REMEDIAL ACTION WORK PLAN

October 28, 2013

OER Project #13CVCP095K
E-Designation #12EHAZ2439Q

Submitted for:
38-20 & 38-26 28th Street
Long Island City, New York

Block 386, Lots 23 & 25

Submitted to:
New York City Office of Environmental Remediation
100 Gold Street, 2nd Floor
New York, NY 10038

Prepared for:
2318 Flatbush Avenue Corp.
38-20 28th Street
Long Island City, New York

Submitted by:
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170 Keyland Court
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IE Project Number:

4338-01-03-3001

OCTOBER 2013

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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 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 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, Joel Rogers, P.E., am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 38-20 & 38-26 28th Street, Long Island City, New York.

I, Kevin Kleaka am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the Site located at 38-20 & 38-26 28th Street, Long Island City, New York.

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

PE Stamp

_____

QEP Name

_____

QEP Signature

_____

Date

EXECUTIVE SUMMARY

2318 Flatbush Avenue Corp. has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 6,918-square foot site located at 38-20 & 38-26 28th Street in Queens, 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 at 38-20 & 38-26 28th Street, Long Island City, New York, and is identified as Block 386 and Lots 23 and 25 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 6,918-square feet and is bounded by a residential dwelling to the north; 28th Street by the east and beyond by a residential building with a private automobile garage; a commercial building to the south; and a residential buildings and child care facility to the west. A map of the Site boundary is depicted in Figure 2. The Site is approximately 0.15 acres. Lot 23 contains a two-story, masonry and wood residential building with a basement constructed prior to 1898, with an approximate footprint of 1,250 square feet and a one-story timber private automobile garage. Lot 25 contains a two-story, masonry and wood residential building with a basement constructed prior to 1898, with an approximate footprint of 1,100 square feet and an above ground pool and wood deck structure in the rear yard. The buildings on Lots 23 and 25 were utilized as residential dwellings and are currently vacant.

Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of a hotel structure. Layout of the proposed site development is presented in Appendix E. The current zoning designation is M1-2/R5B (mixed residential and manufacturing use). The proposed use is consistent with existing zoning for the property.

The proposed redevelopment plan and end use of the property will consist of a residential hotel. Under current redevelopment plans, one four-story structure will be constructed with 47 total guest rooms, with a breakfast area. The cellar level (lowest level) is split between two elevations: the cellar level in the front half of the building will contain utility rooms and will be at an elevation of approximately 10 feet below existing grade; the cellar level in the rear of the building will contain hotel guest rooms, and

will be at an elevation of approximately 5 feet below existing grade. Proposed redevelopment requires excavation to approximately 10 feet below existing grade (bgs) in the areas to be occupied by the lower cellar level, 5 feet bgs in the area to be occupied by the upper cellar level, and 2 feet bgs across any areas of the site not occupied by the proposed building. Excavations and footings will not be located beneath the groundwater table at the Site. Additionally, demolition activities associated with the current structures maintained at the Site are planned during the course of the planned redevelopment activities.

Summary of the Remedy

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP citizen participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 Unrestricted Use SCOs. Excavation will include: arsenic hotspot delineation and removal; excavation of entire property to approximately 2 feet below grade; excavation of the building footprint to 5 to 10 feet below grade.
6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media onsite.

7. 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.
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite.
9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
10. Demarcation of residual soil/fill.
11. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
12. As part of development, construction and maintenance of an engineered composite cover consisting of concrete or asphalt pavement, the building slab, and a 2 foot thick clean fill cover for any open space.
13. As part of development, installation of a vapor barrier system beneath the building slab and behind foundation sidewalls to grade.
14. As part of development, installation of a passive sub-slab depressurization system beneath the building slab.
15. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
16. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
17. Submission of a Remedial Action Report (RAR) that describes the remedial activities performed, certifies that the remedial requirements have been achieved, defines the Site boundaries, and, if Track 1 SCOs are not achieved, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.
18. If Track 1 Unrestricted Use 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 maintenance, inspection, and certification of Engineering and Institutional Controls and reporting at a specified frequency.

19. If Track 1 Unrestricted Use SCOs are not achieved, the property will continue to be registered with an E-Designation and flagged as such by the NYC Department of Buildings. Establishment of Engineering and Institutional Controls and management of these controls 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 (OER) created the New York City Voluntary Cleanup Program (NYC VCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan ("cleanup plan") describes the findings of prior environmental studies that show the location of contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities 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, 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 Ben Hernandez and can be reached at (631) 334-2354.

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 OER. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a 'Contingency Plan').

Odor, Dust and Noise Control. This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and 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 covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager Benjamin Hernandez (631) 334-2354 or NYC Office of Environmental Remediation Project Manager Ms. Hannah Moore at (212) 442-6372.

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 8am through 2:30pm, or as otherwise stipulated by NYC DOB permits.

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 Benjamin Hernandez at (631) 334-2354, the NYC Office of Environmental Remediation Project Manager Ms. Hannah Moore at (212) 442-6372, or call 311 and mention the Site is in the NYC VCP.

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

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

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

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

Trucks and Covers. Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York

State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with all laws and regulations.

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

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

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

Truck Routing. Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (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 Broadway Branch Queens Library, 4020 Broadway, Long Island City NY (718) 721-2462.

Long-Term Site Management. To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan (if Track 1 cleanup is not achieved) that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC OER. Requirements that the property owner must comply with are defined in the property's deed. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 SITE BACKGROUND

2318 Flatbush Avenue Corp. has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 38-20 & 38-26 28th Street in the Long Island City section of Queens, 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 alternative 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 at 38-20 & 38-26 28th Street, Long Island City, New York, and is identified as Block 386 and Lots 23 and 25 on the New York City Tax Map. **Figure 1** shows the Site location. The Site is 6,918-square feet and is bounded by a residential dwelling to the north; 28th Street by the east and beyond by a residential building with a private automobile garage; a commercial building to the south; and a residential buildings and child care facility to the west. A map of the Site boundary is depicted in **Figure 2**. The Site is approximately 0.15 acres. Lot 23 contains a two-story, masonry and wood residential building with a basement constructed prior to 1898, with an approximate footprint of 1,250 square feet and a one-story timber private automobile garage. Lot 25 contains a two-story, masonry and wood residential building with a basement constructed prior to 1898, with an approximate footprint of 1,100 square feet and an above ground pool and wood deck structure in the rear yard. The buildings on Lots 23 and 25 were utilized as residential dwellings and are currently vacant.

1.2 PROPOSED REDEVELOPMENT PLAN

The proposed future use of the Site will consist of a hotel structure. Layout of the proposed site development is presented in **Appendix E**. The current zoning designation is M1-2/R5B (mixed residential and manufacturing use). The proposed use is consistent with existing zoning for the property.

The proposed redevelopment plan and end use of the property will consist of a residential hotel. Under current redevelopment plans, one four-story structure will be constructed with 47 total guest rooms, with a breakfast area. The cellar level (lowest level) is split between two elevations: the cellar level in the front half of the building will contain utility rooms and will be at an elevation of approximately 10 feet below existing grade; the cellar level in the rear of the building will contain hotel guest rooms, and will be at an elevation of approximately 5 feet below existing grade. Proposed redevelopment requires excavation to approximately 10 feet below existing grade (bgs) in the areas to be occupied by the lower cellar level, 5 feet bgs in the area to be occupied by the upper cellar level, and 2 feet bgs across any areas of the site not occupied by the proposed building. Excavations and footings will not be located beneath the groundwater table at the Site. Additionally, demolition activities associated with the current structures maintained at the Site are planned during the course of the planned redevelopment activities.

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

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The area surrounding the Site consists of residential properties. **Figure 3** depicts the surrounding land usage of the adjacent properties listed below as well as additional properties located up to 500 feet away from the Site. No hospitals or schools are located within a 250 ft radius of the Site.

Surrounding Property Usage

Direction	Property Description
North – Adjacent property	Block 386, Lot 20 (38-12 28th Street) –The building is currently used as a multi-family walk-up with a total of 5 units.
South – Adjacent property	Block 386, Lot 127 (38-28 28th Street) – Commercial building, currently utilized as a cabinetry shop.

East – Opposite side of 28th Street	Block 385, Lots 5 and 7(38- 23 28th Street, 38-17 28th Street) – Both lots are developed with two family residential buildings.
West – Adjacent property	Block 386, Lots 4, 5 and 6 (38-19 27th Street, 38-21 27th Street, 38-23 27th Street)– All lots are developed with two family residential buildings, one of the buildings also utilizing a children's care facility.

1.4 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document called "*Remedial Investigation Report*", October 2013 (RIR).

Summary of Past Uses of Site and Areas of Concern

A review of historical documentation revealed that Lots 23 and 25 have maintained residential dwellings since at least 1898. The existing buildings were historically heated by fuel oil. An inactive fuel oil fill port, indicative of a UST was observed on Lot 23. No documentation was available regarding the proper decommissioning of the fuel oil tank maintained on the Site. This lack of documentation represents a recognized environmental condition. An inactive fuel oil fill port was also observed in the northeast corner of the residential building on Lot 25, however further investigation revealed it to be associated with an existing inactive fuel oil above ground storage tank located in the basement of the building.

Several off-site confirmed or potential contamination sources were identified to exist within the ASTM search radius. Specifically, a review of available records revealed that a NYSDEC Spill (Spill No. 9805230) had occurred at 38-28 28th Street, located contiguously south of the Site. The NYSDEC Spill was a result of a #2 fuel oil tank test failure and was closed on April 27, 1999. An auto repair facility was maintained at 38-27 28th Street, located directly across 28th Street, east of the Site. A manufacturing facility was historically maintained at 38-30 28th Street, approximately 100 feet south of the Site. In addition, the Site is listed as a "hazardous-e" designation.

The AOCs identified for this Site include:

1. Suspected fuel oil tank at the Site (Lot 23) with no documentation regarding proper decommissioning.
2. Closed NYSDEC Spill on adjacent property to the south (38-28 28th Street) due to a #2 fuel oil tank test failure and auto repair facility and historic manufacturing facility on adjacent Sites.
3. Historic Fill Material.

Summary of the Work Performed under the Remedial Investigation

Impact Environmental performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed seven soil probes on the Site and collected 12 soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three 1-inch groundwater monitoring wells and one temporary monitoring well throughout the Site to establish groundwater flow, but at 65 feet below existing grade groundwater was not encountered.
4. Installed 2 soil vapor probes and 3 sub-slab vapor points on the Site and collected 5 samples for chemical analysis with summa canisters.

Summary of Environmental Findings

1. The Topographic elevation of the property is approximately 35 feet.
2. Depth to groundwater was not encountered to a depth of 65 feet BEG.
3. Groundwater flow is generally anticipated to be towards the west.
4. Depth to bedrock is at the Site is greater than 65 feet BEG.
5. The stratigraphy of the Site, from the surface down, consists of 6" of concrete and asphalt, up to two feet of historic fill material, and below consists of brown clay and medium sand.
6. Soil samples collected during the RI showed no detectable concentrations of PCBs. No VOCs or SVOCs were detected above Track 1 Unrestricted Use SCOs. The only VOC detected was methylene chloride, a common laboratory contaminant. SVOCs were detected at trace concentrations in three samples. Three pesticides, alpha-chlordane, 4,4-DDT, and heptachlor, were identified above Track 1 Unrestricted Use SCOs, but well below their respective Track 2 Restricted Commercial Use SCOs in three soil samples. Arsenic was identified above its Track 2 Restricted Commercial Use SCO at 280 ppm in the same aforementioned sample. Hexavalent chromium, lead, mercury and zinc were identified above Track 1 Unrestricted Use SCOs, but below Track 2 Restricted Commercial Use SCOs. All other samples showed concentrations of metals below Track 1 Unrestricted Use SCOs. Overall, with the exception of the Arsenic hotspot, the results are unremarkable.

7. No groundwater samples were collected during the RI. Three wells were installed to a depth of 65 feet below grade, but no groundwater was encountered.
8. Soil vapor samples (SV-1 through SV-5) collected during the RI detected several chlorinated and petroleum-related compounds at trace to low concentrations. Petroleum-related VOCs were detected below 20 ug/m^3. The chlorinated VOC PCE was identified in four of five samples at a maximum concentration of 286 ug/m^3 which is within the monitor/ mitigate range established by NYSDOH's Vapor Intrusion Guidance. 1,1,1-TCA was detected in one sample at 2.95 ug/m3 which is below the monitoring range established by NYSDOH. TCE and carbon tetrachloridewere not detected in any soil vapor sample.

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:

Soil

- Prevent direct contact with contaminated soil.
- Prevent migration of contaminants that would result in groundwater 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 of Remedy.

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 involves

- Establishment of Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs);
- Complete removal of all soil exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. Based on the results of the RI, it is expected that this alternative would require approximately 2 feet of excavation across approximately half of the Site, as well as excavation to a minimum of 2 feet below existing basement slab on lot 23 for removal of the Arsenic hotspot. Two to ten feet of excavation would be required for development purposes. If soil containing analytes at concentrations above Track 1 Unrestricted Use SCOs were still

present at the base of the excavation, additional excavation would 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 and passive sub-slab depressurization system would be installed beneath the basement foundation and behind foundation sidewalls of the new building as part of new construction to prevent any potential exposures from off-Site groundwater and soil vapor; and
- Placement of a final cover over the entire Site as part of development.

Alternative 2 involves

- Establishment of Track 4 Site-Specific SCOs;
- Excavation and removal of soil/ fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 Site-specific SCOs have been achieved with post-excavation endpoint sampling. Based on the results of the RI, it is expected that this alternative would require excavation to a minimum of 2 feet below existing basement slab on lot 23 for removal of the Arsenic hotspot. Two to ten feet of excavation would be required for development purposes. If soil containing analytes at concentrations above Track 4 Site-specific SCOs were still present at the base of the hotspot excavation, additional excavation would be performed to ensure complete removal of soil that does not meet Track 4 Site-specific SCOs;
- Placement of a final cover over the entire Site to eliminate exposure to remaining soil/fill;
- Installation of a passive sub-slab depressurization system beneath the foundation of the new building;
- Placement of vapor barrier beneath foundation slab and sidewalls to prevent soil vapor entering new building;
- 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; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan to ensure long-term management of these engineering and institutional controls including the performance of periodic inspections and certification that the controls are performing as they were intended; and
- Continued registration of the property with an E-Designation.

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 would be protective of human health and the environment by removing the contaminated soil exceeding Track 1 Unrestricted Use SCOs at the Site, thus eliminating potential for direct contact with contaminated soil once construction is complete and eliminating the risk of contamination leaching into groundwater.

Alternative 2 would achieve comparable protections of human health and the environment since remaining soil on-Site would meet Track 4 Site-Specific SCOs as well as by placement of institutional and engineering controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing institutional controls including a Site Management Plan and continued registration as an E-designated property would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to contaminated soils during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil / Materials Management Plan and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations, and it is not anticipated to be encountered during construction. Potential migration of soil vapors into the new building would be prevented by installing a vapor barrier and passive SSDS as part of new construction.

3.2. BALANCING CRITERIA

Compliance with Standards, Criteria and Guidance (SCGs)

Alternative 1 would achieve compliance with the remedial goals, SCGs and RAOs for soil through removal to Track 1 Unrestricted Use SCOs and Groundwater Protection SCOs. Compliance with SCGs for soil vapor would also be achieved by installation of a vapor barrier and passive SSDSas part of construction.

Alternative 2 would address the chemical-specific SCGs for soil by establishment of Track 4 SCOs, removal of soils exceeding these SCOs, and placement of a composite cover system across the Site. This Alternative would address chemical-specific SCGs for soil vapor through installation of a vapor barrier and passive SSDS to mitigate against soil vapor intrusion. A Site Management Plan would ensure that these controls remained protective for the long term.

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.

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 1 and 2 have similar short-term impacts during their respective implementations, as each requires excavation of contaminated soil material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short term impacts could potentially be higher for Alternative 1 if excavation of greater amounts of material is encountered below the excavation depth of the proposed building.

Both Alternatives would employ appropriate measures to prevent short term impacts, including a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (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. Construction workers operating under appropriate management procedures and a Health and Safety Plan (CHASP) will be protected from on-site contaminants (personal protective equipment would be worn consistent with the documented and encountered risks within the respective work zones).

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Approximately 86, 25-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

Long-term effectiveness and permanence

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

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

Alternative 2 would provide long-term effectiveness by removing most on-site contamination and attaining Track 4 Site-Specific SCOs, establishing a composite cover system across the Site, establishing use restrictions, establishing a Site Management Plan to ensure long-term management of Institutional Controls (ICs) and Engineering Controls (ECs), and maintaining continued registration as an E-designated property 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 assuring that protections designed into the remedy will 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 will eliminate any migration to groundwater. Potential exposure to soil vapor would also be minimized as part of the remedy.

Reduction of toxicity, mobility, or volume of contaminated material

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

Alternative 1 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of unrestricted use SCOs. Alternative 2 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil excavated for development purposes to at least a depth two to ten feet, and any remaining soil/fill would meet Track 4 Site-Specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on site.

Implementability

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

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

Cost effectiveness

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

Initial costs associated with the Track 1 alternative are higher than the Track 4 alternative in that a higher volume of soil/fill would be excavated for off-site disposal to achieve a Track 1 status over the entire site. However, long-term costs are anticipated to be higher for Alternative 2 than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2. In both cases, appropriate public health and environmental protections are achieved.

Community Acceptance

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

Based on the overall goals of the remedial program and initial observations by the project team, both of the alternatives for the Site would be acceptable to the community. Both remedial actions provide for protection of public health and the environment and minimize potential contaminant exposures. This RAWP will be subject to and undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedial action. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in **Appendix A**.

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.

Because of the complete soil removal proposed for the Track 1 alternative, it provides protection of public health and the environment for both the proposed use of the Site and any future use. Alternative 2 also provides sufficient environmental and public health protection for the intended use. Alternative 2

provides for engineering controls and institutional controls that would provide protections against off site vapor migration.

Both alternatives for remedial action at the site are comparable with respect to the proposed use and to land uses in the vicinity of the Site. The proposed use is consistent with the existing zoning designation, M1-2/R5B for the property and is consistent with recent development patterns. The Site is surrounded by residential and commercial properties and both alternatives provide comprehensive protection of public health and the environment for these uses. Improvements in the current brownfield condition of the property achieved by both alternatives are also consistent with the City's goals for cleanup of contaminated land and bringing such properties into productive reuse. 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. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. While Alternative 2 would potentially result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as **Appendix B**.

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC 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. Establishment of Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 Unrestricted Use SCOs. Excavation will include: arsenic hotspot delineation and removal; excavation of entire property to approximately 2 feet below grade; excavation of the building footprint to 5 to 10 feet below grade.
6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media onsite.
7. 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.

8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite.

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

10. Demarcation of residual soil/fill.

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

12. As part of development, construction and maintenance of an engineered composite cover consisting of concrete or asphalt pavement, the building slab, and a 1 foot thick clean fill cover for any open space.

13. As part of development, installation of a vapor barrier system beneath the building slab and behind foundation sidewalls to grade.

14. As part of development, installation of a passive sub-slab depressurization system beneath the building slab.

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

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

17. Submission of a Remedial Action Report (RAR) that describes the remedial activities performed, certifies that the remedial requirements have been achieved, defines the Site boundaries, and, if Track 1 SCOs are not achieved, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.

18. If Track 1 Unrestricted Use 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

maintenance, inspection, and certification of Engineering and Institutional Controls and reporting at a specified frequency.

19. If Track 1 Unrestricted Use SCOs are not achieved, the property will continue to be registered with an E-Designation and flagged as such by the NYC Department of Buildings. Establishment of Engineering and Institutional Controls and management of these controls 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. 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 C**. The location of planned excavations is shown in **Figure 4**.

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.

If Track 1 is not achieved, the following Track 4 Site-Specific SCOs will be used:

Contaminant	**Track 4 SCOs**
Arsenic	24 ppm
Total SVOCS	100 ppm

Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated and disposed off-Site is 2,250 tons.

Disposal location(s) will be reported promptly to the OER Project Manager prior to the start of the remedial action.

