

**St. Barnabas Hospital, Third Avenue
Bronx, NEW YORK**

Remedial Action Work Plan

**OER Project Number 15HAN401X
NYC Voluntary Cleanup Program Project Number: 16CVCP069X**

Prepared For:

STB Owners LLC and STB Retail Owners LLC
419 Park Ave South, 18th Floor
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Prepared By:

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May 2016

REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C&D	Construction and Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering Controls and Institutional Controls
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IRM	Interim Remedial Measure
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYS DEC	New York State Department of Environmental Conservation
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYC VCP	New York City Voluntary Cleanup Program
NYCRR	New York Codes Rules and Regulations
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
PCBs	Polychlorinated Biphenyls
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
SSDS	Sub-Slab Depressurization System
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

CERTIFICATION

I, Joel Rogers, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for designing the remedial program for the St. Barnabas Wellness Care North, 4511 Third Avenue, Bronx, NEW YORK site, site 16CVCP069X. I certify to the following:

- I have reviewed this document and the Stipulation List, to which my signature and seal are affixed.
- Engineering Controls developed for this remedial action were designed by me or a person under my direct supervision and designed to achieve the goals established in this Remedial Action Work Plan for this site.
- The Engineering Controls to be constructed during this remedial action are accurately reflected in the text and drawings of the Remedial Action Work Plan and are of sufficient detail to enable proper construction.
- 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 Joel Rogers, P.E.

PE License Number 083034

Signature 

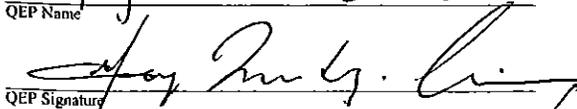
Date 5/3/2016



I, Greg Mendez-Chicas, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the St. Barnabas Wellness Care North, 4511 Third Avenue, Bronx, NEW YORK site, site number 16CVCP069X. I certify to the following:

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.

QEP Name Greg Mendez-Chicas

QEP Signature 

Date 5/3/2016

EXECUTIVE SUMMARY

STB Owners LLC and STB Retail Owners LLC in partnership with Saint Barnabas Hospital (SBH) is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 1.4 acre site currently addressed as: 4487, 4491, 4495, 4497, 4507 3rd Avenue, and 544 East 183rd St., Bronx, 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 Background

The Site is located in the East Tremont/Belmont neighborhood of the Bronx. This project (referred to as the Saint Barnabas Wellness Care Project) developed by STB Owners LLC and STB Retail Owners LLC. in partnership with Saint Barnabas Hospital (SBH). The combined extent of the Site is approximately 1.4 acres and consists of six (6) contiguous parcels. Upon redevelopment, the addresses will be combined and referred to as one address identified as 4511 Third Avenue, Block 3051, Lot 34. The Site is bound to the north by mixed commercial and residential properties along East 183rd St., to the east by Third Avenue and SBH, to the south by the SBH Ambulatory Care Center, New City Muffler and beyond by East 182nd St, and to the west by multi-story apartment buildings on Bathgate Avenue. **Figure 1** shows the Site Location.

Summary of Redevelopment Plan

The proposed redevelopment of the Site includes new construction of a mixed-use multi-story building for healthcare, retail and residential purposes, all of which is consistent with the existing zoning for the property. The development project will include removal of the existing building on lot 43. Development plans include approximately 181,000 square feet (sf) of residential space providing 182 residential units; 50,800 sf of medical space; 17,500 sf of commercial space and

35,500 sf of parking. Development plans include a parking area below grade, an ambulatory care center, health club, café, pharmacy, physical therapy space, and daycare center on the first level, residential apartment units as well as health club and ambulatory care center space on the second level, and residential apartment units on floors three through eleven. The project will be ready to close on construction financing in June of 2016 and is anticipated to take 28 months to complete construction at the Site. The proposed development will include ground surface disturbance activities, including soil excavation for the installation of a subterranean parking area, building foundation and associated footings. The water table is expected at depths greater than 24 feet below grade (bgs); therefore groundwater is not expected to be encountered during the excavation activities.

Summary of Surrounding Property

The Site is located in the East Tremont/Belmont neighborhood of the Bronx. The combined extent of the Site is approximately 1.4 acres and consists of six (6) contiguous parcels. East Tremont is a residential neighborhood located in west Bronx. It is bordered by East 183rd Street to the north, to the east by Crotona Avenue, the Cross-Bronx Expressway to the south, and Webster Avenue to the west. East Tremont is dominated by five and six story tenement buildings, older multi-unit homes, vacant lots, and newly constructed apartment buildings. The land area is less than one square mile.

Summary of Past Site Uses and Areas of Concern

Lot 43 (4491 3rd Avenue) is developed with a one-story building comprised of cement block and brick with a partial basement and an approximate gross floor area of 6,229 sf. Said building was constructed circa 1931 and operated as an automobile repair shop from 1965 to 2008. It is currently utilized as a parking garage. The remaining five parcels contain no permanent structures and are used as active car lots. The current zoning designation, as per Department of City Planning NYC zoning maps, is R6A C4-CD.

Based on the 1951 historical Sanborn map, a 1,000-gallon buried fuel oil tank was shown to exist on the southern portion of lot 34 (4507 3rd Avenue). At the time, lot 34 was developed with a building labeled as “Garage & Repair, capacity 90 cars”. Impact Environmental has not been provided with any documentation or further information regarding the UST removal to date, and

therefore cannot verify the integrity of the tank, the absence of subsurface contamination related to possible leaks, or that legal/proper tank removal protocols were followed.

Based on the historic Site uses as an auto repair shop at lot 43 (4491 3rd Avenue) from 1965 to 2008, there is the potential for contamination to exist from the presence of trench/floor drains, an in-ground hydraulic lift, and a 8-by-12 foot concrete patch indicative of a former excavation. Moreover, the historic Sanborn maps dated 1977 and 1989 indicate that a gas tank existed at the southeastern interior corner of the Site building. However, there is no documentation in regards to the decommissioning of said structures.

Summary of Work Performed under the Remedial Investigation

- Installed 10 soil borings (SB-1 through SB-10) at the project Site, and collected 18 soil samples for chemical analysis to evaluate soil quality;
- Collected one (1) groundwater sample (GW-1) from a pre-existing permanent monitoring well at Lot 40 for chemical analysis to evaluate groundwater quality;
- Installed 6 soil vapor probes at the Site (SV-1 through SV-6), and collected 6 soil vapor samples; and,
- Installed one (1) sub-slab soil vapor implant (SSV-1) within the interior of the building at lot 43 and submitted for laboratory analysis.

Summary of Findings of Remedial Investigation

- 1 The topographic elevation of the property is approximately 90 feet amsl.
- 2 Depth to groundwater was observed at approximately 23.95 feet below grade surface (bgs) at the Site.
- 3 According to previous reports prepared for the Site, regional groundwater in the area of the Site likely flows in an easterly direction, eventually emptying into the Bronx River.
- 4 Subsurface soil at the Site consisted of urban fill, which was primarily comprised of concrete, brick, stone, gravel, and asphalt in a brown to dark-brown silty to medium

coarse sand matrix. Anthropogenic urban fill was encountered from grade to 10 feet bgs. Bedrock was encountered during this Phase II investigation ranging from 5 ft. bgs to 15 ft. bgs at borings SB-1, SB-2, SB-3, SB-6, and SB-7.

- 5 Soil sample results were compared to the NYSDEC Title 6 New York Codes, Rules and Regulations (NYCRR) Part 375 Unrestricted Use (UU) Soil Cleanup Objectives (SCO) and Restricted Residential Use (RRU) SCOs.

Chlorinated hydrocarbons, Benzene, toluene, ethylbenzene and total xylenes (BTEX) compounds and other petroleum related volatile organic compounds (VOCs) were not detected in any soil samples.

Seven semi-volatile organic compounds (SVOCs) were detected above UU SCOs and RRU SCOs in SB-4 0-2' and SB-7 0-2'. Maximum concentrations for each of these compounds were found in the shallow sample zone (0'-2' bgs) including:

Benzo(a)anthracene at 8,800 micrograms per kilogram (ug/kg), benzo(a)pyrene at 7,500 ug/kg, Benzo(b)fluoranthene at 9,400 ug/kg, Benzo-k-Fluoranthene at 3,700 ug/kg, Chrysene at 7,300 ug/kg, Dibenzo-a,h-Anthracene at 1,400 ug/kg, and ideno(1,2,3-cd)pyrene at 5,800 ug/kg. SB-3 0-2' exceeded UU SCOs and RRU SCOs for Benzo-a-Anthracene at 1,200 ug/kg and Indeno(1,2,3-cd)Pyrene at 580 ug/kg. SB-5 0-2' exceeded both UU SCOs and RRU SCOs for Indeno(1,2,3-cd)Pyrene only at 560 ug/kg.

One or a combination of the pesticides 4,4-DDD, 4,4-DDE, 4,4-DDT were detected above UU SCOs at SB-4 0-2', SB-6 0-2', SB-7 0-2', SB-7 10-12' and SB-9 0-2', but below RRU SCOs. Polychlorinated biphenyls (PCBs) were detected in trace concentrations below both UU SCOs and RRU SCOs in all soil samples.

Four metals including Arsenic, Lead, Mercury and Silver were detected above UU SCOs in soil samples SB-1 7-9', SB-7 0-2', and SB9 0-2'. Of these, only Lead was detected above RRU SCOs at 520 ug/kg at SB-7 0-2.

Overall, soil results are consistent with historic fill material encountered at sites throughout NYC.

- 6 Groundwater results were compared to NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS). No SVOC, pesticides or PCB concentrations were detected in the groundwater sample identified as GW-1. Trace VOC concentrations were detected in the sample; however, detections were below AWGS. Concentrations of ten metals were detected above AWQS including Aluminum at 40.5 µg/L, Barium at 1.27 µg/L, Beryllium at 0.0046 µg/L, Chromium at 0.096 µg/L, Copper at 0.28 µg/L, Iron at 90.2 µg/L, Lead at 0.050 µg/L, Manganese at 7.12 µg/L, Nickel at 0.11 µg/L and Thallium at 0.0036 µg/L.
- 7 Soil vapor samples SV-1 through SV-6, and sub-slab vapor sample SSV-1, collected during this investigation were compared to the compounds listed in Table 3.1 Air Guideline Values (AGVs) derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Laboratory analysis of vapor collected at sub-slab sample SSV-1 detected Trichloroethene (TCE) at 1.6 micrograms per cubic meter (ug/m³) and Tetrachloroethene (PCE) at 59.3 ug/m³. 1,1,1-Trichloroethane (1,1,1 TCA) was detected in SV-1 at 1.46 ug/m³ and in SV-5 at 1.13 ug/m³. A number of other VOCs were detected in vapor samples ranging from 0.84 ug/m³ to 305 ug/m³. Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) concentrations were reported as non-detect or detected below regulatory guidelines.

