDE, POTASSIUM  
HYDROXIDE, SODIUM HYDROXIDE, CHLOROFORM, LEAD PERCHLORATE  
Hazardous Decomposition Products:CO, PHOSGENE, CARBONYL BROMIDE

===== Disposal Considerations =====

Waste Disposal Methods:INCINERATE OR DISPOSE AS HAZARDOUS WASTE IN  
ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS.

Disclaimer (provided with this information by the compiling agencies):  
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of Defense. The United States of America in no manner whatsoever,  
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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.

*10.1.2 PCBs Material Safety Data Sheet*

AEROVOC INC. -- P103F337,POLYCHLORINATED BIPHENYLS (PCBS) -- 5910-00-086-  
2688

===== Product Identification =====

Product ID:P103F337,POLYCHLORINATED BIPHENYLS (PCBS)  
MSDS Date:10/15/1985  
FSC:5910  
NIIN:00-086-2688  
MSDS Number: BCYGD  
=== Responsible Party ===  
Company Name:AEROVOC INC.  
Address:740 BELLEVILLE AVE  
City:NEW BEDFORD  
State:MA

ZIP:02745  
Country:US  
Info Phone Num:508-994-9607  
Emergency Phone Num:508-994-9607  
Preparer's Name:JOHN H. CRADDOCK  
CAGE:K0040

=== Contractor Identification ===

Company Name:AEROVOC INC.  
Address:740 BELLEVILLE AVE  
Box:City:NEW BEDFORD  
State:MA  
ZIP:02745

Country:US  
Phone:508-994-9607  
CAGE:K0040

Company Name:AEROVOX INC.  
Address:740 BELLEVILLE AVE  
Box:City:NEW BEDFORD  
State:MA  
ZIP:02745-6010

Country:US  
Phone:508-994-9661 / 508-994-9635  
CAGE:00656

Company Name:MONSANTO COMPANY  
Address:800 N LINDBERGH BLVD  
Box:City:SAINT LOUIS  
State:MO  
ZIP:63167  
Country:US  
Phone:314-694-6661 OR 800-332-3111  
CAGE:76541

==== Composition/Information on Ingredients =====

Ingred Name:POLYCHLORINATED BIPHENYLS (PCBS) (SARA III)  
CAS:1336-36-3  
RTECS #:TQ1350000  
Fraction by Wt: >99.9%  
Other REC Limits:NONE RECOMMENDED  
OSHA PEL:0.5 MG/M3 SKIN  
ACGIH TLV:0.5 MG/M3 SKIN  
EPA Rpt Qty:1 LB  
DOT Rpt Qty:1 LB

==== Hazards Identification =====

LD50 LC50 Mixture:ORAL LD50(RAT);8.65GM/KG(42%CHLORINATED)  
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES  
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO  
Health Hazards Acute and Chronic:ACUTE: EYES: IRRITATING. SKIN: DRYING,  
CRACKING, CHLORACNE. INHALATION: MAY CAUSE LIVER INJURY. INGESTION:  
SLIGHTLY TOXIC. LD50 ORAL RATS: 8.65 GM/KG FOR 42% CHLORINATED AND  
11.9 GM/KG FOR 50% CHLORINATED. CHRONIC: TESTS HAVE NOT

DEMONSTRATED CHRONIC HUMAN ILLNESSES SUCH AS  
CANCER/NEUROLOGICAL/CARDIOVASCULAR EFFECTS.

Explanation of Carcinogenicity:NTP: LISTED AC. ANTICIPATED TO BE  
CARCINOGENS. IARC: LISTED 2A. PROBABLY CARCINOGENIC TO HUMANS.  
OSHA; NOT LISTED.

Effects of Overexposure:EYES: IRRITATION. SKIN: DRYING,CHLORACNE.  
INHALATION: MAY CAUSE LIVER INJURY. INGESTION: SLIGHTLY TOXIC.  
NUMEROUS EPIDEMIOLOGICAL STUDIES OF HUMANS HAVE NOT DEMONSTRATED  
ANY STATISTICALLY SIGNIFICANT CAUSAL RELATIONSHIP BETWEEN PCB  
EXPOSURE AND CHRONIC HUMAN ILLNESSES SUCH AS  
CANCER/NEUROLOGICAL/CARDIOVASCULAR EFFECTS.

Medical Cond Aggravated by Exposure:PCBS CAN CAUSE DERMATOLOGICAL  
SYMPTOMS; HOWEVER THESE ARE REVERSIBLE UPON REMOVAL OF EXPOSURE  
SOURCE.

=====  
===== First Aid Measures =====

First Aid:EYES: FLUSH WITH LARGE AMOUNTS OF WATER.PETROLATUM-BASED  
OPHTHALMIC OINTMENT MAY BE APPLIED FOR IRRITATION. SKIN: REMOVE  
CONTAMINATED CLOTHING. WASH SKIN WITH SOAP AND WATER. HOT PCBS MAY  
CAUSE BURNS. INHALATION: MOVE TO FRESH AIR.IF IRRITATION  
PERSISTS,GET MEDICAL ATTENTION. INGESTION: GET MEDICAL ATTENTION.DO  
NOT INDUCE VOMITING OR GIVE OILY LAXITIVES.FOR LARGE AMOUNTS  
GASTRIC LAVAGE SUGGESTED.

=====  
===== Fire Fighting Measures =====

Flash Point:383F,195C

Extinguishing Media:NONE SPECIFIED BY MANUFACTURER.

Fire Fighting Procedures:STANDARD FIRE FIGHTING WEARING APPAREL AND  
SCAB SHOULD BE WORN WHEN FIGHTING FIRES INVOLVING FIRES INVOLVING  
EXPOSURE TO CHEMICAL COMBUSTION PRODUCTS.

Unusual Fire/Explosion Hazard:AT TEMPERATURE IN RANGE OF 600-650C IN  
PRESENCE OF EXCESS OXYGEN PCBS MAY FORM POLYCHLORINATED  
DIBENZOFURANS (PCDFS).

=====  
===== Accidental Release Measures =====

Spill Release Procedures:VENTILATE AREA. PREVENT LOSS TO SEWER SYSTEMS,  
NAVIGABLE WATERWAYS AND STREAMS. CONTAIN SPILL WITH DIKE. PUMP  
LIQUID TO SUITABLE WASTE CONTAINER. ABSORB RESIDUAL SPILL WITH  
ABSORBENTS SUCH AS SAND, VE RMICULITE. ISOLATE AREA AND NOTIFY  
AUTHORITIES.

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

=====  
===== Handling and Storage =====

Handling and Storage Precautions:STORAGE MUST FOLLOW RCRA REQUIREMENTS.  
AVOID PROLONGED BREATHING OF VAPORS OR MISTS. AVOID CONTACT WITH  
EYES OR PROLONGED CONTACT WITH SKIN.

Other Precautions:FEDERAL REGULATIONS UNDER THE TOXIC SUBSTANCES  
CONTROL ACT REQUIRE PCBS AND PCB ITEMS TO BE MARKED. CHECK FEDERAL  
REGULATIONS FOR DETAILS.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:USE NIOSH/MSHA APPROVED EQUIPMENT WHEN AIRBORNE EXPOSURE LIMITS ARE EXCEEDED. FULL FACEPIECE EQUIPMENT RECOMMENDED. HIGH AIRBORNE CONCENTRATIONS MAY REQUIRE USE OF SCBA OR SUPPLIED AIR RESPIRATOR.

Ventilation:RECOMMEND LOCAL MECHANICAL EXHAUST VENTILATION AT SOURCES OF AIR CONTAMINATION SUCH AS OPEN PROCESS EQUIPMENT.

Protective Gloves:WEAR APPROPRIATE PROTECTIVE GLOVES.

Eye Protection:WEAR CHEMICAL SPLASH GOGGLES,FACESHIELD.

Other Protective Equipment:WEAR PROTECTIVE CLOTHING THAT PROVIDE A BARRIER TO PREVENT SKIN CONTACT. PROVIDE EYE WASH STATION AND SAFETY SHOWER.

Work Hygienic Practices:WASH AFTER HANDLING AND BEFORE EATING,DRINKING,SMOKING.LAUNDRER CONTAMINATED CLOTHING/PROTECTIVE EQUIPMENT BEFORE REUSE.

Supplemental Safety and Health

IF A PCB TRANSFORMER IS INVOLVED IN A FIRE-RELATED INCIDENT, THE OWNER OF THE TRANSFORMER MAY BE REQUIRED TO REPORT THE INCIDENT. CONSULT AND FOLLOW APPROPRIATE FEDERAL, STATE, AND LOCAL REGULATIONS.

===== Physical/Chemical Properties =====

HCC:T6

Boiling Pt:B.P. Text:644F,340C

Vapor Pres:0.005

Spec Gravity:1.2-1.6

Appearance and Odor:LIGHT STRAW-COLOR LIQUID,AROMATIC ODOR.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

STRONG OXIDIZERS.

Stability Condition to Avoid:FLAMES, HOT SURFACES.

Hazardous Decomposition Products:DURING FIRES, PCBS MAY PRODUCE BOTH CHLORINATED DIOXINS (PCDDS) AND FURANS (PCDFS).

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSAL OF PCB AND PCB ITEMS IS REGULATED BY GOVERNMENT. WASTES AND ITEMS CONTAINING PCBS (E.G.,WIPING CLOTHS, ABSORBENT MATERIAL, CLOTHING, ETC.) SHOULD BE PLACED IN PROPER CONTAINERS FOR DISPOSAL BASED ON LOCAL, STATE AND FEDERAL REGULATIONS.

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particular situation.

10.1.3 Chlorinated Solvent

ELDORADO CHEMICAL COMPANY, INC. -- CHLORINATED SOLVENT ID PR-3500 --  
8010-00-181-7568

===== Product Identification =====

Product ID:CHLORINATED SOLVENT ID PR-3500  
MSDS Date:07/27/1988  
FSC:8010  
NIIN:00-181-7568  
MSDS Number: BHDBS  
=== Responsible Party ===  
Company Name:ELDORADO CHEMICAL COMPANY, INC.  
Address:14350 LOOKOUT ROAD  
Box:34837  
City:SAN ANTONIO  
State:TX  
ZIP:78265  
Country:US  
Info Phone Num:512-653-9323  
Emergency Phone Num:1-800-531-1088  
Preparer's Name:PAT E. SMITH  
CAGE:55208  
=== Contractor Identification ===  
Company Name:ELDORADO CHEMICAL COMPANY, INC.  
Address:14350 LOOKOUT ROAD  
Box:34837  
City:SAN ANTONIO  
State:TX  
ZIP:78265-4837  
Country:US  
Phone:800-531-1088/ 210-653-2060  
CAGE:55208

===== Composition/Information on Ingredients =====

Ingred Name:METHYLENE CHLORIDE (SARA III)  
CAS:75-09-2  
RTECS #:PA8050000  
Fraction by Wt: 50%  
OSHA PEL:500 PPM/C,1000; Z2  
ACGIH TLV:50 PPM, A2; 9192  
EPA Rpt Qty:1000 LBS  
DOT Rpt Qty:1000 LBS

Ingred Name:PHENOL  
CAS:108-95-2  
RTECS #:SJ3325000

Fraction by Wt: 17%  
OSHA PEL:5 PPM  
ACGIH TLV:5 PPM  
EPA Rpt Qty:1000 LBS  
DOT Rpt Qty:1000 LBS

Ingred Name:SODIUM CHROMATE  
CAS:7775-11-3  
Fraction by Wt: 0.8%  
ACGIH TLV:.5 PPM  
EPA Rpt Qty:10 LBS  
DOT Rpt Qty:10 LBS

=====  
===== Hazards Identification =====

Routes of Entry: Inhalation:YES Skin:YES Ingestion:NO  
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO  
Health Hazards Acute and Chronic:SKIN CONTACT MAY RESULT IN DERMATITIS.  
INHALATION REDUCES OXYGEN IN BLOOD.  
Effects of Overexposure:INHALATION: DIZZINESS, NARCOSIS, NAUSEA,  
REDUCES OXYGEN IN BLOOD. SKIN CONTACT MAY PRODUCE  
DERMATITIS. SKIN ABSORPTION: CONTACT IS PAINFUL. EYE CONTACT:  
BURNS EYES IMMEDIATELY

=====  
===== First Aid Measures =====

First Aid:EYES: FLUSH WITH WATER FOR 15 MINUTES. CONSULT PHYSICIAN.  
SKIN: FLUSH WITH WATERFOR 15 MINUTES, WASH WITH SOAP AND WATER.  
INHALATION: REMOVE TO FRESH AIR.

=====  
===== Fire Fighting Measures =====

Autoignition Temp:Autoignition Temp Text:1200F  
Fire Fighting Procedures:SELF-CONTAINED BREATHING APPARATUS REQUIRED  
Unusual Fire/Explosion Hazard:TOXIC CHLORIDE FUMES MAY BE GENERATED BY  
CONTACT WITH FLAME.

=====  
===== Accidental Release Measures =====

Spill Release Procedures:RINSE WITH WATER

=====  
===== Exposure Controls/Personal Protection =====

Respiratory Protection:SELF-CONTAINED BREATHING APPARATUS REQUIRED IF  
LIMITS EXCEED.  
Ventilation:RESPIRATORY  
Protective Gloves:POLYETHYLENE  
Eye Protection:FACE SHIELD AND GOGGLES  
Other Protective Equipment:RUBBER APRON & BOOTS  
Supplemental Safety and Health  
NK

=====  
===== Physical/Chemical Properties =====

HCC:T4  
Boiling Pt:B.P. Text:120F  
Vapor Pres:380 MM  
Vapor Density:2.9  
Spec Gravity:1.15  
pH:9.2  
Evaporation Rate & Reference:(WATER = 1) 1  
Solubility in Water:PARTIALLY SOLUBLE  
Appearance and Odor:THICK YELLOW LIQUID, PHENOL ODOR  
Percent Volatiles by Volume:70

===== Stability and Reactivity Data =====

STRONG ALKALIS, STRONG OXIDIZERS  
Hazardous Decomposition Products:HEAT WILL PRODUCE DICHLOROMETHANE  
FUMES

===== Disposal Considerations =====

Waste Disposal Methods:CONSULT FEDERAL, STATE, AND LOCAL REGULATORY  
AGENCIES FOR PROPER DISPOSAL.

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assume responsibility for the suitability of this information to their  
particular situation.

*10.1.4 Degreaser Solvent*

P-T TECHNOLOGIES, INC. -- DEGREASER SOLVENT -- 7930-01-436-7893

===== Product Identification =====

Product ID:DEGREASER SOLVENT  
MSDS Date:09/23/1997  
FSC:7930  
NIIN:01-436-7893  
MSDS Number: CGNPC  
=== Responsible Party ===  
Company Name:P-T TECHNOLOGIES, INC.  
Address:108 4TH AVE. S.  
City:SAFETY HARBOR  
State:FL  
ZIP:34695  
Country:US  
Info Phone Num:800-441-7874  
Emergency Phone Num:800-441-7874

CAGE:0JVH6  
=== Contractor Identification ===  
Company Name:P-T TECHNOLOGIES INC  
Address:108 4TH AVENUE, SOUTH  
Box:City:SAFETY HARBOR  
State:FL  
ZIP:34695  
Country:US  
Phone:813-726-4644  
CAGE:0JVH6

=====  
===== Composition/Information on Ingredients =====

Ingred Name:ORANGE OIL, TERPENES (NON-HAZARDOUS)  
CAS:68647-72-3  
Other REC Limits:NONE RECOMMENDED

Ingred Name:PARAFFINIC OILS (NON-HAZARDOUS)  
CAS:64771-72-8  
Other REC Limits:NONE RECOMMENDED

=====  
===== Hazards Identification =====

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES  
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO  
Health Hazards Acute and Chronic:EYE: IRRIT, TEARING, REDNESS. SKIN:  
DEFATTING, DRYNESS, DERMATITIS. INHAL: RESPIRATORY TRACT IRRIT,  
NAUSEA, DIZZY, HEADACHE. INGEST: ACUTE ORAL TOXICITY, NAUSEA,  
VOMIT, GI IRRIT, ASPIRATION INTO LUNGS .

=====  
===== First Aid Measures =====

First Aid:EYE: FLUSH W/WATER FOR 15 MINUTES. SKIN: WASH W/SOAP AND  
WATER. INHAL: GET FRESH AIR. INGEST: DONT INDUCE VOMIT. PRODUCT  
CONTAINS HYDROCARBONS. IN ALL CASES, GET MED AID.

=====  
===== Fire Fighting Measures =====

Flash Point Method:TCC  
Flash Point:144F,62C  
Autoignition Temp:Autoignition Temp Text:410F  
Lower Limits:1.3  
Upper Limits:8.9  
Extinguishing Media:CO2, FOAM, DRY CHEMICAL, CLASS B FOR FIRE  
PROCEDURES.  
Fire Fighting Procedures:COMBUSTIBLE LIQUID, CAN FORM COMBUSTIBLE  
MIXTURES AT OR ABOVE FLASH POINT.

=====  
===== Accidental Release Measures =====

Spill Release Procedures:LAND SPILL: REMOVE IGNITS, CONTAIN SPILL,  
RECOVER FREE PRODUCTS, ABSORB W/SUITABLE CHEMICAL ABSORBENT FOR  
DISPOSAL. WATER SPILL: REMOVE FROM WATER BY SKIMMING, OR USE

SUITABLE ABSORBENT.

=====  
Handling and Storage =====

Handling and Storage Precautions:STORAGE TEMPERATURE AMBIENT KEEP AWAY FROM HEAT AND IGNITS. KEEP PRODUCT CONTAINER CLOSED WHEN NOT IN USE.

=====  
Exposure Controls/Personal Protection =====

Ventilation:MECHANICAL DILUTION VENTILATION RECOMMENDED IN CONFINED AREAS, HEATED >AMBIENT TEMPERATURES OR IS AGITATED.

Protective Gloves:SOLVENT RESISTANT

Eye Protection:SAFETY GLASSES

Supplemental Safety and Health

NK

=====  
Physical/Chemical Properties =====

Boiling Pt:B.P. Text:380 TO 430F

Vapor Pres:<1 @ 20C

Vapor Density:>1 AIR=1

Spec Gravity:0.76

VOC Pounds/Gallon:756

pH:NA

Evaporation Rate & Reference:3.2 N BUAC = 100

Solubility in Water:NON-MISCIBLE

Appearance and Odor:COLORLESS LIQUID, W/CHARACTERISTIC ODOR.

Percent Volatiles by Volume:100

=====  
Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

STRONG OXIDIZING AGENTS

Hazardous Decomposition Products:CARBON DIOXIDE, CARBON MONOXIDE, SMOKE.

=====  
Disposal Considerations =====

Waste Disposal Methods:INCINERATE OR BURY IN APPROVED LANDFILL IN ACCORDANCE W/STATE, FEDERAL AND LOCAL REGULATIONS.