End-Point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with confirmation soil sampling. Confirmation samples will be collected from the base of the excavation at locations and frequency to be determined by OER. To evaluate attainment of Track 1 Unrestricted Use SCOs, analytes will include metals and pesticides. If Track 4 Site-specific SCOs are pursued, analytes will include those for which SCOs have been developed (i.e. arsenic).

Hotspot removal actions, whether established under this RAWP or identified during the remedial program, will be performed in conjunction with remedial end-point sampling to ensure that hotspots are fully removed. Analytes for endpoint sampling will be those parameters that are driving the hotspot removal action and will be approved by OER. End-point sampling frequency will consist of the following:

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

2. For excavations 20 to 300 feet in perimeter:

- 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 sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that

other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs for end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be analyzed for trigger analytes (those for which SCO exceedence is identified) utilizing the following methodology:

Soil analytical methods will include:

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

Field QA/QC will include the following procedures:

- Calibration of field equipment, including PID, on a daily basis;
- Analysis of one (1) duplicate sample;
- Use of dedicated and/or disposable field sampling equipment;
- Proper sample handling and preservation;
- Proper sample chain of custody documentation; and
- Completion of report logs.

The above procedures will be executed as follows:

- One (1) duplicate end-point soil sample will be collected to evaluate field sampling precision or reproducibility of measurements of the same parameter under the given set of conditions;

- Disposable sampling equipment will be used to minimize cross-contamination between samples. Decontamination of any non-dedicated sampling equipment will consist of wiping equipment clean, washing with Alconox solution, rinsing with deionized water and air drying prior to each use in order to ensure that cross-contamination between sampling locations does not occur. Decontamination procedures will be performed in an area segregated from any sampling areas. If non-disposable sampling equipment is used, field blanks will be prepared at the rate of 1 for every eight samples collected.

- For each of the parameters analyzed, a sufficient sample volume will be collected to adhere to the specific analytical protocol, and provide sufficient sample for reanalysis if necessary;

- Each sample will be collected in pre-cleaned, laboratory supplied glassware, appropriately labeled. Appropriate sample preservation techniques, including cold temperature storage at 4º C, will be utilized to ensure that the analytical parameters concentrations do not change between the time of sample collection and analysis; and

- Samples will be analyzed prior to the expiration of the respective holding time for each analytical parameter to ensure the integrity of the analytical results.

Import and Reuse of Soils

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 500 tons. The quantity of onsite soil to be reused onsite is to be determined and will be reported to the OER project manager.

4.3 ENGINEERING CONTROLS

Based on the excavation required for the proposed development, the Site is expected to achieve Track 1 Unrestricted Use SCOs. If Track 1 Unrestricted Use SCOs are achieved, no engineering or institutional controls will be required where employed in the remedial action to address residual contamination remaining at the site. However, the following elements will be incorporated into the Site and foundation design as part of the development: composite cover system, vapor barrier and passive sub-slab depressurization system. If Track 1 is not achieved, these three elements will constitute Engineering Controls that will be employed in the remedial action to address residual contamination remaining at the Site.

Composite Cover System

As part of the new development, the entire property will be covered by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of:

- 2-foot of clean cover soil in open spaces;
- asphalt covered roads/parking areas;
- concrete covered sidewalks; and
- concrete building slabs.

Figure 4 and **Appendix E** shows the typical design for each remedial cover type used on this Site. Figure x shows the planned location of each cover type to be used at the Site.

If Track 1 SCOs are not achieved at the Site, the composite cover system would serve as a permanent engineering control. The system would be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan would be included in the Site Management Plan and would 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 would be described in the Site Management Plan in the RAR.

Vapor Barrier

As part of development, mitigation of potential soil vapor from offsite will be achieved with a combination of building slab, vapor barrier and a passive sub-slab depressurization system. A high density polyethylene vapor barrier liner (HPDE) will be installed prior to pouring the building's concrete slab. The vapor barrier will consist of a 20-mil (0.5 mm) ECC VIP Type II Vapor Barrier or OER-approved equivalent barrier. The vapor barrier will extend throughout the area occupied by the footprint of the new building and up the sidewalls according to manufacturer specifications. The membrane will be overlapped by a minimum of 6 inches and secured with mastic or asphaltic tape. Conduits penetrating the slab surface will be sealed with mastic or HDPE boots secured with the asphaltic tape. Inspections of the vapor barrier installation will be performed under the oversight of a Professional Engineer. The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The extent of the proposed vapor barrier

membrane is provided in **Figure 5**. Installation details (penetrations, joints, etc.) with respect to the proposed building foundation, footings, slab, and sidewalls are provided in **Figure 5**.

The Remedial Action Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturer's certificate of warranty.

Passive Sub-Slab Depressurization System

A passive sub-slab depressurization system (SSDS) will be installed within the building footprint underneath the slab. The SSDS will provide a conduit for potential residual soil gas vapors to vent to the atmosphere. Said SSDS consists of vapor collecting screen/pipes within the building footprint. Schedule 40 slotted PVC screens will be installed within the building footprint underneath the slab-on-grade structure. PVC screens will be installed 1 foot below slab. The screens will be backfilled over and compacted with clean 3/4-inch pea gravel. Total depth of compacted gravel surrounding piping will be a minimum of 10-inches thick. PVC screens are manifolded to 4-inch diameter solid PVC pipes and then to 4-inch diameter steel riser. The riser will raise 3-feet above the roof. A rain cap will be installed at the end of the riser. The SSDS layout and details are provided in **Figure 6**.

4.4 INSTITUTIONAL CONTROLS

Institutional Controls are not required on sites that achieve Track 1 Remedial Action. 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 an approved site-specific Site Management Plan (SMP) that will be included in the RAR. The property will also continue to be registered with an E-Designation and flagged as such by the NYC Department of Buildings.

If Track 1 Unrestricted Use SCOs are not achieved, Institutional Controls for this remedial action would consist of:

- Continued registration of the E-Designation for the property. 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;

- Site Management Plan approved by OER that provides procedures for appropriate maintenance, inspection, and certification of ECs and ICs. 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 annually and will comply with RCNY §43-1407(l)(3).
- Vegetable gardens and farming on the Site are prohibited;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for restricted residential use and will not be used for a higher level of use without prior approval by OER.

4.5 SITE MANAGEMENT PLAN

Site Management is not required on sites that achieve Track 1 Remedial Action. However, if Track 1 Unrestricted Use SCOs are not achieved, site management will be performed and 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 SMP describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by the DCR and 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 DCR and 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 Voluntary Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and IC's; (2) implementation of monitoring programs; (3) operation and maintenance of EC's; (4) inspection and certification of EC's; and (5) reporting.

Site management activities, reporting, and EC/IC certification will be scheduled on 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 30 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 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 EA 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

Based on the results of the Phase II ESA, the contaminants of concern found are:

- **Soil:** The metal Arsenic exceeding Track 2 Restricted Residential Use SCOs was identified in one soil sample. TCLP analysis identified the concentration of arsenic present as hazardous; pesticides including alpha-chlordane, 4,4-DDT, and heptachlor were identified but did not exceed Restricted Commercial Use SCOs; and metals including lead, mercury, zinc, and hexavalent chromium were identified in other soil

samples exceeding Track 1 Unrestricted Use SCOs, but did not exceed Track 2 Restricted Commercial Use SCOs.

- **Groundwater:** No groundwater was encountered at the Site to a depth of 65 feet.
- **Soil Vapor:** Chlorinated VOCs, including PCE in four of five samples at concentrations exceeding NYSDOH monitoring/ mitigation range, and TCA was identified at a concentration below NYSDOH monitoring range; Petroleum VOCs were also detected at trace concentrations.

Nature, Extent, Fate and Transport of Contaminants

Pesticides were detected in 2 shallow and 1 deep (basement sub-slab) soil samples collected at the Site. The concentrations of pesticides identified at the Site were below their respective Restricted Commercial Use SCOs.

One Metal, Arsenic was detected in a basement sub-slab soil sample at a concentration exceeding Track 2 Restricted Commercial Use SCOs and TCLP analysis identified the concentration as hazardous. As such, this area will be delineated and treated as a hotspot. Metals were detected at concentrations exceeding Track 1 Unrestricted Use SCOs in two shallow and one deep soil samples. All other metals were detected at trace concentrations below their respective Track 1 Unrestricted Use SCOs.

The chlorinated VOC, PCE was identified in four of five soil gas and sub-slab gas samples throughout the site at concentrations ranging from 16.7 ug/m^3 to 286 ug/m^3. The chlorinated VOC, TCA was identified in one sub-slab sample at a trace concentration.

Receptor Populations

On-Site Receptors –The Site is currently occupied with two 2-story residential dwellings and a private automobile garage. However, at this time the structures maintained at the Site are unoccupied. Therefore, the only potential on-Site receptors are Site representatives, visitors granted access to the property, and trespassers. 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 sensitive receptors will include adult and child building residents, workers, and visitors.

Off-Site Receptors - 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 0.25 mile) – existing and future
5. Schools (up to 0.25 mile) – existing and future

Potential Points of Exposure

Existing

The Site is currently occupied with two 2-story residential dwellings and a private automobile garage. The surface area of the Site consists of concrete slabs, asphalt parking areas and concrete sidewalks, thus limiting potential contact with on-Site soil. Groundwater is not exposed at the Site, and because the Site is served by the public water supply, groundwater is not used at the Site. There are several structures on Site where soil vapor could potentially enter and accumulate.

Construction/ Remediation Activities

Once redevelopment activities begin, construction workers could come into direct contact with surface and subsurface soils as a result of on-Site construction/excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with any exposed impacted soil, and fill. Similarly, off-Site receptors could be exposed to dust from onsite activities. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the Soil/Materials Management Plan, dust controls, and through the implementation of the Community Air Monitoring Plan and a Construction Health and Safety Plan. A Health & Safety Plan will be implemented to prevent worker exposure to soil. Groundwater is not anticipated to be encountered, and there will be no structures on site where soil vapor could accumulate.

Proposed Future Conditions

Once the remedial actions and redevelopment of the Site has been completed, there will be no potential on-Site or off-Site exposure pathways. Not only will contaminated soil be removed, but the Site will also be fully capped with the concrete building slab, asphalt driveways/parking areas, concrete sidewalks, and a two foot certified clean fill cap, which will prevent contact with any residual soils. Any exposures to vapors from off-site sources will be prevented by installation of a passive sub-slab depressurization system (SSDS), vapor barrier and building slab. 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 route is the mechanism by which a receptor comes into contact with a chemical. 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, or soil.

Overall Human Health Exposure Assessment

Based upon this analysis, potential complete on-site exposure pathways appear to be present only during the current unremediated phase and the remedial action phase. Under current conditions, on-Site exposure is minimized by preventing access to the Site. During the remedial action, on-site exposure pathways will be minimized by preventing access to the Site, through implementation of soil/materials management, stormwater pollution prevention, dust controls, employment of a community air monitoring plan, and implementation of a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/ fill, as all soil that exceeds Track 1 Unrestricted Use SCOs will have been removed, and the SSDS, vapor barrier and concrete building slab will minimize potential for soil vapor intrusion.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 PROJECT ORGANIZATION AND OVERSIGHT

Principal personnel who will participate in the remedial action include Benjamin Hernandez, Project Manager. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Joel Rogers PE and Kevin Kleaka QEP.

5.2 SITE SECURITY

Site access will be controlled by gated locked entrances to the fenced site.

5.3 WORK HOURS

The hours for operation of remedial construction will be from 8am to 2:30pm or as stipulated under the NYC DOB permit. 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 D**. The Site Safety Coordinator will be Benjamin Hernandez. 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. Exceedences 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 (mcg/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 mcg/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 mcg/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 mcg/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 incompliance 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.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations. Staging locations will be reported to OER prior to the start of the remedial action.

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, 2318 Flatbush Avenue Corp. 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; lose 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; storm water management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; 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 it 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) 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 reported to OER prior to the start of the remedial action.

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 SCOs are 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;
- 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.
- The property will continue to be flagged with an E-Designation by the NYC Department of Buildings if Track 1 is not achieved.
- Reports and supporting material will be submitted in digital form.

Remedial Action Report Certification

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

I, Joel Rogers, P.E., 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 Site located at 38-20 & 38-26 28th Street, Long Island City, New York.

I, Kevin Kleaka, am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the located at 38-20 & 38-26 28th Street, Long Island City, New York.

I certify that the OER-approved Remedial Action Work Plan dated October 28, 2013 and Stipulations in a letter; 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 three month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	1	2
Fact Sheet 2 announcing start of remedy	2	2
Mobilization	2	2
Remedial Excavation	2	2
Demobilization	1	1
Record Declaration of Covenants and Restrictions	2	2
Submit Remedial Action Report	5	5

TABLES

Table1 - Track 1 Soil Cleanup Objectives
38-20 38-26 28th Street
Long Island City, NY

Table 375-6.8(a) - Unrestricted Use Soil Soil Cleanup Objectives		
CAS Number	**Contaminent**	**Unrestricted Use Soil Cleanup Objectives (ppm)**
Volitile Organic Compounds		
71-55-6	1,1,1-Trichloroethane [f]	0.68
75-34-3	1,1-Dichloroethane [f]	0.27
75-35-4	1,1-Dichloroethene[f]	0.33
95-50-1	1,2-Dichlorobenzene[f]	1.1
107-06-2	1,2-Dichloroethane	0.02[c]
156-59-2	cis -1,2-Dichloroethene [f]	0.25
156-60-5	trans-1,2-Dichloroethene [f]	0.19
541-73-1	1,3-Dichlorobenzene[f]	2.4
106-46-7	1,4-Dichlorobenzene	1.8
123-91-1	1,4-Dioxane	0.1 [b]
67-64-1	Acetone	0.05
71-43-2	Benzene	0.06
104-51-8	n-Butylbenzene [f]	12
56-23-5	Carbon tetrachloride [f]	0.76
108-90-7	Chlorobenzene	1.1
67-66-3	Chloroform	0.37
100-41-4	Ethylbenzene[f]	1
118-74-1	Hexachlorobenzene [f]	0.33[b]
78-93-3	Methyl ethyl ketone	0.12
1634-04-4	Methyl tert-butyl ether [f]	0.93
75-09-2	Methylene chloride	0.05
103-65-1	n - Propylbenzene [f]	3.9
135-98-8	sec-Butylbenzene [f]	11
98-06-6	tert-Butylbenzene[f]	5.9
127-18-4	Tetrachloroethene	1.3
108-88-3	Toluene	0.7
79-01-6	Trichloroethene	0.47
95-63-6	1,2,4-Trimethylbenzene [f]	3.6
108-67-8	1,3,5-Trimethylbenzene[f]	8.4
75-01-4	Vinyl chloride[f]	0.02
1330-20-7	Xylene (mixed)	0.26
Semi-Volitile Organic Compounds		
83-32-9	Acenaphthene	20
208-96-8	Acenapthylene [f]	100 [a]
120-12-7	Anthracene [f]	100 [a]
56-55-3	Benz(a)anthracene [f]	1[c]
50-32-8	Benzo(a)pyrene	1[c]
205-99-2	Benzo(b)fluoranthene[f]	1[c]
191-24-2	Benzo(g,h,i)perylene [f]	100
207-08-9	Benzo(k)fluoranthene[f]	0.8 [c]
218-01-9	Chrysene [f]	1[c]
53-70-3	Dibenz(a,h)anthracene[f]	0.33 [b]
206-44-0	Fluoranthene [f]	100 [a]
86-73-7	Fluorene	30
193-39-5	Indeno(1,2,3-cd)pyrene [f]	0.5 [c]
108-39-4	m-Cresol [f]	0.33 [b]
91-20-3	Naphthalene [f]	12
95-48-7	o-Cresol [f]	0.33 [b]
106-44-5	p-Cresol [f]	0.33 [b]
87-86-5	Pentachlorophenol	0.8[b]
85-01-8	Phenanthrene [f]	100
108-95-2	Phenol	0.33[b]
129-00-0	Pyrene[f]	100

Table1 - Track 1 Soil Cleanup Objectives
38-20 38-26 28th Street
Long Island City, NY

CAS Number	Contaminent	Unrestricted Use Soil Cleanup Objectives (ppm)
PCBs / Pesticides		
93-72-1	2,4,5-TP Acid (Silvex)[f]	3.8
72-55-9	4,4'-DDE	0.0033 [b]
50-29-3	4,4'-DDT	0.0033 [b]
72-54-8	4,4'-DDD	0.0033 [b]
309-00-2	Aldrin	0.005 [c]
319-84-6	alpha-BHC	0.02
319-85-7	beta-BHC	0.036
5103-71-9	Chlordane (alpha)	0.094
319-86-8	delta-BHC [g]	0.04
132-64-9	Dibenzofuran [f]	7
60-57-1	Dieldrin	0.005[c]
959-98-8	Endosulfan I[d, f]	2.4
33213-65-9	Endosulfan II[d, f]	2.4
1031-07-8	Endosulfan sulfate[d, f]	2.4
72-20-8	Endrin	0.014
76-44-8	Heptachlor	0.042
58-89-9	Lindane	0.1
1336-36-3	Polychlorinated biphenyls	0.1
Metals		
7440-38-2	Arsenic	13 [c]
7440-39-3	Barium	350 [c]
7440-41-7	Beryllium	7.2
7440-43-9	Cadmium	2.5 [c]
18540-29-9	Chromium, hexavalent [e]	1[b]
16065-83-1	Chromium, trivalent [e]	30 [c]
7440-50-8	Copper	50
	Total Cyanide [e, f]	27
7439-92-1	Lead	63 [c]
7439-96-5	Manganese	1600 [c]
	Total Mercury	0.18 [c]
7440-02-0	Nickel	30
7782-49-2	Selenium	3.9[c]
7440-22-4	Silver	2
7440-66-6	Zinc	109 [c]

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

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

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

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

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

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

Table 2 - Track 2 Soil Cleanup Objectives
38-20 38-26 28th Street
Long Island City, NY