Summary of the Remedial Action

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. Selection of NYSDEC Part 375 Section 6.8(b) Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Restricted Residential Use (Track 2) SCOs. The entire footprint of the building area (about 90% of the property) will be excavated to a terminal depth of approximately 13.5 feet below grade for redevelopment purposes. Approximately 36,450 tons (30,000 cubic yards) of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of all UST's that are encountered, if any, during soil/fill removal actions.
10. Registration of any discovered underground storage tanks (USTs) and reporting of any related petroleum spills associated with said UST's and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations if applicable.
11. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.

13. Collection and analysis of eight (8) end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
14. Installation of a vapor barrier system consisting of vapor beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor migration into the building. The vapor barrier system will consist of a 20-mil vapor barrier, VaporBlock® Plus™ 20. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration. The vapor barrier system is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building.
15. Construction and operation of a grade-level parking garage with high volume air exchange in conformance with NYC Building Code.
16. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
17. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
18. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
19. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and lists any changes from this RAWP.

COMMUNITY PROTECTION STATEMENT

The NYC Office of Environmental Remediation (OER) provides governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies, shows the location of identified 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.

Project Information:

- Site Name: Saint Barnabas Wellness Care Project
- Site Address: 4487, 4491, 4495, 4497, 4507 3rd Avenue, and 544 East 183rd St., Bronx, New York
- NYC Voluntary Cleanup Program Project Number: 16CVCP069X

Project Contacts:

- OER Project Manager: Isabel McRae at (212) 341-2034.
- Site Project Manager: Greg Mendez-Chicas at (631) 252-5480
- Site Safety Officer: Kurt Pfaffenberger at (631) 334-1431
- Online Document Repository: <http://www.nyc.gov/html/oer/html/document-repository/document-repository.shtml>

Remedial Investigation and Cleanup Plan: Under the oversight of the NYC OER, a thorough study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and to 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 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 RAWP are in compliance with applicable safety requirements of the United States Occupational Safety and Health Administration (OSHA). This RAWP includes many protective elements including those discussed below.

Site Safety Coordinator: This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is identified at the beginning of this Community Protection Statement.

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

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

Odor, Dust and Noise Control: This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with applicable NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager or NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document.

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.

Stormwater Management: To limit the potential for soil erosion and discharge, this cleanup plan has provisions for stormwater management. The main elements of the stormwater

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 will conform to requirements of the NYC Department of Buildings.

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 and provides project contact names and numbers, and a link to the document repository where 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 or the NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

Soil Chemical Testing and Screening: All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-

held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

Stockpile Management: Soil stockpiles will be kept covered with tarps to prevent dust, odor 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 applicable 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 the 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 the Remedial Action Report) that will be available for public review online. A link to the online document repository and the public library with Internet access nearest the Site are listed on the first page of this Community Protection Statement document

Long-Term Site Management: If long-term protection is needed after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined either in the property's deed or established through a city environmental designation registered with the Department of Buildings. 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 Project Background

STB Owners LLC and STB Retail Owners LLC in partnership with Saint Barnabas Hospital (SBH) are working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a property located at 4487, 4491, 4495, 4497, 4507 3rd Avenue, and 544 East 183rd St., Bronx, New York in the East Tremont/Belmont section of Bronx, New York (the “Site”) and designated as Block 3051 and Lot(s) 28, 34, 40, 41, 43 and Former Lot 45. 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, and complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 Site Location and Background

The Site is located in the East Tremont/Belmont neighborhood of the Bronx. This project (referred to as the Saint Barnabas Wellness Care Project developed by STB Owners LLC and STB Retail Owners LLC. in partnership with Saint Barnabas Hospital (SBH). The combined extent of the Site is approximately 1.4 acres and consists of six (6) contiguous parcels. The Site is bound to the north by mixed commercial and residential properties along East 183rd St., to the east by Third Avenue and SBH, to the south by the SBH Ambulatory Care Center, New City Muffler and beyond by East 182nd St, and to the west by multi-story apartment buildings on Bathgate Avenue. **Figure 1** shows the Site Location.

1.2 Redevelopment Plan

The proposed redevelopment of the Site includes new construction of a mixed-use multi-story building for healthcare, retail and residential purposes, all of which is consistent with the existing zoning for the property. The development project will include removal of the existing building

on lot 43. Development plans include approximately 181,000 square feet (sf) of residential space providing 182 residential units; 50,800 sf of medical space; 17,500 sf of commercial space and 35,500 sf of parking. Development plans include a parking area below grade, an ambulatory care center, health club, café, pharmacy, physical therapy space, and daycare center on the first level, residential apartment units as well as health club and ambulatory care center space on the second level, and residential apartment units on floors three through eleven. The project will be ready to close on construction financing in May of 2016 and is anticipated to take 28 months to complete construction at the Site. The proposed development will include ground surface disturbance activities, including soil excavation for the installation of a subterranean parking area, building foundation and associated footings. The water table is expected at depths greater than 24 feet below grade (bgs); therefore excavation is expected above the groundwater table.

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

1.3 Description of Surrounding Property

The Site is located in the East Tremont/Belmont neighborhood of the Bronx. The combined extent of the Site is approximately 1.4 acres and consists of six (6) contiguous parcels. East Tremont is a residential neighborhood located in west Bronx. It is bordered by East 183rd Street to the north, to the east by Crotona Avenue, the Cross-Bronx Expressway to the south, and Webster Avenue to the west. East Tremont is dominated by five and six story tenement buildings, older multi-unit homes, vacant lots, and newly constructed apartment buildings. The land area is less than one square mile. **Figure 2** shows the surrounding land usage.

1.4 Summary of Past Site Uses and Areas of Concern

Lot 43 (4491 3rd Avenue) is developed with a one-story building comprised of cement block and brick with a partial basement and an approximate gross floor area of 6,229 square feet. Said building was constructed circa 1931 and operated as an automobile repair shop from 1965 to 2008. It is currently utilized as a parking garage. The remaining five parcels contain no permanent structures and are used as active car lots. The current zoning designation, as per Department of City Planning NYC zoning maps, is R6A C4-CD.

Based on the 1951 historical Sanborn map, a 1,000-gallon buried fuel oil tank was shown to exist on the southern portion of lot 34 (4507 3rd Avenue). At the time, lot 34 was developed with a building labeled as “Garage & Repair, capacity 90 cars”. Impact Environmental has not been provided with any documentation or further information regarding the UST removal to date, and therefore cannot verify the integrity of the tank, the absence of subsurface contamination related to possible leaks, or that legal/proper tank removal protocols were followed.

Based on the historic Site uses as an auto repair shop at lot 43 (4491 3rd Avenue) from 1965 to 2008, there is the potential for contamination to exist from the presence of trench/floor drains, an in-ground hydraulic lift, and a 8-by-12 foot concrete patch indicative of a former excavation. Moreover, the historic Sanborn maps dated 1977 and 1989 indicate that a gas tank existed at the southeastern interior corner of the Site building. However, there is no documentation in regards to the decommissioning of said structures.

1.5 Summary of Work Performed under the Remedial Investigation

- Installed 10 soil borings (SB-1 through SB-10) at the project Site, and collected 18 soil samples for chemical analysis to evaluate soil quality.
- Collected one (1) groundwater sample (GW-1) from a pre-existing permanent monitoring well at Lot 40 for chemical analysis.
- Installed 6 soil vapor probes at the Site (SV-1 through SV-6), and collected 6 soil vapor samples.
- Installed one (1) sub-slab soil vapor implant (SSV-1) within the interior of the building at lot 43 and submitted for laboratory analysis.

1.6 Summary of Findings of Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “Remedial Investigation Report, Third Avenue, Bronx”, dated February 2016 (RIR).

- The topographic elevation of the property is approximately 90 feet.

- Depth to groundwater was observed at approximately 23.95 feet bgs at the Site.
- According to previous reports prepared for the Site, regional groundwater in the area of the Site likely flows in an easterly direction, eventually emptying into the Bronx River.
- Subsurface soil at the Site consisted of anthropogenic urban fill, which was primarily comprised of concrete, brick, stone, gravel, and asphalt in a brown to dark-brown silty to medium coarse sand matrix. Anthropogenic urban fill was encountered from grade to 15 feet bgs (deepest soil boring depth). Bedrock was encountered during this Phase II investigation ranging from 5 ft. bgs to 15 ft. bgs at borings SB-1, SB-2, SB-3, SB-6, and SB-7.
- Soil sample results were compared to the NYSDEC Title 6 New York Codes, Rules and Regulations (NYCRR) Part 375 Unrestricted Use (UU) Soil Cleanup Objectives (SCO) and Restricted Residential Use (RRU) SCOs. Chlorinated hydrocarbons, Benzene, toluene, ethylbenzene and total xylenes (BTEX) compounds and other petroleum related volatile organic compounds (VOCs) were not detected in any soil samples. Seven semi-volatile organic compounds (SVOCs) were detected above UU SCOs and RRU SCOs in SB-4 0-2' and SB-7 0-2'. Maximum concentrations for each of these compounds were found in the shallow sample zone (0'-2' bgs) including: Benzo(a)anthracene at 8,800 micrograms per kilogram (ug/kg), benzo(a)pyrene at 7,500 ug/kg, Benzo(b)fluoranthene at 9,400 ug/kg, Benzo-k-Fluoranthene at 3,700 ug/kg, Chrysene at 7,300 ug/kg, Dibenzo-a,h-Anthracene at 1,400 ug/kg, and ideno(1,2,3-cd)pyrene at 5,800 ug/kg. SB-3 0-2' exceeded UU SCOs and RRU SCOs for Benzo-a-Anthracene at 1,200 ug/kg and Indeno(1,2,3-cd)Pyrene at 580 ug/kg. SB-5 0-2' exceeded both UU SCOs and RRU SCOs for Indeno(1,2,3-cd)Pyrene only at 560 ug/kg. One or a combination of the pesticides 4,4-DDD (max. of 52.9 ug/kg), 4,4-DDE(max. of 10.2 ug/kg), 4,4-DDT (max. of 32.9 ug/kg) were detected above UU SCOs in five soil borings, but below RRU SCOs. Polychlorinated biphenyls (PCBs) were detected at 1,204 ug/kg shallow soil (at SB-7), exceeding both UU SCOs and RRU SCOs. PCBs were reported below the method detection limit for all remaining soil samples. Eight metals including Arsenic, Barium, Copper, Lead, Manganese, Mercury, Nickel, Silver and Zinc were detected above UU SCOs in both shallow and deep soil samples. Of these, Arsenic (maximum concentration

of 36 ug/kg), Barium (max. 420 ug/kg), Lead (max. 520 ug/kg), Manganese (max. 5,300 ug/kg), and Mercury (max. 1 ug/kg) also exceeded RRU SCOs. Overall, soil results are consistent with historic fill material encountered at sites throughout NYC.