=====  
Other Information =====

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## Tetrachloroethylene

ACC# 22900

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** Tetrachloroethylene**Catalog Numbers:** C182 20, C182 4, C182-20, C182-4, C18220, C1824, O4586 4, O4586-4, O45864**Synonyms:** Ethylene tetrachloride; Tetrachlorethylene; Perchloroethylene; Perchlorethylene**Company Identification:**Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410**For information, call:** 201-796-7100**Emergency Number:** 201-796-7100**For CHEMTREC assistance, call:** 800-424-9300**For International CHEMTREC assistance, call:** 703-527-3887

## Section 2 - Composition, Information on Ingredients

| CAS#     | Chemical Name       | Percent | EINECS/ELINCS |
|----------|---------------------|---------|---------------|
| 127-18-4 | Tetrachloroethylene | 99.0+   | 204-825-9     |

**Hazard Symbols:** XN N**Risk Phrases:** 40 51/53

## Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid. Irritant. May cause severe eye and skin irritation with possible burns. May cause central nervous system depression. May cause liver and kidney damage. May cause reproductive and fetal effects. May cause cancer based on animal studies. **Caution!** May cause respiratory tract irritation.

**Target Organs:** Kidneys, central nervous system, liver.**Potential Health Effects****Eye:** Contact with eyes may cause severe irritation, and possible eye burns.**Skin:** May cause severe irritation and possible burns.**Ingestion:** May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.**Inhalation:** Inhalation of vapor may cause respiratory tract irritation. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability.**Chronic:** Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause respiratory tract cancer. May cause adverse

nervous system effects including muscle tremors and incoordination. May cause liver and kidney damage. May cause reproductive and fetal effects.

## Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid if irritation develops or persists. Wash clothing before reuse. Flush skin with plenty of soap and water.

**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Flush down the spill with a large amount of water. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not reuse this container. Avoid breathing vapors from heated material.

Avoid contact with skin and eyes. Keep container tightly closed. Keep away from flames and other sources of high temperatures that may cause material to form vapors or mists.

**Storage:** Keep away from heat and flame. Store in a cool, dry place. Keep containers tightly closed.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

### Exposure Limits

| Chemical Name       | ACGIH                    | NIOSH        | OSHA - Final PELs            |
|---------------------|--------------------------|--------------|------------------------------|
| Tetrachloroethylene | 25 ppm TWA; 100 ppm STEL | 150 ppm IDLH | 100 ppm TWA; 200 ppm Ceiling |

**OSHA Vacated PELs:** Tetrachloroethylene: 25 ppm TWA; 170 mg/m<sup>3</sup> TWA

### Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** sweetish odor

**pH:** Not available.

**Vapor Pressure:** 15.8 mm Hg

**Vapor Density:** 5.2

**Evaporation Rate:** 9 (ether=100)

**Viscosity:** 0.89 mPa s 20 deg C

**Boiling Point:** 121 deg C

**Freezing/Melting Point:** -22.3 deg C

**Decomposition Temperature:** 150 deg C

**Solubility:** Nearly insoluble in water.

**Specific Gravity/Density:** 1.623

**Molecular Formula:** C<sub>2</sub>Cl<sub>4</sub>

**Molecular Weight:** 165.812

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Incompatible materials, excess heat.

**Incompatibilities with Other Materials:** Strong bases, metals, liquid oxygen, dinitrogen tetroxide.

**Hazardous Decomposition Products:** Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 127-18-4: KX3850000

**LD50/LC50:**

CAS# 127-18-4:

Draize test, rabbit, eye: 162 mg Mild;

Draize test, rabbit, eye: 500 mg/24H Mild;

Draize test, rabbit, skin: 810 mg/24H Severe;

Draize test, rabbit, skin: 500 mg/24H Mild;

Inhalation, mouse: LC50 = 5200 ppm/4H;

Inhalation, rat: LC50 = 34200 mg/m<sup>3</sup>/8H;

Oral, mouse: LD50 = 8100 mg/kg;

Oral, rat: LD50 = 2629 mg/kg;<BR.

**Carcinogenicity:**

CAS# 127-18-4:

**ACGIH:** A3 - Animal Carcinogen

**California:** carcinogen; initial date 4/1/88

**NIOSH:** potential occupational carcinogen

**NTP:** Suspect carcinogen

**OSHA:** Possible Select carcinogen

**IARC:** Group 2A carcinogen

**Epidemiology:** Epidemiologic studies have given inconsistent results. Studies have shown that tetrachloroethylene has not caused cancer in exposed workers. The studies have serious weaknesses such as mixed exposures. In tests with rats and mice, it appeared that tissue destruction or peroxisome proliferation rather than genetic mechanisms were the cause of the observed increases in normally occurring cancers. The oral mouse TDLo that was tumorigenic was 195 gm/kg/50W-I.

**Teratogenicity:** Has caused musculoskeletal abnormalities. Has caused morphological transformation at a dose of 97mg/L in a study using rat embryos.

**Reproductive Effects:** Has caused behavioral, biochemical, and metabolic effects on newborn rats when the mother was exposed to the TLo of 900 ppm/7H at 7-13 days after conception. A dose of 300 ppm/7H 6-15 days after conception caused post-implantation mortality.

**Neurotoxicity:** No information available.

**Mutagenicity:** Not mutagenic in Escherichia coli. No mutagenic effects were seen in rat liver after exposure at 200 ppm for 10 weeks. No chromosome changes were seen in the bone marrow cells of exposed mice.

**Other Studies:** A case of 'obstructive jaundice' in a 6-week old infant has been attributed to tetrachloroethylene in breast milk.

## Section 12 - Ecological Information

**Ecotoxicity:** Fish: Rainbow trout: LC50 = 5.28 mg/L; 96 Hr.; Static Condition, 12 degrees C Fathead Minnow: LC50 = 18.4 mg/L; 96 Hr.; Flow-through condition Bluegill/Sunfish: LC50 = 12.9 mg/L; 96 Hr.; Static Condition ria: Phytobacterium phosphoreum: EC50 = 120.0 mg/L; 30 minutes; Microtox test No data available.

**Environmental:** In soil, substance will rapidly evaporate. In water, it will evaporate. In air, it can be expected to exist in the vapor phase.

**Physical:** No information available.

**Other:** No information available.

## Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** CAS# 127-18-4: waste number U210.

## Section 14 - Transport Information

|                       | US DOT              | IATA | RID/ADR | IMO | Canada TDG          |
|-----------------------|---------------------|------|---------|-----|---------------------|
| <b>Shipping Name:</b> | TETRACHLOROETHYLENE |      |         |     | TETRACHLOROETHYLENE |
| <b>Hazard Class:</b>  | 6.1                 |      |         |     | 6.1                 |
| <b>UN Number:</b>     | UN1897              |      |         |     | UN1897              |
| <b>Packing Group:</b> | III                 |      |         |     | III                 |

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 127-18-4 is listed on the TSCA inventory.

#### Health & Safety Reporting List

CAS# 127-18-4: Effective Date: 6/1/87; Sunset Date: 6/1/97

#### Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

#### Section 12b

None of the chemicals are listed under TSCA Section 12b.

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### SARA

#### CERCLA Hazardous Substances and corresponding RQs

CAS# 127-18-4: 100 lb final RQ; 45.4 kg final RQ

### **SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

#### **SARA Codes**

CAS # 127-18-4: acute.

#### **Section 313**

This material contains Tetrachloroethylene (CAS# 127-18-4, 99.0%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

#### **Clean Air Act:**

CAS# 127-18-4 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depleters. This material does not contain any Class 2 Ozone depleters.

#### **Clean Water Act:**

None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 127-18-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 127-18-4 is listed as a Toxic Pollutant under the Clean Water Act.

#### **OSHA:**

None of the chemicals in this product are considered highly hazardous by OSHA.

#### **STATE**

CAS# 127-18-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:** WARNING: This product contains Tetrachloroethylene, a chemical known to the state of California to cause cancer. California No Significant Risk Level: CAS# 127-18-4: 14 ug/day NSRL

### **European/International Regulations**

#### **European Labeling in Accordance with EC Directives**

##### **Hazard Symbols:**

XN N

##### **Risk Phrases:**

R 40 Limited evidence of a carcinogenic effect.

R 51/53 Toxic to aquatic organisms; may cause

long-term adverse effects in the aquatic environment.

##### **Safety Phrases:**

S 23 Do not inhale gas/fumes/vapour/spray.

S 36/37 Wear suitable protective clothing and gloves.

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

#### **WGK (Water Danger/Protection)**

CAS# 127-18-4: 3

#### **Canada - DSL/NDSL**

CAS# 127-18-4 is listed on Canada's DSL List.

#### **Canada - WHMIS**

This product has a WHMIS classification of D1B, D2A.

#### **Canadian Ingredient Disclosure List**

CAS# 127-18-4 is listed on the Canadian Ingredient Disclosure List.

#### **Exposure Limits**

CAS# 127-18-4: OEL-ARAB Republic of Egypt:TWA 5 ppm (35 mg/m<sup>3</sup>);Skin

OEL-AUSTRALIA:TWA 50 ppm (335 mg/m<sup>3</sup>);STEL 150 ppm;CAR OEL-BELGIUM:TW

A 50 ppm (339 mg/m<sup>3</sup>);STEL 200 ppm (1368 mg/m<sup>3</sup>) OEL-CZECHOSLOVAKIA:TWA

250 mg/m<sup>3</sup>;STEL 1250 mg/m<sup>3</sup> OEL-DENMARK:TWA 30 ppm (200 mg/m<sup>3</sup>);Skin O

EL-FINLAND:TWA 50 ppm (335 mg/m<sup>3</sup>);STEL 75 ppm (520 mg/m<sup>3</sup>);Skin OEL-FR

ANCE:TWA 50 ppm (335 mg/m3) OEL-GERMANY:TWA 50 ppm (345 mg/m3);Carcinogen OEL-HUNGARY:STEL 50 mg/m3;Skin;Carcinogen OEL-JAPAN:TWA 50 ppm (340 mg/m3) OEL-THE NETHERLANDS:TWA 35 ppm (240 mg/m3);Skin OEL-THE PHILIPPINES:TWA 100 ppm (670 mg/m3) OEL-POLAND:TWA 60 mg/m3 OEL-RUSSIA:TWA 50 ppm;STEL 10 mg/m3 OEL-SWEDEN:TWA 10 ppm (70 mg/m3);STEL 25 ppm (170 mg/m3) OEL-SWITZERLAND:TWA 50 ppm (345 mg/m3);STEL 100 ppm;Skin OEL-THAILAND:TWA 100 ppm;STEL 200 ppm OEL-UNITED KINGDOM:TWA 50 ppm (335 mg/m3);STEL 15 ppm OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

## Section 16 - Additional Information

**MSDS Creation Date:** 6/17/1999

**Revision #3 Date:** 3/18/2003

*The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.*

### 10.1.6 Zinc Material Safety Data Sheet

| Section 1 Identification |   |  |   |
|--------------------------|---|--|---|
| Product Number:          | C2980                                   | Health:                                  | 1 |
| Product Name:            | Zinc Metal Reagent Grade, Powder (dust) | Flammability                             | 2 |
| Trade/Chemical Synonyms  |   | Reactivity                               | 1 |
| Formula:                 | Zn                                      | Hazard Rating:                           |   |
| RTECS:                   | ZG8600000                               | Least Slight Moderate High Extreme       |   |
| C.A.S                    | CAS# 7740-66-6                          | 0 1 2 3 4                                |   |
|                          |   | NA = Not Applicable NE = Not Established |   |

| Section 2 Component Mixture |            |                |      |     |                  |
|-----------------------------|------------|----------------|------|-----|------------------|
| Sara 313                    | Component  | CAS Number     | %    | Dim | Exposure Limits: |
|                             |            |                |      |     |                  |
| <input type="checkbox"/>    | Zinc Metal | CAS# 7740-66-6 | 100% | W/W | OSHA TWA 5 mg/mf |

### Section 3 Hazard Identification (Also see section 11)

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

### Section 4 First Aid Measures

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

FIRST AID: CALL A PHYSICIAN. SKIN: Wash exposed area with soap and water.

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

INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

### Section 5 Fire Fighting Measures

Fire Extinguisher Type: Smother with dry powder (i.e.: sand, sodium chloride, magnesium oxide).  
Fire/Explosion Hazards: Dust, in moist air can generate sufficient heat to ignite the hydrogen gas released. Metal burns at high temperatures.  
Fire Fighting Procedure: Avoid water. Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

### Section 6 Accidental Release Measures

Avoid water. Remove all sources of ignition. Ventilate area of leak or spill. Wear respiratory protection. Do not disperse dust into air. Use non-sparking tools to pick up and place in closed dry container.

### Section 7 Handling and Storage

Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.

### Section 8 Exposure Controls & Personal Protection

Respiratory Protection: NIOSH/MSHA-approved respirator

Ventilation: Mechanical:  Hand Protection: NIOSH Approved Gloves  
Local Exhaust:  Eye Protection: Safety Glasses

Other Protective Equipment: Use safe laboratory handling procedures.

### Section 9 Physical and Chemical Properties

|                      |                                      |                             |        |
|----------------------|--------------------------------------|-----------------------------|--------|
| Melting Point:       | 419° C                               | Specific Gravity            | 7.14   |
| Boiling Point:       | 907° C                               | Percent Volatile by Volume: | N/A    |
| Vapor Pressure:      | N/A                                  | Evaporation Rate:           | N/A    |
| Vapor Density:       | N/A                                  | Evaporation Standard:       |        |
| Solubility in Water: | Not soluble                          | Auto ignition Temperature:  | 460° C |
| Appearance and Odor: | Gray, blue metallic powder / no odor | Lower Flamm. Limit in Air:  | N/E    |
| Flash Point:         | information not available            | Upper Flamm. Limit in Air:  | N/E    |

### Section 10 Stability and Reactivity Information

Stability: Stable Conditions to Avoid: Heat and moisture  
Materials to Avoid:  
Hazardous Decomposition Products:  
Hydrogen gas, Zinc oxide fumes  
Hazardous Polymerization: Will Not Occur  
Condition to Avoid: None known

### Section 11 Additional Information

Conditions aggravated/Target organs: Persons with preexisting skin or respiratory disorders may be more susceptible. Acute: Irritation possible to skin, eyes, lungs, mucous membranes, and GI tract. If heated fumes may cause "zinc fume fever". Chronic: None known.

DOT Classification: Zinc Dust, 4.3, UN1436, PG II

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No:0 Date Entered: 9/1/2005 Approved by: WPF

#### 10.1.7 Magnesium Material Safety Data Sheet

### Section 1 Identification

|                         |                                      |  |   |
|-------------------------|--------------------------------------|--|---|
| Product Number:         | C2009                                | Health:                                  | 1 |
| Product Name:           | Magnesium Laboratory Grade, Turnings | Flammability                             | 2 |
| Trade/Chemical Synonyms |                                      | Reactivity                               | 2 |
| Formula:                | Mg                                   | Hazard Rating:                           |   |
| RTECS:                  | OM2100000                            | Least Slight Moderate High Extreme       |   |
| C.A.S                   | CAS# 7439-95-4                       | 0 1 2 3 4                                |   |
|                         |                                      | NA = Not Applicable NE = Not Established |   |

### Section 2 Component Mixture

| Sara 313                 | Component | CAS Number     | %    | Dim | Exposure Limits: |
|--------------------------|-----------|----------------|------|-----|------------------|
| <input type="checkbox"/> | Magnesium | CAS# 7439-95-4 | 100% | W/W | None established |

### Section 3 Hazard Identification (Also see section 11)

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

### Section 4 First Aid Measures

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

FIRST AID: SKIN: Wash exposed area with soap and water. If irritation persists, seek medical attention.

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

INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

### Section 5 Fire Fighting Measures

Fire Extinguisher Type: Melting flux/dry sand &/or metal exting pwdr. DO NOT USE WATER!

Fire/Explosion Hazards: Dangerous in the form of dust or flakes. When heated in air to near melting point, may ignite and burn.

Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

### Section 6 Accidental Release Measures

Remove all sources of ignition wear protective equipment. Clean up in a manner that doesn't disperse dust. Sweep up and containerize for later reclamation.

### Section 7 Handling and Storage

Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.

### Section 8 Exposure Controls & Personal Protection

Respiratory Protection: NIOSH/MSHA-approved respirator

Ventilation: Mechanical:  Hand Protection: Wear appropriate gloves to prevent skin exposure  
 Local Exhaust:  Eye Protection: Face Shield and chem worker goggles

Other Protective Equipment: Wear appropriate clothing to prevent skin exposure

### Section 9 Physical and Chemical Properties

Melting Point: 649 °C Specific Gravity 1.74

|                      |                           |                             |                |
|----------------------|---------------------------|-----------------------------|----------------|
| Boiling Point:       | 1110° C                   | Percent Volatile by Volume: | N/A            |
| Vapor Pressure:      | 1mm@621°                  | Evaporation Rate:           | N/A            |
| Vapor Density:       | information not available | Evaporation Standard:       |                |
| Solubility in Water: | Not soluble               | Auto ignition Temperature:  | Not applicable |
| Appearance and Odor: | Silver solid, odorless    | Lower Flamm. Limit in Air:  | Not applicable |
| Flash Point:         | Not known                 | Upper Flamm. Limit in Air:  | Not applicable |

### Section 10 Stability and Reactivity Information

Stability: Stable                      Conditions to Avoid: Moisture, Incompatible substances  
Materials to Avoid:  
Oxides, carbonates, cyanides, chlorinated hydrocarbons  
Hazardous Decomposition Products:  
Fire produces toxic fumes and vapors  
Hazardous Polymerization: Will Not Occur  
Condition to Avoid: None known

### Section 11 Additional Information

Inhalation of dust may irritate respiratory tract and may cause coughing, chest pain, and fever. Ingestion may cause stomach pain and diarrhea. Particles imbedded in the skin may cause eruptions. Molten magnesium may cause serious burns. Conditions aggravated/target organs: Persons with pre-existing eye, skin, or respiratory conditions may be more susceptible.

DOT Classification: Magnesium Turnings, 4.1, UN1869, PG III

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No:1                      Date Entered: 9/1/2005                      Approved by: WPF

#### 10.1.8 Copper Material Safety Data Sheet

### Section 1 Identification

|                         |                                 |  |   |
|-------------------------|---------------------------------|--|---|
| Product Number:         | C1610                           | Health:  | 1 |
| Product Name:           | Copper Reagent A.C.S., Granular | Flammability:                                  | 0 |
| Trade/Chemical Synonyms |                                 | Reactivity:                                    | 0 |
| Formula:                | Cu                              | Hazard Rating:                                 |   |
| RTECS:                  | GL5325000                       | Least    Slight    Moderate    High    Extreme |   |
| C.A.S                   | CAS# 7440-50-8                  | 0    1    2    3    4                          |   |
|                         |                                 | NA = Not Applicable NE = Not Established       |   |

### Section 2 Component Mixture

| Sara 313                 | Component | CAS Number     | %    | Dim | Exposure Limits:                   |
|--------------------------|-----------|----------------|------|-----|------------------------------------|
| <input type="checkbox"/> | Copper    | CAS# 7440-50-8 | 100% | W/W | OSHA TWA 1 mg (Cu)/mf (dust, mist) |

### Section 3 Hazard Identification (Also see section 11)

Generally not hazardous in normal handling, however good laboratory practices should always be used. Avoid long term exposure to skin or by inhalation.