Table 375-6.8(b) - Restricted Use Soil Soil Cleanup Objectives							
		Protection of Public Health				Protection of Ecological Resources	Protection of Groundwater
CAS Number	Contaminant	Residential	Restricted - Residential	Commercial	Industrial		
Volitile Organic Compounds							
71-55-6	1,1,1-Trichloroethane	100[a]	100[a]	500[b]	1,000[c]	NS	0.68
75-34-3	1,1-Dichloroethane	19	26	240	480	NS	0.27
75-35-4	1,1-Dichloroethene	100[a]	100[a]	500[b]	1,000[c]	NS	0.33
95-50-1	1,2-Dichlorobenzene	100[a]	100[a]	500[b]	1,000[c]	NS	1.1
107-06-2	1,2-Dichloroethane	2.3	3.1	30	60	10	0.02[f]
156-59-2	cis-1,2-Dichloroethene	59	100[a]	500[b]	1,000[c]	NS	0.25
156-60-5	trans-1,2-Dichloroethene	100[a]	100[a]	500[b]	1,000[c]	NS	0.19
541-73-1	1,3-Dichlorobenzene	17	49	280	560	NS	2.4
106-46-7	1,4-Dichlorobenzene	9.8	13	130	250	20	1.8
123-91-1	1,4-Dioxane	9.8	13	130	250	0.1[e]	0.1[e]
67-64-1	Acetone	100[a]	100[b]	500[b]	1,000[c]	2.2	0.05
71-43-2	Benzene	2.9	4.8	44	89	70	0.06
104-51-8	Butylbenzene	100[a]	100[a]	500[b]	1,000[c]	NS	12
56-23-5	Carbon tetrachloride	1.4	2.4	22	44	NS	0.76
108-90-7	Chlorobenzene	100[a]	100[a]	500[b]	1,000[c]	40	1.1
67-66-3	Chloroform	10	49	350	700	12	0.37
100-41-4	Ethylbenzene	30	41	390	780	NS	1
118-74-1	Hexachlorobenzene	0.33[e]	1.2	6	12	NS	3.2
78-93-3	Methyl ethyl ketone	100[a]	100[a]	500[b]	1,000[c]	100[a]	0.12
1634-04-4	Methyl tert-butyl ether	62	100[a]	500[b]	1,000[c]	NS	0.93
75-09-2	Methylene chloride	51	100[a]	500[b]	1,000[c]	12	0.05
103-65-1	n-Propylbenzene	100[a]	100[a]	500[b]	1,000[c]	NS	3.9
135-98-8	sec-Butylbenzene	100[a]	100[a]	500[b]	1,000[c]	NS	11
98-06-6	tert-Butylbenzene	100[a]	100[a]	500[b]	1,000[c]	NS	5.9
127-18-4	Tetrachloroethene	5.5	19	150	300	2	1.3
108-88-3	Toluene	100[a]	100[a]	500[b]	1,000[c]	36	0.7
79-01-6	Trichloroethene	10	21	200	400	2	0.47
95-63-6	1,2,4-Trimethylbenzene	47	52	190	380	NS	3.6
108-67-8	1,3,5- Trimethylbenzene	47	52	190	380	NS	8.4
75-01-4	Vinyl chloride	0.21	0.9	13	27	NS	0.02
1330-20-7	Xylene (mixed)	100[a]	100[a]	500[b]	1,000[c]	0.26	1.6
Semi-Volitile Organic Compounds							
83-32-9	Acenaphthene	100[a]	100[a]	500[b]	1,000[c]	20	98
208-96-8	Acenapthylene	100[a]	100[a]	500[b]	1,000[c]	NS	107
120-12-7	Anthracene	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
56-55-3	Benz(a)anthracene	1[f]	1[f]	5.6	11	NS	1[f]
50-32-8	Benzo(a)pyrene	1[f]	1[f]	1[f]	1.1	2.6	22
205-99-2	Benzo(b)fluoranthene	1[f]	1[f]	5.6	11	NS	1.7
191-24-2	Benzo(g,h,i)perylene	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
207-08-9	Benzo(k)fluoranthene	1	3.9	56	110	NS	1.7
218-01-9	Chrysene	1[f]	3.9	56	110	NS	1[f]
53-70-3	Dibenz(a,h)anthracene	0.33[e]	0.33[e]	0.56	1.1	NS	1,000[c]
206-44-0	Fluoranthene	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
86-73-7	Fluorene	100[a]	100[a]	500[b]	1,000[c]	30	386
193-39-5	Indeno(1,2,3-cd)pyrene	0.5[f]	0.5[f]	5.6	11	NS	8.2
108-39-4	m-Cresol	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
91-20-3	Naphthalene	100[a]	100[a]	500[b]	1,000[c]	NS	12
95-48-7	o-Cresol	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
106-44-5	p-Cresol	34	100[a]	500[b]	1,000[c]	NS	0.33[e]
87-86-5	Pentachlorophenol	2.4	6.7	6.7	55	0.8[e]	0.8[e]
85-01-8	Phenanthrene	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
108-95-2	Phenol	100[a]	100[a]	500[b]	1,000[c]	30	0.33[e]
129-00-0	Pyrene	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]

Table 2 - Track 2 Soil Cleanup Objectives
38-20 38-26 28th Street
Long Island City, NY

Table 375-6.8(b) - Restricted Use Soil Soil Cleanup Objectives							
		Protection of Public Health				Protection of Ecological Resources	Protection of Groundwater
CAS Number	Contaminant	Residential	Restricted - Residential	Commercial	Industrial		
PCBs / Pesticides							
93-72-1	2,4,5-TP Acid (Silvex)	58	100[a]	500[b]	1,000[c]	NS	3.8
72-55-9	4,4'-DDE	1.8	8.9	62	120	0.0033 [e]	17
50-29-3	4,4'-DDT	1.7	7.9	47	94	0.0033 [e]	136
72-54-8	4,4'-DDD	2.6	13	92	180	0.0033 [e]	14
309-00-2	Aldrin	0.019	0.097	0.68	1.4	0.14	0.19
319-84-6	alpha-BHC	0.097	0.48	3.4	6.8	0.04[g]	0.02
319-85-7	beta-BHC	0.072	0.36	3	14	0.6	0.09
5103-71-9	Chlordane (alpha)	0.91	4.2	24	47	1.3	2.9
319-86-8	delta-BHC	100[a]	100[a]	500[b]	1,000[c]	0.04[g]	0.25
132-64-9	Dibenzofuran	14	59	350	1,000[c]	NS	210
60-57-1	Dieldrin	0.039	0.2	1.4	2.8	0.006	0.1
959-98-8	Endosulfan I	4.8[i]	24[i]	200[i]	920[i]	NS	102
33213-65-9	Endosulfan II	4.8[i]	24[i]	200[i]	920[i]	NS	102
1031-07-8	Endosulfan sulfate	4.8[i]	24[i]	200[i]	920[i]	NS	1,000[c]
72-20-8	Endrin	2.2	11	89	410	0.014	0.06
76-44-8	Heptachlor	0.42	2.1	15	29	0.14	0.38
58-89-9	Lindane	0.28	1.3	9.2	23	6	0.1
1336-36-3	Polychlorinated biphenyls	1	1	1	25	1	3.2
Metals							
7440-38-2	Arsenic	16[f]	16[f]	16[f]	16[f]	13[f]	16[f]
7440-39-3	Barium	350[f]	400	400	10,000 [d]	433	820
7440-41-7	Beryllium	14	72	590	2,700	10	47
7440-43-9	Cadmium	2.5[f]	4.3	9.3	60	4	7.5
18540-29-9	Chromium, hexavalent [h]	22	110	400	800	1[e]	19
16065-83-1	Chromium, trivalent[h]	36	180	1,500	6,800	41	NS
7440-50-8	Copper	270	270	270	10,000 [d]	50	1,720
	Total Cyanide [h]	27	27	27	10,000 [d]	NS	40
7439-92-1	Lead	400	400	1,000	3,900	63[f]	450
7439-96-5	Manganese	2,000[f]	2,000[f]	10,000 [d]	10,000 [d]	1600[f]	2,000[f]
	Total Mercury	0.81[j]	0.81[j]	2.8[j]	5.7[j]	0.18[f]	0.73
7440-02-0	Nickel	140	310	310	10,000 [d]	30	130
7782-49-2	Selenium	36	180	1,500	6,800	3.9[f]	4[f]
7440-22-4	Silver	36	180	1,500	6,800	2	8.3
7440-66-6	Zinc	2200	10,000 [d]	10,000 [d]	10,000 [d]	109[f]	2,480

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified. See Technical Support Document (TSD).

[a] The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

[b] The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

[c] The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

[d] The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

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

[f] For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.

[g] This SCO is derived from data on mixed isomers of BHC.

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

[i] This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.

[j] This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts). See TSD Table 5.6-1.

Table 3a - Onsite Soil Reuse Criteria for Track 1 SCOs

38-20 38-26 28th Street

Long Island City, NY

Table 375-6.8(a) - Unrestricted Use Soil Soil Cleanup Objectives		
CAS Number	**Contaminent**	**Unrestricted Use Soil Cleanup Objectives (ppm)**
Volitile Organic Compounds		
71-55-6	1,1,1-Trichloroethane [f]	0.68
75-34-3	1,1-Dichloroethane [f]	0.27
75-35-4	1,1-Dichloroethene [f]	0.33
95-50-1	1,2-Dichlorobenzene [f]	1.1
107-06-2	1,2-Dichloroethane	0.02 [c]
156-59-2	cis -1,2-Dichloroethene [f]	0.25
156-60-5	trans-1,2-Dichloroethene [f]	0.19
541-73-1	1,3-Dichlorobenzene [f]	2.4
106-46-7	1,4-Dichlorobenzene	1.8
123-91-1	1,4-Dioxane	0.1 [b]
67-64-1	Acetone	0.05
71-43-2	Benzene	0.06
104-51-8	n-Butylbenzene [f]	12
56-23-5	Carbon tetrachloride [f]	0.76
108-90-7	Chlorobenzene	1.1
67-66-3	Chloroform	0.37
100-41-4	Ethylbenzene [f]	1
118-74-1	Hexachlorobenzene [f]	0.33 [b]
78-93-3	Methyl ethyl ketone	0.12
1634-04-4	Methyl tert-butyl ether [f]	0.93
75-09-2	Methylene chloride	0.05
103-65-1	n - Propylbenzene [f]	3.9
135-98-8	sec-Butylbenzene [f]	11
98-06-6	tert-Butylbenzene [f]	5.9
127-18-4	Tetrachloroethene	1.3
108-88-3	Toluene	0.7
79-01-6	Trichloroethene	0.47
95-63-6	1,2,4-Trimethylbenzene [f]	3.6
108-67-8	1,3,5-Trimethylbenzene [f]	8.4
75-01-4	Vinyl chloride [f]	0.02
1330-20-7	Xylene (mixed)	0.26
Semi-Volitile Organic Compounds		
83-32-9	Acenaphthene	20
208-96-8	Acenapthylene [f]	100 [a]
120-12-7	Anthracene [f]	100 [a]
56-55-3	Benz(a)anthracene [f]	1 [c]
50-32-8	Benzo(a)pyrene	1 [c]
205-99-2	Benzo(b)fluoranthene [f]	1 [c]
191-24-2	Benzo(g,h,i)perylene [f]	100
207-08-9	Benzo(k)fluoranthene [f]	0.8 [c]
218-01-9	Chrysene [f]	1 [c]
53-70-3	Dibenz(a,h)anthracene [f]	0.33 [b]
206-44-0	Fluoranthene [f]	100 [a]
86-73-7	Fluorene	30
193-39-5	Indeno(1,2,3-cd)pyrene [f]	0.5 [c]
108-39-4	m-Cresol [f]	0.33 [b]
91-20-3	Naphthalene [f]	12
95-48-7	o-Cresol [f]	0.33 [b]
106-44-5	p-Cresol [f]	0.33 [b]
87-86-5	Pentachlorophenol	0.8 [b]
85-01-8	Phenanthrene [f]	100
108-95-2	Phenol	0.33 [b]
129-00-0	Pyrene [f]	100

Table 3a - Onsite Soil Reuse Criteria for Track 1 SCOs

38-20 38-26 28th Street

Long Island City, NY

PCBs / Pesticides		
93-72-1	2,4,5-TP Acid (Silvex)[f]	3.8
72-55-9	4,4'-DDE	0.0033 [b]
50-29-3	4,4'-DDT	0.0033 [b]
72-54-8	4,4'-DDD	0.0033 [b]
309-00-2	Aldrin	0.005 [c]
319-84-6	alpha-BHC	0.02
319-85-7	beta-BHC	0.036
5103-71-9	Chlordane (alpha)	0.094
319-86-8	delta-BHC [g]	0.04
132-64-9	Dibenzofuran [f]	7
60-57-1	Dieldrin	0.005[c]
959-98-8	Endosulfan I[d, f]	2.4
33213-65-9	Endosulfan II[d, f]	2.4
1031-07-8	Endosulfan sulfate[d, f]	2.4
72-20-8	Endrin	0.014
76-44-8	Heptachlor	0.042
58-89-9	Lindane	0.1
1336-36-3	Polychlorinated biphenyls	0.1
Metals		
7440-38-2	Arsenic	13 [c]
7440-39-3	Barium	350 [c]
7440-41-7	Beryllium	7.2
7440-43-9	Cadmium	2.5 [c]
18540-29-9	Chromium, hexavalent [e]	1[b]
16065-83-1	Chromium, trivalent [e]	30 [c]
7440-50-8	Copper	50
	Total Cyanide [e, f]	27
7439-92-1	Lead	63 [c]
7439-96-5	Manganese	1600 [c]
	Total Mercury	0.18 [c]
7440-02-0	Nickel	30
7782-49-2	Selenium	3.9[c]
7440-22-4	Silver	2
7440-66-6	Zinc	109 [c]

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

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

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

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

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

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

Table 3b - Onsite Soil Reuse Criteria for Track 2 SCOs

38-20 38-26 28th Street

Long Island City, NY

Table 375-6.8(b) - Restricted Use Soil Soil Cleanup Objectives		
CAS Number	**Contaminant**	**Restricted - Residential**
Volitile Organic Compounds		
71-55-6	1,1,1-Trichloroethane	100[a]
75-34-3	1,1-Dichloroethane	26
75-35-4	1,1-Dichloroethene	100[a]
95-50-1	1,2-Dichlorobenzene	100[a]
107-06-2	1,2-Dichloroethane	3.1
156-59-2	cis-1,2-Dichloroethene	100[a]
156-60-5	trans-1,2-Dichloroethene	100[a]
541-73-1	1,3-Dichlorobenzene	49
106-46-7	1,4-Dichlorobenzene	13
123-91-1	1,4-Dioxane	13
67-64-1	Acetone	100[b]
71-43-2	Benzene	4.8
104-51-8	Butylbenzene	100[a]
56-23-5	Carbon tetrachloride	2.4
108-90-7	Chlorobenzene	100[a]
67-66-3	Chloroform	49
100-41-4	Ethylbenzene	41
118-74-1	Hexachlorobenzene	1.2
78-93-3	Methyl ethyl ketone	100[a]
1634-04-4	Methyl tert-butyl ether	100[a]
75-09-2	Methylene chloride	100[a]
103-65-1	n-Propylbenzene	100[a]
135-98-8	sec-Butylbenzene	100[a]
98-06-6	tert-Butylbenzene	100[a]
127-18-4	Tetrachloroethene	19
108-88-3	Toluene	100[a]
79-01-6	Trichloroethene	21
95-63-6	1,2,4-Trimethylbenzene	52
108-67-8	1,3,5- Trimethylbenzene	52
75-01-4	Vinyl chloride	0.9
1330-20-7	Xylene (mixed)	100[a]
Semi-Volitile Organic Compounds		
83-32-9	Acenaphthene	100[a]
208-96-8	Acenapthylene	100[a]
120-12-7	Anthracene	100[a]
56-55-3	Benz(a)anthracene	1[f]
50-32-8	Benzo(a)pyrene	1[f]
205-99-2	Benzo(b)fluoranthene	1[f]
191-24-2	Benzo(g,h,i)perylene	100[a]
207-08-9	Benzo(k)fluoranthene	3.9
218-01-9	Chrysene	3.9
53-70-3	Dibenz(a,h)anthracene	0.33[e]
206-44-0	Fluoranthene	100[a]
86-73-7	Fluorene	100[a]
193-39-5	Indeno(1,2,3-cd)pyrene	0.5[f]
108-39-4	m-Cresol	100[a]
91-20-3	Naphthalene	100[a]
95-48-7	o-Cresol	100[a]
106-44-5	p-Cresol	100[a]
87-86-5	Pentachlorophenol	6.7
85-01-8	Phenanthrene	100[a]
108-95-2	Phenol	100[a]
129-00-0	Pyrene	100[a]
PCBs / Pesticides		
93-72-1	2,4,5-TP Acid (Silvex)	100[a]

Table 3b - Onsite Soil Reuse Criteria for Track 2 SCOs

38-20 38-26 28th Street

Long Island City, NY

72-55-9	4,4'-DDE	8.9
50-29-3	4,4'-DDT	7.9
72-54-8	4,4'-DDD	13
309-00-2	Aldrin	0.097
319-84-6	alpha-BHC	0.48
319-85-7	beta-BHC	0.36
5103-71-9	Chlordane (alpha)	4.2
319-86-8	delta-BHC	100[a]
132-64-9	Dibenzofuran	59
60-57-1	Dieldrin	0.2
959-98-8	Endosulfan I	24[i]
33213-65-9	Endosulfan II	24[i]
1031-07-8	Endosulfan sulfate	24[i]
72-20-8	Endrin	11
76-44-8	Heptachlor	2.1
58-89-9	Lindane	1.3
1336-36-3	Polychlorinated biphenyls	1
	Metals	
7440-38-2	Arsenic	16[f]
7440-39-3	Barium	400
7440-41-7	Beryllium	72
7440-43-9	Cadmium	4.3
18540-29-9	Chromium, hexavalent [h]	110
16065-83-1	Chromium, trivalent[h]	180
7440-50-8	Copper	270
	Total Cyanide [h]	27
7439-92-1	Lead	400
7439-96-5	Manganese	2,000[f]
	Total Mercury	0.81[j]
7440-02-0	Nickel	310
7782-49-2	Selenium	180
7440-22-4	Silver	180
7440-66-6	Zinc	10,000 [d]

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified. See Technical Support Document (TSD).

[a] The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

[d] The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

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

[f] For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the

[g] This SCO is derived from data on mixed isomers of BHC.

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

[i] This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.

[j] This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts). See TSD Table 5.6-1.

FIGURES

PROJECT # 4338-03

Figure # 1

TITLE: Site Location Plan

38-20 28th Street
Long Island City, New York

DRAWN BY:	MV
CHECKED BY:	JC
DATE:	9/05/2012
SCALE:	XX

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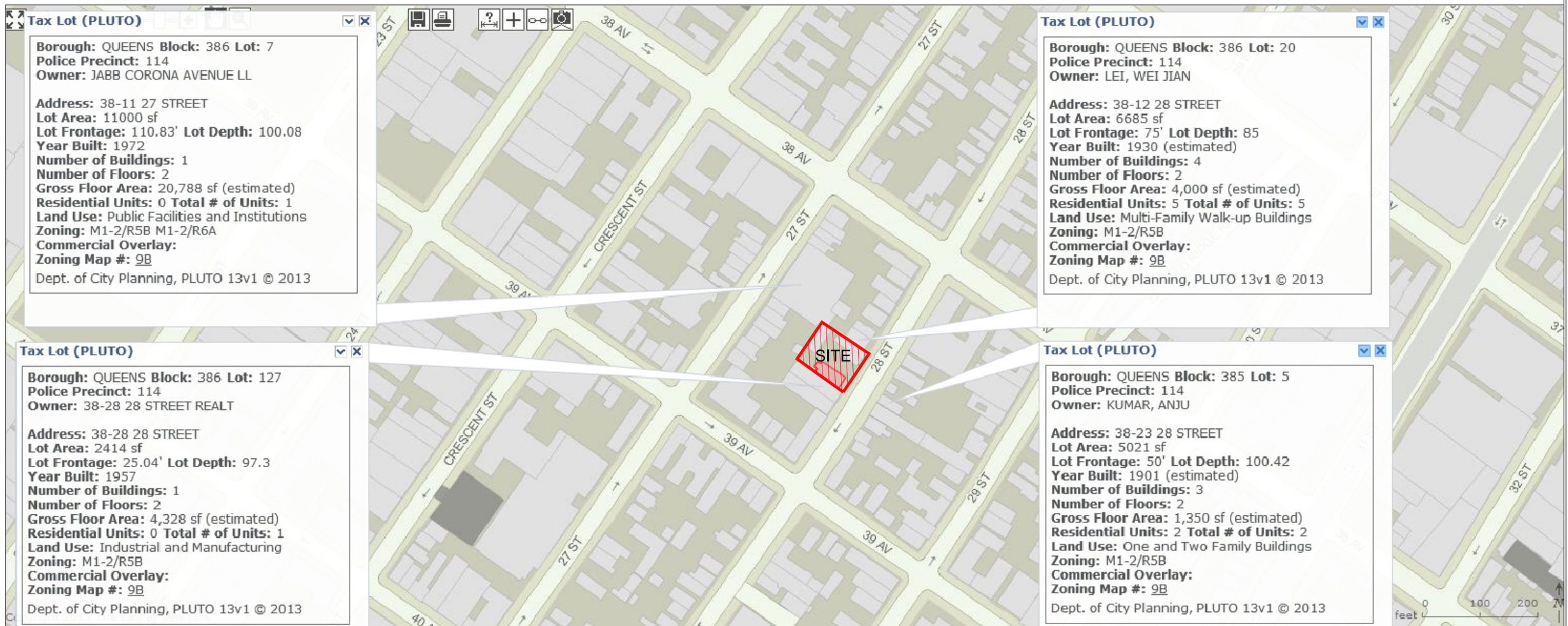
TITLE: Site Boundary Map

38-20 28th Street
Long Island City, New York

DRAWN BY:	MV
CHECKED BY:	JC
DATE:	9/05/2012
SCALE:	XX

PROJECT #	4338-03
FIGURE #	2

Project Site Property Boundary



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TITLE:

FIGURE 3

SURROUNDING LAND USE

SITE:

38-20 28th STREET
Long Island City, NY

TAX BLOCK 386 ;
LOT 23 & 25

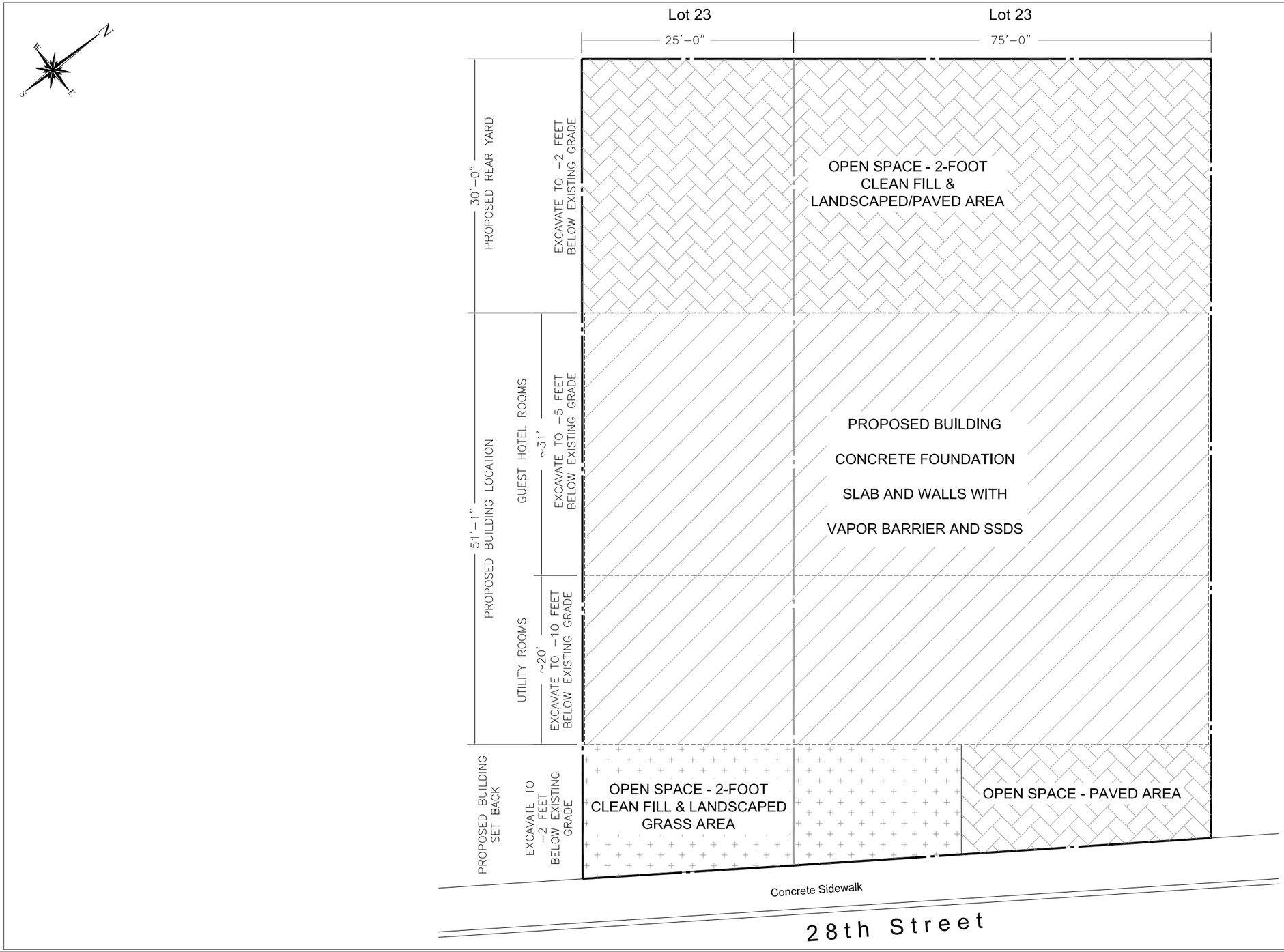
DRAWING NO: Figure 3

PROJECT NO.	4338-01-03-3001
DESIGNED BY:	BH
DRAWN BY:	BH
CHECKED BY:	KK
DATE:	10/15/2013
SCALE:	NTS

REVISIONS NO:	DATE:

NOTES:

LEGEND:



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TITLE:

FIGURE 4

EXCAVATION AND COMPOSITE COVER MAP

SITE:

38-20 28th STREET
Long Island City, NY

TAX BLOCK 386 ;
LOT 23 & 25

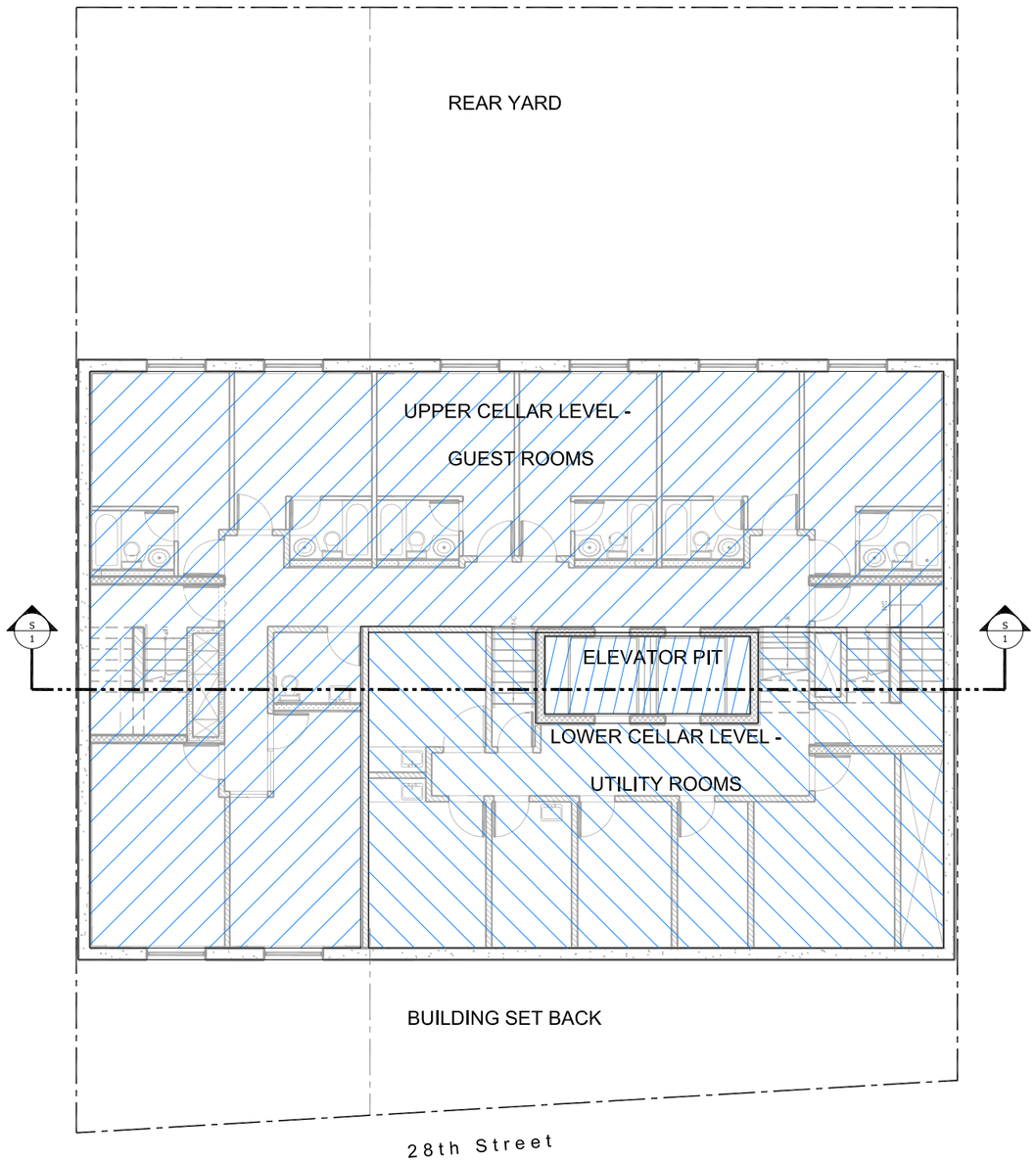
DRAWING NO: Figure 4

PROJECT NO.	4338-01-03-3001
DESIGNED BY:	BH
DRAWN BY:	BH
CHECKED BY:	KK
DATE:	10/15/2013
SCALE:	NTS

REVISIONS NO:	DATE:

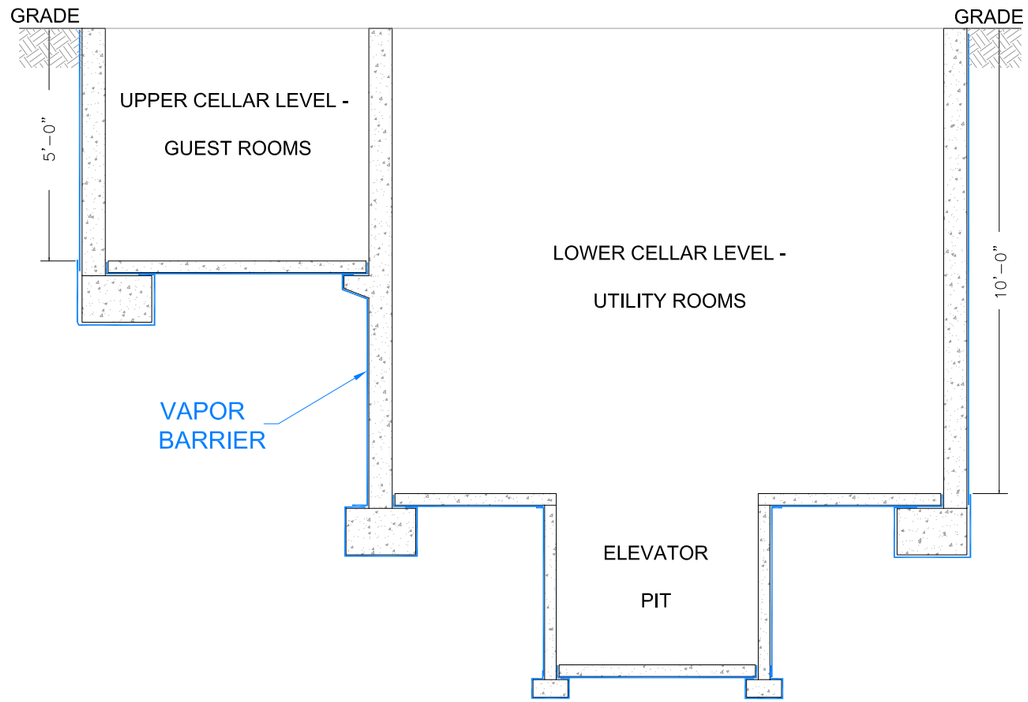
NOTES:

LEGEND:



1 VAPOR BARRIER LAYOUT PLAN

NTS



S1 VAPOR BARRIER INSTALLATION CROSS SECTION

NTS

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LYNDHURST, NEW JERSEY 07071

TITLE:

FIGURE 5A

VAPOR BARRIER INSTALLATION LAYOUT AND CROSS SECTION

SITE:

38-20 28th STREET
Long Island City, NY

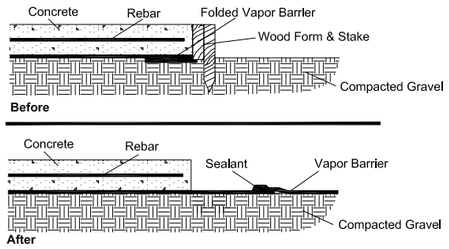
TAX BLOCK 386 ;
LOT 23 & 25

DRAWING NO: Figure 5A		REVISIONS NO:	REVISIONS DATE:
PROJECT NO.	4338-01-03-3001		
DESIGNED BY:	BH		
DRAWN BY:	BH		
CHECKED BY:	KK		
DATE:	10/15/2013		
SCALE:	NTS		

NOTES:

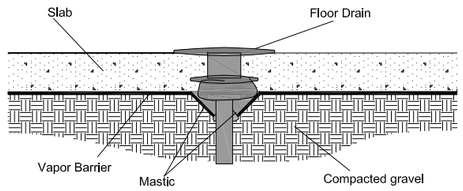
LEGEND:

Construction Joint Application for Large Slabs Placed in Stages



NOT TO SCALE

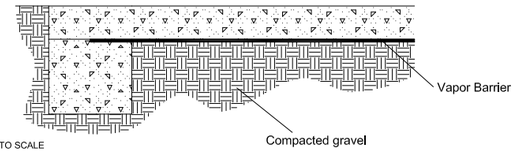
Membrane Interaction with Floor Drain



NOT TO SCALE

Membrane Termination Between Footer and Slab Needing Concrete Bond

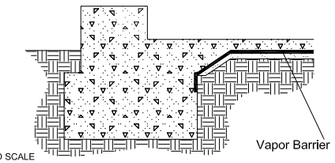
•Overlap the vapor barrier as far as necessary to ensure that it remains sandwiched between the slab and footer during construction, but not so far that it prohibits adequate bonding of concrete to concrete.



NOT TO SCALE

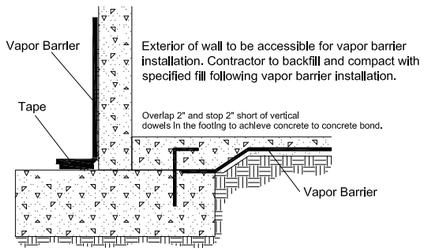
Membrane Termination Onto Exterior Wall Footing

Lap membrane down the vertical face of the footing 2" to 4"



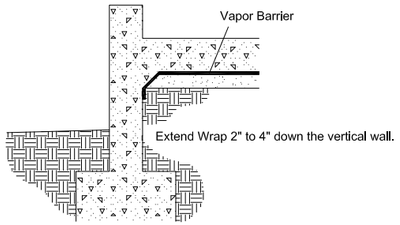
NOT TO SCALE

Membrane Termination Onto Footing just Short of Rebar Dowels



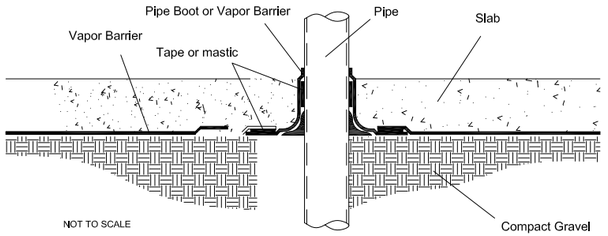
NOT TO SCALE

MembraneTermination Onto Below Slab Wall Footing



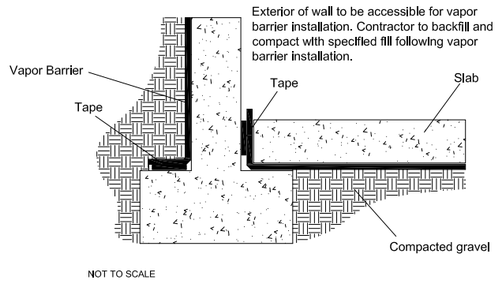
NOT TO SCALE

Membrane Interaction with Pipe Penetration



NOT TO SCALE

MembraneTermination Onto Outside Cellar Wall Footing



NOT TO SCALE

2 TYPICAL VAPOR BARRIER INSTALLATION DETAILS

NTS

VAPOR BARRIER CONSTRUCTION NOTES:

1. 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, unless otherwise approved by design engineer. In no case shall membrane contain recycled plastic product or have a permeance of greater than 0.04 Perms.

2. 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.

3. 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 ¾" 2B pea gravel, or an equivalent approved by design engineer. Do not begin installation until unacceptable conditions have been corrected.

4. 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. 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 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.

5. Protect membrane from damage during installation of reinforcing steel and utilities, and during placement of concrete slab.

6. 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.

7. Place concrete within 30 days of vapor barrier installation.

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TITLE: **FIGURE 5B**

VAPOR BARRIER TYPICAL DETAILS AND NOTES

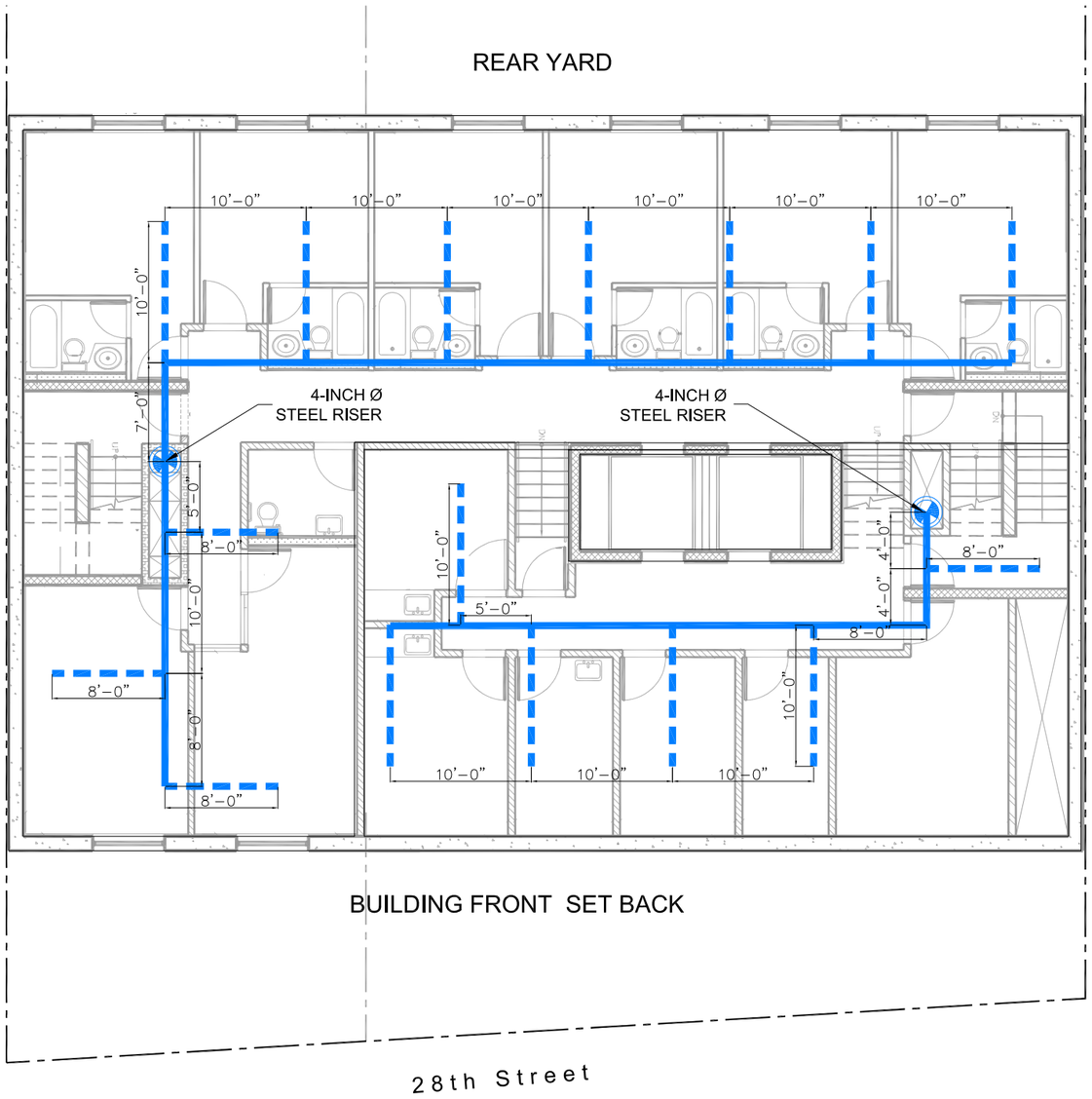
SITE:
38-20 28th STREET
Long Island City, NY

TAX BLOCK 386 ;
LOT 23 & 25

DRAWING NO: Figure 5B		REVISIONS NO:	REVISIONS DATE:
PROJECT NO.	4338-01-03-3001		
DESIGNED BY:	BH		
DRAWN BY:	BH		
CHECKED BY:	KK		
DATE:	10/15/2013		
SCALE:	NTS		

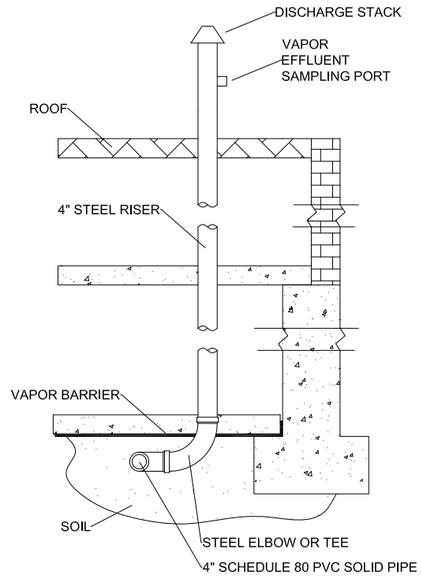
NOTES:

LEGEND:



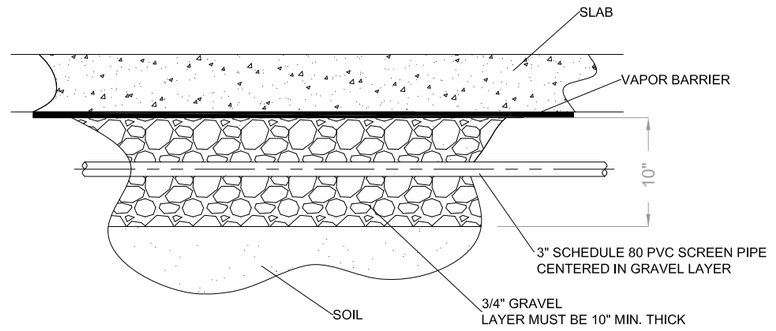
1 CONCEPTUAL PASSIVE SUB SLAB DEPRESSURIZATION SYSTEM LAYOUT

NTS



DEPRESSURIZATION SCREEN PIPING DETAIL

N.T.S.