- Groundwater results were compared to NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS). No SVOC, pesticides or PCB concentrations were detected in the groundwater sample identified as GW-1. Trace VOC concentrations were detected in the sample; however, detections were below AWQS. Concentrations of ten metals were detected above AWQS including Aluminum at 40.5 µg/L, Barium at 1.27 µg/L, Beryllium at 0.0046 µg/L, Chromium at 0.096 µg/L, Copper at 0.28 µg/L, Iron at 90.2 µg/L, Lead at 0.050 µg/L, Manganese at 7.12 µg/L, Nickel at 0.11 µg/L and Thallium at 0.0036 µg/L. Manganese was also detected above AWQS, dissolved in groundwater, at 1.65 µg/L in GW-1.
- Soil vapor samples SV-1 through SV-6, and sub-slab vapor sample SSV-1, collected during this investigation were compared to the compounds listed in Table 3.1 Air Guideline Values (AGVs) derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Laboratory analysis of vapor collected at sub-slab sample SSV-1 detected Trichloroethene (TCE) at 1.6 micrograms per cubic meter (ug/m^3) and Tetrachloroethene (PCE) at 59.3 ug/m^3 . 1,1,1-Trichloroethane (1,1,1 TCA) was detected in SV-1 at 1.46 ug/m^3 and in SV-5 at 1.13 ug/m^3 . A number of other VOCs were detected in vapor samples ranging from 0.84 ug/m^3 to 305 ug/m^3 . Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) concentrations were detected below regulatory guidelines at a maximum concentration of 41.3 ug/m^3 .

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 exposure to contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Groundwater

- Prevent direct exposure to contaminated groundwater.

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). Remedial alternatives are then developed and evaluated 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.

As required, a Track 1 Unrestricted Use scenario is evaluated for the remedial action. The following is a detailed description of the alternatives analyzed to address impacted media at the Site:

Alternative 1:

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. If soil/fill containing analytes at concentrations above Unrestricted Use SCOs is still present at the base of the excavation after removal of all

soil required for construction of the new building's cellar level is complete, additional excavation would be performed to ensure complete removal of soil/ fill that does not meet Track 1 Unrestricted Use SCOs.

- Collection and analysis of confirmation end point samples to determine the performance of the remedy with respect to the SCOs.
- No Engineering or Institutional Controls are required for a Track 1 cleanup. However, as part of development, a vapor barrier and a composite cap, would be installed to prevent potential exposures from soil vapor in the future.”

Alternative 2:

- Establishment of Track 2 Restricted Residential SCOs.
- Removal of all soil/fill exceeding Track 2 Restricted Residential SCOs and confirmation that Track 2 Restricted Residential SCOs have been achieved with post-excavation end point sampling. Based on the results of the Remedial Investigation, it is expected that SCOs would be achieved by excavating for construction of the new building's cellar level to a depth of approximately 13.5 feet across the entire Site and approximately 23.5 feet in selected elevator pit locations. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation, additional excavation would be performed to meet Track 2 Restricted Residential SCOs.
- Collection and analysis of confirmation end point samples to determine the performance of the remedy with respect to the SCOs.

Alternative 3:

- Establishment of Track 4 Site-specific SCOs.
- Removal of all soil/fill exceeding Track 4 Site-specific SCOs and confirmation that Track 4 Site-specific SCOs have been achieved with post-excavation end point sampling. Based on the results of the Remedial Investigation, it is expected that SCOs would be achieved by excavating for construction of the new building's cellar level to a depth of approximately 13.5 feet across the entire Site and approximately 23.5 feet in selected elevator pit locations. If soil/fill containing analytes at concentrations above Track 4 Site-

Specific SCOs is still present at the base of the excavation, additional excavation would be performed to meet Track 4 Site-Specific SCOs.

- Backfilling of over-excavated areas to development grade with SCO-compliant certified clean material, recycled concrete aggregate (RCA) or virgin, native crushed stone.
- Placement of a composite cover system over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a vapor barrier (or) waterproofing/vapor barrier system beneath the building slab and along foundation side walls to prevent potential exposures from soil vapor;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended. The SMP will note that the property owner and property owner's successors and assigns must comply with the approved SMP; and
- The property will continue to be registered with an E-Designation (or) Restrictive Declaration at the NYC Buildings Department.

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 all soil/fill exceeding Track 1 Unrestricted Use SCO's and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contaminants leaching into groundwater.

Alternative 2 would be protective of human health and the environment by removing all soil/fill exceeding Track 2 Restricted Residential SCO's and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contaminants leaching into groundwater.

Alternative 3 would achieve comparable protections of human health and the environment by excavation and removal of most of the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCO's, 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 continuing the E-designation instituting a deed notice on the property would ensure that the composite cover system remains intact and protective of public health. Establishment of Track 4 Site-Specific SCO's would minimize the risk of contamination leaching into groundwater.

For each alternative, potential exposure to contaminated soils or groundwater 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. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier below the building slab and outside foundations walls below grade.

3.2 Balancing Criteria

Compliance with Standards, Criteria and Guidance (SCGs)

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

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCO's and Protection of Groundwater SCO's. Compliance with SCGs for soil vapor would also be achieved by installing a waterproofing/vapor barrier system below the new building's basement slab and continuing the vapor barrier outside of subgrade foundation walls, as part of development. In addition, the cellar of the building will contain a parking garage with high volume air exchange that conforms to the NYC Building Code.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 2 Restricted Residential SCO's and Protection of Groundwater SCO's. Compliance with SCGs for soil vapor would also be achieved by installing a waterproofing/vapor barrier system below the new building's basement slab and continuing the vapor barrier outside of subgrade foundation walls, as part of development. In addition, the cellar of the building will contain a parking garage with high volume air exchange that conforms to the NYC Building Code.

Alternative 3 would achieve compliance with the remedial goals, chemical-specific SCG's and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCO's. Compliance with SCG's for soil vapor would also be achieved by installing a waterproofing/vapor barrier system below the new building's basement slab and continuing the vapor barrier outside of subgrade foundation walls. A Site Management Plan would ensure that these controls remained protective for the long term. In addition, the cellar of the building will contain a parking garage with high volume air exchange that conforms to the NYC Building Code and will mediate any potential accumulation of soil vapors inside the building.

Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) will be implemented during Site redevelopment under this RAWP. For both Alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

Short-Term Effectiveness and Impacts

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

Each alternative has similar-short term impacts during their respective implementations, as each requires excavation of historic fill material. Each alternative would result in short-term dust generation associated with excavation, handling, and load out of materials. Each alternative would employ appropriate measures to prevent short-term impacts, including a Construction Health and Safety Plan, 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. Each alternative provides 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 all remedial alternatives is increased truck traffic. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flag persons will be used to protect pedestrians at Site entrances and exits.

The potential adverse impact to the community, workers and the environment for all alternatives would be minimized through implementation of control plans including a Construction Health and Safety Plan, 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 Construction Health and Safety Plan (CHASP) would provide protection from on-Site contaminants by using personal protective equipment would be worn consistent with the documented risks within the respective work zones.

Long-term effectiveness and permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of Engineering Controls/Institutional Controls (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 ECs.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill and enabling unrestricted usage of the property. Removal of on-Site contaminant sources will also prevent continued and future groundwater contamination.

Alternative 2 would provide long-term effectiveness by removing by permanently removing all impacted soil/fill and enabling unrestricted usage of the property and attaining Track 2 Restricted Residential Use SCOs, establishing Engineering Controls including a composite cover system across the Site; A Site Management Plan would ensure that controls remained protective for the long term. Compliance with groundwater SCGs would be achieved over the long term by excavation and removal of soil exceeding Track 2 Restricted Residential Use SCOs.

Alternative 3 would provide long-term effectiveness by removing by permanently removing all impacted soil/fill and attaining Track 4 Site-specific SCOs, establishing Engineering Controls by installing a waterproofing / vapor barrier system, establishing Institutional Controls to ensure long-term management including use restrictions, and a Site Management Plan to ensure that controls remained protective 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 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.

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 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 Unrestricted Use SCO's.

Alternative 2 would remove most of the historic fill at the Site, and all remaining on-Site soil/fill beneath the new building will meet Track 4 Site-Specific SCO's.

Alternative 1 and **2** would remove a greater total mass of contaminants from the Site. The removal of soil to 13.5 feet for the new development in both scenarios would lessen the difference in contaminant mass removal between these two alternatives.

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.

The techniques, materials and equipment to implement both Alternatives 1 and 2 are readily available and have been proven to be effective in remediating the contaminants present on the Site. They use standard equipment and technologies that are well established in the industry. 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.

Since historic fill at the Site was found to extend to a depth of up to 10 feet below grade during the RI, and the new building requires excavation of the entire Site to a depth of 13.5 feet, the costs associated with all three alternatives will likely be comparable. Costs associated with Alternative 1 could potentially be higher than Alternative 2 and Alternative 3 if soil with analytes above Track 1 Unrestricted Use SCOs is encountered below the excavation depth required for development. Additional costs would include installation of additional disposal of additional soil, and import of clean soil for backfill. However, long-term costs for Alternative 1 or 2 are comparable, but long-term costs for Alternative 3 are likely higher than Alternative 1 and 2 based on implementation of a Site Management Plan as part of Alternative 3.

The remedial plan would couple the remedial action with the redevelopment of the Site, lowering total costs. The remedial plan will also consider the selection of the most appropriate disposal facilities to reduce transportation and disposal costs during cleanup and redevelopment of the Site.

Community Acceptance

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

This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. 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 2. Observations here will be supplemented by public comment received on the RAWP. Under both alternatives, the overall goals of the remedial program, to protect public health and the environment and eliminate potential contaminant exposures, have been broadly supported by citizens in NYC communities.

Land use

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

The current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy of soil remediation. The proposed future use of the Site includes approximately 181,000 square feet (sf) of residential space providing 181 residential units; 54,000 sf of medical space; 9,852 sf of commercial space and 33,000 sf of parking. Development plans include a parking area below grade, an ambulatory care center, café, pharmacy, and other retail on the first floor, residential apartment units and ambulatory care center space on the second level, and residential apartment units on floors three through eleven. Following remediation, the Site will meet either Track 2 Unrestricted Use or Track 4 Site-Specific SCOs, both of which are protective of public health and the environment for its planned residential use. The proposed use is compliant with the property's zoning and is consistent with recent development patterns. The areas surrounding the site is urban and consists of predominantly mixed residential and commercial buildings in zoning districts designated for commercial and residential uses. The development would remediate a vacant contaminated lot and provide a health care facility and residential building. The proposed development would clean up the property and make it safer, create new employment opportunities, living space for affordable and supportive housing and associated societal benefits to the community, and other economic benefits from land revitalization.