### Section 4 First Aid Measures

Generally not hazardous in normal handling, however good laboratory practices should always be used. Avoid long term exposure to skin or by inhalation.

FIRST AID: SKIN: Wash exposed area with soap and water. If irritation persists, seek medical attention.

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

INGESTION: Give several glasses of milk or water. Vomiting may occur spontaneously, but it is not necessary to induce. Never give anything by mouth to an unconscious person.

### Section 5 Fire Fighting Measures

Fire Extinguisher Type: Any means suitable for extinguishing surrounding fire

Fire/Explosion Hazards: None Known.

Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

### Section 6 Accidental Release Measures

Sweep up and place in suitable (fiberboard) containers for reclamation or later disposal.

### Section 7 Handling and Storage

Store in a cool dry place. This Material is not considered hazardous. Handle using safe laboratory practices.

### Section 8 Exposure Controls & Personal Protection

Respiratory Protection: None required

Ventilation: Mechanical:

Hand Protection: Wear appropriate gloves to prevent skin exposure

Local Exhaust:

Eye Protection: Splash Goggles

Other Protective Equipment: Wear appropriate clothing to prevent skin exposure

### Section 9 Physical and Chemical Properties

|                      |                         |                             |                |
|----------------------|-------------------------|-----------------------------|----------------|
| Melting Point:       | 1083°C                  | Specific Gravity            | 8.94           |
| Boiling Point:       | 2595°C                  | Percent Volatile by Volume: | N/A            |
| Vapor Pressure:      | 1 mm Hg @1628°C         | Evaporation Rate:           | N/A            |
| Vapor Density:       | N/A                     | Evaporation Standard:       |                |
| Solubility in Water: | Insoluble               | Auto ignition Temperature:  | Not applicable |
| Appearance and Odor: | Reddish, lustrous metal | Lower Flamm. Limit in Air:  | Not applicable |
| Flash Point:         | N/A                     | Upper Flamm. Limit in Air:  | Not applicable |

### Section 10 Stability and Reactivity Information

Stability: Stable Conditions to Avoid: Avoid contact with incompatible materials.

Materials to Avoid:  
Acetylene, magnesium metal (as copper dust)

Hazardous Decomposition Products:  
None

Hazardous Polymerization: Will Not Occur

Condition to Avoid: None known

### Section 11 Additional Information

Can irritate eyes, mucous membranes, and pharynx. Can cause nausea, ulcer perforation, metal taste and dermatitis. Conditions aggravated/target organs: Persons with pre-existing eye, skin, or respiratory conditions may be more susceptible

DOT Classification: Not Regulated

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No: 0.1

Date Entered: 9/1/2005

Approved by: WPF

10.1.9 Cadmium Material Safety Data Sheet

| Section 1 Identification                 |  |
|--|--|
| Product Number:                          | C1407                                    |
| Product Name:                            | Cadmium Chloride Reagent A.C.S., Crystal |
| Trade/Chemical Synonyms                  |  |
| Formula:                                 | CdCl <sub>2</sub> · 1/2 H <sub>2</sub> O |
| RTECS:                                   | EV0178000                                |
| C.A.S                                    | CAS# 7790-78-5                           |
| Health:                                  | 2  |
| Flammability                             | 0  |
| Reactivity                               | 0  |
| Hazard Rating:                           |  |
| Least Slight Moderate High Extreme       |  |
| 0 1 2 3 4                                |  |
| NA = Not Applicable NE = Not Established |  |

| Section 2 Component Mixture |                  |                |      |     |                         |
|-----------------------------|------------------|----------------|------|-----|-------------------------|
| Sara 313                    | Component        | CAS Number     | %    | Dim | Exposure Limits:        |
| <input type="checkbox"/>    | Cadmium Chloride | CAS# 7790-78-5 | 100% | W/W | OSHA TWA 0.2 mg/mf (Cd) |

**Section 3 Hazard Identification (Also see section 11)**  
 May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.

**Section 4 First Aid Measures**  
 May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.  
 FIRST AID: SKIN: Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention  
 EYES: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen  
 INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

**Section 5 Fire Fighting Measures**  
 Fire Extinguisher Type: Any means suitable for extinguishing surrounding fire  
 Fire/Explosion Hazards: Thermal decomposition produces highly toxic fumes.  
 Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

**Section 6 Accidental Release Measures**  
 Evacuate area. Wear self-contained breathing apparatus and protective clothing. Eliminate all sources of ignition.

**Section 7 Handling and Storage**  
 Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.

**Section 8 Exposure Controls & Personal Protection**  
 Respiratory Protection: NIOSH/MSHA-approved respirator  
 Ventilation: Mechanical:  Local Exhaust:   
 Hand Protection: NIOSH Approved Gloves  
 Eye Protection: Splash Goggles  
 Other Protective Equipment: Wear appropriate clothing to prevent skin exposure

## Section 9 Physical and Chemical Properties

|                      |                               |                             |                           |
|----------------------|-------------------------------|-----------------------------|---------------------------|
| Melting Point:       | 568° C                        | Specific Gravity            | Information not available |
| Boiling Point:       | 960° C                        | Percent Volatile by Volume: | 0                         |
| Vapor Pressure:      | 10mm @ 656°C                  | Evaporation Rate:           | 0                         |
| Vapor Density:       | Information not available     | Evaporation Standard:       |                           |
| Solubility in Water: | Soluble                       | Auto ignition Temperature:  | Not applicable            |
| Appearance and Odor: | Colorless crystals , odorless | Lower Flamm. Limit in Air:  | Not applicable            |
| Flash Point:         | N/A                           | Upper Flamm. Limit in Air:  | Not applicable            |

## Section 10 Stability and Reactivity Information

|   |                                 |
|---|---------------------------------|
| Stability: Stable                         | Conditions to Avoid: None known |
| Materials to Avoid:<br>Oxidizing agents   |                                 |
| Hazardous Decomposition Products:<br>None |                                 |
| Hazardous Polymerization: Will Not Occur  |                                 |
| Condition to Avoid: None known            |                                 |

## Section 11 Additional Information

Effects of overexposure. Acute: Material is irritating to mucous membranes and upper respiratory tract. Chronic: Carcinogen. May cause congenital malformation in the fetus. Exposure can cause damage to the kidneys and lungs.

DOT Classification: Cadmium Compound, 6.1, UN2570, PG II Marine Pollutant

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No:0                      Date Entered: 9/1/2005                      Approved by: WPF

### 10.1.10 Diesel Engine Oil Material Safety Data Sheet

#### 1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: N9000 DIESEL ENGINE OIL

SUPPLIER: EXXON MOBIL CORPORATION

3225 GALLOWS RD.  
FAIRFAX, VA 22037

24 - Hour Health and Safety Emergency (call collect): 609-737-4411

24 - Hour Transportation Emergency (Primary) CHEMTREC: 800-424-9300  
(Secondary) 281-834-3296

Product and Technical Information: 800-443-9966

MSDS Fax on Demand: 613-228-1467, other MSDS information: 856-224-4644

#### 2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: BASE OIL AND ADDITIVES

GLOBALY REPORTABLE MSDS INGREDIENTS:

| Substance Name | Approx. Wt% |
|----------------|-------------|
|----------------|-------------|

|                          |     |
|--------------------------|-----|
| CALCIUM ALKYLENE PHENATE | 1-5 |
|--------------------------|-----|

SULFIDE CARBONATE

(OVERBASED) (122384-87-6)

|                            |     |
|----------------------------|-----|
| CALCIUM LONG-CHAIN ALKARYL | 1-5 |
|----------------------------|-----|

SULFONATES (LOW OVERBASED)  
(156619-82-8)

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### 3. HAZARDS IDENTIFICATION

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Under normal conditions of use, this product is not considered hazardous according to regulatory guidelines (See section 15).

EMERGENCY OVERVIEW: Clear Dark Amber Liquid. DOT ERG No. : NA

POTENTIAL HEALTH EFFECTS: Under normal conditions of intended use, this product does not pose a risk to health. Excessive exposure may result in eye, skin or respiratory irritation.

For further health effects/toxicological data, see Section 11.

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### 4. FIRST AID MEASURES

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EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT: Wash contact areas with soap and water. Remove and clean oil soaked clothing daily and wash affected area. (See Section 16 - Injection Injury)

INHALATION: Not expected to be a problem. However, if respiratory irritation, dizziness, nausea, or unconsciousness occurs due to excessive vapor or mist exposure, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or mouth-to-mouth resuscitation.

INGESTION: Not expected to be a problem. Seek medical attention if discomfort occurs. Do not induce vomiting.

---

### 5. FIRE-FIGHTING MEASURES

---

EXTINGUISHING MEDIA: Carbon dioxide, foam, dry chemical and water fog.

SPECIAL FIRE FIGHTING PROCEDURES: Water or foam may cause frothing.

Use water to keep fire exposed containers cool. Water spray may be used to flush spills away from exposure. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

COMBUSTION PRODUCTS: Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

Flash Point C(F): 204(400) (ASTM D-92).

Flammable Limits (approx.% vol.in air) - LEL: 0.9%, UEL: 7.0%

NFPA HAZARD ID: Health: 0, Flammability: 1, Reactivity: 0

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### 6. ACCIDENTAL RELEASE MEASURES

---

NOTIFICATION PROCEDURES: Report spills/releases as required to appropriate authorities. U.S. Coast Guard and EPA regulations require immediate reporting of spills/releases that could reach any waterway including intermittent dry creeks. Report spill/release to Coast Guard National Response Center toll free number (800)424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

LAND SPILL: Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping or contain spilled material with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

WATER SPILL: Confine the spill immediately with booms. Warn other ships in the vicinity. Notify port and other relevant authorities. Remove from the surface by skimming or with suitable absorbents. If permitted by regulatory authorities the use of suitable dispersants should be considered where recommended in local oil spill procedures.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewers, water sources or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation.

PERSONAL PRECAUTIONS: See Section 8

---

## 7. HANDLING AND STORAGE

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HANDLING: No special precautions are necessary beyond normal good hygiene practices. See Section 8 for additional personal protection advice when handling this product.

STORAGE: Keep containers closed when not in use. Do not store in open or unlabelled containers. Store away from strong oxidizing agents and combustible materials. Do not store near heat, sparks, flame or strong oxidants.

SPECIAL PRECAUTIONS: Prevent small spills and leakages to avoid slip hazard.

EMPTY CONTAINER WARNING: Empty containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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OCCUPATIONAL EXPOSURE LIMITS:

When mists/aerosols can occur, the following are recommended: 5 mg/m<sup>3</sup> (as oil mist)- ACGIH Threshold Limit Value (TLV), 10 mg/m<sup>3</sup> (as oil mist) - ACGIH Short Term Exposure Limit (STEL), 5 mg/m<sup>3</sup> (as oil mist) - OSHA Permissible Exposure Limit (PEL)

VENTILATION: If mists are generated, use adequate ventilation, local exhaust or enclosures to control below exposure limits.

RESPIRATORY PROTECTION: If mists are generated, and/or when ventilation is not adequate, wear approved respirator.

EYE PROTECTION: If eye contact is likely, safety glasses with side shields or chemical type goggles should be worn.

SKIN PROTECTION: Not normally required. When splashing or liquid contact can occur frequently, wear oil resistant gloves and/or other protective clothing. Good personal hygiene practices

should always be followed.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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Typical physical properties are given below. Consult Product Data Sheet for specific details.

APPEARANCE: Liquid

COLOR: Clear Dark Amber

ODOR: Mild

ODOR THRESHOLD-ppm: NE

pH: NA

BOILING POINT C(F): > 391(735)

MELTING POINT C(F): NA

FLASH POINT C(F): 204(400) (ASTM D-92)

FLAMMABILITY (solids): NE

AUTO FLAMMABILITY C(F): NA

EXPLOSIVE PROPERTIES: NA

OXIDIZING PROPERTIES: NA

VAPOR PRESSURE-mmHg 20 C: NE

VAPOR DENSITY: NE

EVAPORATION RATE: NE

RELATIVE DENSITY, 15/4 C: 0.89

SOLUBILITY IN WATER: Negligible

PARTITION COEFFICIENT: > 3.5

VISCOSITY AT 40 C, cSt: > 100.0

VISCOSITY AT 100 C, cSt: > 10.0

POUR POINT C(F): -12(10)

FREEZING POINT C(F): NE

VOLATILE ORGANIC COMPOUND: NE

DMSO EXTRACT, IP-346 (WT.%): <3, for mineral oil only

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

FOR FURTHER TECHNICAL INFORMATION, CONTACT YOUR MARKETING REPRESENTATIVE

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## 10. STABILITY AND REACTIVITY

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STABILITY (THERMAL, LIGHT, ETC.): Stable.

CONDITIONS TO AVOID: Extreme heat and high energy sources of ignition.

INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Product does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

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## 11. TOXICOLOGICAL DATA

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---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

DERMAL TOXICITY (RABBITS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

INHALATION TOXICITY (RATS): Practically non-toxic (LC50: greater than 5 mg/l). ---Based on testing of similar products and/or the components.

EYE IRRITATION (RABBITS): Practically non-irritating. (Draize score: greater than 6 but 15 or less). ---Based on testing of similar products and/or the components.

SKIN IRRITATION (RABBITS): Practically non-irritating. (Primary Irritation Index: greater than 0.5 but less than 3). ---Based on testing of similar products and/or the components.

OTHER ACUTE TOXICITY DATA: Although an acute inhalation study was not performed with this product, a variety of mineral and synthetic oils, such as those in this product, have been tested. These samples had virtually no effect other than a nonspecific inflammatory response in the lung to the aerosolized mineral oil. The presence of additives in other tested formulations (in approximately the same amounts as in the present formulation) did not alter the observed effects.

---SUBCHRONIC TOXICOLOGY (SUMMARY)---

No significant adverse effects were found in studies using repeated dermal applications of similar formulations to the skin of laboratory animals for 13 weeks at doses significantly higher than those expected during normal industrial exposure. The animals were evaluated extensively for effects of exposure (hematology, serum chemistry, urinalysis, organ weights, microscopic examination of tissues etc.).

---REPRODUCTIVE TOXICOLOGY (SUMMARY)---

No teratogenic effects would be expected from dermal exposure, based on laboratory developmental toxicity studies of major components in this formulation and/or materials of similar composition.

---CHRONIC TOXICOLOGY (SUMMARY)---

Repeated and/or prolonged exposure may cause irritation to the skin, eyes or respiratory tract. Overexposure to oil mist may result in oil droplet deposition and/or granuloma formation. For mineral base oils: Base oils in this product are severely solvent refined and/or severely hydrotreated. Chronic mouse skin painting studies of severely treated oils showed no evidence of carcinogenic effects. These results are confirmed on a continuing basis using various screening methods such as Modified Ames Test, IP-346, and/or other analytical methods. For synthetic base oils: The base oils in this product have been tested in the Ames assay and other tests of mutagenicity with negative results. These base oils are not expected to be carcinogenic with chronic dermal exposures.

---SENSITIZATION (SUMMARY)---

Not expected to be sensitizing based on tests of this product, components, or similar products.

---OTHER TOXICOLOGY DATA---

Used gasoline engine oils have shown evidence of skin carcinogenic activity in laboratory tests when no effort was made to wash the oil off between applications. Used oil from diesel engines did not produce this effect.

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## 12. ECOLOGICAL INFORMATION

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ENVIRONMENTAL FATE AND EFFECTS: This product is expected to be inherently biodegradable. Bioaccumulation is unlikely due to the very low water solubility of this product, therefore bioavailability to aquatic organisms is minimal. Available ectotoxicity data (LL50 >1000 mg/L) indicates that adverse effects to aquatic organisms are not expected from this product.

When released into the environment, adsorption to sediment and soil will be the predominant behavior.

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### **13. DISPOSAL CONSIDERATIONS**

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WASTE DISPOSAL: Product is suitable for burning in an enclosed, controlled burner for fuel value. Such burning may be limited pursuant to the Resource Conservation and Recovery Act. In addition, the product is suitable for processing by an approved recycling facility or can be disposed of at an appropriate government waste disposal facility. Use of these methods is subject to user compliance with applicable laws and regulations and consideration of product characteristics at time of disposal.

RCRA INFORMATION: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity, or reactivity. The unused product is not formulated with substances covered by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

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### **14. TRANSPORT INFORMATION**

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USA DOT: NOT REGULATED BY USA DOT.

RID/ADR: NOT REGULATED BY RID/ADR.

IMO: NOT REGULATED BY IMO.

IATA: NOT REGULATED BY IATA.

STATIC ACCUMULATOR (50 picosiemens or less): YES

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### **15. REGULATORY INFORMATION**

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US OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this product is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

EU Labeling: Product is not dangerous as defined by the European Union Dangerous Substances/Preparations Directives. EU labeling not required.

Governmental Inventory Status: All components comply with TSCA.

U.S. Superfund Amendments and Reauthorization Act (SARA) Title III:

This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

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### **16. OTHER INFORMATION**

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USE: COMMERCIAL ENGINE OIL

NOTE: PRODUCTS OF EXXON MOBIL CORPORATION AND ITS AFFILIATED COMPANIES ARE NOT FORMULATED TO CONTAIN PCBS.

Health studies have shown that many hydrocarbons pose potential human health risks which may vary from person to person. Information provided on this MSDS reflects intended use. This product should not be used for other applications. In any case, the following advice should be

considered:

INJECTION INJURY WARNING: If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

INDUSTRIAL LABEL

Under normal conditions of intended use, this product does not pose a risk to health. Excessive exposure may result in eye, skin or respiratory irritation. Always observe good hygiene measures. First Aid: Wash skin with soap and water. Flush eyes with water. If overcome by fumes or vapor, remove to fresh air. If ingested do not induce vomiting. If symptoms persist seek medical assistance. Read and understand the MSDS before using this product.