1 TYPICAL SSDS DETAILS

NTS

SUB-SLAB 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 ACI 302.1R-04 SECTION 4.1. PLACE, LEVEL, AND COMPACT GRAVEL BED CONSISTING OF CLEAN 3/4-INCH PEA GRAVEL, OR AN EQUIVALENT APPROVED BY THE DESIGN ENGINEER. GRAVEL TO BE NO MORE THAN 1-INCH IN DIAMETER, WITH NO SHARP 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 BENEATH THE BUILDING SLAB. PIPING SHALL BE PITCHED TOWARD SCREENS FOR DRAINAGE. BACKFILL AND COMPACT OVER SUPPORTED SCREEN WITH CLEAN 3/4-INCH PEA GRAVEL. TOTAL DEPTH OF COMPACTED GRAVEL SURROUNDING PIPING SHALL BE MINIMUM 10-INCHES THICK. PVC SCREENS SHALL BE CONNECTED TO 4-INCH DIAMETER SCHEDULE 80 PVC SOILD PIPE AND STEEL RISERS. 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 TO THE EXTENT PRACTICABLE. SCREEN TO BE 40-SLOT (0.040 INCH WIDE SLOTS). STEEL RISER PIPE AND FITTINGS FOR THE VERTICAL STACK TO BE PRIMED AND PAINTED WITH WEATHER RESISTENT PAINT. A MINIMUM OF TWO UNIONS SHALL BE INSTALLED ON THE STACK PIPE TO PROVIDE FOR FUTURE MODIFICATION.

5. PLUMBING, PRIMING, GLUING, PAINTING, FASTENING, AND SUPPORTING PVC AND STEEL PIPES, SCREENS, RISERS, AND FITTINGS TO BE CONDUCTED IN ACCORDANCE WITH EXISTING PROJECT PLANS AND SPECIFICATIONS, INDUSTRY STANDARDS, AND MANUFACTURERS INSTRUCTIONS, UNLESS OTHERWISE APPROVED BY THE PROJECT ENGINEER. THE INSTALLATION SHALL COMPLY WITH ALL 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.

7. SAMPLING PORTS SHALL BE INSTALLED AT EACH SEPARATE BRANCH OF THE SSDS FOR TESTING OF THE SYSTEM EFFECTIVENESS.

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TITLE: **FIGURE 6**

CONCEPTUAL PASSIVE SUB SLAB DEPRESSURIZATION SYSTEM LAYOUT AND DETAILS

SITE:

38-20 28th STREET
Long Island City, NY

TAX BLOCK 386 ;
LOT 23 & 25

DRAWING NO: Figure 6

PROJECT NO.	4338-01-03-3001
DESIGNED BY:	BH
DRAWN BY:	BH
CHECKED BY:	KK
DATE:	10/15/2013
SCALE:	NTS

REVISIONS NO:	DATE:

NOTES:
1. CONCEPTUAL PLAN ONLY, NOT FOR CONSTRUCTION

LEGEND:
- SCH. 80 Ø 3-INCH PVC SCREEN
- SCH. 80 Ø 4-INCH PVC SOLID PIPE
- STEEL RISER

APPENDIX A

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and 2318 Flatbush Avenue Corp. 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, 2318 Flatbush Avenue Corp. 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, Ms. Hannah Moore, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

Project Contact List. 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.

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. 2318 Flatbush Avenue Corp. will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Repository Name: Broadway Branch Queens Library

Repository Address: 4020 Broadway, Long Island City NY

Repository Telephone Number: (718) 721-2462

Repository Hours of Operation: Monday: 9am – 8pm; Tuesday: 2pm – 7pm; Wednesday: 11am – 7pm; Thursday: 11am – 7pm; Friday: 11am – 7pm; Saturday: 10am – 5:30pm; Sunday: Closed.

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.

Issues of Public Concern. The major issues of concern to the public will be potential impacts of nuisance dust during the disturbance of soils at the Site. This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to monitor the potential for exposure including a Construction Health and Safety Plan and a Community Air Monitoring Plan are required components of the remedial program. Implementation of these plans will be conducted under the direct oversight of the New York City Office of Environmental Remediation (NYCOER). These plans will specify the following worker and community health and safety activities during remedial activity at the Site:

- On-Site air monitoring for worker protection,
- Perimeter air monitoring for community protection.

The Health and Safety Plan and the Community Air Monitoring Plan prepared as part of the Remedial Action Work Plan will be available for public review at the document repository.

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 2318 Flatbush Avenue Corp., reviewed and approved by OER prior to distribution and mailed by 2318 Flatbush Avenue Corp. 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 B

SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

Reuse of Clean, Recyclable Materials. Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

This project intends to use recycled concrete aggregate wherever possible in grading and backfilling the Site. An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

Reduce Consumption of Virgin and Non-Renewable Resources. Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

The project will reduce the consumption of virgin materials by substituting recycled concrete aggregate for mined gravel and/or sand backfill whenever possible. An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency. Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Recycled concrete materials and other backfill materials will be locally sourced reducing the energy consumption associated with transporting these materials to the Site. 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.

Conversion to Clean Fuels. Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

Recontamination Control. Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

Storm-water Retention. Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

Linkage with Green Building. Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

Paperless Voluntary Cleanup Program. 2318 Flatbush Avenue Corp. is participating in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program. 2318 Flatbush Avenue Corp. 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.

Trees and Plantings. Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

APPENDIX C

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 route is as 3ollows:

1. Exit the site via 28th Street, turn right (heading southwest)
2. Turn right onto Queens Plaza North (heading northeast)
3. Turn left at Crescent Street (heading west)
4. Take ramp onto New York 25 West / Ed Koch Queensboro Bridge (heading west)

Outbound truck transport routes will be reported to OER prior to the start of the remedial action. 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 Queens, 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.

If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by OER with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

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 3:** Soil On-site Reuse Criteria. '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.

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 1**.

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 D

CONSTRUCTION HEALTH AND SAFETY PLAN

CONSTRUCTION HEALTH & SAFETY PLAN

October 28, 2013

OER Project #13CVCP095K
E-Designation #12EHAZ2439Q

Submitted for:
38-20 & 38-26 28th Street
Long Island City, New York

Block 386, Lots 23 & 25

Submitted to:
New York City Office of Environmental Remediation
100 Gold Street, 2nd Floor
New York, NY 10038

Prepared for:
2318 Flatbush Avenue Corp.
38-20 28th Street
Long Island City, New York

Submitted by:
Impact Environmental Closures, Inc.
170 Keyland Court
Bohemia, NY 11716

IE Project Number:

4338-01-03-3001

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Introduction

This Construction Health and Safety Plan (CHASP) describes the procedures to be followed in order to reduce employee exposure to potential health and safety hazards that may be present during environmental investigation activities being performed at the site. The emergency response procedures necessary to respond to such hazards are also described within this CHASP. All activities performed under this CHASP are targeted to comply with Occupational Safety and Health Administration (OSHA) Regulations 29 CFR Part 1910.1025.

This document is not, nor does it purport to be, a complete description of all safety and health requirements applicable to work performed at the site. Rather, the CHASP is a general overview of the compliance policies and work practices applicable to the primary tasks and hazards associated with the environmental assessment portion of the development project, as well as a recitation of minimum safety and health compliance obligations for contractors, subcontractors and workers at the site. All subcontractors of any tier operating at the worksite are obligated to implement and maintain comprehensive safety and health plans for their own employees and to ensure that their employees comply with all applicable safety and health requirements. All subcontractors operating at the worksite should refer to the applicable specific OSHA Standards for detailed requirements.

1.1 Purpose

The purpose of this CHASP is to provide the contractors' field personnel, as well as other site-occupants, with an understanding of the potential chemical and physical hazards that exist or may arise while portions of this project are being performed. To this end, this CHASP also presents information on the progression of the environmental restoration activities and specific details regarding the handling of materials excavated from the site.

The primary objective is to ensure the well-being of all field personnel and the community surrounding this site. In order to accomplish this, project staff and approved subcontractors of any tier shall acknowledge and adhere to the policies and procedures established herein. Accordingly, all personnel assigned to the remediation activities associated with this project (Remedial Personnel) shall read this CHASP and sign the Agreement and Acknowledgment Statement (Appendix F) to certify that they have read, understood, and agree to abide by its provisions. A copy of this CHASP will be available to anyone

that requests it. Personnel involved in construction activities (Construction Personnel) and other Personnel (e.g. government officials, administrators, bank inspectors, assessors, etc.) that will have limited exposure to the site native soil/fill material during construction activities will be instructed on how to reduce the probability of exposure to site contaminants, but will not be required read the CHASP.

2 Application of Health and Safety Plan

The procedures of this CHASP apply for any person that will enter the boundaries of the site or a portion of the Site during environmental remediation activities or construction, until the existing soil/fill material has been covered with either a paved surface or an uncontaminated soil cap. When the Project Manager has designated an area of the site as clear of any environmental issues, construction contractors and subcontractors of any tier will perform the balance of the work in accordance with their individual OSHA-compliant corporate CHASP.

2.1 Restoration Personnel

Employees of contractors and subcontractors of any tier performing the following activities will be considered Restoration Personnel:

- Excavation of native soil/fill material
- Loading of native soil/fill onto vehicles
- Processing of native soil/fill into components
- Transporting of native soil/fill across the site
- Sampling of native soil/fill material for subsequent physical or chemical analysis
- Cleaning or decontaminating equipment or personnel
- Handling of ground waters

All subcontractors, of any tier, must submit a CHASP to the Site Health and Safety Officer for review and approval prior to mobilizing to the site. Only CHASPs that comply with this CHASP will be approved. Where a subcontractors CHASP is deficient, the Site Health and Safety Officer will provide written notification of any required changes. Approved CHASPs will be submitted to the Project Manager and retained on-site for reference by the Site Health and Safety Officer.

2.1.1 Construction Personnel

For this document, “Construction Personnel” is the term given for those employees of contractors and subcontractors of any tier performing activities associated with site development other than those performed by the Remedial Personnel. This designation does not preclude that Construction Personnel will traverse or work upon native soil/fill material, rather, it infers that it will not involve performing

tasks that will create a route of exposure to the contaminants contained therein. Construction Personnel will receive instruction to limit the potential for exposure to these contaminants. Construction Personnel will be prohibited from entering Environmental Remediation Areas (i.e., active excavation / handling / processing areas, loading areas, exclusion zones or support zones).

3 Key Personnel / Identification of Health & Safety Personnel

3.1 Key Personnel

A list of the pertinent personnel authorized to be present on site is as follows:

Title	Name	Telephone Number
Project Manager *Impact Environmental*	Benjamin Hernandez Salazar	(O) 631-269-8800 (C) 631-334-2354
Field Operations Leader *Impact Environmental*	Hal Benjamin	(O) 631-269-8800 (C) 631-897-7189
Site Health & Safety Officer *Impact Environmental*	Benjamin Hernandez Salazar	(O) 631-269-8800 (C) 631-334-2354

3.2 Organizational Responsibility

3.2.1 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 (e.g.., EPA, contractors, state officials, visitors) 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.

3.2.2 Field Operations Leader

The Field Operations Leader will be responsible for field operations and safety. Specific duties will include, but are not limited to:

- Scheduling with the construction company and their subcontractors;
- Coordinating with the Site Health and Safety Officer in determining protection levels;
- Documenting field activities;
- Coordinate activities between environmental and construction personnel.
- Coordination with waste management contractors.
- Review and approval of waste disposal facilities.

In the event that the Project Manager and the Site Health and Safety Officer are not on site, the Field Operations Leader will assume all responsibility of the Site Health and Safety Officer.

3.2.3 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.

4 Health and Safety Risk Analysis

The field tasks covered by the CHASP will include material excavation with hydraulic equipment and hand tools, the manual sorting of materials, and containerization of soil and groundwater samples. Additionally, standard job task hazards that are inherent to a construction project will exist.

4.1 Explosion and Fire

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to explosion and fire. Rather, contractors, subcontractors and workers at the site must refer to OSHA's Fire Protection and Prevention Standard, set forth at 29 C.F.R. § 1910 part 1926.35, as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations. The following are possible fire and explosion hazards that may be encountered on the job site along with fire preventive measures to take.

4.1.1 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. For OSHA-defined "confined space" activities, work will stop if the LEL reading exceeds 10%.

4.1.2 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. If the oxygen level is less than 19.5%, do not enter the space without level B PPE.

4.1.3 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 or designated field worker 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.

4.2 Operational Safety Hazards

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to earth moving equipment. Rather, contractors, subcontractors and workers at the site must refer to OSHA's Excavation Standard, set forth at 29 C.F.R. § 1910 Subpart P as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations.

4.2.1 Heavy Machinery / Equipment

All site employees must remain aware of those site activities that involve the use of heavy equipment and machinery. Respiratory protection and protective eyewear may be worn frequently during site activities. This protective equipment significantly reduces peripheral vision of the wearer. Therefore, it is essential that all employees at the site exercise extreme caution during operation of equipment and machinery to avoid physical injury to themselves or others.

4.2.2 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.

4.3 Noise Hazards

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to noise hazards. Rather, contractors, subcontractors and workers at the site must refer to OSHA's Occupational Noise Exposure Standard, set forth at 29 C.F.R. § 1910 part 1926.52, as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations.

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.

4.4 Safe Material Handling

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to safe material (soil/fill) handling. Rather, contractors, subcontractors and workers at the site must refer to OSHA's Eye and Face, and Respiratory Safety Standards, set forth at 29 C.F.R. § 1910 Parts 1926.102 and 1926.103 as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations.

Skin and eye contact with contaminated soil/fill or materials in contact with the 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.

4.5 Temperature Hazards

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to temperature stresses. Rather, contractors, subcontractors and workers at the site must refer to OSHA's Technical Manual (TED 1-0.15A), Section III – Chapter 4 (1999) as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations.

Since climatic changes cannot be avoided, work schedules will be adjusted to provide time intervals for intake of juices, juice products, and water in an area free from contamination and in quantities appropriate for fluid replacement to prevent heat stress conditions from occurring.

4.5.1 Types of Heat Stress

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

4.5.1.1 Heat Rash

Result of continuous exposure to heat, humid air, and chafing clothes. Heat rash is uncomfortable and decreases the ability to tolerate heat.

4.5.1.2 Heat Cramps

Result of the inadequate replacement of body electrolytes lost through perspiration. Signs include severe spasms and pain in the extremities and abdomen.

4.5.1.3 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.

4.5.1.4 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.

4.5.2 Heat Stress Prevention

A. 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.
B. 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).

C. Conduct non-emergency response activities in the early morning or evening during very hot weather.

D. Provide shelter against heat and direct sunlight to protect personnel. Take breaks in shaded areas.

E. Rotate workers utilizing protective clothing during hot weather.

F. Establish a work regime that will provide adequate rest periods, with personnel working in shifts.

4.6 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 ºC (20 ºF), 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 (adapted from TLV's and Biological Exposure Indices 1988-1989, ACGIH).

5 Personnel Training

5.1 Pre-assignment and OSHA Training

All Remedial 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). Restoration 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.

On-site managers and supervisors of Restoration Personnel (Field Operations Leader, Site Health and Safety Officer) directly responsible for employees engaged in hazardous substance operations have received an initial 40-hour HAZWOPER training course and an additional (above the 40-hour HAZWOPER) eight hours of supervisory training. These training requirements comply with the OSHA Hazardous Waste Operations and Emergency Response Regulation, 29 CFR 1910.120. The Site Health and Safety Officer will be certified in First Aid and Cardiovascular Pulmonary Resuscitation.

The Site Health and Safety Officer will conduct an on-site training meeting for all Construction 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 by Construction Personnel 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.

5.2 Respirator Requirements

5.2.1 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.

5.2.2 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. Appendix E has a copy of the forms to be completed.

A medical examination may be necessary whenever the employee gives a positive response to any of questions 1 through 8 in Appendix C, Part A, Section 2.

6 Personal Protective Equipment

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to personal protective equipment. Rather, contractors, subcontractors and workers at the site must refer to OSHA's Personal Protective Equipment Standard, set forth at 29 C.F.R. § 1910.Part 1926.28(a) as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations.

The purpose of personal protective clothing and equipment (PPE) is to shield or isolate individuals from the chemical, physical, and biological hazards that may be encountered on-site when engineering and other controls are not feasible or cannot provide adequate protection. Careful selection and use of adequate PPE should protect the health of all on-site workers. No single combination of PPE is capable of protecting against all hazards. Therefore, PPE should be used in conjunction with, not in place of, other protective methods, such as engineering controls and safe work practices.

Site-specific chemicals of concern include semi-volatile organic compounds. These chemicals are of moderate to low hazard. Therefore, level D personal protective equipment will be required at all times when on site. The following is a breakdown of the types of protective clothing and equipment to be used during the site activities.

6.1.1 Levels of Protection

The Site Health and Safety Officer will determine whether a level of protection should be upgraded or downgraded. Changes in the level of protection will be recorded in the dedicated site logbook along with the rationale for the changes (see Section 7.1.3 for additional information on PPE upgrades). Level D PPE will be the minimum requirement at all times during the environmental remediation portion of the project.

6.1.2 Level D Personal Protective Equipment

All initial site access and activities will be done in Level D attire. Level D protection is sufficient under conditions where no contaminants are present or those activities that do not pose a potential threat of unexpected inhalation of or contact with hazardous levels of any substances. Typical Level D activities may include sediment, logging and groundwater sampling, and as surficial site surveys.

• Hard hat
• Safety glasses (as appropriate)
• Steel toe and shank boots
• Fluorescent vest
• Hearing protection (as appropriate)

6.1.3 Modified Level D Personal Protective Equipment

• Hard hat
• Safety glasses
• Steel toe and shank boots
• Fluorescent vest
• Nitrile "N-Dex" inner gloves
• Latex outer boots (chemical resistant)
• Polyethylene coated Tyvek suit
• Hearing protection (as appropriate)

6.1.4 Level C Personal Protective Equipment

Level C protection, as described in this plan, will be available at a minimum for those activities that involve surface and subsurface soil (strata disturbance such as well installation, and all subsurface media sampling activities such as split-spoon sampling and borings). Level C protection equipment should be readily available at all times. Consistent with OSHA training, prior to donning Level C, oxygen percent must be continuously monitored.

• Buddy system required at all times
• Full face respirator with NIOSH approved OV/AG/HEPA combination cartridges (MSA GMC-H)
• Saranex coated Tyvek Suit
• Inner Nitrile "N-Dex" gloves
• Outer Nitrile (NBR) gloves
• Steel toe and shank boots
• Outer boots (chemical resistant)
• Hard hat
• Hearing protection (as appropriate)

6.1.5 Level B Personal Protective Equipment

Some activities may require Level B protection. In atmospheres potentially containing toluene and xylenes, the protective ensemble should include chemical resistant clothing since the two compounds have skin absorption potential.