Temporary short-term project impacts are being mitigated through site management controls and truck traffic controls during remediation activities. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs or Track 2 Restricted Residential SCOs, both of which are protective of public health and the environmental for its planned use.

The Site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The Site is located in an urban area and not in proximity to fish or wildlife and neither alternative would result in any potential exposure pathways of contaminant migration affecting fish or wildlife. The remedial action is also protective of groundwater natural resources. The Site does not lie in a Federal Emergency Management Agency (FEMA)-designated flood plain. Both alternatives are equally protective of natural resources and cultural resources. Improvements in the current

environmental condition of the property achieved by both alternatives considered in this plan are consistent with the City's goals for cleanup of contaminated land.

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.

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. The remedial plan for either alternative 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. The New York City Clean Soil Bank program is available for reuse of any clean native soils under either alternative. A complete list of green remedial activities considered as part of the NYC VCP is included in a Sustainability Statement.

SELECTION OF THE PREFERRED REMEDY

The preferred remedy for the site is Alternative 2. Data generated during the site investigation support the conclusion that Alternative 2 is achievable. It is also possible that post-excavation site conditions may prevent achievement of Track 2, in which case the Track 4 remedy will be implemented.

The Alternative 2 remedy will remove all soil/fill exceeding Track 2 Restricted Use SCOs throughout the Site, which will be confirmed with post-excavation sampling. If soil/fill containing analytes at concentrations above Track 2 Restricted Use SCOs is still present at the

base or walls of the excavation after removal of all soil required for construction of the new building's cellar level and slab are complete, additional excavation would be performed to ensure complete removal of soil/ fill that does not meet Track 2 Unrestricted Use SCOs.

No Engineering Controls are required for a Track 2 cleanup. A concrete slab covering the entire site and waterproofing membrane would be installed as part of standard building development and are not considered part of the remedy. Additional soil vapor management would not be required in areas on the first constructed floor where high volume air exchange is required by NYC Building Code to address indoor vehicle parking. Use restrictions will be imposed on the site (including prohibitions on any use higher than Restricted Residential, e.g. the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval).

4.0 Remedial Action

4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is Alternative 2, the Track 2 remedial action. The preferred remedial action achieves protection of public health and the environment for the intended use of the property. The preferred remedial action will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action 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. Selection of Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Restricted Residential Use (Track 2) SCOs. The entire footprint of the building area (about 90% of the property) will be excavated to a terminal depth of approximately 13.5 feet below grade for redevelopment purposes. Approximately 36,450 tons (30,000 cubic yards) of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.

8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of all UST's that are encountered, if any, during soil/fill removal actions.
10. Registration of any discovered underground storage tanks (USTs) and reporting of any related petroleum spills associated with said UST's and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations if applicable.
11. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
12. Collection and analysis of eight (8) end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
14. Installation of a vapor barrier system beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor migration into the building. The vapor barrier system will consist of a 20-mil vapor barrier, VaporBlock® Plus™ 20. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration. The vapor barrier system is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building.
15. Construction and operation of a grade-level parking garage with high volume air exchange in conformance with NYC Building Code.
16. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
17. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.

18. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
19. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and lists any changes from this RAWP.

4.2 Soil Cleanup Objectives and Soil/ Fill Management

Track 2 Restricted Residential SCOs are proposed for this project and SCO's are defined in 6 NYCRR Part 375, Table 6.8 Track 2 Restricted Residential Use. If these Track 2 SCO's are not achieved, the following site-specific SCO's will be utilized:

The following Track 4 Site-Specific SCO's will be utilized for this project:

<u>Contaminant</u>	<u>Site-Specific SCO's</u>
Total SVOCs	100 ppm
Lead	800 ppm
Mercury	1.5 ppm
Arsenic	25 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in **Appendix 4**. Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Soil/Fill Excavation and Removal

Excavation and removal of soil/fill exceeding Track 2 Site Specific SCOs. Almost the entire footprint of the Site will be excavated to a depth of approximately 13.5 feet below grade for

development purposes. A small portion of the property will be excavated to the depths of 15.5 feet below grade for hotspot areas. Approximately 36,450 tons (30,000 cubic yards) of soil will be excavated and removed from this site. The location of planned excavations is shown in **Figure 4**. For each disposal facility to be used in the remedial action, a letter from the developer/QEP to the receiving facility requesting approval for disposal and a letter back to the developer/QEP providing approval for disposal will be submitted to OER prior to any transport and disposal of soil at a facility.

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

Soil/Fill Waste Characterization

Waste characterization samples will be collected throughout the Site, representative of soil/fill required to be excavated and disposed off-Site during the construction of foundation structures. Laboratory analysis and frequency will be in compliance with disposal facility requirements.

End-point Sampling

End-point samples will be analyzed for compounds and elements as described below utilizing the following methodology:

- 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.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs performing 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.

Confirmation End-point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with confirmation end-point soil sampling. Eight (8) confirmation samples will be collected from the base of the excavation at locations to be determined by OER as shown in Figure 3.

Hotspot End-point Sampling

End-point samples will be collected from the sidewalls and base of excavation at one (1) hotspot location identified in the Remedial Investigation, according to the procedure listed below. The hotspot is located at SB-7. End-point samples will be analyzed for SVOCs and PCBs.

For any hotspots identified during this remedial program, including any hotspots identified during the remedial action, hotspot removal actions will be performed to ensure that hotspots are fully removed and end-point samples will be collected at the following frequency:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
 - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
 - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Post-remediation end-point sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination. End Point Sample Locations are included in **Figure 3**.

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

QA/QC procedures will be used to provide performance information with regard to accuracy, precision, sensitivity, representation, completeness, and comparability associated with the sampling and analysis for documentation and soil sampling. Sampling equipment will be decontaminated by wiping 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. Each sample will be collected in pre-cleaned, laboratory supplied glassware, appropriately labeled, stored in a cooler with ice and submitted for analysis under proper chain of custody procedures to Alpha Analytical Laboratories (Alpha) of Westborough, MA, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11148). Dedicated disposable sampling material will be used for the collection of endpoint samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.), field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Decontamination of non-disposable sampling equipment will consist of the following:

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

- Rinse with distilled or deionized water

Import of Soils

Import of soils onto the property will be performed in conformance with the Soil/Materials Management Plan in **Appendix 4**. The estimated quantity of soil to be imported into the Site for backfill and cover soil is to be determined. Onsite soil/fill is not expected to be reused or relocated on Site. Imported soil will meet the lower of:

- Track 2 Restricted Residential Use SCO's, and
- Groundwater Protection Standards in Part 375-6.8.

The estimated quantity of soil to be imported into the Site for backfill and cover soil is 3,200 cubic yards (4,320 tons). The total quantity of soil imported into the Site for backfill and cover soil will be reported in the RAR. A map of soil backfill placement locations will be included in the RAR.

Reuse of Onsite Soils

Reuse of onsite soils already onsite will be performed in conformance with the Soil/Materials Management Plan in **Appendix 4**. The project will aim to reduce the consumption of virgin materials by substituting pre-existing soil from the Site whenever possible. An estimate of the quantity (in tons) of reused soil will be quantified and reported in the RAR.

4.3 Engineering Controls

Engineering Controls will be employed in the remedial action to address residual contamination remaining at the site. The Site has 1 primary Engineering Control System. This is:

- (1) Composite Cover System consisting of concrete building foundation slabs and walls; and,
- (2) Soil Vapor Barrier System

Composite Cover System

As part of development, a composite cover system will be installed across the Site to prevent potential exposures from any remaining on-Site soil/fill. The system will consist of a concrete a five-inch thick concrete building slab with an six-inch clean granular sub-base beneath all building areas, four-inch poured concrete on a six-inch sub-base in sidewalk areas, and two feet of clean soil in all open space and landscaped areas to prevent human exposure to residual soil/fill remaining on the site. The building slab will be combined with a vapor barrier extended throughout the footprint of the new building and up the foundation sidewalls.

Vapor Barrier System

Migration of soil vapor from onsite or offsite sources into the building will be mitigated with a combination of building slab and vapor barrier. The vapor barrier will consist of the Raven Industries VaporBlock® Plus™ 20, a seven-layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins. VaporBlock® Plus™ 20 is one of the most effective underslab gas barriers in the building industry, exceeding ASTM E-1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. Plans include the installation of a 20 (Class A) mil thick barrier designed to meet the most stringent requirements, resists gas and moisture migration into the building, and to provide protection from toxic/harmful chemicals.

The vapor barrier will extend throughout the area occupied by the footprint of the new building and up the foundation sidewalls and will be installed in accordance with manufacturer specifications.

Vapor barrier system specifications, detail drawings and product specification sheets are provided in **Appendix 6**. The Remedial Action Report will include as-built drawings and diagrams; manufacturer documentation; and photographs.

The Remedial Action Report will include a PE-certified letter (on company letterhead) from the primary contractor responsible for installation oversight and field inspections and a copy of the manufacturer's certificate of warranty.

The Vapor Barrier System is a permanent engineering control and will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying vapor barrier system is disturbed after the remedial action is complete. Maintenance of these systems will be described in the Site Management Plan in the Remedial Action Report.

4.4 Institutional Controls

A series of Institutional Controls (IC's) are required under this Remedial Action to assure permanent protection of public health by elimination of exposure to residual materials. These IC's define the program to operate, maintain, inspect and certify the performance of Engineering Controls and Institutional Controls on this property. Institutional Controls would be implemented in accordance with a Site Management Plan included in the final Remedial Action Report (RAR). Institutional Controls would be:

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

- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for residential, commercial and medical/healthcare 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 the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the SMP.

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 ICs; (2) operation and maintenance of EC's; (3) inspection and certification of IC's and EC's.

Site management activities and EC/IC certification will be scheduled by OER on a periodic basis to be established in the RAR and 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 for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

Data and information reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA) for this project. 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 under current and future conditions by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Contaminant Sources

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

Soil:

- Several SVOCs were detected above Restricted Residential Use SCOs in shallow soils.
- Polychlorinated biphenyls (PCBs) were detected at levels exceeding both Track 1 and Track 2 SCOs.
- Metals including Arsenic, Barium, Lead, Manganese, and Mercury were detected above RRU SCOs.