\*\*\*\*\*

For Internal Use Only: MHC: 1\* 1\* 1\* 1\* 1\*, MPPEC: A, TRN: 7312229-00, CMCS97: 97P835, REQ: PS+C, SAFE USE: L  
EHS Approval Date: 30SEP2001

\*\*\*\*\*

10.1.11 Lead-Free Gasoline; No-lead Gasoline – Gasoline, Unleaded Material Safety Data Sheet

NSN: 9130012084172  
Manufacturer's CAGE: 8P539  
Part No. Indicator: A  
Part Number/Trade Name: LEAD-FREE GASOLINE; NO-LEAD GASOLINE

=====  
General Information  
=====

Item Name: GASOLINE,UNLEADED  
  
Date MSDS Prepared: 23FEB90  
Safety Data Review Date: 21OCT94  
Supply Item Manager: KY  
MSDS Serial Number: BVHJT  
Specification Number: VV-G-1690  
Spec Type, Grade, Class: CIVGAS  
Hazard Characteristic Code: F2  
Unit Of Issue: DR  
Unit Of Issue Container Qty: 55 GALLONS  
Type Of Container: DRUM, 18 GAGE  
Net Unit Weight: 325.2 LBS

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient: HYDROCARBONS, AROMATIC  
Ingredient Sequence Number: 01  
Percent: 15-35  
NIOSH (RTECS) Number: 1008732HA  
OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED  
Other Recommended Limit: NONE RECOMMENDED

-----  
Proprietary: NO  
Ingredient: SATURATED HYDROCARBONS  
Ingredient Sequence Number: 02  
Percent: 60-75  
NIOSH (RTECS) Number: 1006886SH  
OSHA PEL: NOT ESTABLISHED  
ACGIH TLV: NOT ESTABLISHED  
Other Recommended Limit: NONE RECOMMENDED

-----  
Proprietary: NO  
Ingredient: UNSATURATED HYDROCARBONS  
Ingredient Sequence Number: 03  
Percent: 1-15  
NIOSH (RTECS) Number: 1006887UH  
OSHA PEL: NOT ESTABLISHED  
ACGIH TLV: NOT ESTABLISHED  
Other Recommended Limit: NONE RECOMMENDED

-----  
Proprietary: NO  
Ingredient: DYE AND OTHER ADDITIVES  
Ingredient Sequence Number: 04  
Percent: 0.02  
NIOSH (RTECS) Number: 1003746AD  
OSHA PEL: NOT ESTABLISHED  
ACGIH TLV: NOT ESTABLISHED  
Other Recommended Limit: NONE RECOMMENDED

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: BLUE OR CLEAR, TYPICAL HYDROCARBON ODOR.  
Boiling Point: 90.0F,32.2C  
Vapor Pressure (MM Hg/70 F): 414 @100C  
Vapor Density (Air=1): 3-4  
Specific Gravity: 0.71-0.77  
Solubility In Water: NEGLIGIBLE.

=====

Fire and Explosion Hazard Data

=====

Flash Point: -50F,-46C  
Flash Point Method: TCC  
Lower Explosive Limit: 1.3  
Upper Explosive Limit: 6  
Extinguishing Media: ANY UL APPROVED CLASS B MEDIA SUCH AS FOAM, CARBON DIOXIDE, DRY CHEMICAL.  
Special Fire Fighting Proc: NONE SPECIFIED BY MFG; HOWEVER USE APPROPRIATE PROTECTIVE EQPMT INCLUDING SELF-CONTAINED BREATHING APPARATUS.  
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MFG; HOWEVER MATL IS HEAVIER THAN AIR AND WILL TRAVEL LONG DISTANCES & FLASHBACK. EXPLOSIVE MIXTURE FORMS W/GASOLINE & AIR.

=====

Reactivity Data

=====  
Stability: YES  
Cond To Avoid (Stability): NONE SPECIFIED BY MFG; HOWEVER AVOID OPEN  
FLAMES/HEAT/SPARKS/OTHER IGNITION SOURCES.  
Materials To Avoid: OXIDIZERS.  
Hazardous Decomp Products: NONE SPECIFIED BY MFG.  
Hazardous Poly Occur: NO  
Conditions To Avoid (Poly): NOT RELEVANT.  
=====

Health Hazard Data

=====  
LD50-LC50 Mixture: UNKNOWN  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: YES  
Route Of Entry - Ingestion: YES  
Health Haz Acute And Chronic: ACUTE:EYE:IRRIT @ HIGH VAP LEVELS OR DIRECT  
CONTACT W/FLUID. SKIN:IRRIT ON PROLONG CONTACT W/LIQ, DERM RESULTING FROM  
DEFATTING NATURE OF LIQ. SYSTEMATIC:CNS EFFECTS (NARCOSIS) @ HIGH VAP  
LEVELS; MUC MEMBRANE IRRIT, PNEUMONIA. INGEST:GASTROINTESTINAL  
DISTRUBANCES. CHRONIC:PERIPERAL NERVOUS SY EFFECTS, BLOOD ALTERATIONS  
Carcinogenicity - NTP: NO  
Carcinogenicity - IARC: YES  
Carcinogenicity - OSHA: NO  
Explanation Carcinogenicity: PER MSDS:NONE STATED; HOWEVER CONTAINS  
GASOLINE WHICH IS CONSIDERED BY IARC TO BE POTENTIAL CARCINOGEN.  
Signs/Symptoms Of Overexp: EYE & SKIN IRRITATION. DERMATITIS. NARCOSIS. GI  
DISTRUBANCES:NAUSEA, DIARRHEA, STOMACH PAINS.  
Med Cond Aggravated By Exp: NONE SPECIFIED BY MFG.  
THOROUGHLY WASH AREA W/SOAP & WATER. INHAL:REMOVE FROM CONTAMINATED AREA.  
ADMINISTER ARTIFICIAL RESP IF NECESSARY. CALL PHYSICIAN. INGEST:GIVE A  
VEGETABLE OIL TO RETARD ABSORPTION. DO NOT INDUCE VOMITING. CALL PHYSICIAN.  
FATAL DOSE ADULT HUMAN APPROX 350G, CHILD APPROX 10-13G.  
=====

Precautions for Safe Handling and Use

=====  
Steps If Matl Released/Spill: KEEP PUBLIC AWAY. SHUT OFF SOURCE W/O RISK.  
ADVISE POLICE & NAT RESP CENTER 800-424-8802 IF SUBSTANCE HAS ENTERED A  
WATER COURSE OR SEWER. CONTAIN LIQ W/EARTH, SAND. RECOVER FREE LIQ BY  
PPUMPING OR W/SUITABLE ABSORBENT.  
Neutralizing Agent: NONE SPECIFIED BY MFG.  
Waste Disposal Method: UNDER MANY SPILL SITUATIONS LIQ CAN BE RECOVERED &  
RECLAIMED. WHERE SOLID ABSORBENTS ARE USED THEY SHOULD BE INCINERATED PER  
APPLICABLE STATE & LOCAL REGULATIONS.  
Precautions-Handling/Storing: USE APPROPRIATE GROUNDING-DISPENSING  
PROCEDURES. STORE IN RELATIVELY COOL PLACE. DO NOT EXPOSE TO HEAT, OPEN  
FLAME OR OXIDANTS.  
Other Precautions: NONE SPECIFIED BY MFG.  
=====

Control Measures

=====  
Respiratory Protection: FOR EXPOSURES IN EXCESS OF EXPOSURE LIMITS  
CHEMICAL CARTRIDGE RESPIRATOR OR AIR SUPPLIED EQUIPMENT.  
=====

Ventilation: LOCAL EXHAUST REQUIRED & EXPLOSION PROOF EQUIPMENT.  
Protective Gloves: IMPERMEABLE GLOVES.  
Eye Protection: NONE SPECIFIED HOWEVER SAF GLASSES/GOGG  
Other Protective Equipment: NONE SPECIFIED BY MFG.  
Work Hygienic Practices: WASH HANDS AFTER HANDLING & PRIOR TO EAT/DRINK/  
SMOKE/USE OF TOILET FACILITIES. FOLLOW GOOD WORK HYGIENE PRACTICES.

=====  
Transportation Data  
=====

Trans Data Review Date: 94294  
DOT PSN Code: GTN  
DOT Proper Shipping Name: GASOLINE  
DOT Class: 3  
DOT ID Number: UN1203  
DOT Pack Group: II  
DOT Label: FLAMMABLE LIQUID  
IMO PSN Code: HRV  
IMO Proper Shipping Name: GASOLINE  
IMO Regulations Page Number: 3141  
IMO UN Number: 1203  
IMO UN Class: 3.1  
IMO Subsidiary Risk Label: -  
IATA PSN Code: MUC  
IATA UN ID Number: 1203  
IATA Proper Shipping Name: GASOLINE  
IATA UN Class: 3  
IATA Label: FLAMMABLE LIQUID  
AFI PSN Code: MUC

=====

Label Required: YES  
Technical Review Date: 21OCT94  
Label Status: F  
Common Name: LEAD-FREE GASOLINE; NO-LEAD GASOLINE  
Signal Word: DANGER!  
Acute Health Hazard-Moderate: X  
Contact Hazard-Moderate: X  
Fire Hazard-Severe: X  
Reactivity Hazard-None: X  
Special Hazard Precautions: ACUTE:EYE:IRRIT @ HIGH VAP LEVELS OR DIRECT CONTACT W/FLUID. SKIN:IRRIT ON PROLONG CONTACT W/LIQ, DERM RESULTING FROM DEFATTING NATURE OF LIQ. SYSTEMATIC:CNS EFFECTS (NARCOSIS) @ HIGH VAP LEVELS; MUC MEMBRANE IRRIT, PNEUMONIA. INGEST:GASTROINTESTINAL DISTURBANCES. CHRONIC:PERIPHERAL NERVOUS SYS EFFECTS, BLOOD ALTERATIONS. 1ST AID:EYE:FLUSH FOR @ LEAST 15MINS W/WATER. SKIN:THOROUGHLY WASH AREA W/ SOAP & WATER. INHAL:REMOVE FROM CONTAMINATED AREA. ADMINISTER ARTIFICIAL RESP IF NECESSARY. CALL PHYSICIAN. INGEST:GIVE A VEGETABLE OIL TO RETARD ABSORPTION. DO NOT INDUCE VOMITING. CALL PHYSICIAN. FATAL DOSE ADULT HUMAN APPROX 350G, CHILD APPROX 10-13G.  
Protect Eye: Y  
Protect Skin: Y  
Protect Respiratory: Y  
Label Name: BELL FUELS, INC  
Label Street: 4116 WEST PATERSON AVE

Label City: CHICAGO  
Label State: IL  
Label Zip Code: 60646  
Label Country: US  
Label Emergency Number: 312-286-0200

### 10.1.12 Lead Material Safety Data Sheet

## SECTION 1. GENERAL INFORMATION

FREE ELEMENTAL LEAD; LEAD SALTS

## SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

| Hazardous Ingredient | Approximate Percent by Weight | C.A.S. Number | Occupational Exposure Limits (OELs)   | LD <sub>50</sub> /LC <sub>50</sub> Species and Route |
|----------------------|-------------------------------|---------------|---|--|
| Lead                 | 99+%                          | 7439-92-1     | OSHA PEL 0.05mg/m <sup>3</sup><br>ACGIH TLV 0.05mg/m <sup>3</sup><br>NIOSH REL <0.10mg/m <sup>3</sup> | No Data  |

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL - Occupational Exposure Limit, PEL - Permissible Exposure Limit, TLV - Threshold Limit Value, REL - Recommended Exposure Limit.

**Trade Names and Synonyms:** Lead; Pb; Plumbum; Metallic Lead; Inorganic Lead; ASTM B29; TADANAC Lead, Low-Alpha Lead.

## SECTION 3. HAZARDS IDENTIFICATION

**Emergency Overview:** A bluish-white to silvery-grey heavy, soft metal that does not burn in bulk. Finely-divided lead dust clouds are a moderate fire hazard and moderate explosion hazard, however. When heated in air highly toxic lead oxide fumes can be generated. Inhalation or ingestion of lead may produce both acute and chronic health effects. Possible cancer and reproductive hazard. SCBA and full protective clothing required for fire emergency response personnel.

**Potential Health Effects:** Inhalation or ingestion of lead dust or fumes may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage (e.g., fatigue, headaches, tremors, hypertension), gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure to prevent lead crossing the placental barrier and causing infant neurological disorders. Lead is classified as an A3 Carcinogen by the ACGIH and as a 2B Carcinogen by IARC. (see Toxicological Information, Section 11)

**Potential Environmental Effects:** Lead metal has low bioavailability but its compounds can be hazardous in the environment at low concentrations. They can be particularly toxic in the aquatic environment. Lead bioaccumulates in plants and animals in both the aquatic and terrestrial environments. (see Ecological Information, Section 12)

**EU Risk Phrase(s):** R61 - May cause harm to unborn child; R62 - Possible risk of impaired fertility; R20/22 - Harmful by inhalation and if swallowed; R33 - Danger of cumulative effects.

#### **SECTION 4. FIRST AID MEASURES**

**Eye Contact:** Flush with warm, running water, including under the eyelids, to remove dust particle(s). If irritation persists seek medical attention.

**Skin Contact:** *Dust:* Remove contaminated clothing and wash affected area with soap and warm water. Launder contaminated clothing before reuse. Seek medical attention if irritation develops or persists. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

**Inhalation:** Remove victim from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Keep affected person warm and at rest. Medical oxygen may be administered, if available, where breathing is difficult. Seek immediate medical attention.

**Ingestion:** If victim is conscious and can swallow, dilute stomach contents with 2-4 cupfuls of water or milk. Do not induce vomiting. Seek medical attention and bring a copy of this MSDS. Never give anything by mouth to an unconscious person.

#### **SECTION 5. FIRE FIGHTING MEASURES**

**Fire and Explosion Hazards:** Massive metal is not flammable or combustible. Finely-divided lead dust or powder is a moderate fire hazard and moderate explosion hazard when dispersed in the air at high concentrations and exposed to heat, flame, or incandescents. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

**Extinguishing Media:** Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

**Fire Fighting:** If possible, move material from fire area and cool material exposed to flame. Highly toxic lead oxide fumes may evolve in fires. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

**Flashpoint and Method:** Not Applicable.

**Upper and Lower Flammable Limit:** Not Applicable.

**Autoignition Temperature:** Not Applicable.

#### **SECTION 6. ACCIDENTAL RELEASE MEASURES**

**Procedures for Cleanup:** Control source of spillage if possible to do so safely. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection. Molten metal should be allowed to solidify before cleanup. If solid metal, wear gloves, pick up and return to process. If dust, wear recommended personal protective equipment (see Section 8) and use methods which will minimize dust generation (e.g., vacuum solids). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labeled containers for recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

**Personal Precautions:** Persons responding to an accidental release should wear protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash as well as a respirator to protect against inhalation of lead fume. Workers should wash and change clothing following cleanup of a lead spill to prevent personal contamination with lead dust.

**Environmental Precautions:** Lead metal has limited bioavailability but its compounds can pose a severe threat to the aquatic and terrestrial environments. Contamination of water and soil should be prevented.

#### **SECTION 7. HANDLING AND STORAGE**

Store in a dry, covered area away from incompatible materials, strong acids and food or feedstuffs. Solid metal suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture

could expand explosively and spatter molten metal out of the bath. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas as well as at the end of the workday. No special packaging materials are required.

**EU Safety Phrase(s):** S53 - Avoid exposure - obtain special instructions before use; S45 – In case of accident, or if you feel unwell, seek medical advice immediately (show label where possible).

## SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Protective Clothing:** Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when lead is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Do not eat, drink or smoke in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas as well as at the end of the workday. A double locker-shower system with separate clean and dirty sides is usually required for lead handling operations. Remove contaminated clothing promptly and discard or launder before reuse. Inform laundry personnel of contaminants' hazards.

**Ventilation:** Use adequate local or general ventilation to maintain the concentration of lead fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is recommended for melting, casting, grinding, burning, and use of powders.

**Respirators:** Where lead dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge). When exposure levels are unknown, a self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask should be worn.

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

|  |  |   |   |
|--|--|---|---|
| <b>Appearance:</b><br>Malleable, bluish-white or silvery-grey metal  | <b>Odour:</b><br>None                      | <b>Physical State:</b><br>Solid                                 | <b>pH:</b><br>Not Applicable                  |
| <b>Vapour Pressure:</b><br>1.3 mm Hg at 970°C<br>(negligible @ 20°C) | <b>Vapour Density:</b><br>Not Applicable   | <b>Boiling Point/Range:</b><br>1,740°C                          | <b>Freezing/Melting Point/Range:</b><br>328°C |
| <b>Specific Gravity:</b><br>11.34                                    | <b>Evaporation Rate:</b><br>Not Applicable | <b>Coefficient of Water/Oil Distribution:</b><br>Not Applicable | <b>Odour Threshold:</b><br>None               |
| <b>Solubility:</b><br>Insoluble in water                             |  |   |   |

## SECTION 10. STABILITY AND REACTIVITY

**Stability & Reactivity:** Massive metal is stable under normal temperatures and pressures. Fresh cut or cast lead surfaces tarnish rapidly due to the formation of an insoluble protective layer of basic lead carbonate.

**Incompatibilities:** Lead reacts vigorously with strong oxidizers, such as hydrogen peroxide and chlorine trifluoride, and active metals, such as sodium and potassium. Powdered lead metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead metal can form lead azide, which is a detonating compound. A lead-zirconium alloy (10-70% Zr) will ignite when struck with a hammer.

**Hazardous Decomposition Products:** High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate highly toxic lead oxide fume. Lead oxide is highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

## SECTION 11. TOXICOLOGICAL INFORMATION

**General:** Lead accumulates in bone and body organs once it enters the body. Elimination from the body is slow. Initial and periodic medical examinations are advised for persons repeatedly exposed to levels above the exposure limits of lead dust or

fumes. Once lead enters the body, it can affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal system. The primary routes of exposure to lead are inhalation or ingestion of dust and fumes.

**Acute:**

**Skin/Eye:** Contact with dust or fume may cause local irritation but would not cause tissue damage.

**Inhalation:** Exposure to lead dust or fume may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An acute, short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposure of this magnitude is rare. Kidney damage, as well as anemia, can occur from acute exposure.

**Ingestion:** Symptoms due to ingestion of lead dust or fume would be similar to those from inhalation. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also be expected to occur.

**Chronic:**

Prolonged exposure to lead dust and fume may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, anemia, and, rarely, wrist drop. Reduced hemoglobin production has been associated with low lead exposures. Symptoms of central nervous system damage due to moderate lead exposure include fatigue, headaches, tremors and hypertension. Very high lead exposure can result in lead encephalopathy with symptoms of hallucinations, convulsions, and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agency for the impairment of male and female reproductive capacity. Pregnant women should be protected from excessive exposure as lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems due to excessive lead exposure in pregnant women. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. Lead and lead compounds are listed as an A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans) by the ACGIH and as a Group 2B Carcinogen (possibly carcinogenic to humans) by IARC. The NTP, OSHA and the EU do not currently list lead as a human carcinogen.

**SECTION 12. ECOLOGICAL INFORMATION**

While lead metal is insoluble, its processing or extended exposure in the aquatic and terrestrial environments may lead to the release of lead in bioavailable forms. Lead compounds are not particularly mobile in the aquatic environment but can be toxic to organisms, especially fish, at low concentrations. Water hardness, pH and dissolved organic carbon content are factors which regulate the degree of toxicity. In soil, lead is generally not very mobile or bioavailable as it can become strongly sorbed on soil particles, increasingly so over time, to a degree dependent on soil properties. Lead bioaccumulates in plants and animals in both the terrestrial and aquatic environments.