Regional Health and Safety representatives must be on site upon start-up of any project requiring level B protection. This should be understood to include subcontractors conducting Level B activity.

- Buddy system required at all times
- Supplied air respirator or SCBA
- Saranex coated Tyvek Suit
- Inner Nitrile "N-Dex" gloves
- Outer Nitrile (NBR) gloves
- Steel toe and shank boots
- Outer boots (chemical resistant)
- Hard hat
- Hearing protection (as appropriate)

6.1.6 Personal Use Factors and Equipment Change Out Schedule

Prohibitive or precautionary measures should be taken as necessary to prevent workers from jeopardizing safety during equipment use.

If necessary, all respiratory protective equipment used will be approved by NIOSH/MSHA. Respirator cartridges will be changed once per eight-hour shift at a minimum. This can be accomplished at the end of the workday during respirator decontamination. Employees working within the excavation front should change the cartridge of their respirators once every four hours. If odor breakthrough is detected while wearing the respirator or if breathing becomes difficult, change cartridges immediately. A filter change out schedule is provided below.

Remedial Worker	Work Area	Filter Type	Replacement Rate
Site Screener	EZ – At Excavation Front	MSA GMC-H	Every 4 Hours
Laborer	EZ – At Excavation Front	MSA GMC-H	Every 2 Hours
	SZ, CRZ	MSA GMC-H	Every 8 Hours
Equipment Operator	EZ	MSA GMC-H	Every 4 Hours
	SZ, CRZ	MSA GMC-H	Every 8 Hours
Administrator	EZ	MSA GMC-H	Every 4 Hours
	SZ, CRZ	MSA GMC-H	Every 8 Hours

When utilizing protective garments such as Tyvek suits, gloves, and booties, all seams between protective items will be sealed with duct tape.

Contact with contaminated surfaces, or surfaces suspected of being contaminated, should be avoided. This includes walking through, kneeling in, or placing equipment in puddles, mud, discolored surfaces, or on drums and other containers.

Eating, smoking, drinking, and/or the application of cosmetics in the immediate work area is prohibited. Ingestion of contaminants or absorption of contaminants into the skin may occur.

The use of contact lenses on the job site is strongly advised against. Contact lenses may trap contaminants and/or particulate between the lens and eye, causing irritation. However, when glasses are not available, contact lenses are preferred over faulty vision. When contact lenses are worn, safety glasses and/or goggles must be worn at all times while on the job site. Wearing contact lenses with a respirator in a contaminated atmosphere is prohibited under 29 CFR ss1910.134 (e)(5)(iii).

7 Air Monitoring Program

During excavation, waste handling, and material transport, 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.

7.1 Organic Compounds

When deemed appropriate, a member of the safety team will use a real-time, organic vapor analyzer to monitor the concentration VOCs in the air in the work areas, and will determine when changes in site operations and personal protection equipment are necessary. No changes in the levels of respiratory protection specified above will be made without the approval of the site safety supervisor and the project team leader.

During the environmental restoration activities, the site workers will use a photo ionization detector (PID) and/or a combustible gas indicator (CGI) to monitor levels of organic vapor in the air and verify that they are within the safety guidelines established by the preliminary assessment of the risks associated with site investigations. The PID has an audible alarm set for 5 ppm (the lowest action threshold presented within this plan). If used, the GCI will have an audible alarm set to detect explosive atmospheres. Testing will be performed as necessary within the exclusion zone and at the nearest down-wind property line.

Screening activities with respect to soil quality are detailed in section 8 of this report. At a minimum, where monitoring equipment is used, the following information will be logged.

- Instrument type and detection range
- Control settings
- Reading locations
- Atmospheric conditions
- Calibration Records – To be performed a minimum of once per day

For health and safety purposes, the benzene concentration in air will be identified as 2% of the total concentration of detected hydrocarbons. This method is consistent with air monitoring conducted by the NYSDEC.

The data collected during monitoring will be used to guide site operations in a manner that is consistent with the New York State Department of Environmental Conservation, DER-I0 Technical Guidance for Site Investigation and Remediation, Generic Community Air Monitoring Plan.

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

If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the l5-minute average. **If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.**

7.2 Fugitive Emissions and Odor Monitoring

Airborne fugitive particulate emissions at the site EZ and at the nearest down wind property line will be measured by the Site Safety Officer on a continuous basis during waste handling activities. The measurements will be made using a portable particulate monitoring device manufactured by the Casella Corporation. The monitoring device is capable of detecting airborne particulate (PM-10) at concentrations ranging from 1 to 1000 micrograms per cubic meter (ug/m3). Detected concentrations are logged within the instrument memory and can be retrieved using Microsoft Windows-based software provided by the manufacturer. Retrieved data cab be imported into standard PC-based spreadsheet and database software for analysis and report presentation.

At a minimum, where the particulate monitoring device is used, the following information will be logged.

- Instrument type and detection range

- Control settings
- Reading locations
- Atmospheric conditions
- Calibration Records – To be performed a minimum of once per day

The data collected during monitoring will be used to guide site operations in a manner that is consistent, or due to the presence of heavy metal contaminants within the soil is more restrictive than those presented within the New York State Department of Environmental Conservation, DER-I0 Technical Guidance for Site Investigation and Remediation, Generic Community Air Monitoring Plan.

If **during handling or the historic fill** the total downwind PM-10 particulate level is 150 micrograms per cubic meter (ug/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then the handling activities must immediately stop, and the dust suppression techniques listed in section 8.3 of this document must be employed. Activities cannot resume until the mitigating measures result in a net downwind PM-10 particulate concentration below150 ug/m3.

If during **handling of certified clean soil** the total downwind PM-10 particulate level is 200 micrograms per cubic meter (ug/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques listed in section 8.3 of this document must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 200 ug/m3 above the upwind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM - 10 particulate levels are greater than 150 ug/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-IO particulate concentration to within 150 ug/m3 of the upwind level and in preventing visible dust migration.

Because the detection of odors is subjective, the Site Health and Safety Officer will be charged with the responsibility of making a determination if measures are required to abate odors. Since the contaminant concentrations in the soil/fill are generally below the odor threshold, the odor sources during the site will be the operation of diesel engines associated with hydraulic material handling and transportation.

7.3 Site Matrix for Protection Level Determinations

Action levels represent those conditions requiring an upgrade of personal protective equipment (PPE). The information presented below applies to the above chemical constituents. All air monitoring results should be logged in the Site Safety Log. The following tables provide for quick reference for each monitored parameter.

Ionization Detector Response

Photoionization Detector (PID)	
Concentrations (in ppm)	**Level of PPE Required/Procedure**
0.0 to 15.0	Level D
15.1 to 250.0	Level C
> 750.0	Immediately withdraw from the area

Combustible Gas Response

Combustible Gas Indicator (CGI)	
Results (% of LEL)	**Level of PPE Required/Procedure**
0.0 to 20.0	Level D - Continue with normal activity
Above 20.0	Discontinue all site restoration activities - Immediately withdraw from the area and implement emergency procedures presented in Section 11 of this document.

Particulate Detector Response

Real Time Particulate Detection Meter	
Results (mg/m3)	**Level of PPE Required/Procedure**
0.0 to 5.0	Continue with normal activity – Level D
>5.0	Level C Protection - Discontinue site activities – initiate dust control activities listed in Section 8.3 of this document

7.4 Work Zone Definitions

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.

7.4.1 Exclusion Zone (EZ)

It is within this zone that the excavation or environmental remediation activities such as tank abandonment operations (as described in 8.1.1.1) 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.

7.4.2 Contaminant Reduction Zone (CRZ)

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 (no less than 100 feet away) and the site boundary.

7.4.3 Support Zone (SZ)

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.

7.4.4 Fugitive Dust Control Measures

To prevent the occurrence of fugitive emissions the following procedures will be implemented.

- A strict facility speed limit will be set at 15 miles per hour.
- Roads will be wetted using potable water.
- Media stockpiles over 500 cubic yards will be covered with plastic poly sheeting.
- Excavation and handling activities will be halted where winds exceed 40 miles per hour.
- Loading and mechanical screening of material will be performed within the central portions of the site as to provide maximum distance to the property lines.
- Media handled about the site will be covered while being transported within trucks.

7.5 Backfilling

All backfill material must be demonstrated to be free of any detectable concentrations of organic compounds and have concentrations of inorganic compounds that are consistent with uncontaminated regional soils (McGovern, NYSDEC, 1987).

8 General Safety and Health Provisions

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to general safety and health provisions. Rather, contractors, subcontractors and workers at the site must refer to OSHA's General Safety and Health Provision Standard, set forth at 29 C.F.R. § 1910 subparts C and G as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations.

8.1 Safety Practices / Standing Orders

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

1. 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.
2. Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activity.
3. 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.
4. 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.
5. 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.
6. Medicine and alcohol can potentate the effect from exposure to certain compounds. Prescribed drugs and alcoholic beverages should not be consumed by personnel involved in the project.
7. Personnel and equipment in the work areas should be minimized, consistent with effective site operations.
8. Work areas for various operational activities should be established.

9. 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.
10. Respirators will be issued for the exclusive use of one worker and will be cleaned and disinfected after each use.
11. Safety gloves and boots shall be taped to the disposable, chemical-protective suits as necessary.
12. All unsafe equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.
13. 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.
14. 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.

8.4 Retention of Records

The following records will be maintained on-site and in corporate records for no less than three years.

- Fit test results
- OSHA Training Certification
- Medical Questionairre and/or Medical Clearance
- Medical Data Sheets
- Accident Report Forms

9 Decontamination Plan

9.1 General

Personnel involved in work activities at the site may be exposed to compounds in a number of ways, despite the most stringent protective procedures. Site personnel may come in contact with vapors, gases, mists, particulates in the air, or other site media while performing site duties. Use of monitoring instruments and site equipment can also result in exposure and transmittal of hazardous substances.

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 decontamination zone layout and procedures should match the prescribed levels of personal protection.

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.

9.2 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.

9.3 Standard Decontamination Procedure

The following decontamination procedures should be implemented during site operations for the appropriate level of protection.

9.3.1 Level B

Segregated equipment drop	Deposit equipment (tools, sampling devices, notes, monitoring instruments, radios, etc.) used on the site onto plastic drop cloths.
Boot covers and glove wash	Outer boots and outer gloves should be scrubbed with a decontamination solution of detergent and water or replaced.
Rinse off boot covers and gloves	Decontamination solution should be rinsed off boot covers and gloves using generous amounts of water. Repeat as many times as necessary.
Tape removal	Remove tape from around boots and gloves and place into container with plastic liner.
Boot cover removal	Remove disposable boot covers and place into container with plastic liner.
Outer glove removal	Remove outer gloves and deposit in container with plastic liner.
Suit / safety boot wash	Completely wash splash suit, SCBA, gloves, and safety boots. Care should be exercised that no water is allowed into the SCBA regulator. It is suggested that the SCBA regulator be wrapped in plastic.
Suit / safety boot rinse	Thoroughly rinse off all decontamination solution from protective

	clothing.
Tank or canister changes	This is the last step in the decontamination procedure for those workers wishing to change air tanks and return to the EZ. The worker's air tank or cartridge is exchanged, new outer glove and boot covers are donned, and joints taped.
Removal of safety boots	Remove safety boots and deposit in container with a plastic liner.
SCBA backpack removal	Without removing the face piece, the SCBA backpack should be removed and placed on a table. The face piece should then be disconnected from the remaining SCBA unit and then proceed to the next station.
Splash suit removal	With care, remove the splash suit. The exterior of the splash suit should not come in contact with any inner layers of clothing.
Inner glove wash	The inner gloves should be washed with a mild decontamination solution (detergent / water).
Inner glove rinse	Generously rinse the inner gloves with water.
Face piece removal	Without touching the face with gloves, remove the face piece. The face piece should be deposited into a container that has a plastic liner.
Inner glove removal	Remove the inner glove and deposit into a container that has a plastic liner.
Field wash	Wash hands and face thoroughly. If highly toxic, skin corrosive, or skin absorbent materials are known or suspected to be present, a shower should be taken.

9.3.2 Level C and Level D

The decontamination procedure for Level C and Level D will be satisfied with the Minimum procedures outlined in section 8.2.

9.4 Heavy Equipment and Handling 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 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.

At the conclusion of the use of each piece of excavation equipment on the site, it will be decontaminated with an Alconox / water solution followed by a clean water rinse within the Contaminant Reduction Zone. The rinsate will be allowed to charge into the site ground.

10 Emergency Response / Contingency Plan

10.1 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. Based upon the results of previous investigations, these contaminants consist of a mixture of organic compounds consistent with those found within diesel and/or heating oil. The MSDS for both products are presented on the following pages.

In the event a suspected or known hazardous substance or substance container is encountered during site activities, a contingency plan will be triggered (see Section 11.3).

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:HEXACHLOROBENZENE
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 ANCER 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.

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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:KO040
=== 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:KO040
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% CHLORIN ATED. 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.LAUNDER 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 B ASED ON LOCAL, STATE AND FEDERAL REGULATIONS.

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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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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10.1.5 Tetrachloroethylene

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/m3 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:C2Cl4
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/m3/8H;
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. Studi es have shown that tetrachloroethylene has not caused canc er in exposed workers. The studies have serious weakne sses such as mixed exposures. In tests with rats and mice, i t appeared that tissue destruction or peroxisome prolifera tion 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 97mol/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 TCLo 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
Shipping Name:	TETRACHLOROETHYLENE				TETRACHLOROETHYLENE
Hazard Class:	6.1				6.1
UN Number:	UN1897				UN1897
Packing Group:	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 depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. 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/m3);Skin OEL-AUSTRALIA:TWA 50 ppm (335 mg/m3);STEL 150 ppm;CAR OEL-BELGIUM:TWA 50 ppm (339 mg/m3);STEL 200 ppm (1368 mg/m3) OEL-CZECHOSLOVAKIA:TWA 250 mg/m3;STEL 1250 mg/m3 OEL-DENMARK:TWA 30 ppm (200 mg/m3);Skin OEL-FINLAND:TWA 50 ppm (335 mg/m3);STEL 75 ppm (520 mg/m3);Skin OEL-FRANCE: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	
Formula:	Zn
RTECS:	ZG8600000
C.A.S	CAS# 7740-66-6

Reactivity	1

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:
☐	Zinc Metal	CAS# 7740-66-6	100%	W/W	OSHA TWA 5 mg/mƒ

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 unconcious 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 tempuratures.

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: ☑

Local Exhaust: ☐

Hand Protection: NIOSH Approved Gloves

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 matallic 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

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Section 1 Identification

Product Number:	C2009
Product Name:	Magnesium Laboratory Grade, Turnings
Trade/Chemical Synonyms	
Formula:	Mg
RTECS:	OM2100000
C.A.S	CAS# 7439-95-4

Health:	1
Flammability	2
Reactivity	2

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:
	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 doen't disperse dust. Sweep up and containerize for later reclaimation.

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: Wear appropriate gloves to prevent skin exposure

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
Product Name:	Copper Reagent A.C.S., Granular
Trade/Chemical Synonyms	
Formula:	Cu
RTECS:	GL5325000
C.A.S	CAS# 7440-50-8

Health:	1
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:
☐	Copper	CAS# 7440-50-8	100%	W/W	OSHA TWA 1 mg (Cu)/mƒ (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: ☐

Local Exhaust: ☑

Hand Protection: Wear appropriate gloves to prevent skin exposure

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, lusterous 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'½2 1/2 H'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:
	Cadmium Chloride	CAS# 7790-78-5	100%	W/W	OSHA TWA 0.2 mg/mƒ (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	Informaiton 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:
Oxidizing agents

Hazardous Decomposition Products:
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

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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

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2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: BASE OIL AND ADDITIVES
GLOBALLY REPORTABLE MSDS INGREDIENTS:

Substance Name	Approx. Wt%
CALCIUM ALKYLENE PHENATE SULFIDE CARBONATE (OVERBASED) (122384-87-6)	1-5
CALCIUM LONG-CHAIN ALKARYL SULFONATES (LOW OVERBASED) (156619-82-8)	1-5

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3. HAZARDS IDENTIFICATION

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

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.

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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

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7. HANDLING AND STORAGE

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

OCCUPATIONAL EXPOSURE LIMITS:
When mists/aerosols can occur, the following are recommended: 5 mg/m3 (as oil mist)- ACGIH Threshold Limit Value (TLV), 10 mg/m3 (as oil mist) - ACGIH Short Term Exposure Limit (STEL), 5 mg/m3 (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

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

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

---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.

---

12. ECOLOGICAL INFORMATION

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 ectoxicity 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.

---

13. DISPOSAL CONSIDERATIONS

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

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

---
15. REGULATORY INFORMATION

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

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 DISTURBANCES: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.

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Precautions for Safe Handling and Use

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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.

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Control Measures

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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 SPEICFIED BY MFG.
Work Hygienic Practices: WASH HANDS AFTER HANDLING & PRIOR TO EAT/DRINK/ SMOKE/USE OF TOILET FACILITIES. FOLLOW GOOD WORK HYGIENE PRACTICES.

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Transportation Data

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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 DISTRUBANCES. CHRONIC:PERIPERAL NERVOUS SYS EFFECTS, BLOOD ALTERATIONS. 1STAID: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 ELMENTAL LEAD; LEAD SALTS

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	C.A.S. Number	Occupational Exposure Limits (OELs)		LD_{50}/LC_{50} Species and Route
Lead	99+%	7439-92-1	OSHA PEL	0.05mg/m^3	No Data
			ACGIH TLV	0.05mg/m^3	
			NIOSH REL	<0.10mg/m^3	

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

Appearance: Malleable, bluish-white or silvery-grey metal	**Odour:** None	**Physical State:** Solid	**pH:** Not Applicable
Vapour Pressure: 1.3 mm Hg at 970°C (negligible @ 20°C)	**Vapour Density:** Not Applicable	**Boiling Point/Range:** 1,740°C	**Freezing/Melting Point/Range:** 328°C
Specific Gravity: 11.34	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Odour Threshold:** None
Solubility: 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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10.1.13 Arsenic Material Safety Data Sheet

I. GENERAL INFORMATION

Trade Name: Arsenic **Formula**: As
Chemical Family: Metallic element **CAS #**: 7440-38-2

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2. HAZARDOUS INGREDIENTS

Hazardous Components % OSHA/PEL ACGIH/TLV Sec. 313
Arsenic 0-100 10 ug/m^3 0.01 mg/m^3 Yes

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3. PHYSICAL DATA

Boiling Point: 613 ^{o}C (Sublimes) **Melting Point**: 817 ^{o}C
Vapor Density (Air=1): N/A **Vapor Pressure**: 1mm @ 372 ^{o}C
Solubility in H_2O: Insoluble **% Volatiles**: 0
Appearance and Odor: Steel-grey brittle solid, no odor. **Specific gravity (H_2O=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.

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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.

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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 acetylide.

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.

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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

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^3.

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

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

0 1 2 3 4

NA = Not Applicable NE = Not Established

Section 2 Component Mixture

Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
☐	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, diffuculty 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
Product Name:	Nickel Metal Laboratory Grade, Shot
Trade/Chemical Synonyms	
Formula:	Ni
RTECS:	QR5950000
C.A.S	CAS# 7440-02-0

Health:	3
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:
☐	Nickel Metal	CAS# 7440-02-0	100	W/W	OSHA TWA 1 mg/mƒ

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: ☑ 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:	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: Athsma, 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
Product Name:	Chromium
Trade/Chemical Synonyms	
Formula:	Cr
RTECS:	GB4200000
C.A.S	CAS# 7440-47-3

Health:	2
Flammability	1
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:
	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
Other Protective Equipment: Wear appropriate clothing to prevent skin exposure		

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
Product Name:	Calcium Metal Reagent Grade
Trade/Chemical Synonyms	
Formula:	Ca
RTECS:	EV8040000
C.A.S	CAS# 7440-70-2

Health:	3
Flammability	3
Reactivity	2

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:
	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 reclamaion 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:

Local Exhaust:

Hand Protection: Wear appropriate gloves to prevent skin exposure

Eye Protection: Goggles and Face Shield

Other Protective Equipment: Wear appropriate clothing to prevent skin exposure

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

Section 10 Stability and Reactivity Information

Stability: Stable Conditions to Avoid: Product is unstable when exposed to water. Moisture, water, high temperatures, sparks, and open flames

Materials to Avoid:
Water, Alali metal hydroxides and carbonates, acids.