Groundwater:

- No SVOC, pesticides or PCB concentrations were detected in the groundwater sample Trace VOC concentrations were detected in the sample; however, detections were below AWGS.

Concentrations of eight metals were detected above AWQS including Aluminum, Barium, Beryllium, Chromium, Copper, Iron, Lead, Manganese and Nickel.

Soil Vapor:

- Laboratory analysis of vapor samples collected (SV-1 through SV-6) and Sub-Slab Vapor Sample SSV-1 detected trace levels of VOCs. Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) concentrations were reported as non-detect, or were detected below regulatory guidelines.

Nature, Extent, Fate and Transport of Contaminants

SVOCs, Metals and Pesticides are present in the soil throughout the Site, predominantly in the shallow 0-2' range. Metal contaminants found in soil were found in groundwater samples at concentrations above their respective AWQs, indicating that these contaminants are mobilizing into groundwater. No petroleum associated VOCs and SVOCs found in soil were detected in groundwater samples at concentrations above their respective AWQs. Soil vapor sample results showed no detectable concentrations of VOCs above the NYSDOH Air Guideline Values or Matrices for soil vapor intrusion.

Receptor Populations

Current Conditions: The Site currently consists of a single-story commercial building with a vacant lot to the north and northeast. The surface area of the Site consists of concrete slab within the Site building, exposed soil and/or grassy areas across the exterior of the Site. Groundwater is not exposed at the Site, and because the Site is served by the public water supply and groundwater use for potable supply is prohibited, groundwater is not used at the Site. Accumulation of soil vapor does not pose an exposure threat within the building.

Construction/ Remediation Activities: Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils, as a result of on-Site construction and excavation activities. Due to planned excavation depth above the groundwater table at the Site (groundwater is encountered at 24 ft. bgs), exposure to groundwater is not

anticipated. 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 and vapors from on-Site 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 Program and a Construction Health and Safety Plan.

With the exception of planting areas, the Site will be fully capped with impervious surfaces, limiting potential direct exposure to soil remaining in place. 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.

On-Site Receptors: The Site currently consists of a single-story commercial building with vacant lots to the north and northeast. Access to the area will be limited by construction fences. Therefore, the only potential receptors include Site representatives, visitors granted access to the Site, 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 building residents and visitors, patients of the healthcare facility, as well as building employees.

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 – existing and future
2. Residential Buildings – existing and future
3. Building Construction/ Renovation – existing and future
4. Pedestrians, Trespassers, Cyclists – existing and future
5. Schools – existing and future

Potential Routes of Exposure

Three potential primary routes exist by which chemicals can enter the body: ingestion, inhalation, and dermal absorption. Exposure can occur based on the following potential media:

- Ingestion of groundwater or fill/ soil;
- Inhalation of vapors or particulates; and
- Dermal absorption of groundwater or fill/ soil.

Potential Exposure Points

Current Conditions: The site is currently comprised of exposed soil and grassy areas which could allow for potential exposure pathways from ingestion, inhalation, or dermal absorption of soil/ fill. Groundwater is not exposed at the site. The site is served by the public water supply and groundwater is not used at the site for potable supply and there is no potential for exposure. The Site is currently developed with a one-story building comprised of cement block and brick with a partial basement.

Construction/ Remediation Conditions: During the remedial action, onsite workers will come into direct contact with surface and subsurface soils as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with exposed impacted soil and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. Due to the depth of groundwater, direct contact with groundwater is not expected. 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 Program and a Construction Health and Safety Plan.

Proposed Future Conditions: Under future remediated conditions, all soils in excess of Track 2 SCOs will be removed. The site will be fully capped, preventing potential direct exposure to soil and groundwater remaining in place, and engineering controls (vapor barrier) will prevent any potential exposure due to inhalation by preventing soil vapor intrusion. The site is served by the public water supply, and groundwater is not used at the site. There are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the site.

Overall Human Health Exposure Assessment

There are potential complete exposure pathways for the current site condition. There is a potential complete exposure pathway that requires mitigation during implementation of the remedy. There is no complete exposure pathway under future conditions after the site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a commercial and residential structure and site-wide surface cover cap. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source.

During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill or groundwater, as all soil above Track 2 SCOs will have been removed and a vapor barrier system and composite cover system will have been installed. The vapor barrier will prevent potential vapor intrusion. The composite cover system and use restrictions will prevent contact with residual soil or groundwater and continued protection after the remedial action will be achieved by the implementation of site management including periodic inspection and certification of the performance of remedial controls.

5.0 Remedial Action Management

5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Greg Mendez-Chicas and Joel Rogers, P.E., the Qualified Environmental Professional (QEP) and the Professional Engineer (PE), respectively.

5.2 Site Security

Site access will be controlled by chain link or wooden construction fence, which will surround the Site with gated locked entrances.

5.3 Work Hours

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. The hours of operation will be conveyed to OER during the pre-construction meeting.

5.4 Construction Health and Safety Plan

The Health and Safety Plan is included in **Appendix 5**. The Site Safety Coordinator will be Kurt Pfaffenberger. 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, such as 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 will comply with all requirements of 29 CFR 1910.120. 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 CHASP. 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 bailing/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/m³) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed.

Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m³ above the upwind level and provided that no visible dust is migrating from the work area.

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

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

5.6 Agency Approvals

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

5.7 Site Preparation

Pre-Construction Meeting

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

Mobilization

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

Utility Marker Layouts, Easement Layouts

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

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

Dewatering

Dewatering is not anticipated during remediation and construction.

Equipment and Material Staging

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

Stabilized Construction Entrance

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete pads 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 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 clean water will be utilized for the removal of soil from vehicles and equipment, as necessary.

Extreme Storm Preparedness and Response Contingency Plan

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

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, 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. Stormwater 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 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website (www.nyc.gov/oer) 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 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 determined based on the selected disposal facility.

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 business day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of excavation and other remedial 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 results noting all excursions. CAMP data may be reported;
- 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, and approved by, 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 with basis 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;
- Text description with thorough detail of all engineering and institutional controls (if Track 1 remedial action is not achieved);
- As-built drawings for all constructed remedial elements;
- Manifests for all soil or fill disposal;
- Photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 remedial action is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results (including all soil test results from the remedial investigation for soil that will remain on site) and all soil/fill waste characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all soil or fill material removed from the Site including a map showing the location of these excavations and hotspots, tanks or other contaminant source areas;
- Full accounting of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material;
- Account of the origin and required chemical quality testing for material imported onto the Site;
- Continue registration of the property with an E-Designation by the NYC Department of Buildings (if Track 2 remedial action is not achieved);
- The RAWP and Remedial Investigation Report will be included as appendices to the RAR;
- Reports and supporting material will be submitted in digital form and final PDF's will include bookmarks for each appendix.

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 four month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	1	1
Remedial Excavation	2	16
Record Declaration of Covenants and Restrictions	2	4
Submit Remedial Action Report	32 months	4

FIGURES

Figure 1:
Site Location Maps

Third Avenue, Bronx, New York





-  The Site
-  Residential Properties
-  Commercial Properties
-  Educational Facility
-  Medical Facility



IMPACT ENVIRONMENTAL

170 KEYLAND COURT
BOHEMIA, NEW YORK 11716
TEL (631) 269-8800 FAX (631) 269-1599

1000 PAGE AVENUE
LYNDHURST, NEW JERSEY 07071
TEL (201) 268-5686 FAX (201) 604-7081

TITLE: **Surrounding Land Usage Map**

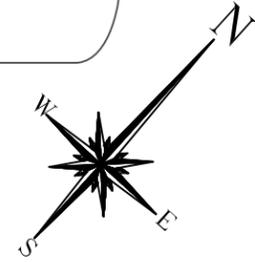
*Saint Barnabas Hospital South,
Third Avenue,
Bronx, New York*

DRAWN BY:	AGF
CHECKED BY:	JP
DATE:	3-24-2016
SCALE:	

PROJECT # 7313-01-02-2000

FIGURE # 02

BATHGATE AVENUE



Legend

- Post Excavation Sample Locations

NOTES:

Post Excavation Sample Locations Map

THIRD AVENUE,
BRONX, NEW YORK

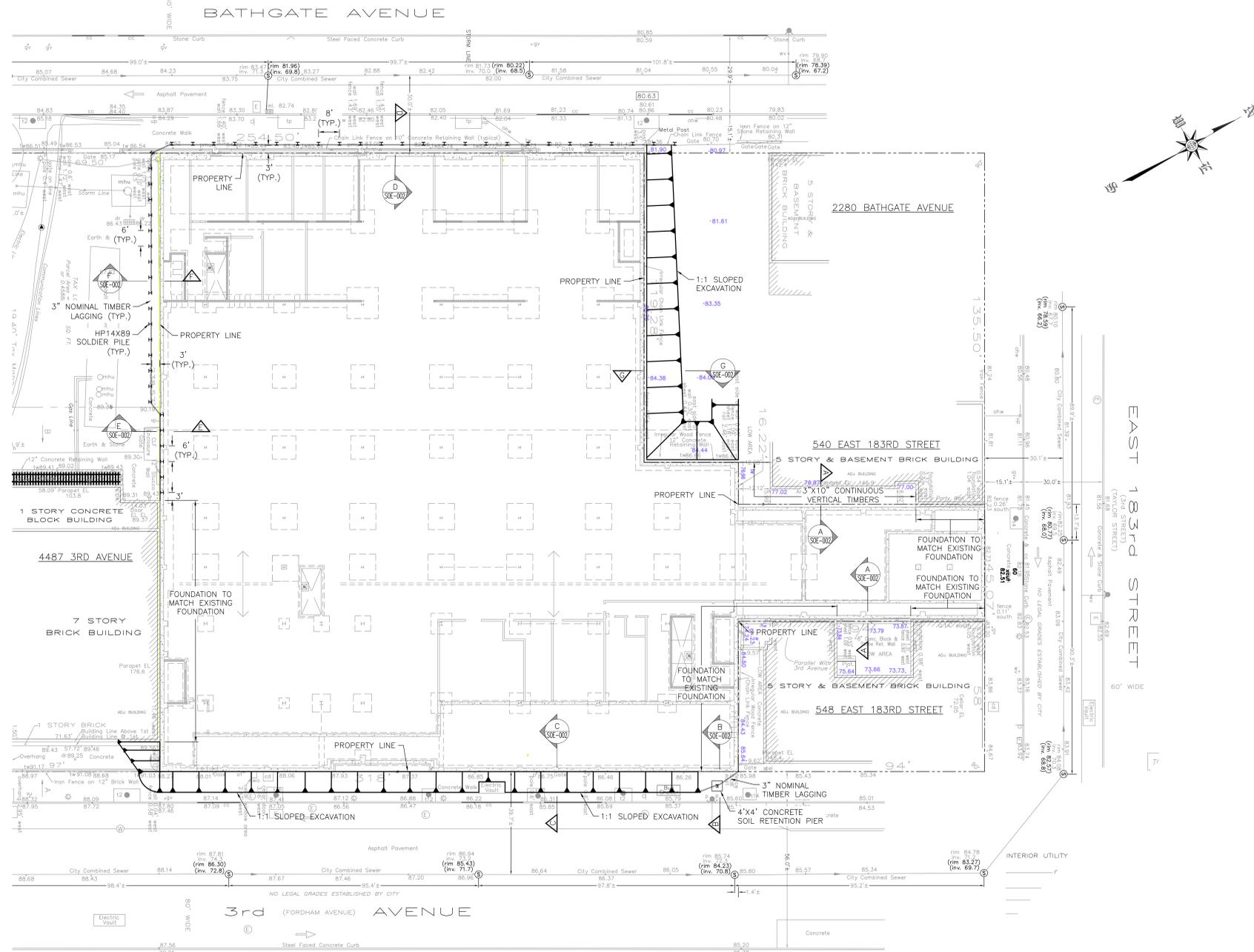
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CHECKED BY:	
DATE:	04/13/2016
SCALE:	
REVISIONS	