**SECTION 13. DISPOSAL CONSIDERATIONS**

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

**SECTION 14. TRANSPORT INFORMATION**

PROPER SHIPPING NAME .....Not a regulated product in ingot form.  
TRANSPORT CANADA AND U.S. DOT CLASSIFICATION .....Not Applicable  
TRANSPORT CANADA AND U.S. DOT PIN .....Not Applicable  
MARINE POLLUTANT .....No  
IMO CLASSIFICATION .....Not Regulated

**SECTION 15. REGULATORY INFORMATION**

**U.S.**

Ingredient Listed on TSCA Inventory.....Yes

Hazardous Under Hazard Communication Standard.....Yes

CERCLA Section 103 Hazardous Substances .....Lead RQ: 10 lbs. (4.54 kg.)\*  
\*reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA Section 302 Extremely Hazardous Substance .....No

**Disclaimer:**

\*\*\*\*\*

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**I. GENERAL INFORMATION**  
-----

**Trade Name:** Arsenic **Formula:** As  
**Chemical Family:** Metallic element **CAS #:** 7440-38-2

-----  
**2. HAZARDOUS INGREDIENTS**  
-----

**Hazardous Components % OSHA/PEL ACGIH/TLV Sec. 313**  
Arsenic 0-100 10 ug/m<sup>3</sup> 0.01 mg/m<sup>3</sup> Yes

-----  
**3. PHYSICAL DATA**  
-----

**Boiling Point:** 613 °C (Sublimes) **Melting Point:** 817 °C  
**Vapor Density (Air=1):** N/A **Vapor Pressure:** 1mm @ 372 °C  
**Solubility in H<sub>2</sub>O:** Insoluble **% Volatiles:** 0  
**Appearance and Odor:** Steel-grey brittle solid, no odor. **Specific gravity (H<sub>2</sub>O=1):** 5.72gm/cc

-----  
**4. FIRE AND EXPLOSION HAZARD DATA**  
-----

**Flash Point:** N/A **Autoignition Temp:** N/A  
**Flammability: Lower:** N/A **Upper:** N/A

**Extinguishing Media:** Do not use water. Use carbon dioxide, dry chemical extinguishing agents, dry sand, dry ground dolomite.  
**Special Firefighting Procedures:** Use NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing if involved in fire.

**Unusual Fire and Explosion Hazard:** Slight explosion hazard in the form of a dust when exposed to flame. Moderate fire hazard in the form of dust when exposed to heat or flame or by chemical reaction.

-----  
**5. HEALTH HAZARD INFORMATION**  
-----

**Effects of Exposure:**

Acute arsenic poisoning (from ingestion) results in marked irritation of the stomach and intestines with nausea, vomiting and diarrhea. In severe cases the vomitus and stools are bloody and the patient goes into collapse and shock with weak, rapid pulse, cold sweats, coma and death. Chronic arsenic poisoning, whether through ingestion or inhalation, may manifest itself in many different ways. There may be disturbances of the digestive system such as loss of appetite, cramps, nausea, constipation or diarrhea. Liver damage may occur, resulting in jaundice. Disturbances of the blood, kidneys and nervous system are not infrequent. Arsenic can cause a variety of skin abnormalities including itching, pigmentation and even cancerous changes. A characteristic of arsenic poisoning is the great variety of symptoms that can be

produced. A recognized carcinogen of the skin, lungs, liver. An experimental carcinogen of the mouth, esophagus, larynx, bladder and para nasal sinus. (Sax, Dangerous Properties of Industrial Materials)

**Acute Effects:**

**Inhalation:** Causes irritation of mucous membranes and respiratory tract, metallic taste, pharyngitis, bloody nose, perforation of the nasal septum.

**Ingestion:** May cause vomiting, diarrhea and nausea.

**Skin:** Causes moderate irritation, skin sensitization.

**Eye:** Causes moderate irritation.

**Chronic Effects:**

**Inhalation:** May cause cancer (skin and lung).

**Ingestion:** May cause cancer (skin and lung).

**Skin:** Can cause eczematous dermatitis, pigmentation, hyperkeratosis.

**Eye:** None known

**Other Health Hazards:** There is evidence that arsenic may cross the placental barrier. Arsenic is a neurotoxin. Poisoning may affect the heart, GI system, kidneys and liver.

**Routes of Entry:** Inhalation, ingestion.

**Medical Conditions Generally Aggravated by Exposure:** No data

**Carcinogenicity:** **NTP:** Yes **IARC:** Yes **OSHA:** Yes

**EMERGENCY AND FIRST AID PROCEDURES:**

**INHALATION:** No specific information available, one should obtain medical attention.

**INGESTION:** No data available but one should obtain medical attention.

**SKIN:** Remove contaminated clothing, flood skin with large amounts of water. If irritation persists seek medical attention.

**EYE:** Immediately flush eyes, including under eyelids, with large amounts of water for at least 15 minutes. Call a physician.

-----  
**6. REACTIVITY DATA**  
-----

**Stability:** Stable

**Conditions to Avoid:** Incompatibles, exposure to air.

**Incompatibility (Materials to Avoid):** Acids, acid fumes, oxidizing agents, halogens, heat, palladium, zinc, platinum, nitrogen trichloride, silver nitrate, acetylenes, chlorosylamine, chromium (VI) oxide, sodium peroxide, dirubidium acetylde.

**Hazardous Decomposition Products:** At temperatures above the melting point, metal oxide fumes may be evolved. Under reducing conditions (i.e. any strong acid or base plus an active metal) or in the presence of nascent hydrogen, highly toxic arsine gas may be evolved.

**Hazardous Polymerization:** Will not occur.

-----  
**7. SPILL OR LEAK PROCEDURES**  
-----

**Steps to Be Taken in Case Material Is Released or Spilled:** Any method which keeps dust to a minimum is acceptable. Vacuuming is preferred for dust. Use approved respiratory protection if possibility of dust/fume exposure exists. Do not use compressed air for cleaning.

**Waste Disposal Method:** Dispose of in accordance with all State, Federal and Local regulations.

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## 8. SPECIAL PROTECTION INFORMATION

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**Respiratory Protection:** Where airborne exposures may exceed OSHA/ACGIH permissible air concentrations, the minimum respiratory protection recommended is a negative pressure air purifying respirator with cartridges that are NIOSH/MSHA approved against dust, fumes and mists having a TWA less than 0.05 mg/m<sup>3</sup>.

**Ventilation:** Glove bag or box preferred.

**Protective Gloves:** Rubber

**Eye/Face Protection:** ANSI approved safety goggles with a full face shield.

**Other Protective Equipment:** Full protective clothing, lab coat and apron, flame and chemical resistant coveralls, is recommended for exposures that exceed permissible air concentrations. All contaminated clothing should be removed before leaving plant premises.

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## 9. SPECIAL PRECAUTIONS

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**Precautions to Be Taken in Handling and Storage:** Use of approved respirators is required for applications where adequate ventilation cannot be provided. Activities which generate dust or fume should be avoided. When melted, the temperature should be kept as low as possible. Keep container tightly closed. Store in a cool, dry, well-ventilated area. Wash thoroughly after use.

**Work Practices:** Avoid inhalation or ingestion. Practice good housekeeping and personal hygiene procedures. No tobacco or food in the work area. Wash thoroughly before eating or smoking. Shower and change clothes at end of work shift. Do not wear contaminated clothing home. Do not blow dust off clothing with compressed air. Maintain eyewash capable of sustained flushing, safety drench shower and hygienic facilities for washing.

**Danger: Poison, causes skin and lung cancer.**

The above information is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI shall not be held liable for any damage resulting from handling or from contact with the above product.

10.1.14 Selenium Material Safety Data Sheet

| Section 1 Identification |   |
|--------------------------|---|
| Product Number:          | C2450   |
| Product Name:            | Selenium Metal 99.5% Powder   |
| Trade/Chemical Synonyms  |   |
| Formula:                 | Se  |
| RTECS:                   | VS7700000   |
| C.A.S                    | CAS# 7782-49-2  |
| Health:                  | 2   |
| Flammability             | 1   |
| Reactivity               | 0   |
| Hazard Rating:           | Least Slight Moderate High Extreme<br>0 1 2 3 4<br>NA = Not Applicable NE = Not Established |

| Section 2 Component Mixture |                      |                |      |     |                    |
|-----------------------------|----------------------|----------------|------|-----|--------------------|
| Sara 313                    | Component            | CAS Number     | %    | Dim | Exposure Limits:   |
| <input type="checkbox"/>    | Selenium Metal 99.5% | CAS# 7782-49-2 | 100% | W/W | OSHA TWA 0.2 mg/mf |

**Section 3 Hazard Identification (Also see section 11)**  
 May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.

**Section 4 First Aid Measures**  
 May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.  
 FIRST AID: SKIN: Wash exposed area with soap and water. If irritation persists, seek medical attention.  
 EYES: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen  
 INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

**Section 5 Fire Fighting Measures**  
 Fire Extinguisher Type: Dry chemical powder or appropriate foam. Do not use water jet.  
 Fire/Explosion Hazards: May be combustible at high temperature. Emits TOXIC fumes under fire conditions.  
 Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

**Section 6 Accidental Release Measures**  
 Evacuate area. Wear self-contained breathing apparatus and protective clothing. Eliminate all sources of ignition.

**Section 7 Handling and Storage**  
 Store in a cool dry well ventilated area. Keep away from heat and flame. Do not get in eyes, on skin, or on clothing. Keep tightly closed.

**Section 8 Exposure Controls & Personal Protection**  
 Respiratory Protection:NIOSH/MSHA-approved respirator

Ventilation: Mechanical:  Hand Protection: Wear appropriate gloves to prevent skin exposure  
 Local Exhaust:  Eye Protection: Splash Goggles  
 Other Protective Equipment: Wear appropriate clothing to prevent skin exposure. Impervious clothing to prevent exposure.

**Section 9 Physical and Chemical Properties**

|                      |                          |                             |                |
|----------------------|--------------------------|-----------------------------|----------------|
| Melting Point:       | 217°C                    | Specific Gravity            | 4.810          |
| Boiling Point:       | 690°C                    | Percent Volatile by Volume: | 0              |
| Vapor Pressure:      | Not available            | Evaporation Rate:           | Not available  |
| Vapor Density:       | Not available            | Evaporation Standard:       | Not available  |
| Solubility in Water: | insoluble                | Auto ignition Temperature:  | Not applicable |
| Appearance and Odor: | odorless metallic powder | Lower Flamm. Limit in Air:  | Not available  |
| Flash Point:         | Not available            | Upper Flamm. Limit in Air:  | Not available  |

**Section 10 Stability and Reactivity Information**

Stability: yes Conditions to Avoid: vapors and heat.  
 Materials to Avoid:  
 Oxidizing materials, and acids  
 Hazardous Decomposition Products:  
 TOXIC fumes.  
 Hazardous Polymerization: Will Not Occur  
 Condition to Avoid: None known

**Section 11 Additional Information**

DANGER!! Vapors if inhaled or absorbed through the skin can be POISONIOUS!! Effects of over exposure: lung irritation and dermatitis. Acute: Dust is TOXIC . HARMFUL if swallowed. Stomach pains, vomiting, diarrhea, coughing and chest pains, difficulty in breathing. Chronic: none are specified by manufacturer. Target organs: upper respiratory tract and eyes. Conditions aggravated/target organs. Persons with pre-existing eye, skin or respiratory conditions may be more susceptible.

DOT Classification: Selenium compounds n.o.s. (Selenium powder), 6.1, UN3283, PG III

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No: 0.1 Date Entered: 9/1/2006 Approved by: WPF

*10.1.15 Nickel Material Safety Data Sheet*

**Section 1 Identification**

|                         |                                     |  |   |
|-------------------------|-------------------------------------|--|---|
| Product Number:         | C2156                               | Health:                                  | 3 |
| Product Name:           | Nickel Metal Laboratory Grade, Shot | Flammability                             | 0 |
| Trade/Chemical Synonyms |                                     | Reactivity                               | 0 |
| Formula:                | Ni                                  | Hazard Rating:                           |   |
| RTECS:                  | QR5950000                           | Least Slight Moderate High Extreme       |   |
| C.A.S                   | CAS# 7440-02-0                      | 0 1 2 3 4                                |   |
|                         |                                     | NA = Not Applicable NE = Not Established |   |

**Section 2 Component Mixture**

| Sara 313 | Component | CAS Number | % | Dim | Exposure Limits: |
|----------|-----------|------------|---|-----|------------------|
|          |           |            |   |     |                  |

|                          |              |                |     |     |                  |
|--------------------------|--------------|----------------|-----|-----|------------------|
| <input type="checkbox"/> | Nickel Metal | CAS# 7440-02-0 | 100 | W/W | OSHA TWA 1 mg/mf |
|--------------------------|--------------|----------------|-----|-----|------------------|

**Section 3 Hazard Identification (Also see section 11)**

May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.

**Section 4 First Aid Measures**

May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.

FIRST AID: CALL A PHYSICIAN. SKIN: Remove contaminated clothing. Wash exposed area with soap and water.

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

INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

**Section 5 Fire Fighting Measures**

Fire Extinguisher Type: Use agents for metal, such as graphite

Fire/Explosion Hazards: Dust at sufficient concentrations can form explosive mixtures with air.

Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

**Section 6 Accidental Release Measures**

Evacuate area. Wear self-contained breathing apparatus and protective clothing. Eliminate all sources of ignition.

**Section 7 Handling and Storage**

Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.

**Section 8 Exposure Controls & Personal Protection**

Respiratory Protection:NIOSH/MSHA-approved respirator

|              |  |  |
|--------------|--|--|
| Ventilation: | Mechanical: <input checked="" type="checkbox"/>    | Hand Protection: NIOSH Approved Gloves |
|              | Local Exhaust: <input checked="" type="checkbox"/> | Eye Protection: Splash Goggles         |

**Section 9 Physical and Chemical Properties**

|                      |                               |                             |                |
|----------------------|-------------------------------|-----------------------------|----------------|
| Melting Point:       | 1455° C                       | Specific Gravity            | 8.9            |
| Boiling Point:       | 2732° C                       | Percent Volatile by Volume: | N/A            |
| Vapor Pressure:      | 1 @ 1810° C                   | Evaporation Rate:           | N/A            |
| Vapor Density:       | N/A                           | Evaporation Standard:       |                |
| Solubility in Water: | Insoluble                     | Auto ignition Temperature:  | Not applicable |
| Appearance and Odor: | Silvery white metallic powder | Lower Flamm. Limit in Air:  | Not applicable |
| Flash Point:         | N/A                           | Upper Flamm. Limit in Air:  | Not applicable |

**Section 10 Stability and Reactivity Information**

Stability: Stable      Conditions to Avoid: Avoid contact with incompatible materials.  
 Materials to Avoid: mineral acids, strong oxidizers  
 Hazardous Decomposition Products:

Hydrogen gas  
 Hazardous Polymerization: Will Not Occur  
 Condition to Avoid: None known

**Section 11 Additional Information**

Dust may irritate eyes skin and respiratory tract. Conditions aggravated: Asthma, emphysema, etc. Persons with pre-existing eye, skin or respiratory conditions may be more susceptible.

DOT Classification: Not Regulated

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No: 0

Date Entered: 9/1/2006

Approved by: WPF

*10.1.16 Chromium Material Safety Data Sheet*

**Section 1 Identification**

|                         |                |  |         |
|-------------------------|----------------|--|---------|
| Product Number:         | C1503          | Health:                                  | 2       |
| Product Name:           | Chromium       | Flammability                             | 1       |
| Trade/Chemical Synonyms |                | Reactivity                               | 0       |
| Formula:                | Cr             | Hazard Rating:                           |         |
| RTECS:                  | GB4200000      | Least Slight Moderate High Extreme       |         |
| C.A.S                   | CAS# 7440-47-3 | 0  | 1 2 3 4 |
|                         |                | NA = Not Applicable NE = Not Established |         |

**Section 2 Component Mixture**

| Sara 313                 | Component | CAS Number     | %    | Dim | Exposure Limits: |
|--------------------------|-----------|----------------|------|-----|------------------|
| <input type="checkbox"/> | Chromium  | CAS# 7440-47-3 | 100% | w/w | OSHA TWA 1 mg/mf |

**Section 3 Hazard Identification (Also see section 11)**

May be harmful if swallowed. May cause irritation. Avoid breathing vapors, or dusts. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

**Section 4 First Aid Measures**

May be harmful if swallowed. May cause irritation. Avoid breathing vapors, or dusts. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

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

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

INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

**Section 5 Fire Fighting Measures**

Fire Extinguisher Type: Carbon Dioxide, dry chemical or sand. Do not disturb burning metal while extinguishing the fire.

Fire/Explosion Hazards: Dust at sufficient concentrations can form explosive mixtures with air.

Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

**Section 6 Accidental Release Measures**

Sweep up and place in suitable (fiberboard) containers for reclamation or later disposal.

**Section 7 Handling and Storage**

Precautions such as the use of inert atmosphere are advisable when sizing material to minus 100 mesh and when 50% is minus 200 mesh

**Section 8 Exposure Controls & Personal Protection**

Respiratory Protection: NIOSH/MSHA-approved respirator

Ventilation: Mechanical:  Hand Protection: NIOSH Approved Gloves  
 Local Exhaust:  Eye Protection: Splash Goggles

**Section 9 Physical and Chemical Properties**

Melting Point: 3326 Deg. F Specific Gravity 7.14  
 Boiling Point: 3992 Deg. F Percent Volatile by Volume: N/A  
 Vapor Pressure: N/A Evaporation Rate: N/A  
 Vapor Density: N/A Evaporation Standard:  
 Solubility in Water: Not soluble Auto ignition Temperature: Not applicable  
 Appearance and Odor: Lower Flamm. Limit in Air: Not applicable  
 Flash Point: N/A Upper Flamm. Limit in Air: Not applicable

**Section 10 Stability and Reactivity Information**

Stability: Stable Conditions to Avoid: Avoid contact with incompatible materials.  
 Materials to Avoid: Acidic conditions  
 Hazardous Decomposition Products: Not known to occur  
 Hazardous Polymerization: Will Not Occur  
 Condition to Avoid: None known

**Section 11 Additional Information**

Overexposure to dust may irritate eyes, nose or throat. Conditions aggravated/target organs. Persons with pre-existing eye, skin or respiratory conditions may be more susceptible.

DOT Classification: Not Regulated

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No: 0 Date Entered: 9/1/2006 Approved by: WPF

*10.1.17 Calcium Material Safety Data Sheet*

**Section 1 Identification**

|                 |                             |              |   |
|-----------------|-----------------------------|--------------|---|
| Product Number: | C1411                       | Health:      | 3 |
| Product Name:   | Calcium Metal Reagent Grade | Flammability | 3 |

|                         |                |  |   |
|-------------------------|----------------|--|---|
| Trade/Chemical Synonyms |                | Reactivity                               | 2 |
| Formula:                | Ca             | Hazard Rating:                           |   |
| RTECS:                  | EV8040000      | Least Slight Moderate High Extreme       |   |
| C.A.S                   | CAS# 7440-70-2 | 0 1 2 3 4                                |   |
|                         |                | NA = Not Applicable NE = Not Established |   |

#### Section 2 Component Mixture

| Sara 313                 | Component     | CAS Number     | %     | Dim | Exposure Limits: |
|--------------------------|---------------|----------------|-------|-----|------------------|
| <input type="checkbox"/> | Calcium Metal | CAS# 7440-70-2 | 100 % | W/W | None established |

#### Section 3 Hazard Identification (Also see section 11)

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

#### Section 4 First Aid Measures

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

FIRST AID: CALL A PHYSICIAN. SKIN: In case of contact, immediately flush skin with water for at least 15 minutes while removing contaminated clothing and shoes. Thoroughly clean clothing and shoes before reuse.