Hazardous Decomposition Products:
Hydrogen and calcium hydroxide.

Hazardous Polymerization:Will Not Occur

Condition to Avoid:None known

Section 11 Additional Information

Contact with skin while moist or perspired may cause burns due to reactions. Eye contact can cause irritaiton. If inhaled can cause irritation to mucous membranes.If ingested can cause burns of mouth and esophogus.If comes in contact with skin or eyes wash with water. If inhaled rlemove 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/m3 [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.
8.2WORK 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/in3):	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

10.1.19 Mercury Material Safety Data Sheet

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1. GENERAL INFORMATION

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

Ingredient	CAS No	Percent	Hazardous
Mercury	7439-97-6	90 - 100%	Yes

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3. HAZARDS IDENTIFICATION

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. Gastrointenstinal 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.

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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.

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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.

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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

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

Airborne Exposure Limits:
- OSHA Acceptable Ceiling Concentration:
mercury and mercury compounds: 0.1 mg/m3 (TWA), skin
- ACGIH Threshold Limit Value (TLV):
inorganic and metallic mercury, as Hg: 0.025 mg/m3 (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

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

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10. STABILITY AND REACTIVITY

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

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

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

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.

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14. TRANSPORTATION INFORMATION

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

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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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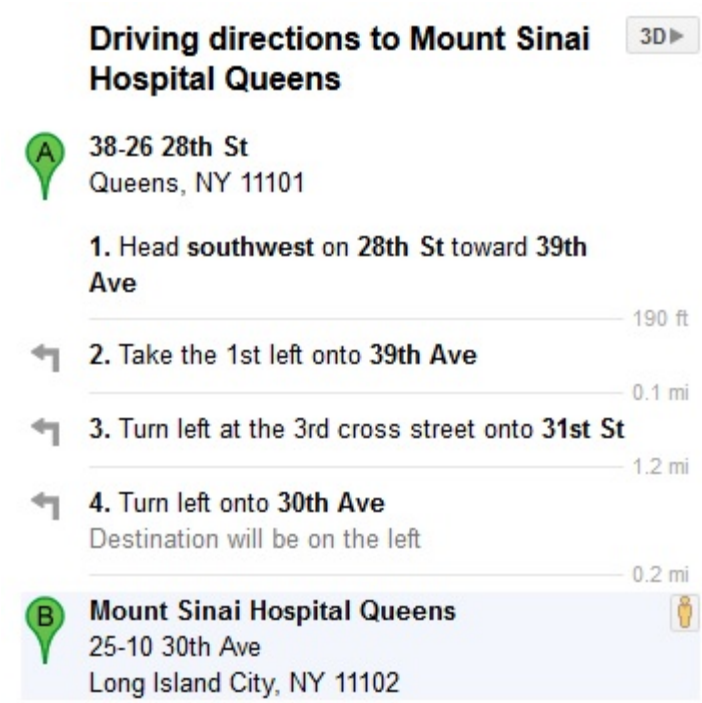
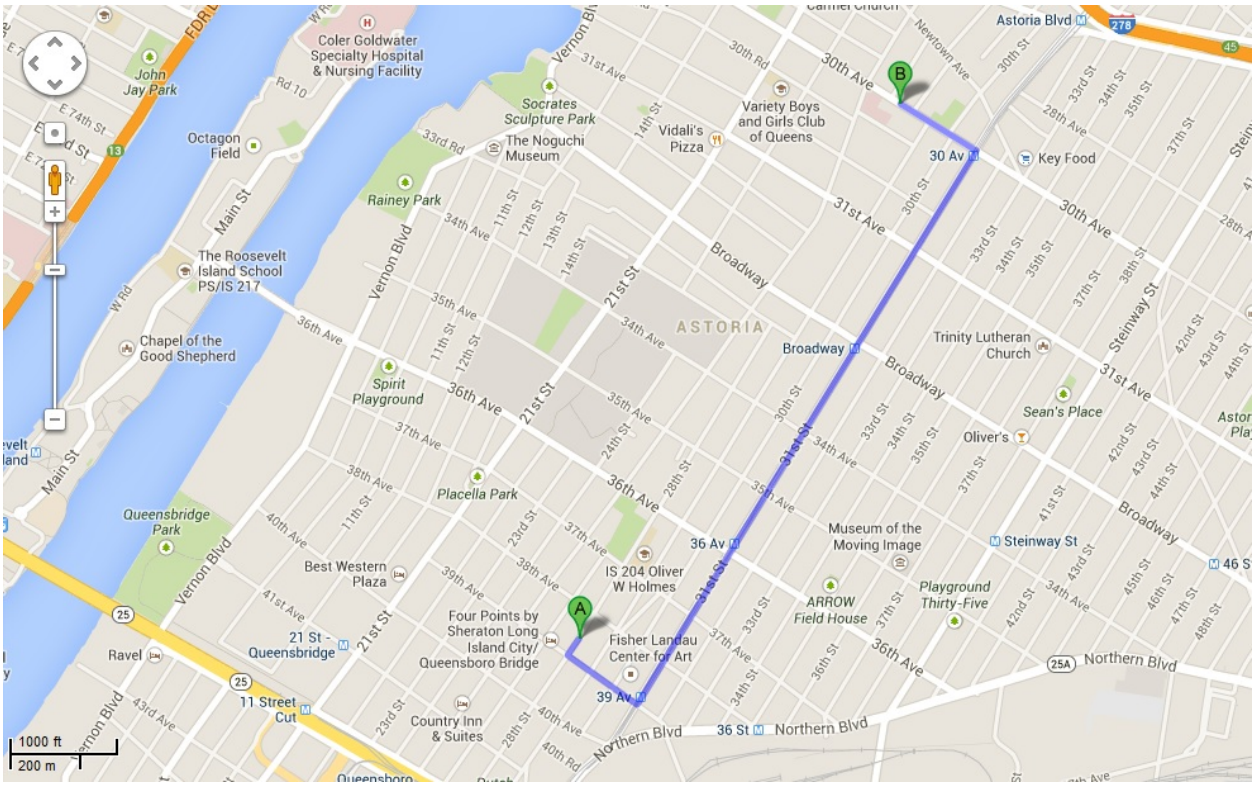
10.2 Emergency Contact Information

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 Project Field Manager will be notified about the situation immediately after emergency procedures are implemented.

10.2.1 Emergency Contacts

Emergency:	911	
Hospital:	(718) 932-1000	Mount Sinai Hospital - Queens
Police:	911	Police
Fire Department:	911	NYFD
Chemtrec:	800-424-9300	
Poison Control Center:	800-336-6997	
National Response Center:	800-424-8802	
US EPA (24-hour hotline):	800-424-9346	





10.2.2 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.

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

10.3 Contingency / Evacuation Plan

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to emergency procedures. Rather, contractors, subcontractors and workers at the site must refer to OSHA's Employee Emergency Action Plan Standard, set forth at 29 C.F.R. § 1910 Part 1926.35(a), as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations.

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

1. 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.
2. All staff will be evacuated from the Exclusion Zone.
3. Air monitoring will be conducted down-wind of the Exclusion Zone.
4. The NYSDEC, as well as any other Government regulatory agency whose need may be prompted by the particular situation, will be notified.
5. 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.

10.4 Emergency Medical Treatment Procedures

This Section is not, nor does it purport to be, a comprehensive recitation of safety and health requirements applicable to medical treatment and first aid. Rather, contractors, subcontractors and workers at the site must refer to OSHA's Medical Services and First Aid Standard, set forth at 29 C.F.R. § 1910 Part 1926.23 and 1926.50, as well as all supporting OSHA Compliance Directives and Letters of Interpretation, for complete information on safety and health compliance obligations.

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 (Appendix B).

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.

10.4.1 Standard Procedures for Injury

1. Notify the Site Health and Safety Officer, Project Manager, and the NYCDEP, NYC OER and NYCDHPD 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. Refer to the map in section 11.2.1.
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.

10.4.2 Chemical Overexposure

In all cases of chemical overexposure, follow standard procedures as outlined below for poison management, first aid, and, if applicable, cardiopulmonary resuscitation. Different routes of exposure and their respective first aid/poison management procedures are outlined below.

Ingestion	Do not induce vomiting unless prompted by a health professional. Transport person to nearest hospital immediately.
Inhalation / Confined Space	Do not enter a confined space to rescue someone who has been overcome unless properly equipped and a standby person present.
Inhalation / Other	Move the person from the contaminated environment. Initiate CPR if necessary. Call or have someone call for medical assistance. Refer to MSDS for additional specific information. If necessary, transport the victim to the nearest hospital as soon as possible.
Skin Contact / Non-Caustic Contaminant (Petroleum, Gasoline, etc.)	Wash off skin with a large amount of water immediately. Remove any affected clothing and rewash skin using soap, if available. Transport person to a medical facility if necessary.
Skin Contact / Corrosive Contaminant	Wash off skin with a large amount of water immediately. Remove any

(Acids, Hydrogen Peroxide, etc.)	affected clothing and rewash skin with water. Transport person to a medical facility if necessary.
Eyes	Hold eyelids open and rinse the eyes immediately with large amounts of water for 15 minutes. Never permit the eyes to be rubbed. Transport person to a medical facility as soon as possible.

10.4.3 First Aid for Injuries Incurred During Field Work

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.

10.4.4 First Aid Equipment List

The first aid kit(s) kept at the site will consist of a weatherproof container with individually sealed packages for each type of item.

The kit will include at least the following items:

- Gauze roller bandages, 1-inch and 2-inch
- Gauze compress bandages, 4-inch
- Gauze pads, 2-inch
- Adhesive tape, 1-inch
- Bandage, 1-inch
- Butterfly bandages
- Triangular bandages, 40-inch
- Ampules of ammonia inhalants
- Antiseptic applicators or swabs
- Burn dressing and sterilized towels
- Surgical scissors
- Eye dressing
- Portable emergency eye wash
- Emergency oxygen supply
- Alcohol

- Hydrogen peroxide
- Clinical grade thermometer
- Tourniquet

10.4.5 Other Emergency Equipment

One portable fire extinguisher with a rating (ratio) of 20 pound A/B/C and one portable fire extinguisher with a rating of 2A will be conspicuously and centrally located between the restricted and non-restricted zones. In addition, similar extinguishers of the same size and class will be located in the site office trailer so that maximum travel distance to the nearest unit shall not exceed 50 feet. Portable extinguishers will be properly tagged with inspection dates and maintained in accordance with standard maintenance procedures for portable fire extinguishers. Field personnel will be trained in fire extinguisher use before field operations begin.

An emergency at any part of the site, such as fire or chemical release, might require that some appropriately trained site workers direct traffic on or near the site.
The following safety equipment to be used for traffic should be kept readily available on site in the field office:

- reflective/fluorescent vests
- flares
- traffic cones (and flags, or the equivalent, as needed)
- hazard tape (barricades as needed)
- working flashlights

10.5 Record of Injuries Incurred On-Site

10.5.1 Occupational 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 C). The site safety supervisor will record occupational injuries and illnesses within 48 hours of occurrence, as required by statute.

10.5.2 Employer's First Report of Injury

The site safety supervisor for all accidents involving work injury at the site will complete this form (Appendix D). 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.

Appendix A

Accident Report Form

OSHA's Form 301
Injuries and Illnesses Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone _____ Date _____

Information about the employee

1) Full Name _____

2) Street _____

City _____ State _____ Zip _____

3) Date of birth _____

4) Date hired _____

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional

_____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ Zip _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the Log _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness _____

12) Time employee began work _____ AM/PM

13) Time of event _____ AM/PM ☐ Check if time cannot be determined

14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as the tools, equipment or material the employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) **What happened?** Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt", "pain", or "sore." Examples: "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) **What object or substance directly harmed the employee?** Examples: "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, leave it blank.

18) **If the employee died, when did death occur?** Date of death

Appendix B

OSHA Form 300 – Occupational Injuries & Illnesses

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year _____

U.S. Department of Labor
Occupational Safety and Health Administration

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0176

Establishment name _____

City _____ State _____

Identify the person				Describe the case		Classify the case											
						CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:					
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	Death	Days away from work	Remained at work		Away From Work (days)	On job transfer or restriction (days)	(M) Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
								Job transfer or restriction	Other record-able cases								
						(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
					Page totals	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

	Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
	(1)	(2)	(3)	(4)	(5)	(6)

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review 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 about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year _____

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of… (M)			
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Establishment information

Your establishment name _____

Street _____

City _____ State _____ Zip _____

Industry description (e.g., Manufacture of motor truck trailers)

_____

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

____ ____ ____ ____

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

____ ____ ____ ____ ____ ____

Employment information

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ Company executive

_____ Title

_____ Phone

_____ Date

Appendix C

Safety Meeting Sheet

HEALTH AND SAFETY BRIEFING STATEMENT

The following personnel were present at a pre-job safety briefing conducted at _____(time) on _____ (date) a_____(location), and have read this Health and Safety Plan for the above Site and are familiar with its provisions:

Name	Signature
_____	_____
_____	_____
_____	_____
_____ _	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Fully charged ABC class fire extinguisher available on Site? _____
Fully stocked First Aid Kit available on Site? _____
All project personnel advised of location of nearest phone? _____
All project personnel advised of location of designated medical facility? _____

_____
Name of Field Team Leader or Site Safety Officer

_____
Signature Date

Appendix D

Vapor Monitoring Sheet

On- Site Dust and Volatile Organic Vapor Monitoring

Project: _____ Job No.: _____

Location: _____ On-site Personnel: _____

Day & Date: _____ Weather: _____

	AM	PM	Sample Interval: 15 minutes
Wind Direction			Background Reading (particulates) **mg/m^3**
Temperature Range:		°F	Background Reading (organic vapors) **ppm**

Calibration Dates: Particulate Meters: Photoionization Detector:

Action Level/Response: Organic vapors: > 5ppm above background levels/ 15 minute readings

Particulates: 0.100 mg/m^3 above up wind reading/15 minute period

Time	Particulate levels:		ORGANIC VAPOR LEVELS	NOTES
	UPWIND (mg/m^3)	DOWNWIND (mg/m^3)	(ppm)	
0700				
0715				
0730				
0745				
0800				
0815				
0830				
0845				
0900				
0915				
0930				
0945				
1000				
1015				
1030				
1045				
1100				
1115				
1130				
1145				
1200				

Project: _____ Job No.: _____

Location: _____ Day & Date: _____

Time	Particulate levels:		ORGANCI VAPOR LEVELS	NOTES
	UPWIND (mg/m^3)	DOWNWIND (mg/m^3)	(ppm)	
1215				
1230				
1245				
1300				
1315				
1330				
1345				
1400				
1415				
1430				
1445				
1500				
1515				
1530				
1545				
1600				
1615				
1630				
1645				
1700				

APPENDIX E

PROPOSED REDEVELOPMENT PLANS

ZONING ANALYSIS

PREMISES: 38–20 28TH STREET, QUEENS, NY

BLOCK: 386 ZONE: M1–2 / R5b

LOT: 23 MAP: 9b

LOT SIZE: 7,018.46 SF

SECT. 43–12 MAX. FAR FOR M1–2 COMMERCIAL BUILDING = 2.0
MAX. PERMITTED FLOOR AREA
= 7,018.46 SF X 2.00 = 14,036.92 SF

ZONING AREA CALCULATION:				
	UNIT	GROSS AREA	DEDUCTION	zoning AREA
CEL. FL	6	3,814		
1ST FL	8	3,814	143.20	3,670.80
2ND FL	11	3,814	377.23	3,436.77
3RD FL	11	3,814	354.11	3,459.89
4TH FL	11	3,814	354.11	3,459.89
TOTAL	47	19,070		14,027.35

TOTAL NET FLOOR AREA = 14,027.35 SF < 14,036.92 SF O.K.

SECT. 43–25 NO SIDE YARDS ARE REQUIRED.

SECT. 43–26 MIN. 20' OF REAR YARD IS REQ'D.
PROPOSED REAR YARD = 30' > 20' O.K.
(GUESTROOM IN CELLAR, NEED AT LEAST 30' REAR YARD)

SECT. 43–43 MIN. FRONT WALL HT BEFORE INITAL SETBACK = 4 STORIES OR 60' WHICHEVER IS LESS.
PROPOSED 4–STORY HOTEL, NO MIN. FRONT YARD REQUIRED.

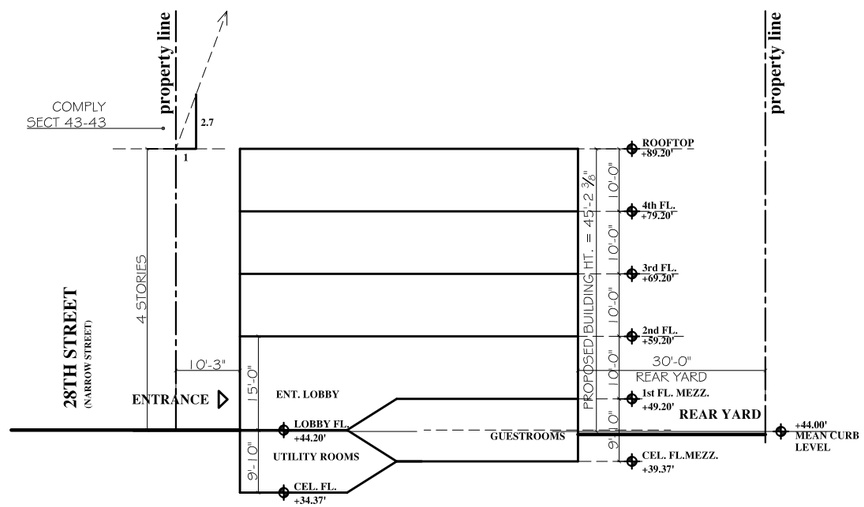
SECT. 44–21 1 PARKING SPACE REQ'D PER 8 GUESTROOMS
PROPOSED 47 GUESTROOM / 8 = 6 PARKING SPACES REQ'D
REQ'D PARKING LESS THAN 15, PARKING CAN BE WAIVED.