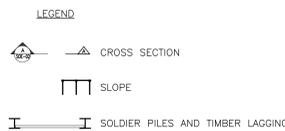
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The information on this drawing was prepared by the engineer or architect on the basis of field notes, photographs, and other data furnished to the engineer or architect by the contractor or other persons. The engineer or architect is not responsible for the accuracy of the information furnished to him. The engineer or architect is not responsible for the accuracy of the information furnished to him. The engineer or architect is not responsible for the accuracy of the information furnished to him.



- NOTES:**
- ALL WORK TO BE PERFORMED IN ACCORDANCE WITH REQUIREMENTS OF NEW YORK CITY BUILDING CODE. CONTRACTOR SHALL GIVE REQUIRED NOTICE TO THE NEW YORK CITY DEPARTMENT OF BUILDINGS BEFORE COMMENCEMENT OF WORK, PER NYCBC 3304.3.1.
 - BASE PLAN COMPILED FROM SURVEY DRAWING PREPARED BY MONTROSE SURVEYING CO., LLP., DATED 02-10-15 AND REVISED 02-12-16 AND FOUNDATION PLAN BY RODNEY D. GIBBLE CONSULTING ENGINEERS, DATED 12-18-15.
 - COORDINATE THESE PLANS WITH THE STRUCTURAL PLANS FOR THE NEW BUILDING.
 - ALL ELEVATIONS SHOWN REFER TO NAVD88 DATUM, WHICH IS 1.106 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, NEW JERSEY.
 - CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
 - REFER TO GEOTECHNICAL ENGINEERING REPORT PREPARED BY URS CORPORATION, DATED MARCH 3, 2015 FOR ADDITIONAL SUBSURFACE INFORMATION.
 - CONTRACTOR SHALL VERIFY LOCATION OF ALL UNDERGROUND UTILITIES AND VAULTS PRIOR TO DRILLING. CONTRACTOR SHALL CALL FOR A UTILITY MARK-OUT BEFORE COMMENCEMENT OF WORK AND WAIT THE REQUIRED NUMBER OF DAYS. CONTRACTOR SHALL REPORT LOCATIONS AND ELEVATIONS OF UTILITIES, STRUCTURES AND OBSTRUCTIONS WHICH CONFLICT WITH LOCATIONS OF SUPPORT OF EXCAVATION ELEMENTS.
 - CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SAFETY AND PROVIDE A SAFETY PLAN CONFORMING TO OSHA STANDARDS.
 - SOLDIER PILE AND LAGGING, WALLER AND BRACING ARE SUBJECT TO SPECIAL INSPECTION AS PER THE NEW YORK CITY BUILDING CODE. SEE STRUCTURAL DRAWINGS FOR A COMPLETE LIST OF REQUIRED SPECIAL INSPECTIONS.
 - UPON INSTALLATION OF THE PERMANENT WALLS, CUT AND REMOVE SOLDIER PILES A MINIMUM 2 FEET FROM THE GRADE LEVEL, OR AS REQUIRED FOR INSTALLATION OF FOUNDATIONS FOR THE PROPOSED BUILDING.
 - ANY PROPOSED REVISION/MODIFICATION TO THE SUPPORT OF EXCAVATION SHOWN SHALL BE SUBMITTED TO GEODESIGN FOR REVIEW.
 - ALL STEEL SHALL CONFORM TO ASTM A572 GRADE 50 (FY=50 KSI), UNLESS OTHERWISE NOTED.
 - A 250 PSF UNIFORM VERTICAL SURCHARGE HAS BEEN INCLUDED AT THE DRILLED SOLDIER PILE LOCATIONS. A 100 PSF UNIFORM LIVE LOAD HAS BEEN INCLUDED AT THE DRIVEN SOLDIER PILE LOCATIONS. IF IT IS DETERMINED THAT THESE LOADS ARE NOT SUFFICIENT, THE VALUE TO BE USED SHOULD BE PROVIDED SO THAT THE DESIGN CAN BE MODIFIED, AS NECESSARY.
 - THE GROUNDWATER LEVEL INSIDE THE EXCAVATION SHALL BE MAINTAINED AT A MINIMUM OF 2 FEET BELOW THE FINAL SUBGRADE LEVEL.
 - DRIVEN AND DRILLED SOLDIER PILE DESIGN IS BASED ON A GROUNDWATER ELEVATION OF +3.0 FEET. IF GROUNDWATER LEVELS ARE DIFFERENT FROM THIS, GEODESIGN SHALL BE NOTIFIED BEFORE PROCEEDING WITH THE WORK.
 - WELDING SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AMERICAN SOCIETY FOR WELDING IN BUILDING CONSTRUCTION AWS D1.1-88. WELDING ELECTRODES TO BE E7018.
 - THE PROPOSED BUILDING IS SHOWN FOR REFERENCE ONLY. REFER TO STRUCTURAL DRAWINGS FOR REQUIRED INFORMATION.
 - A CONDITION SURVEY OF ADJACENT BUILDINGS SHALL BE PERFORMED BY A COMPANY RETAINED BY THE OWNER PRIOR TO THE START OF CONSTRUCTION.



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4511 Third Avenue, Bronx, NY, 10457

Barnabas North LLC
1865 Palmer Ave Suite 203
Larchmont, NY 10538

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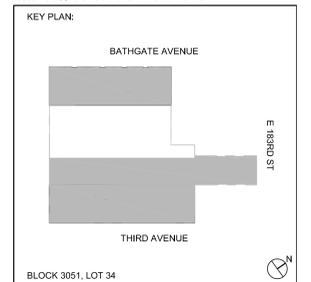
Structural Engineers
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18 West 21st Fl 3
New York, NY 10010

Mechanical/Electrical/Plumbing Engineers
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New York, NY 10018

Landscape Architects
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80 Maiden Ln Suite 1901
New York, NY 10038

Geotechnical Engineers
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Newark, NJ 07102

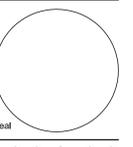
Revisions
Issue: 50% Construction Documents



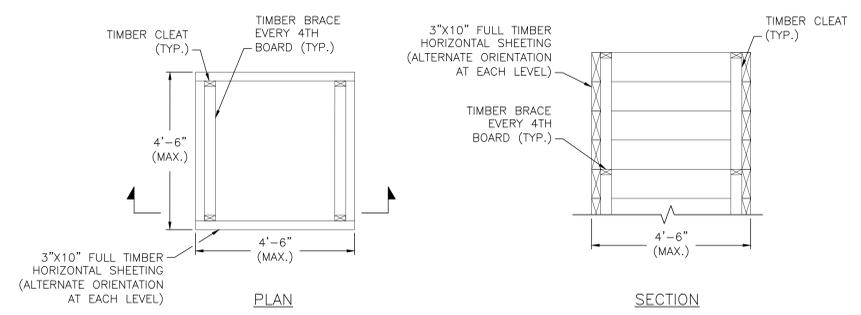
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SUPPORT OF EXCAVATION - PLAN

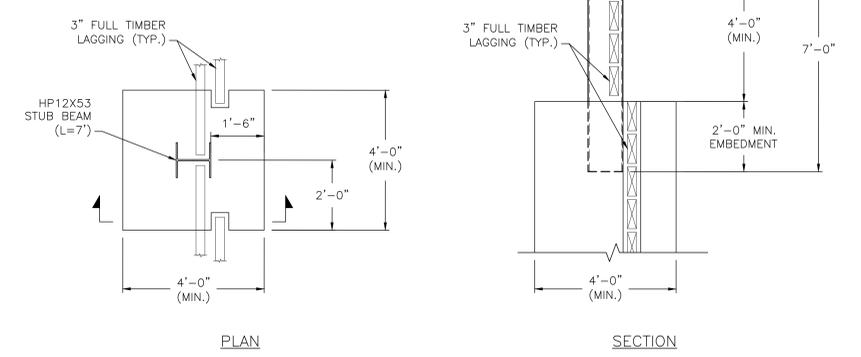
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Checked By TGT
Project No. 0518-018
Sheet No. SOE-001.00