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

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

#### Section 5 Fire Fighting Measures

|                          |   |
|--------------------------|---|
| Fire Extinguisher Type:  | G-1 powder, Pyrene, Dry lime(not limestone)   |
| Fire/Explosion Hazards:  | Evolves hydrogen gas when heated or in contact with acids, moisture. Finely divided calcium is considered pyrophoric and will explode if ignited. |
| Fire Fighting Procedure: | Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.  |

#### Section 6 Accidental Release Measures

Collect spilled material for reclamation or disposal in sealed containers.

#### Section 7 Handling and Storage

Store in a cool dry well ventilated area. Keep away from heat and flame. Do not get in eyes, on skin, or on clothing.

#### Section 8 Exposure Controls & Personal Protection

Respiratory Protection:NIOSH/MSHA-approved respirator

|              |   |   |
|--------------|---|---|
| Ventilation: | Mechanical: <input type="checkbox"/>    | Hand Protection: Wear appropriate gloves to prevent skin exposure |
|              | Local Exhaust: <input type="checkbox"/> | Eye Protection: Goggles and Face Shield                           |

#### Section 9 Physical and Chemical Properties

|   |   |                             |                |
|---|---|-----------------------------|----------------|
| Melting Point:  | Information not available   | Specific Gravity            | 1.55           |
| Boiling Point:  | 2817 Deg F  | Percent Volatile by Volume: | 0              |
| Vapor Pressure:   | 0   | Evaporation Rate:           | 0              |
| Vapor Density:  | Information not available   | Evaporation Standard:       |                |
| Solubility in Water:  | Reacts with water   | Auto ignition Temperature:  | Not applicable |
| Appearance and Odor:  | Gray metallic solid, no odor  | Lower Flamm. Limit in Air:  | Not applicable |
| Flash Point:  | None  | Upper Flamm. Limit in Air:  | Not applicable |
| <b>Section 10 Stability and Reactivity Information</b>  |   |                             |                |
| Stability: Stable   | Conditions to Avoid: Product is unstable when exposed to water. Moisture, water, high temperatures, sparks, and open flames |                             |                |
| Materials to Avoid:   | Water, Alkali metal hydroxides and carbonates, acids.   |                             |                |
| Hazardous Decomposition Products:   | Hydrogen and calcium hydroxide.   |                             |                |
| Hazardous Polymerization:   | Will Not Occur  |                             |                |
| Condition to Avoid:   | None known  |                             |                |
| <b>Section 11 Additional Information</b>  |   |                             |                |
| Contact with skin while moist or perspired may cause burns due to reactions. Eye contact can cause irritation. If inhaled can cause irritation to mucous membranes. If ingested can cause burns of mouth and esophagus. If comes in contact with skin or eyes wash with water. If inhaled remove to fresh air. If ingested, Do not induce vomiting. For all above situation get medical assistance immediately. Persons with pre-existing disorders may be more susceptible |   |                             |                |
| DOT Classification: Calcium, 4.3, UN1401, PG II   |   |                             |                |
| DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.   |   |                             |                |
| Revision No:0   | Date Entered: 9/1/2006  | Approved by: WPF            |                |

10.1.18 Beryllium Material Safety Data Sheet

**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**Beryllia Ceramic**

SYNONYMS

MANUFACTURER

Beryllium Oxide

Beryllia

Thermalox Brush Ceramic Products, Inc.

6100 S. Tucson Boulevard

Tucson, Arizona 85706

Phone: (520) 746-0699

Fax: (520) 573-9077 CHEMICAL FAMILY Beryllium Compound

**Transportation Emergency**

Call Chemtrec at: CUSTOMER SERVICE

Domestic: (800) 424-9300 Brush Wellman Inc.

International: (703) 527-3887 Product Stewardship Department

**Other Emergency** 17876 St. Clair Avenue

Call Brush Wellman at: (800) 862-4118 Cleveland, Ohio 44110

Phone: (800) 862-4118

Revised: 01-12-06 Fax: (216) 383-4091

Replaces: MSDS C10 (01-13-03) Websites www.brushwellman.com

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

**CHEMICAL COMPOSITION (Percent by Weight)**

BRUSH WELLMAN PRODUCT

CONSTITUENTS CAS Numbers Beryllia Ceramic

Beryllium Oxide 1304-56-9 100

Hazard Communication regulations of the U.S. Occupational Safety and Health Administration apply to this product. NOTE: As used in this Material Safety Data Sheet, the term "particulate" refers to dust, mist, fume, fragments, particles and/or powder.

### **3. HAZARD IDENTIFICATION**

#### **3.1 EMERGENCY OVERVIEW**

**White solid, which poses little or no immediate hazard in solid form. See label in Section 16. If the material is involved in a fire; pressure-demand self-contained breathing apparatus and protective clothing must be worn by persons potentially exposed to the airborne particulate during or after a fire.**

#### **3.2 POTENTIAL HEALTH EFFECTS**

Exposure to the elements listed in Section 2 by inhalation, ingestion, and skin contact can occur when sintering, machining, grinding, sanding, abrasive cutting, polishing, laser scribing and trimming, chemical etching, crushing, or otherwise abrading the surface of this material in a manner which generates particulate. Volatile beryllium hydroxide can be formed when firing solid BeO parts at temperatures greater than 900°C in a moist atmosphere such as in a hydrogen atmosphere sintering furnace. Exposure may also occur during repair or maintenance activities on contaminated equipment such as: furnace rebuilding, maintenance or repair of air cleaning equipment, structural renovation, etc. Particulate depositing on hands, gloves, and clothing, can be transferred to the breathing zone and inhaled during normal hand to face motions such as rubbing of the nose or eyes, sneezing, coughing, etc.

##### **3.2.1. Inhalation**

Beryllium Oxide: The beryllium in this product is not known to cause acute health effects. Inhaling particulate containing beryllium may cause a serious, chronic lung disease called Chronic Beryllium Disease (CBD) in some individuals. See section 3.2.5 Chronic (long-term health effects).

##### **3.2.2. Ingestion**

Ingestion can occur from hand, clothing, food and drink contact with particulate during hand to mouth activities such as eating, drinking, smoking, nail biting, etc. Beryllium Oxide: The health effect of ingestion of beryllium in the form found in this product is unknown.

##### **3.2.3. Skin**

Skin contact with this material may cause, in some sensitive individuals, an allergic dermal response. Skin contact may cause irritation. Symptoms include redness, itching and pain. Beryllium Oxide: Particulate that becomes lodged under the skin has the potential to induce sensitization and skin lesions.

##### **3.2.4. Eyes**

Exposure may result from direct contact with airborne particulate or contact to the eye with contaminated hands or clothing. Damage can result from irritation or mechanical injury to the eyes by particulate.

##### **3.2.5. Chronic (long-term health effects)**

Beryllium Oxide: Inhaling particulate containing beryllium may cause a serious, chronic lung disease called chronic beryllium disease (CBD) in some individuals. Over time lung disease can be fatal. Chronic beryllium disease is a hypersensitivity or allergic condition in which the tissues of the lungs become inflamed. This inflammation, sometimes with accompanying fibrosis (scarring), may restrict the exchange of oxygen between the lungs and the bloodstream. Medical science suggests that CBD may be related to genetic factors.

##### **3.2.6. Carcinogenic References**

Beryllium Oxide: The International Agency for Research on Cancer (IARC) lists beryllium as a Group 1 – Known Human Carcinogen. The National Toxicology Program (NTP) lists beryllium as known to be human carcinogens. The ACGIH lists beryllium as an A1 – Confirmed Human Carcinogen. IARC lists beryllium as a known human carcinogen (Group1) and notes that the work environment of workers involved in refining, machining and producing beryllium metal was associated with an increased risk of lung cancer, "the greater excess was in workers hired before 1950 when exposures to beryllium in the work place were relatively uncontrolled and much higher than in subsequent decades"; and "the highest risk for lung cancer being observed among individuals diagnosed with acute beryllium-induced pneumonitis, who represent a group that had the most intense exposure to beryllium." IARC further noted that "Prior to 1950, exposure to beryllium in working environments was usually very high, and concentrations exceeding 1 mg/m<sup>3</sup> [1000 micrograms per cubic meter] were not unusual."

##### **3.2.7. Medical Conditions Aggravated by Exposure**

Persons with impaired pulmonary function, airway diseases, or conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further impairment if particulate is inhaled. If prior damage or disease to the neurologic (nervous), circulatory, hematologic (blood), or urinary (kidney) systems has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk where handling and use of this

material may cause exposure. Beryllium Oxide: The effects of chronic beryllium disease on the lungs and heart are additive to the effects of other health conditions.

### **3.3 POTENTIAL ENVIRONMENTAL EFFECTS**

See Ecological Information (Section 12)

## **4. FIRST AID MEASURES**

### **FIRST AID PROCEDURES**

**INHALATION:** Breathing difficulty caused by inhalation of particulate requires immediate removal to fresh air. If breathing has stopped, perform artificial respiration and obtain medical help.

**INGESTION:** Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

**SKIN:** Thoroughly wash skin cuts or wounds to remove all particulate debris from the wound. Seek medical attention for wounds that cannot be thoroughly cleansed. Treat skin cuts and wounds with standard first aid practices such as cleansing, disinfecting and covering to prevent wound infection and contamination before continuing work. Obtain medical help for persistent irritation. Material accidentally implanted or lodged under the skin must be removed.

**EYES:** Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

### **NOTE TO PHYSICIANS**

**Treatment of Chronic Beryllium Disease:** There is no known treatment which will cure chronic beryllium disease. Prednisone or other corticosteroids are the most specific treatment currently available. They are directed at suppressing the immunological reaction and can be effective in diminishing signs and symptoms of chronic beryllium disease. In cases where steroid therapy has had only partial or minimal effectiveness, other immunosuppressive agents, such as cyclophosphamide, cyclosporine, or methotrexate, have been used. These latter agents remain investigational. Further, in view of the potential side effects of all the immunosuppressive medications, including steroids such as prednisone, they should be used only under the direct care of a physician. In general, these medications should be reserved for cases with significant symptoms and/or significant loss of lung function. Other symptomatic treatment, such as oxygen, inhaled steroids or bronchodilators, may be prescribed by some physicians and can be effective in selected cases. The decision about when and with what medication to treat is a judgment situation for individual physicians. For the most part, treatment is reserved for those persons with symptoms and measurable loss of lung function. The value of starting oral steroid treatment, before signs or symptoms are evident, remains a medically unresolved issue. The effects of continued low exposure to beryllium are unknown for individuals who are sensitized to beryllium or who have a diagnosis of chronic beryllium disease. It is generally recommended that persons who are sensitized to beryllium or who have CBD terminate their occupational exposure to beryllium.

## **5. FIRE FIGHTING MEASURES**

Flash Point Not Applicable

Explosive Limits Not Applicable

Extinguishing Media Not Applicable

Unusual Fire and Explosion

Hazards

Not Applicable

Special Fire Fighting Procedures If this material becomes airborne as a respirable particulate during a fire situation, pressure-demand self-contained breathing apparatus must be worn by firefighters or any other persons potentially exposed.

## **6. ACCIDENTAL RELEASE MEASURES**

### **STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED**

If this material is a particulate, establish a restricted entry zone based on the severity of the spill. Persons entering the restricted zone must wear adequate respiratory protection and protective clothing appropriate for the severity of the spill (see Section 8). Cleanup spills with a vacuum system utilizing a high efficiency particulate air (HEPA) filtration system followed by wet cleaning methods. Special precautions must be taken when changing filters on HEPA vacuum cleaners used to clean up hazardous materials. Be careful to minimize airborne generation of particulate and avoid contamination of air and water. Depending upon the quantity of material released into the environment, the incident may be required to be reported to the National Response Center at (800) 424-8802 as well as the State Emergency Response Commission and Local Emergency Planning Committee.

## **7. HANDLING AND STORAGE**

### **HANDLING**

Particulate may enter the body through cuts, abrasions or other wounds on the surface of the skin. Wear gloves when handling parts with loose surface particulate or sharp edges.

### **STORAGE**

Store in a dry area.

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

### **8.1 VENTILATION AND ENGINEERING CONTROLS**

Whenever possible, the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne particulate. Where utilized, exhaust inlets to the ventilation system must be positioned as close as possible to the source of airborne generation. Avoid disruption of the airflow in the area of a local exhaust inlet by equipment such as a man-cooling fan. Check ventilation equipment regularly to ensure it is functioning properly. Provide training on the use and operation of ventilation to all users. Use qualified professionals to design and install ventilation systems.

### **8.2 WORK PRACTICES**

Develop work practices and procedures that prevent particulate from coming in contact with worker skin, hair, or personal clothing. If work practices and/or procedures are ineffective in controlling airborne exposure or visual particulate from deposition on skin, hair, or clothing, provide appropriate cleaning/washing facilities. Procedures should be written that clearly communicate the facility's requirements for protective clothing and personal hygiene. These clothing and personal hygiene requirements help keep particulate from being spread to non-production areas or from being taken home by the worker. Never use compressed air to clean work clothing or other surfaces. Fabrication processes may leave a residue of particulate on the surface of parts, products or equipment that could result in employee exposure during subsequent material handling activities. As necessary, clean loose particulate from parts between processing steps. As a standard hygiene practice, wash hands before eating or smoking. To prevent exposure, remove surface scale or oxidation formed on cast or heat treated products in an adequately ventilated process prior to working the surface.

### **8.3 WET METHODS**

Machining operations conducted under a flood of liquid coolant require complete hooded containment and local exhaust ventilation. Openings into the hood must be baffled to prevent release of fast moving particulate. The cycling through a machine of liquid lubricant/coolant containing finely divided beryllium particulate in suspension can result in the concentration building to a point where the particulate may become airborne during use. Prevent coolant from splashing onto floor areas, external structures or operators' clothing. Utilize a coolant filtering system to remove particulate from the coolant.

### **8.4 RESPIRATORY PROTECTION**

When airborne exposures exceed or have the potential to exceed the occupational limits shown in Section 8.13, approved respirators must be used as specified by an Industrial Hygienist or other qualified professional. Respirator users must be medically evaluated to determine if they are physically capable of wearing a respirator. Quantitative and/or qualitative fit testing and respirator training must be satisfactorily completed by all personnel prior to respirator use. Users of tight fitting respirators must be clean shaven on those areas of the face where the respirator seal contacts the face. Exposure to unknown concentrations of particulate requires the wearing of a pressure-demand airline respirator or pressure-demand self-contained breathing apparatus (SCBA). Use pressure-demand airline respirators when performing jobs with high potential exposures such as changing filters in a baghouse air cleaning device.

### **8.5 OTHER PROTECTIVE EQUIPMENT**

Protective overgarments or work clothing must be worn by persons who may become contaminated with particulate during activities such as machining, furnace rebuilding, air cleaning equipment filter changes, maintenance, furnace tending, etc. Contaminated work clothing and overgarments must be managed in a controlled manner to prevent secondary exposure to workers of third parties, to prevent the spread of particulate to other areas, and to prevent particulate from being taken home by workers.

### **8.6 PROTECTIVE GLOVES**

Wear gloves to prevent contact with particulate or solutions. Wear gloves to prevent metal cuts and skin abrasions during handling.

### **8.7 EYE PROTECTION**

Wear safety glasses, goggles, face shield, or welder's helmet when risk of eye injury is present, particularly during melting, casting, machining, grinding, welding, powder handling, etc.

### **8.8 HOUSEKEEPING**

Use vacuum and wet cleaning methods for particulate removal from surfaces. Be certain to de-energize electrical systems, as necessary, before beginning wet cleaning. Use vacuum cleaners with high efficiency particulate air (HEPA). Do not use compressed air, brooms, or conventional vacuum cleaners to remove particulate from surfaces as this activity can result in elevated exposures to airborne particulate. Follow the manufacturer's instructions when performing maintenance on HEPA filtered vacuums used to clean hazardous materials.

### **8.9 MAINTENANCE**

During repair or maintenance activities the potential exists for exposures to particulate in excess of the occupational standards. Under these circumstances, protecting workers can require the use of specific work practices or

procedures involving the combined use of ventilation, wet and vacuum cleaning methods, respiratory protection, decontamination, special protective clothing, and when necessary, restricted work zones.

### 8.10 EXPOSURE CHARACTERIZATION

Determine exposure to airborne particulate by air sampling in the employee breathing zone, work area, and department. Utilize an Industrial Hygienist or other qualified professional to specify the frequency and type of air sampling. Develop and utilize a sampling strategy which identifies the extent of exposure variation and provides statistical confidence in the results. Conduct an exposure risk assessment of processes to determine if conditions or situations exist which dictate the need for additional controls or improved work practices. Make air sample results available to employees.

### 8.11 MEDICAL SURVEILLANCE

Beryllium Oxide: Medical surveillance for beryllium health effects includes (1) skin examination, (2) respiratory history, (3) examination of the lungs, (4) lung function tests (FVC and FEV1), and (5) periodic chest x-ray. In addition, a specialized, specific, immunological blood test, the beryllium blood lymphocyte proliferation test (BLPT), is available to assist in the diagnosis of beryllium related reactions. Individuals who have an abnormal BLPT are normally referred to a lung specialist for additional specific tests to determine if chronic beryllium disease is present. Note: Substantial inter- and intra-laboratory disagreement exists among the laboratories that conduct this test. The BLPT does not at this time meet the criteria for a screening test. Despite its limitations however, the BLPT remains a useful disease surveillance tool.

### 8.12 RISK FACTORS

Specific genetic factors have been identified and have been shown to increase an individual's susceptibility to CBD. Medical testing is available to detect genetic factors in individuals.

### 8.13 OCCUPATIONAL EXPOSURE LIMITS

| CONSTITUENTS            | OSHA* |         |       | ACGIH* |          | NIOSH RTECS NUMBER |
|-------------------------|-------|---------|-------|--------|----------|--------------------|
|                         | PEL   | CEILING | PEAK  | TLV    | TLV-STEL |                    |
| Beryllium Oxide (as Be) | 0.002 | 0.005   | 0.025 | 0.002  | 0.01     | DS4025000          |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

|                                |                |                          |                |
|--------------------------------|----------------|--------------------------|----------------|
| Boiling Point (°F):            | Not Applicable | Radioactivity:           | Not Applicable |
| Evaporation Rate:              | Not Applicable | Solubility:              | None           |
| Freezing Point (°F):           | Not Applicable | Sublimes At (°F):        | Not Applicable |
| Odor:                          | None           | Vapor Density (Air = 1): | Not Applicable |
| pH:                            | Not Applicable | Vapor Pressure (mmHg):   | Not Applicable |
| Physical State:                | Solid          | % Volatiles By Volume:   | None           |
| Color:                         | White          | Melting Point (°F):      | 4455 (BeO)     |
| Density (lb/in <sup>3</sup> ): | 0.103 (BeO)    |                          |                |

### 10. STABILITY AND REACTIVITY

|                                      |                                     |
|--------------------------------------|-------------------------------------|
| General Reactivity                   | This material is stable             |
| Incompatibility (materials to avoid) | Not Applicable                      |
| Hazardous Decomposition Products     | None under normal conditions of use |
| Hazardous Polymerization             | Will not occur                      |

### 11. TOXICOLOGICAL INFORMATION

For questions concerning toxicological information, write to: Medical Director, Brush Wellman Inc., 14710. West Portage River South Road, Elmore, Ohio 43416-9502.