ROOM TYPE SCHEDULE

	KING	QUEEN	DOUBLE/DOUBLE	ADA	TOTAL
CEL. FL.	2	4	0	0	6
1ST FL.	4	4	0	0	8
2ND FL.	5	4	2	0	11
3RD FL.	5	4	1	1	11
4TH FL.	5	4	1	1	11
TOTAL	21	20	4	2	47
%	45%	43%	8%	4%	100%

TABLE 1107.6.1.1 ACCESSIBLE DWELLING AND SLEEPING UNITS

(between 26 – 49) 47 OF UNITS PROVIDED, AT LEAST 2 H/C UNITS PROVIDED, NO ROLL–IN SHOWER REQ'D.
PROPOSED TOTAL 2 H/C UNITS ON 3RD, 4TH FLOOR ONLY



SKY EXPLOSURE PLAN

MKA
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37-01 Main Street, Suite #308, Flushing, NY 11354
michaelkangra@yahoo.com
Tel: (718) 353-2929
Fax: (718) 661-1619

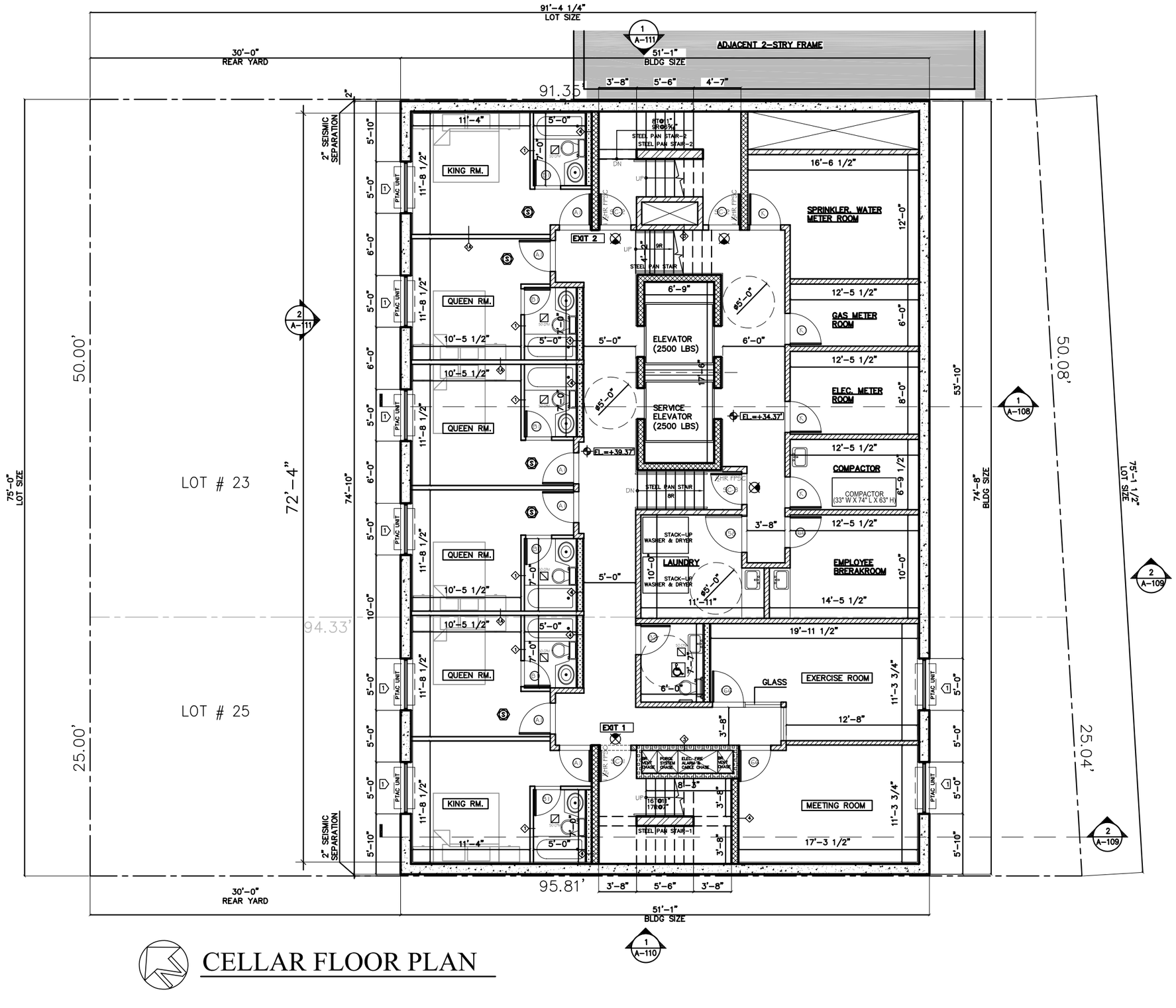
REV.#	DATE	DESCRIPTION

PROJECT TITLE:
38-20, 28th street
QUEENS, NEW YORK

ZONING ANALYSIS

SEAL & SIGNATURE:

DATE: 02-27-13
PROJECT No: 201203
DRAWING BY: C Kuo
CHK BY: M Kang
DWG No:
A-001.00
CADD FILE No: 1 of 6



CELLAR FLOOR PLAN

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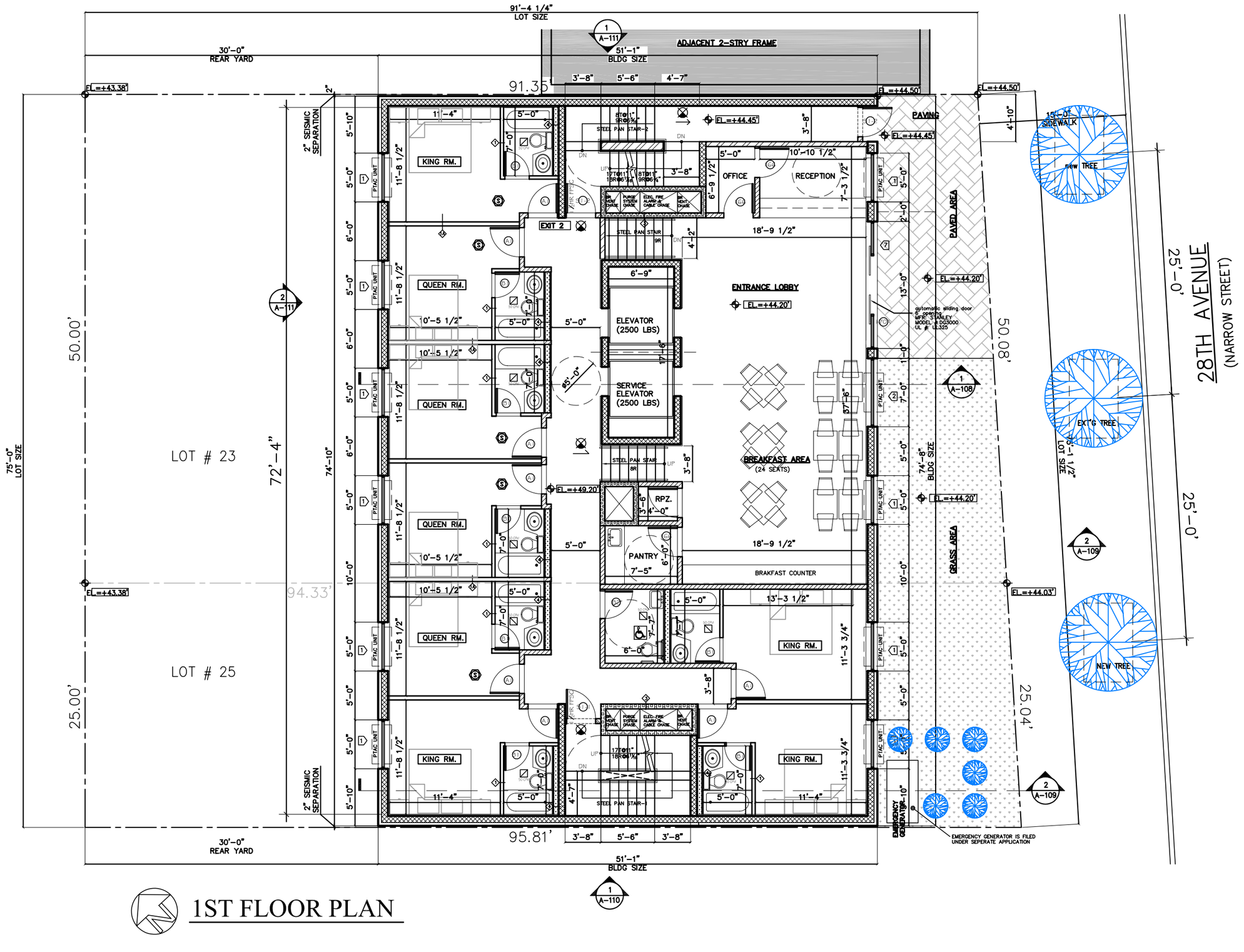
REV.#	DATE	DESCRIPTION

PROJECT TITLE:
38-20, 28th street
QUEENS, NEW YORK

CELLAR FLOOR PLAN

SEAL & SIGNATURE:

DATE:	02-27-13
PROJECT No:	201203
DRAWING BY:	C Kuo
CHK BY:	M Kang
DWG No:	A-002.00
CADD FILE No:	2 of 6



1ST FLOOR PLAN

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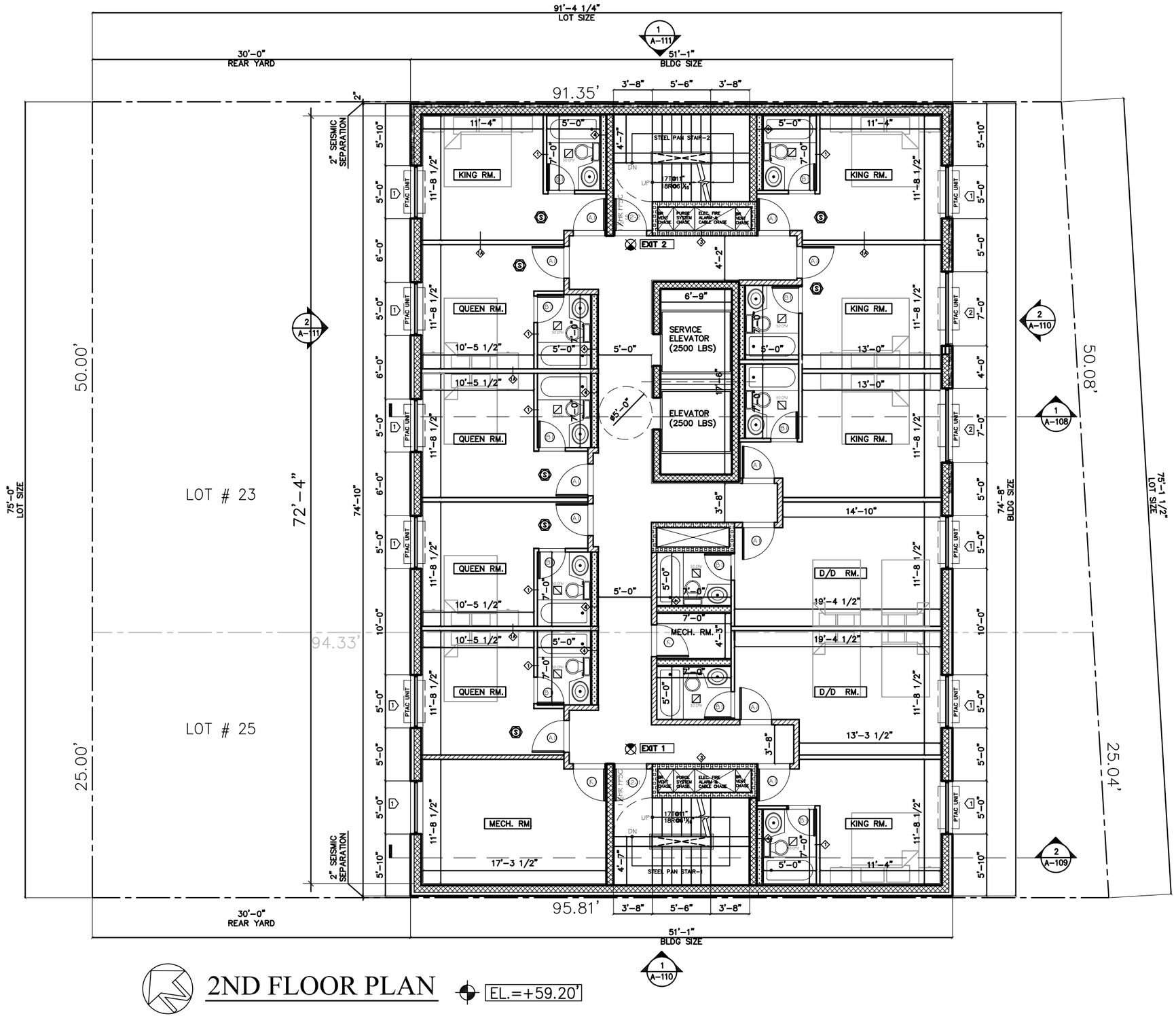
REV.#	DATE	DESCRIPTION

PROJECT TITLE:
38-20, 28th street
QUEENS, NEW YORK

1ST FLOOR PLAN

SEAL & SIGNATURE:

DATE:	02-27-13
PROJECT No:	201203
DRAWING BY:	C Kuo
CHK BY:	M Kang
DWG No:	A-003.00
CADO FILE No:	3 of 6



2ND FLOOR PLAN

EL.=+59.20'

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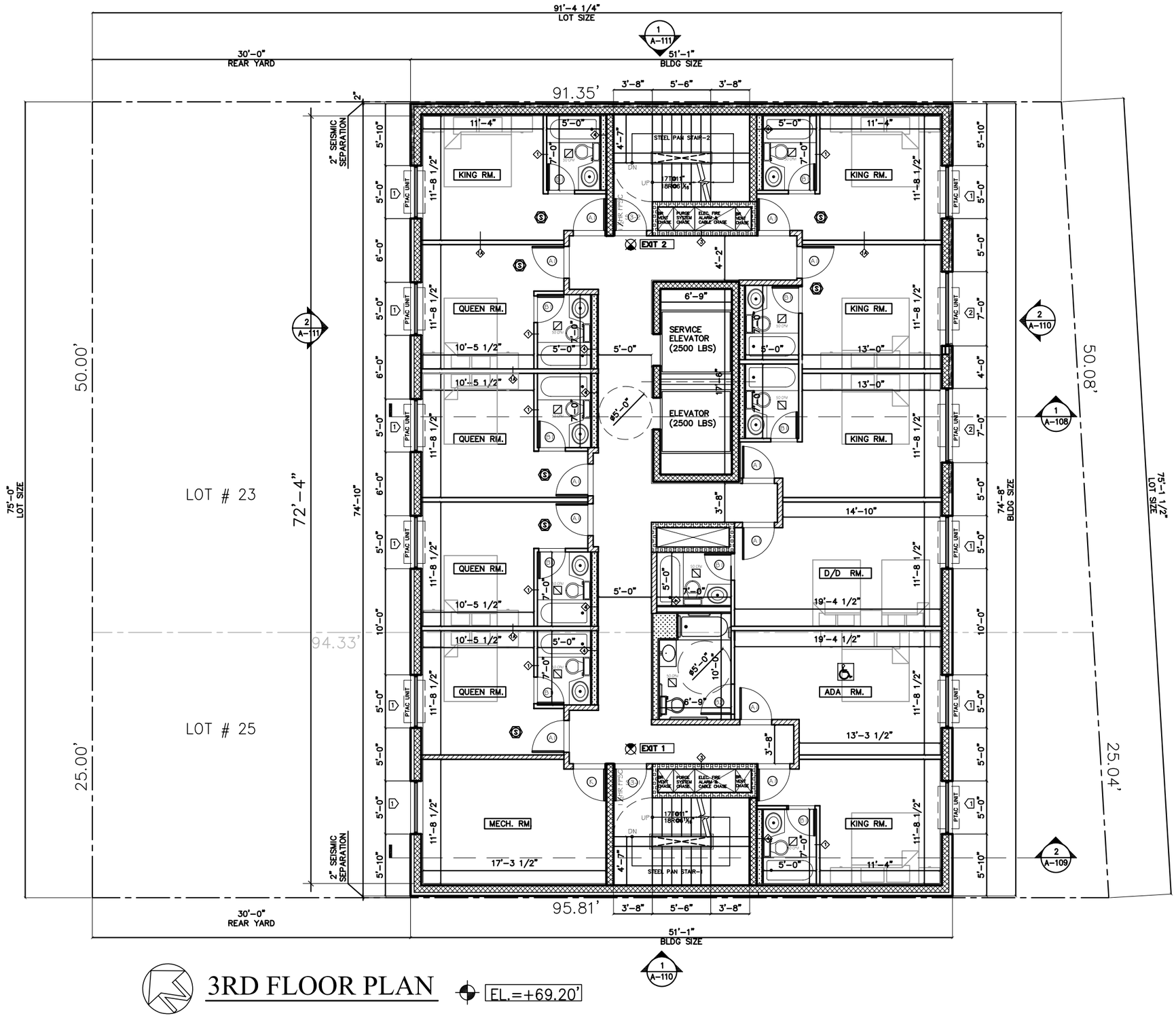
REV.#	DATE	DESCRIPTION

PROJECT TITLE:
38-20, 28th street
QUEENS, NEW YORK

2ND FLOOR PLAN

SEAL & SIGNATURE:

DATE:	02-27-13
PROJECT No:	201203
DRAWING BY:	C Kuo
CHK BY:	M Kang
DWG No:	A-004.00
CADO FILE No:	4 of 6



3RD FLOOR PLAN

EL.=+69.20'

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REV.#	DATE	DESCRIPTION

PROJECT TITLE:

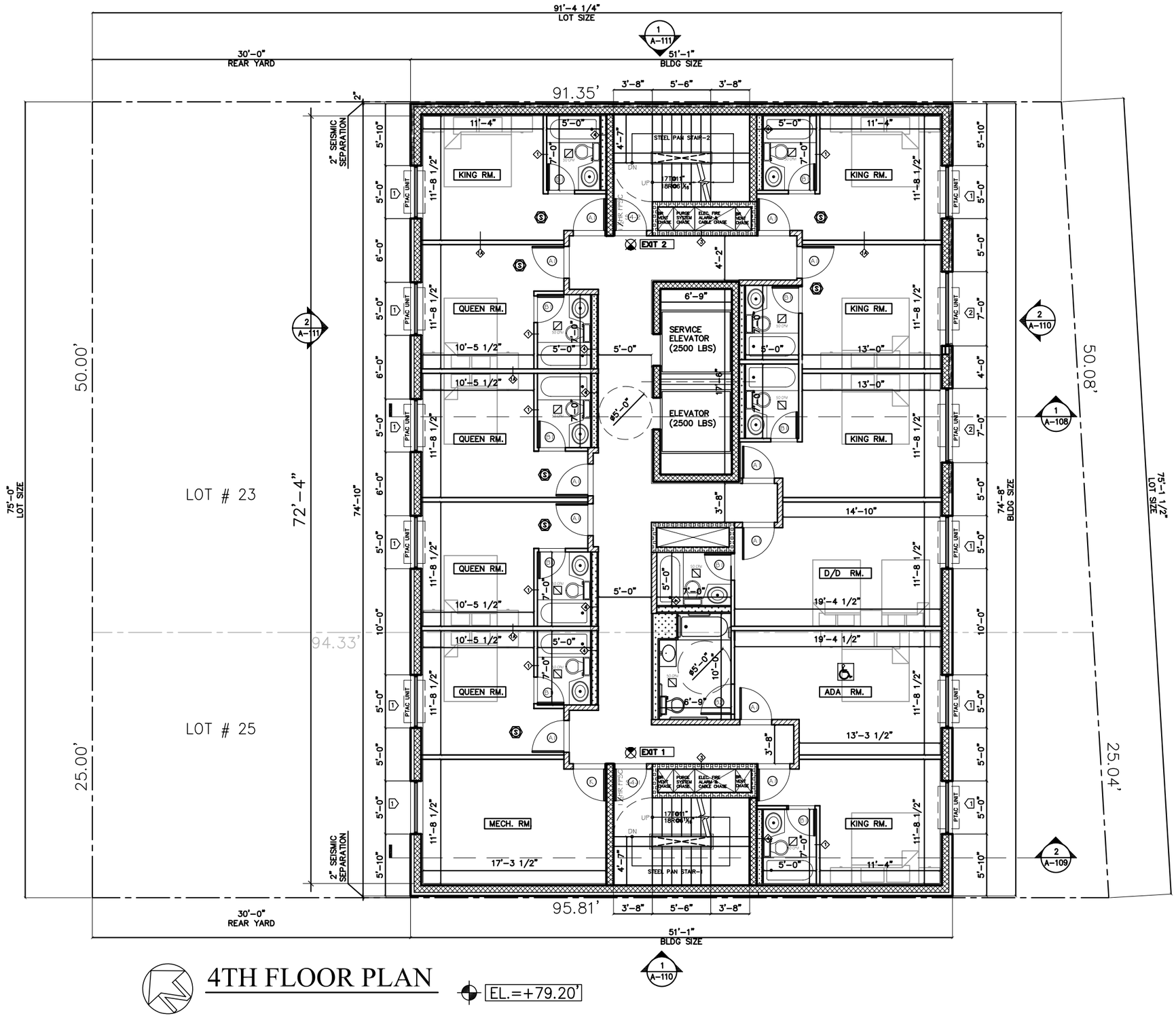
38-20, 28th street

QUEENS, NEW YORK

3RD FLOOR PLAN

SEAL & SIGNATURE:

DATE:	02-27-13
PROJECT No:	201203
DRAWING BY:	C Kuo
CHK BY:	M Kang
DWG No:	A-005.00
CADO FILE No:	5 of 6



4TH FLOOR PLAN

EL.=+79.20'

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REV.#	DATE	DESCRIPTION

PROJECT TITLE:
38-20, 28th street
QUEENS, NEW YORK

3RD FLOOR PLAN

SEAL & SIGNATURE:

DATE:	02-27-13
PROJECT No:	201203
DRAWING BY:	C Kuo
CHK BY:	M Kang
DWG No:	A-006.00
CADO FILE No:	6 of 6