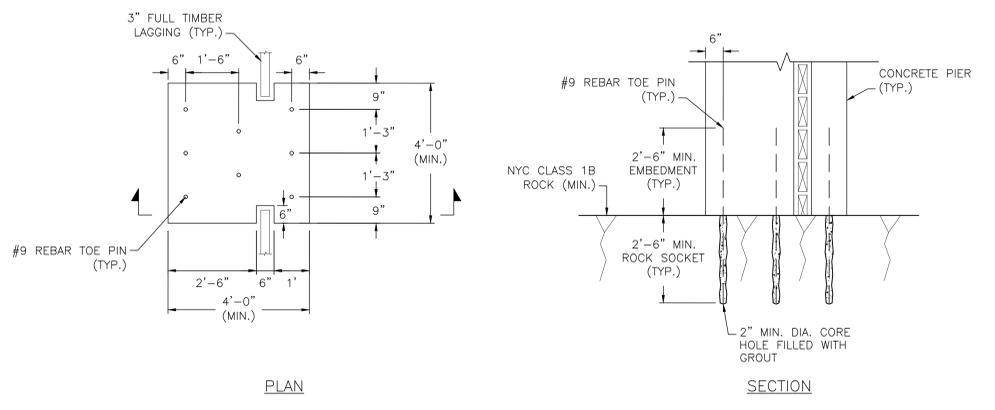
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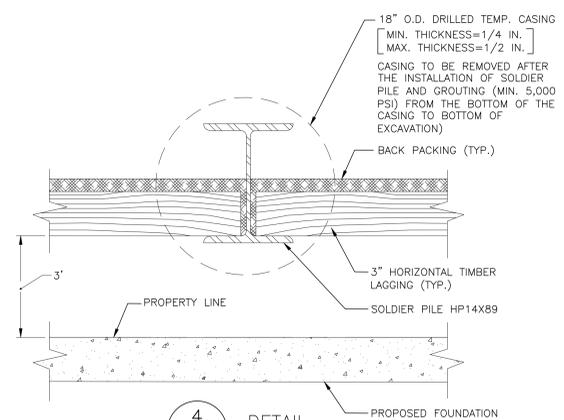
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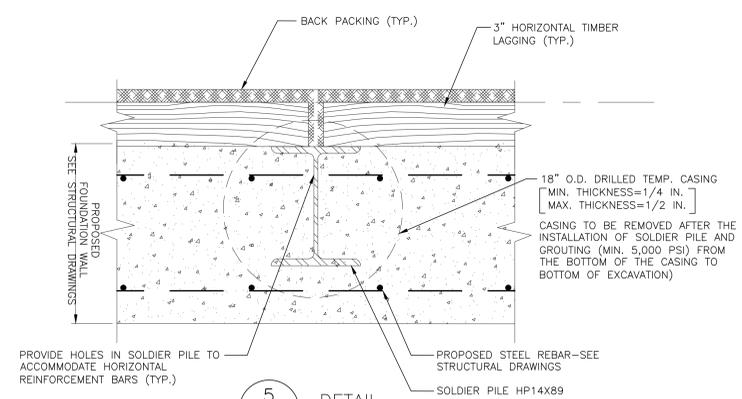
2 STUB BEAM DETAIL
SOE-003 N.T.S.



3 REBAR TOE PIN DETAIL
SOE-003 N.T.S.



4 DETAIL
SOE-003 N.T.S.



5 DETAIL
SOE-003 N.T.S.

St. Barnabas North

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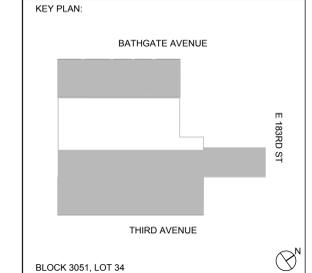
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Revisions

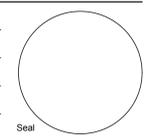
Issue: 50% Construction Documents



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SUPPORT OF EXCAVATION - DETAILS

Date 02/26/16
Scale AS SHOWN
Drawn By RH
Checked By TGT
Project No. 0518-018 Seal
Sheet No. SOE-003.00



3 of 3

TABLES

Table 1: Soil Analytical Results
Third Avenue,
Bronx, NY

Parameter Name	Parameter ID	NYCRR 375 Unrestricted Use Soil Cleanup Objectives (SCOs)	NYCRR 375 Restricted-Residential Use Soil Cleanup Objectives (SCOs)	SB-1 0-2	SB-1 7-9	SB-2 0-2	SB-2 6-8	SB-3 0-2	SB-4 0-2	SB-4 13-15	SB-5 0-2	SB-5 13-15	SB-6 0-2	SB-7 0-2	SB-7 10-12	SB-8 0-2	SB-8 13-15	SB-9 0-2	SB-9 13-15	SB-10 0-2	SB-10 13-15	
				11/13/2015 µg/kg	11/13/2015 µg/kg	11/12/2015 µg/kg																
Sample Date																						
Unit		µg/kg	µg/kg																			
1,1,1-Trichloroethane	VOC	680	100,000a	ND																		
1,1-Dichloroethane	VOC	270	26,000	ND																		
1,1-Dichloroethene	VOC	330	100,000a	ND																		
1,2,4-Trimethylbenzene	VOC	3,600	52,000	ND																		
1,2-Dichlorobenzene	VOC	1,100	100,000a	ND																		
1,2-Dichloroethane	VOC	20c	3,100	ND																		
1,3,5-Trimethylbenzene	VOC	8,400	52,000	ND																		
1,3-Dichlorobenzene	VOC	2,400	49,000	ND																		
1,4-Dichlorobenzene	VOC	1,800	13,000	ND																		
1,4-Dioxane	VOC	100b	13,000	ND																		
2-Butanone	VOC	120	100,000a	ND	24	ND																
Acetone	VOC	50	100,000b	4 J	24	6.1 J	8.6 J	6 J	ND	5.6 J	7 J	9.5 J	ND	170	3.6 J	14	4.3 J	2.4 J	9.4 J	8.2 J	10 J	
Benzene	VOC	60	4,800	ND																		
Carbon Tetrachloride	VOC	760	2,400	ND																		
Chlorobenzene	VOC	1,100	100,000a	ND																		
Chloroform	VOC	370	49,000	ND																		
cis-1,2-Dichloroethene	VOC	250	100,000a	ND																		
Ethylbenzene	VOC	1,000	41,000	ND																		
Methylene Chloride	VOC	50	100,000a	ND																		
Methyl Tert-Butyl Ether	VOC	930	100,000a	ND																		
Naphthalene	VOC	12,000	100,000a	ND																		
n-Butylbenzene	VOC	12,000	100,000a	ND																		
n-Propylbenzene	VOC	3,900	100,000a	ND																		
sec-Butylbenzene	VOC	11,000	100,000a	ND																		
tert-Butylbenzene	VOC	5,900	100,000a	ND																		
Tetrachloroethene	VOC	1,300	19,000	ND																		
Toluene	VOC	700	100,000a	ND																		
Total Xylenes	VOC	260	100,000a	ND																		
trans-1,2-Dichloroethene	VOC	190	100,000a	ND																		
Trichloroethene	VOC	470	21,000	ND																		
Vinyl Chloride	VOC	20	900	ND																		
2-Methylphenol	SVOC	330b	100,000a	ND																		
m-Cresol(s)	SVOC	330b	100,000a	ND																		
4-Methylphenol	SVOC	330b	100,000a	ND																		
Acenaphthene	SVOC	20,000	100,000a	ND	ND	ND	110 J	ND	58 J	ND	ND	2200	ND									
Acenaphthylene	SVOC	100,000a	100,000a	ND	ND	ND	240	640 J	ND	260	ND	55 J	660 J	250	ND							
Anthracene	SVOC	100,000a	100,000a	ND	ND	50 J	ND	510	570 J	ND	340	ND	81 J	4600	230	ND						
Benzo-a-Anthracene	SVOC	1,000c	1,000f	ND	ND	100 J	90 J	1200	2300	ND	930	ND	330	8800	700	ND	ND	ND	55 J	ND	ND	ND
Benzo-a-Pyrene	SVOC	1,000c	1,000f	77 J	ND	130 J	120 J	850	2800	ND	730	ND	350	7500	550	ND	ND	ND	88 J	ND	ND	ND
Benzo-b-Fluoranthene	SVOC	1,000c	1,000f	92 J	ND	160	150	1000	2800	ND	930	ND	400	9400	730	ND	ND	ND	110	ND	ND	ND
Benzo-k-Fluoranthene	SVOC	800c	3,900	ND	ND	42 J	36 J	430	950 J	ND	400	ND	190	3700	330	ND						
Benzo-g,h,i-Perylene	SVOC	100,000	100,000a	ND	ND	54 J	52 J	480	1800	ND	500	ND	230	5000	400	ND						
Chrysene	SVOC	1,000c	3900	ND	ND	82 J	79 J	960	2400	ND	770	ND	300	7300	610	ND	ND	ND	42 J	ND	ND	ND
Dibenzofuran	SVOC	7,500	59,000	ND	92 J	ND	ND	1500 J	ND													
Dibenz-a,h-Anthracene	SVOC	330b	330e	ND	ND	45 J	44 J	160	760 J	ND	150	ND	84 J	4400	130	ND	ND	ND	41 J	ND	ND	ND
Fluoranthene	SVOC	100,000	100,000a	71 J	ND	150	150	2200	3000	ND	2000	ND	590	20000	1600	ND	ND	ND	76 J	ND	ND	ND
Fluorene	SVOC	30,000	100,000a	ND	ND	ND	ND	160 J	ND	ND	130 J	ND	ND	1800 J	85 J	ND						
Hexachlorobenzene	SVOC	330	1,200	ND																		
Indeno(1,2,3-cd)Pyrene	SVOC	500c	500f	110 J	ND	140 J	130 J	580	2300	ND	560	ND	310	5800	480	ND	ND	ND	120 J	ND	ND	ND
Pentachlorophenol	SVOC	800b	6,700	ND																		
Phenanthrene	SVOC	100,000	100,000a	52 J	ND	42 J	55 J	1500	1400	ND	1300	ND	220	6300	800	ND						
Phenol	SVOC	330b	100,000a	ND																		
Pyrene	SVOC	100,000	100,000a	59 J	ND	160	140	1,800	3,800	ND	1,500	ND	500	16000	1200	ND	ND	ND	60 J	ND	ND	ND