## **12. ECOLOGICAL INFORMATION**

This material can be recycled; contact your Sales Representative.

## **13. DISPOSAL CONSIDERATIONS**

### **BYPRODUCT RECYCLING**

When recycled (used in a process to recover metals), this material is not classified as hazardous waste under federal law. Seal particulate or particulate containing materials inside two plastic bags, place in a DOT approved container, and label appropriately.

### **SOLID WASTE MANAGEMENT**

When recycled (used in a process to recover metals), this material is not classified as hazardous waste under federal law. When spent products are declared solid wastes (no longer recyclable), they must be labeled, managed and disposed of, in accordance with federal, state and local requirements.

## **14. TRANSPORT INFORMATION**

There are no U.S. Department of Transportation hazardous material regulations which apply to the packaging and labeling of this product as shipped by Brush Ceramic Products. Hazard Communication regulations of the U.S. Occupational Safety and Health Administration require this product be labeled.

## **15. REGULATORY INFORMATION**

### **15.1 UNITED STATES FEDERAL REGULATIONS**

#### **15.1.1. Occupational Safety and Health Administration (OSHA)**

Air contaminants, 29 CFR 1910.1000

Hazard Communication Standard, 29 CFR 1910.1200

#### **15.1.2. Environmental Protection Agency (EPA)**

**AMBIENT AIR EMISSIONS:** Beryllium-containing materials are subject to the National Emission Standard for Beryllium as promulgated by EPA (40 CFR 61, Subpart C). The National Emission Standard for beryllium is 0.01 micrograms per cubic meter (30 day average) in ambient air for those production facilities which have been qualified to be regulated through ambient air monitoring. Other facilities must meet a 10 gram per 24- hour total site emission limit. Most process air emission sources will require an air permit from a local and/or state air pollution control agency. The use of air cleaning equipment may be necessary to achieve the permissible emission. Tempered makeup air should be provided to prevent excessive negative pressure in a building. Direct recycling of cleaned process exhaust air is not recommended. Plant exhausts should be located so as not to re-enter the plant through makeup air or other inlets. Regular maintenance and inspection of air cleaning equipment and monitoring of operating parameters is recommended to ensure adequate efficiency is maintained.

**WASTEWATER:** Wastewater regulations can vary considerably. Contact your local and state governments to determine their requirements.

**TOXIC SUBSTANCES CONTROL ACT:** Component(s) of this material is/are listed on the TSCA Chemical Substance Inventory of Existing Chemical Substances

**SARA TITLE III REPORTING REQUIREMENTS:** On February 16, 1988 the U.S. Environmental Protection Agency (EPA) issued a final rule that implements the requirements of the Superfund Amendments and Reauthorization Act (SARA) Title III, Section 313 (53) Federal Register 4525. Title III is the portion of SARA concerning emergency planning and community right-to-know issues. Section 313 covers annual emission reporting on specific chemicals which are manufactured, processed or used at certain U.S. Industrial facilities.

Brush Ceramic products are reportable under the Section 313 category of Compounds and/or Mixtures. These mixtures contain beryllium a reportable constituent. The specific chemical makeup, concentration by weight and the Chemical Abstracts Services number for each of our products is provided in Sections 2. You may obtain additional information by calling the EPA SARA Title III Hotline at 1-800-535-0202 (or 703 412 9810).

### **15.2 STATE REGULATIONS**

Beryllium Oxide

- Is listed on the following state right to know lists: California, (listed as \* \* no name \*\*), New Jersey, Florida, Pennsylvania, Minnesota, (listed as \* \* no name \*\*) and Massachusetts.
- The following statements are made in order to comply with the California State Drinking Water Act - Warning: This product contains Beryllium Oxide, listed as " \*\* undefined \*\*", a chemical known to the state of California to cause cancer.
- California No Significant Risk Level: CAS# 1304-56-9: No significant risk level = 0.1 ug/day

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## 1. GENERAL INFORMATION

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**Synonyms:** Quicksilver; hydrargyrum; Liquid Silver

**CAS No.:** 7439-97-6

**Molecular Weight:** 200.59

**Chemical Formula:** Hg

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## 2. COMPOSITION/INFORMATION ON INGREDIENTS

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Ingredient CAS No Percent Hazardous

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Mercury 7439-97-6 90 - 100% Yes

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## 3. HAZARDS IDENTIFICATION

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### Emergency Overview

---

**DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.**

---

Health Rating: 4 - Extreme (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 1 - Slight

Contact Rating: 3 - Severe (Life)

Lab Protective Equip: GOGGLES; LAB COAT; PROPER GLOVES

Storage Color Code: Blue (Health)

---

### Potential Health Effects

---

#### Inhalation:

Mercury vapor is highly toxic via this route. Causes severe respiratory tract damage. Symptoms include sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath, headache, muscle weakness, anorexia, gastrointestinal disturbance, ringing in the ear, liver changes, fever, bronchitis and pneumonitis. Can be absorbed through inhalation with symptoms similar to ingestion.

#### Ingestion:

May cause burning of the mouth and pharynx, abdominal pain, vomiting, corrosive ulceration, bloody diarrhea. May be followed by a rapid and weak pulse, shallow breathing, paleness, exhaustion, tremors and collapse. Delayed death may occur from renal failure. Gastrointestinal uptake of mercury is less than 5% but its ability to penetrate tissues presents some hazard. Initial symptoms may be thirst, possible abdominal discomfort.

#### Skin Contact:

Causes irritation and burns to skin. Symptoms include redness and pain. May cause skin allergy and sensitization. Can be absorbed through the skin with symptoms to parallel ingestion.

**Eye Contact:**

Causes irritation and burns to eyes. Symptoms include redness, pain, blurred vision; may cause serious and permanent eye damage.

**Chronic Exposure:**

Chronic exposure through any route can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn gray in color. A suspected reproductive hazard; may damage the developing fetus and decrease fertility in males and females.

**Aggravation of Pre-existing Conditions:**

Persons with nervous disorders, or impaired kidney or respiratory function, or a history of allergies or a known sensitization to mercury may be more susceptible to the effects of the substance.

-----  
**4. FIRST AID MEASURES**  
-----

**Inhalation:**

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

**Ingestion:**

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Skin Contact:**

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eye Contact:**

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

-----  
**5. FIRE FIGHTING MEASURES**  
-----

**Fire:**

Not considered to be a fire hazard.

**Explosion:**

Not considered to be an explosion hazard.

**Fire Extinguishing Media:**

Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.

**Special Information:**

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode. Undergoes hazardous reactions in the presence of heat and sparks or ignition. Smoke may contain toxic mercury or mercuric oxide. Smoke may contain toxic mercury or mercuric oxide.

-----  
**6. ACCIDENTAL RELEASE MEASURES**  
-----

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapor.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate misting. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. 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.

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## 7. HANDLING AND STORAGE

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Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Do not use or store on porous work surfaces (wood, unsealed concrete, etc.). Follow strict hygiene practices. 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.

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTIVE EQUIPMENT

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### **Airborne Exposure Limits:**

- OSHA Acceptable Ceiling Concentration:  
mercury and mercury compounds: 0.1 mg/m<sup>3</sup> (TWA), skin
- ACGIH Threshold Limit Value (TLV):  
inorganic and metallic mercury, as Hg: 0.025 mg/m<sup>3</sup> (TWA) skin, A4 Not classifiable as a human carcinogen.
- ACGIH Biological Exposure Indices:  
total inorganic mercury in urine (preshift): 35 ug/g creatinine;  
total inorganic mercury in blood (end of shift): 15 ug/l.

### **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 and engineering controls are not feasible, a half-face respirator with a mercury vapor or chlorine gas cartridge may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with a mercury vapor or chlorine gas cartridge may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

### **Skin Protection:**

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

### **Eye Protection:**

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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**Appearance:** Silver-white, heavy, mobile, liquid metal.

**Odor:** Odorless.

**Solubility:** Insoluble in water.

**Density:** 13.55

**pH:** No information found.

**% Volatiles by volume @ 21C (70F):** 100

**Boiling Point:** 356.7C (675F)

**Melting Point:** -38.87C (-38F)

**Vapor Density (Air=1):** 7.0

**Vapor Pressure (mm Hg):** 0.0018 @ 25C (77F)

**Evaporation Rate (BuAc=1):** 4

---

## 10. STABILITY AND REACTIVITY

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**Stability:** Stable under ordinary conditions of use and storage.

**Hazardous Decomposition Products:** At high temperatures, vaporizes to form extremely toxic fumes.

**Hazardous Polymerization:** Will not occur.

**Incompatibilities:** Acetylenes, ammonia, ethylene oxide, chlorine dioxide, azides, metal oxides, methyl silane, lithium, rubidium, oxygen, strong oxidants, metal carbonyls.

**Conditions to Avoid:** Heat, flames, ignition sources, metal surfaces and incompatibles.

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## 11. TOXICOLOGICAL INFORMATION

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**Toxicological Data:** Investigated as a tumorigen, mutagen, reproductive effector.

**Reproductive Toxicity:** All forms of mercury can cross the placenta to the fetus, but most of what is known has been learned from experimental animals. See Chronic Health Hazards.

**Carcinogenicity:** EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

-----\Cancer Lists\-----

---NTP Carcinogen---

Ingredient Known Anticipated IARC Category

-----  
Mercury (7439-97-6) No No 3

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## 12. ECOLOGICAL INFORMATION

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**Environmental Fate:** This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material is expected to significantly bioaccumulate.

**Environmental Toxicity:** This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are less than 1 mg/l.

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## 13. DISPOSAL CONSIDERATIONS

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Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste

management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

-----  
**14. TRANSPORTATION INFORMATION**  
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**Domestic (Land, D.O.T.)**  
-----

**Proper Shipping Name:** RQ, MERCURY  
**Hazard Class:** 8  
**UN/NA:** UN2809  
Packing Group: III  
**Information reported for product/size:** 1LB

**International (Water, I.M.O.)**  
-----

**Proper Shipping Name:** MERCURY  
**Hazard Class:** 8  
**UN/NA:** UN2809  
Packing Group: III  
**Information reported for product/size:** 1LB

-----  
**15. OTHER INFORMATION**  
-----

**NFPA Ratings:** Health: **3** Flammability: **0** Reactivity: **0**

**Label Hazard Warning:**

DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.

**Label Precautions:**

Do not get in eyes, on skin, or on clothing.  
Do not breathe vapor.  
Keep container closed.  
Use only with adequate ventilation.  
Wash thoroughly after handling.

**Label First Aid:**

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. 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 get medical attention immediately.

**Product Use:**

Laboratory Reagent.

**Revision Information:**

No Changes.

**Disclaimer:** Follows next page

\*\*\*\*\*

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## **Appendix 6**

### **Specification for Vapor Barrier**

# Grace Below Grade Waterproofing

## PREPRUFE® 300R Plus & 160R Plus

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

### Description

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

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

The Preprufe R Plus System includes:

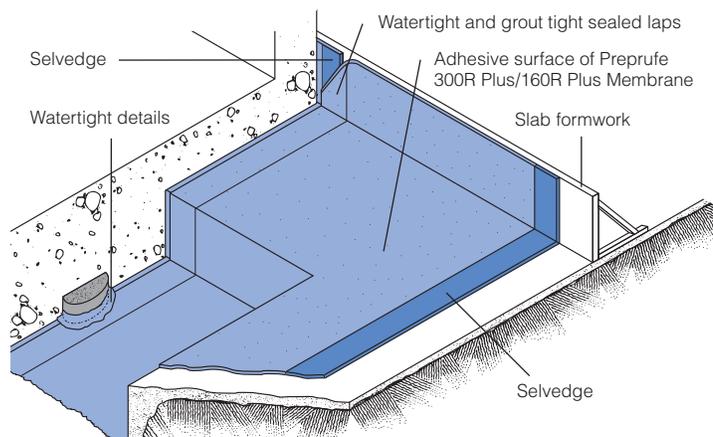
- **Preprufe 300R Plus**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R Plus**—thinner grade for blindside, zero property line applications against soil retention systems.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

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

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

### Advantages

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



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

## Installation

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

Preprufe Plus has colored zip strips at the top and bottom of the seam area on the edge of the roll. Both zip strips cover an aggressive adhesive. Once the yellow zip strip on the top of the membrane and the blue zip strip on the bottom of the membrane are removed, a strong adhesive to adhesive bond is achieved in the overlap area.

### Substrate Preparation

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

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

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

### Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions <40°F (<4°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Plus Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe Plus LT data sheet for more information.

**Horizontal substrates**—Kick out or roll out the membrane HDPE film side to the substrate with the yellow zip strip facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave yellow and blue zip strips on the membrane until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with the blue zip strip on top of the yellow zip strip. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.

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

**Vertical substrates**—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the yellow zip strip facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with the blue zip strip on top of the yellow zip strip. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and

blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Roll firmly to ensure a watertight seal.

**Roll ends and cut edges**—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 2). Immediately remove tinted plastic release liner from the tape.

### Details

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

### Membrane Repair

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

### Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe Tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete. Provide temporary protection from concrete over splash for areas of the Preprufe membrane that are adjacent to a concrete pour.

### Removal of Formwork

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

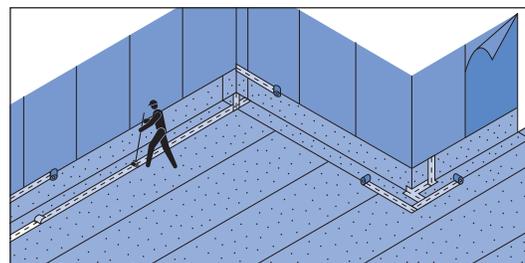
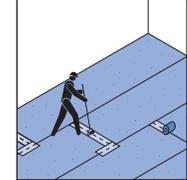
A minimum concrete compressive strength of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

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

Figure 1



Figure 2

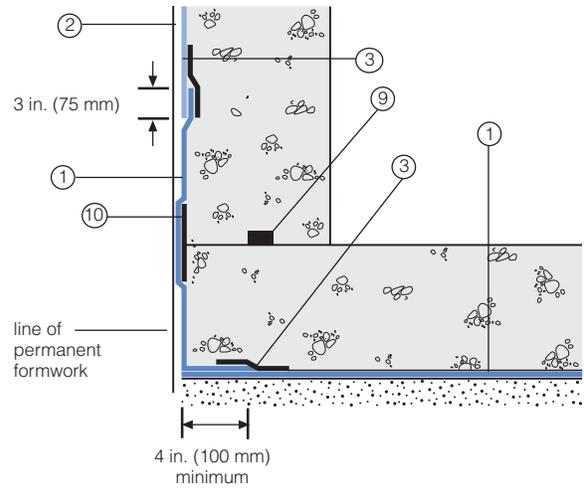


## Detail Drawings

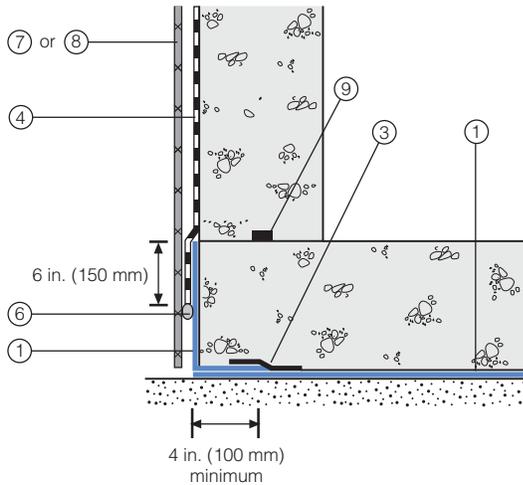
Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [graceconstruction.com](http://graceconstruction.com).

For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

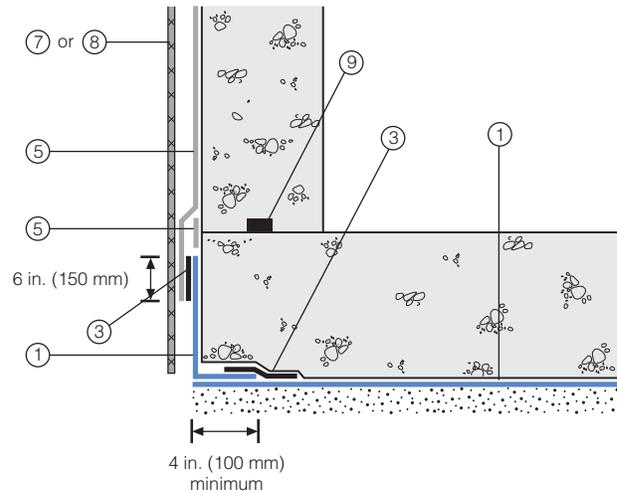
### Wall base detail against permanent shutter



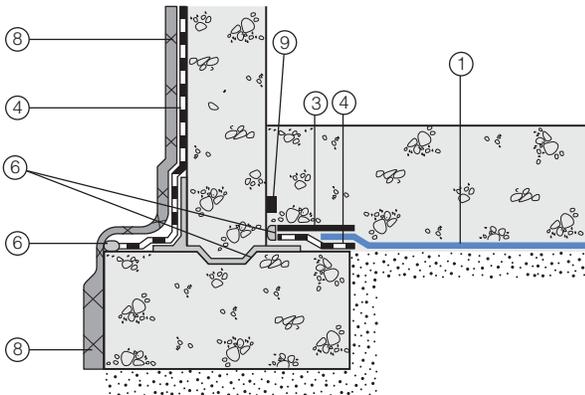
### Bituthene wall base detail (Option 1)



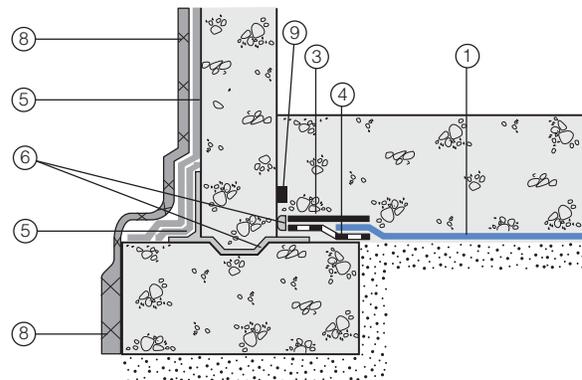
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



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

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Protection

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

## Supply

| Dimensions (Nominal)  | Preprufe 300R Plus Membrane              | Preprufe 160R Plus Membrane              | Preprufe Tape (LT or HC*)     |
|---|--|--|-------------------------------|
| Thickness   | 0.046 in. (1.2 mm)                       | 0.032 in. (0.8 mm)                       |                               |
| Roll size   | 3 ft. 10 in. x 102 ft. (1.17m x 31.15m)  | 3 ft. 10 in. x 120 ft. (1.17m x 36.6m)   | 4 in. x 49 ft (100 mm x 15 m) |
| Roll area   | 392 ft <sup>2</sup> (36 m <sup>2</sup> ) | 460 ft <sup>2</sup> (42 m <sup>2</sup> ) |                               |
| Roll weight   | 108 lbs (50 kg)                          | 92 lbs (42 kg)                           | 4.3 lbs (2 kg)                |
| Minimum side/end laps   | 3 in. (75 mm)                            | 3 in. (75 mm)                            | 3 in. (75 mm)                 |
| * LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C))<br>HC denotes Hot Climate (50°F (>+10°C)) |  |  |                               |
| <b>Ancillary Products</b>   |  |  |                               |
| Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)                                     |  |  |                               |

## Physical Properties

| Property                                    | Typical Value 300R Plus                            | Typical Value 160R Plus                            | Test Method                       |
|---|--|--|-----------------------------------|
| Color                                       | white  | white  |                                   |
| Thickness                                   | 0.046 in. (1.2 mm)                                 | 0.032 in. (0.8 mm)                                 | ASTM D3767                        |
| Lateral Water Migration Resistance          | Pass at 231 ft (71 m) of hydrostatic head pressure | Pass at 231 ft (71 m) of hydrostatic head pressure | ASTM D5385, modified <sup>1</sup> |
| Low temperature flexibility                 | Unaffected at -20°F (-29°C)                        | Unaffected at -20°F (-29°C)                        | ASTM D1970                        |
| Resistance to hydrostatic head              | 231 ft (71 m)                                      | 231 ft (71 m)                                      | ASTM D5385, modified <sup>2</sup> |
| Elongation                                  | 500%   | 500%   | ASTM D412, modified <sup>3</sup>  |
| Tensile strength, film                      | 4000 psi (27.6 MPa)                                | 4000 psi (27.6 MPa)                                | ASTM D412                         |
| Crack cycling at -9.4°F (-23°C), 100 cycles | Unaffected, Pass                                   | Unaffected, Pass                                   | ASTM C836 <sup>4</sup>            |
| Puncture resistance                         | 221 lbs (990 N)                                    | 100 lbs (445 N)                                    | ASTM E154                         |
| Peel adhesion to concrete                   | 5 lbs/in. (880 N/m)                                | 5 lbs/in. (880 N/m)                                | ASTM D903, modified <sup>5</sup>  |
| Lap peel adhesion at 72°F (22°C)            | 8 lbs/in. (1408 N/m)                               | 8 lbs/in. (1408 N/m)                               | ASTM D1876, modified <sup>6</sup> |
| Lap peel adhesion at 40°F (4°C)             | 8 lbs/in. (1408 N/m)                               | 8 lbs/in. (1408 N/m)                               | ASTM D1876, modified <sup>6</sup> |
| Permeance to water vapor transmission       | 0.01 perms<br>(0.6 ng/(Pa x s x m <sup>2</sup> ))  | 0.01 perms<br>(0.6 ng/(Pa x s x m <sup>2</sup> ))  | ASTM E96, method B                |

### Footnotes:

- Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
- Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
- Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
- Concrete is cast against the Preprufe membrane and allowed to cure (7 days minimum)
- Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
- The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute at 72°F (22°C).

## Specification Clauses

Preprufe 300R Plus or 160R Plus shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe. All Preprufe system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.  
NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

## Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be lifted and carried by a minimum of two persons.

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

### For technical assistance call toll free at 866-333-3SBM (3726)

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**GRACE**

## FLORPRUFE® 120

### Integrally bonded vapor protection for slabs on grade

#### Description

Florprufe® 120 is a high performance vapor barrier with Grace's Advanced Bond Technology™ that forms a unique seal to the underside of concrete floor slabs.

Comprising a highly durable polyolefin sheet and a specially developed, non-tacky adhesive coating, Florprufe 120 seals to liquid concrete to provide integrally bonded vapor protection.

Florprufe exceeds ASTM E1745 Class A rating.

#### Advantages

- Forms a powerful integral seal to the underside of concrete slabs
- Protects valuable floor finishes such as wood, tiles, carpet and resilient flooring from damage by vapor transmission
- Direct contact with the slab complies with the latest industry recommendations
- Remains sealed to the slab even in cases of ground settlement
- Ultra low vapor permeability
- Durable, chemical resistant polyolefin sheet
- Lightweight, easy to apply, kick out rolls
- Simple lap forming with mechanical fixings or tape

#### Use

Florprufe 120 is engineered for use below slabs on grade with moisture-impermeable or moisture-sensitive floor finishes that require the highest level of vapor protection.

<sup>1</sup> ACI 302.1R-96

Florprufe complies with the latest recommendations of ACI Committees 302 and 360, i.e. for slabs with vapor sensitive coverings, the location of the vapor barrier should always be in direct contact with the slab<sup>1</sup>.

The membrane is loose laid onto the prepared subbase, forming overlaps that can be either mechanically secured or taped. The unique bond of Florprufe to concrete provides continuity of vapor protection at laps. Alternatively, if a taped system is preferred, self-adhered Preprufe® Tape can be used to overband the laps.

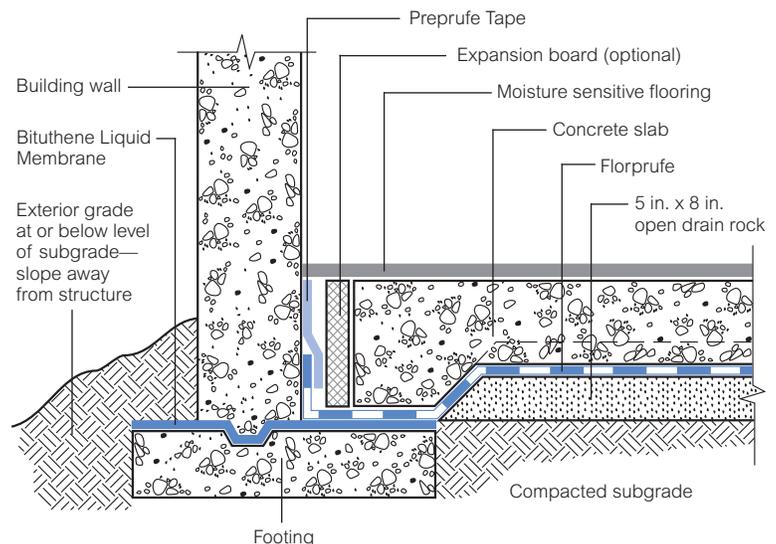
Slab reinforcement and concrete can be placed immediately. Once the concrete is poured, an integral bond develops between the concrete and membrane.

#### Installation

##### Health & Safety

Refer to relevant Material Safety Data Sheet. Complete rolls should be handled by 2 persons.

Florprufe 120 can be applied at temperatures of 25°F (-4°C) or above. Membrane installation is unaffected by wet weather. Installation and detailing of Florprufe 120 are generally in accordance with ASTM E1643-98.



#### Typical Assembly

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

#### Product Advantages

- Forms a powerful integral seal
- Protects valuable floor finishes
- Ultra low vapor permeability
- Durable, chemical resistant
- Lightweight and easy to apply

## Supply

|   |  |
|---|--|
| <b>Florprufe 120</b>  |  |
| Supplied in rolls   | 4 ft x 115 ft (1.2 m x 35 m)             |
| Roll area   | 460 ft <sup>2</sup> (42 m <sup>2</sup> ) |
| Roll weight   | 70 lbs (32 kg) approx.                   |
| <b>Ancillary Products</b>   |  |
| Preprufe Tape is packaged in cartons containing 4 rolls that are 4 in. x 49 ft (100 mm x 15 m). |  |
| Bituthene Liquid Membrane is supplied in 1.5 gal (5.7 L) pails.                                 |  |

## Physical Properties: Exceeds ASTM E1745 Class A rating

| Property                  | Typical Value      | Test Method         |
|---------------------------|--------------------|---------------------|
| Color                     | White              |                     |
| Thickness (nominal)       | 0.021 in. (0.5 mm) | ASTM D3767—method A |
| Water vapor permeance     | 0.03 perms         | ASTM E96—method B1  |
| Tensile strength          | 65 lbs/in.         | ASTM E1541          |
| Elongation                | 300%               | ASTM D412           |
| Puncture resistance       | 3300 gms           | ASTM D17091         |
| Peel adhesion to concrete | >4 lbs/in.         | ASTM D903           |

1. Test methods that comprise ASTM E1745 standard for vapor retarders

Prepare substrate in accordance with ACI 302.1R Section 4.1. Install Florprufe 120 over the leveled and compacted base. Place the membrane with the smooth side down and the plastic release liner side up facing towards the concrete slab. Remove and discard plastic release liner. End laps should be staggered to avoid a build up of layers. Succeeding sheets should be accurately positioned to overlap the previous sheet 2 in. (50 mm) along the marked lap line.

### Laps

#### 1. Mechanical fastening method—

To prevent the membrane from moving and gaps opening, the laps should be fastened together at 39 in. (1.0 m) maximum centers. Fix through the center of the lap area using 0.5 in. (12 mm) long washer-head, self-tapping, galvanized screws (or similar) and allowing the head of the screw to bed into the adhesive compound to self-seal. It is not necessary to fix the membrane to the substrate, only to itself. Ensure the membrane lays flat and no openings occur. (See Figure 1.) Additional fastening may be required at corners, details, etc. Continuity is achieved once the slab is poured and the bond to concrete develops.

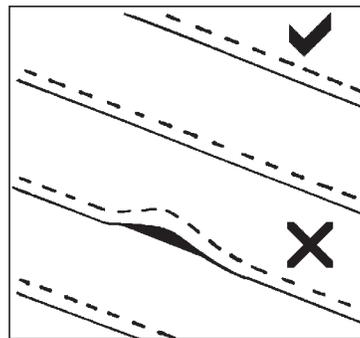


Figure 1

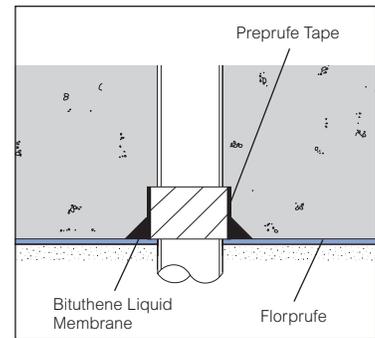


Figure 2

OR

#### 2. Taped lap method—

For additional security use Grace Preprufe Tape to secure and seal the overlaps. Overband the lap with the 4 in. (100 mm) wide Preprufe Tape, using the lap line for alignment. Remove plastic release liner to ensure bond to concrete.

### Penetrations

Mix and apply Bituthene Liquid Membrane detailing compound to seal around penetrations such as drainage pipes, etc. (See Figure 2 and refer to the Bituthene Liquid Membrane data sheet, BIT-230.)

### Concrete Placement

Place concrete within 30 days. Inspect membrane and repair any damage with patches of Preprufe Tape. Ensure all liner is removed from membrane and tape before concreting.

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

For technical assistance call toll free at 866-333-3SBM (3726)

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## Bituthene® 3000/3000 HC

High performance waterproofing membrane for sub-structures and flat deck applications

### Description

Bituthene® 3000/3000 HC is a high performance, cold applied, flexible, preformed waterproof membrane combining a special high performance cross-laminated, HDPE carrier film with a unique self-adhesive rubber bitumen compound.

### Applications

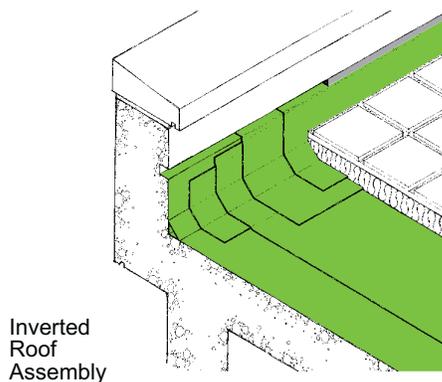
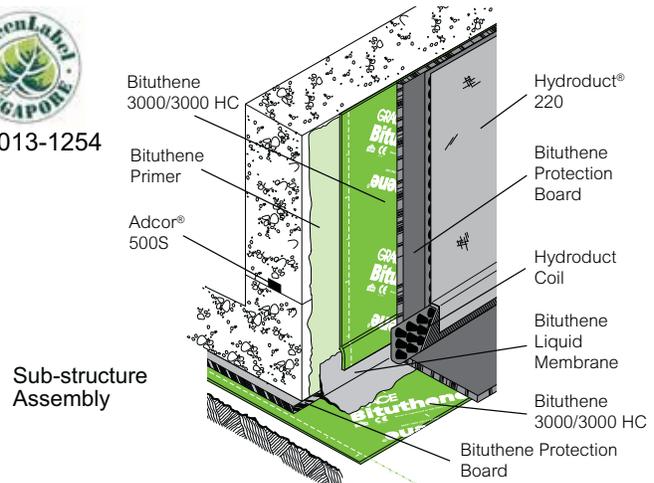
- Basement
- Sub-structures
- Flat decks
- Roof assemblies
- Elevated or grade level podiums
- Plaza decks / Roof gardens / Terraces

### Advantages

| Features                                       | Advantages   |
|--|--|
| Waterproof                                     | • High hydrostatic head resistance   |
| High density cross laminated polyethylene film | • Provides dimensional stability<br>• Provides puncture resistance   |
| Single layer                                   | • Simple, reliable, low labour cost with the benefit of site programmed installation   |
| Gas Resistant                                  | • Methane, carbon dioxide and radon gas protection in excess of the standard membrane requirements in BRE Reports 211 (radon) and 212 (methane and carbon dioxide) |
| Cold applied                                   | • No flame hazard<br>• No heating required   |
| Self-adhesive rubberised asphalt               | • Continuity ensured at overlaps<br>• Unique rubber/bitumen formulation allows healing of small punctures  |
| Factory controlled thickness                   | • No variation by site practices   |
| Chemically resistant                           | • Provides effective external protection against aggressive environments and ozone attack  |
| Flexible                                       | • Accommodates minor settlement and shrinkage movement   |
| Tanking security                               | • Combined flexible membrane and waterstop system for security   |



040-013-1254



Inverted Roof Assembly

### Installation

- Measures should be taken to ensure that all surfaces are free from ice, frost or condensation. Roof slab surfaces must be dry, and free from sharp protrusions, and any hollows to be filled with high strength mortar.
- Horizontal and vertical faces must be smooth, regular, dry and free from nails. Prime the horizontal and vertical surfaces with one coat of Bituthene Primer applied by brush or roller at a rate of 6-8 sq m per litre depending on the

## Physical Properties

| Property   | Typical Values                | Test Method           |
|--|-------------------------------|-----------------------|
| Colour   | Dark Grey                     | NA                    |
| Nominal Thickness*   | 1.5 mm                        | NA                    |
| Tensile strength of membrane                                       | 4 N/mm                        | ASTM D412 modified ** |
| Elongation of membrane (to ultimate failure of rubberised asphalt) | 200%                          | ASTM D412 modified ** |
| Lap adhesion @23°C   | 683 N/m                       | ASTM D1876            |
| Cycling over crack @-32°C  | No effect 100 cycles          | ASTM C836             |
| Puncture resistance of membrane                                    | >220N                         | ASTM E154             |
| Resistance to hydrostatic head                                     | 60 m                          | ASTM D5385            |
| Tear resistance  | 23 N/mm                       | ASTM D624             |
| Permeance  | 1.9 na/Pa. m <sup>2</sup> . S | ASTM E96 [12]         |

Typical test values represent average values from samples tested. Test methods noted may be modified.

\* Nominal thickness refers to the thickness of the membrane without release liner.

\*\* The test is run at a rate of 100 mm per minute.

Please consult Grace representative on recommended installation temperature.

porosity of the surface, and allow to dry completely before the application of Bituthene 3000/3000 HC.

- Bituthene 3000/3000 HC should be laid by peeling back the protective silicone release paper and applying the self-adhesive face on to the surface to ensure good initial bond.
- Adjacent rolls are aligned and overlapped 50mm minimum at side and 50mm\*\*\* at ends, and the overlaps well rolled with a firm pressure using a lap roller to ensure complete adhesion and continuity between the layers.
- Following the application and inspection, care should be taken to prevent damage by following trades. As soon as practicable after the application, Bituthene 3000/3000 HC should be protected from exposure to the weather and physical damage using Bituthene protection boards, insulation or Hydroduct® drainage composites laid dry.
- Any punctured or damaged areas should be cleaned and patched using Bituthene 3000/3000 HC with minimum 50mm laps all around.
- Following the application, care should be taken to prevent damage by following trades by using Bituthene protection boards spot bonded with Pak Adhesive or a 25mm screed as horizontal protection. Vertical faces to be protected against damage from backfilling and reinforcement by using Bituthene protection boards spot bonded with Pak Adhesive.

\*\*\* For usage in China mainland, please follow China GB code requirement for lapping. For more details, please contact your local Grace representative.

## Supply

|              |                            |
|--------------|----------------------------|
| Pack size    | 1m x 20m roll (20 sqm)     |
| Gross weight | 39 kg                      |
| Storage      | Dry conditions below +35°C |

- The junction between the slab and parapet shall have a fillet of Bituthene Liquid Membrane or other acceptable methods placed firmly into position before using 300mm wide reinforcing corner strips of Bituthene 3000/3000 HC placed centrally over the axis of the change of direction.
- Always apply Bituthene membrane directly to primed or conditioned structural substrates. Insulation, if used, must be applied over the membrane. Do not apply Bituthene membranes over lightweight insulating concrete.

## Health and Safety

Refer to relevant Material Safety Data Sheet.

## Quality Assurance

W. R. Grace (Singapore) Pte. Ltd. is certified to ISO 9001 Quality Systems by the Singapore Productivity and Standards Board for the manufacture of Bituthene Waterproofing Membranes under the registered certification number ISO 93-2-0268.

## Grace Technical Services

For assistance with working drawings for projects and additional technical advice, please contact Grace Technical Services.

## www.graceconstruction.com

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**Hong Kong (852) 2675 7898 Indonesia (62-21) 893 4260 Japan (81-3) 3537 6366 Korea (82-32) 820 0800**  
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# GRACE

## Appendix 7

### SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

**Reduced Energy Consumption and Promotion of Greater Energy Efficiency.** Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

**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.

On-Site controls will provide protection against recontamination originating from currently unknown off-Site sources. This project will involve the installation of vapor barriers and sub-slab depressurization systems that can eliminate the risk of future migration of soil vapor contamination from off-Site.

The entire area of the Site, a total of 67,500 square feet, will utilize recontamination controls under this plan. The installation and operation of the recontamination controls will be reported in the RAR.

**Paperless Brownfield Cleanup Program.** Mr. Rehan Perveez is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic

documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

**Low-Energy Project Management Program.** Mr. Rehan Perveez is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.