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				11/13/2015	11/13/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015
Unit		µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1,1,1-Trichloroethane	VOC	680	100,000a	ND	ND																	
4,4-DDD	PESTICIDE	3.3b	13,000	ND	ND	ND	ND	ND	3.18 PI	ND	ND	ND	ND	4.32	52.9	ND	ND	ND	1.39 J	ND	ND	ND
4,4-DDE	PESTICIDE	3.3b	8,900	ND	ND	ND	ND	ND	3.31	ND	2.77	ND	10.2	ND	ND	ND	ND	ND	2.26	ND	ND	ND
4,4-DDT	PESTICIDE	3.3b	7,900	ND	ND	ND	ND	2.96 J	ND	ND	5.28	ND	16.7	ND	4.25	ND	ND	13	ND	ND	ND	ND
Aldrin	PESTICIDE	5c	97	ND	ND																	
alpha-BHC	PESTICIDE	20	490	ND	ND																	
Alpha-Chlordane	PESTICIDE	94	4,200	ND	ND	ND	ND	ND	6.3	ND	5.51	ND	23.4	ND	ND	ND	ND	ND	1.44 J	ND	ND	1.24 J
beta-BHC	PESTICIDE	36	360	ND	ND																	
delta-BHC	PESTICIDE	40	100,000a	ND	ND																	
Dieldrin	PESTICIDE	5	200	ND	ND	ND	ND	ND	28.9 P	ND	ND	ND	1.16 PI	ND	ND	ND	ND	ND	1.41	ND	ND	ND
Endosulfan	PESTICIDE	2400	NA	ND	ND	ND	ND	ND	2.09 PI	ND	ND											
Endosulfan I	PESTICIDE	2,400	24,000i	ND	ND																	
Endosulfan II	PESTICIDE	2,400	24,000i	ND	ND	ND	ND	ND	2.09 PI	ND	ND											
Endosulfan Sulfate	PESTICIDE	2,400	24,000i	ND	ND																	
Endrin	PESTICIDE	14	11,000	ND	ND																	
gamma-BHC	PESTICIDE	100	1,300	ND	ND																	
Heptachlor	PESTICIDE	42	2,100	ND	1.78	ND	ND															
Aroclor 1016	PCB	NA	NA	ND	ND																	
Aroclor 1221	PCB	NA	NA	ND	ND																	
Aroclor 1222	PCB	NA	NA	ND	ND																	
Aroclor 1242	PCB	NA	NA	ND	841	ND	ND															
Aroclor 1248	PCB	NA	NA	ND	ND																	
Aroclor 1254	PCB	NA	NA	ND	ND	ND	ND	ND	12.9 J	ND	13.8 J	ND	ND	257	ND	ND						
Aroclor 1260	PCB	NA	NA	ND	ND	ND	ND	ND	12.3 J	ND	12.2 J	ND	ND	106	ND	ND						
Total PCBs	PCB	100	1,000	ND	ND	ND	ND	ND	25.2	ND	26.0	ND	ND	1,204	ND	ND						
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum, Al	METAL	NA	NA	17000	26000	13000	NA*	NA*	NA*	NA*	NA*	7900	7100	8800	7100	8200	14000	7000	11000	7900		
Antimony, Sb	METAL	NA	NA	ND	ND	0.51	0.57 JB	0.86 JB	0.99 JB	1.3	0.54	1.5 JB	1.4	NA	0.64	0.46	0.39	1.7	0.42	0.55	0.34	
Arsenic, As	METAL	13c	16f	33	36	3.1	3.1	4.5	4.9	3.3	4.9	3	8.2	15	3.8	1.7	2	3.3	2.4	3.3	1.9	
Barium, Ba	METAL	350c	400	140	420	64	66	54	220	100	85	230	82	120	100	34	36	270	52	60	50	
Beryllium, Be	METAL	7.2	72	2.3	2.9	0.49	0.4	0.58	0.23	2.2	0.47	2.4	1.6	0.39	0.27	0.14	0.34	0.3	0.37	0.79	0.84	
Cadmium, Cd	METAL	2.5c	4.3	ND	0.84	ND	ND	ND	0.1	ND	ND	ND										
Calcium, Ca	METAL	NA	NA	3,100	8900	NA*	NA*	30000	3600	22000	2900	16000	NA*	NA*	1400	1200	40000	1600	1400	1900		
Chromium, Cr	METAL	NA	110	33	47	25	28	24	18	32	18	24	16	25	11	14	22	56	21	52	27	
Cobalt, Co	METAL	NA	NA	20	30	5.5	6.2	5.4	7	9.5	6.6	22	6.8	5.4	3.6	5.1	6.4	5.4	6.8	8.6	12	
Copper, Cu	METAL	50	270	18	16	14	17	17	56	17	26	18	20	190	11	17	18	33	27	13	22	
Iron, Fe	METAL	NA	NA	100000	190000	17000	16000	20000	17000	27000	17000	35000	NA*	29000	9700	10000	13000	13000	18000	17000	20000	
Lead, Pb	METAL	63c	400	ND	ND	4.6	9.1	18	150	ND	16	ND	8.8	520	9.3	ND	ND	400	ND	0.19	ND	
Manganese, Mn	METAL	1,600c	2,000f	3300	5300	270	270	580	220	560	260	990	450	350	150	160	260	380	220	520	310	
Mercury, Hg	METAL	.18c	.81j	ND	ND	ND	ND	0.15	0.19	ND	0.06	ND	0.11	1	0.03	ND	ND	0.18	ND	ND	ND	
Nickel, Ni	METAL	30	310	19	20	11	14	14	14	41	15	110	10	21	7.2	11	12	13	17	14	18	
Selenium, Se	METAL	3.9c	180	ND																		
Silver, Ag	METAL	2	180	ND	2.1	ND																
Thallium, Tl	METAL	NA	NA	2.8	ND																	
Vanadium, V	METAL	NA	NA	26	40	21	26	27	47	37	28	27	23	20	16	22	25	25	30	26	28	
Zinc, Zn	METAL	109c	10,000d	38	86	37	43	63	160	120	82	160	74	740	60	18	27	280	25	46	100	

Notes:

µg/kg = micrograms per kilogram (ppb)

mg/kg = milligrams per kilogram (ppm)

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL)

P - The RPD between the results for the two columns exceeds the method-specified criteria.

I - The lower value for the two columns has been reported due to obvious interference.

NA* = Could not be analyzed by the laboratory

Table 2: Groundwater Analytical Results

Third Avenue,
Bronx, NY

Parameter Name	Parameter ID	GW-1	NYSDEC TOGS 1.1.1 Water Quality Standards
Sample ID		L1529895-19	
Date		11/12/2015	
Unit		µg/L	
1,1,1,2-Tetrachloroethane	VOC	ND	5
1,1,1-Trichloroethane	VOC	ND	5
1,1,2,2-Tetrachloroethane	VOC	ND	5
1,1,2-Trichloroethane	VOC	ND	1
1,1-Dichloroethane	VOC	ND	5
1,1-Dichloroethene	VOC	ND	5
1,2,3-Trichloropropane	VOC	ND	0.04
1,2,4-Trimethylbenzene	VOC	ND	5
1,2-Dibromo-3-Chloropropane	VOC	ND	0.04
1,2-Dibromoethane	VOC	ND	5
1,2-Dichlorobenzene	VOC	ND	3
1,2-Dichloroethane	VOC	ND	0.6
1,2-Dichloropropane	VOC	ND	1
1,3,5-Trimethylbenzene	VOC	ND	5
1,3-Dichlorobenzene	VOC	ND	3
1,3-Dichloropropane	VOC	ND	5
1,3-Dichloropropene(cis and trans)	VOC	ND	NA
1,4-Dichlorobenzene	VOC	ND	3
1,4-Dioxane	VOC	ND	NA
2-Butanone	VOC	ND	50
2-Chlorotoluene	VOC	ND	5
4-Methyl-2-Pentanone	VOC	ND	NA
Acetone	VOC	ND	50
Acrylonitrile	VOC	ND	5
Benzene	VOC	ND	1
Bromochloromethane	VOC	ND	5
Bromodichloromethane	VOC	ND	50
Bromoform	VOC	ND	50
Bromomethane	VOC	ND	5
Carbon Disulfide	VOC	ND	60
Carbon Tetrachloride	VOC	ND	5
Chlorobenzene	VOC	ND	5
Chlorodibromomethane	VOC	ND	NA
Chloroethane	VOC	ND	5
Chloroform	VOC	1.3 J	7
Chloromethane	VOC	ND	5
cis-1,2-Dichloroethene	VOC	ND	5
Dibromomethane	VOC	ND	NA
Dichlorodifluoromethane	VOC	ND	5
Ethylbenzene	VOC	ND	5
Isopropylbenzene	VOC	ND	5
Methylene Chloride	VOC	ND	5
Methyl Tert-Butyl Ether	VOC	ND	10
n-Butylbenzene	VOC	ND	5
n-Propylbenzene	VOC	ND	5
p-Isopropyltoluene	VOC	ND	5
sec-Butylbenzene	VOC	ND	5
Styrene	VOC	ND	5
tert-Butylbenzene	VOC	ND	NA
Tetrachloroethene	VOC	ND	5
Toluene	VOC	ND	5
Total Xylenes	VOC	0.77 J	5
trans-1,2-Dichloroethene	VOC	ND	5
Trichloroethene	VOC	ND	5
Trichlorofluoromethane	VOC	ND	5
Vinyl Acetate	VOC	ND	NA
Vinyl Chloride	VOC	ND	2
1,2,4-Trichlorobenzene	VOC	ND	5
1-1- Biphenyl	SVOC	ND	NA
Naphthalene	SVOC	ND	10
Hexachlorobutadiene	SVOC	ND	NA
1,2,4,5-Tetrachlorobenzene	SVOC	ND	NA
2,4,5-Trichlorophenol	SVOC	ND	NA

Table 2: Groundwater Analytical Results

Third Avenue,
Bronx, NY

Parameter Name	Parameter ID	GW-1	NYSDEC TOGS 1.1.1 Water Quality Standards
Sample ID		L1529895-19	
Date		11/12/2015	
Unit		µg/L	
2,4,6-Trichlorophenol	SVOC	ND	NA
2,4-Dichlorophenol	SVOC	ND	NA
2,4-Dimethylphenol	SVOC	ND	NA
2,4-Dinitrophenol	SVOC	ND	10
2,4-Dinitrotoluene	SVOC	ND	5
2,6-Dinitrotoluene	SVOC	ND	5
2-Chloronaphthalene	SVOC	ND	10
2-Chlorophenol	SVOC	ND	NA
2-Methylnaphthalene	SVOC	ND	NA
2-Methylphenol	SVOC	ND	NA
2-Nitroaniline	SVOC	ND	5
2-Nitrophenol	SVOC	ND	NA
3,3-Dichlorobenzidine	SVOC	ND	5
m-Cresol(s)	SVOC	ND	NA
3-Nitroaniline	SVOC	ND	5
4,6-Dinitro-2-methylphenol	SVOC	ND	NA
4-Chloro-3-methylphenol	SVOC	ND	NA
4-Chloroaniline	SVOC	ND	5
4-Methylphenol	SVOC	ND	NA
4-Nitroaniline	SVOC	ND	5
4-Nitrophenol	SVOC	ND	NA
Acenaphthene	SVOC	ND	20
Acenaphthylene	SVOC	ND	NA
Acetophenone	SVOC	ND	NA
Anthracene	SVOC	ND	50
Benzo-a-Anthracene	SVOC	ND	0.002
Benzo-a-Pyrene	SVOC	ND	MDL
Benzo-b-Fluoranthene	SVOC	ND	NA
Benzo-k-Fluoranthene	SVOC	ND	NA
Benzo-g,h,i-Perylene	SVOC	ND	NA
Benzoic Acid	SVOC	ND	NA
Benzyl Alcohol	SVOC	ND	NA
Bis(2-Chloroethyl)ether	SVOC	ND	NA
Bis(2-Chloroisopropyl)ether	SVOC	ND	5
Bis(2-Ethylhexyl)Phthalate	SVOC	ND	5
Butylbenzylphthalate	SVOC	ND	50
Carbazole	SVOC	ND	NA
Chrysene	SVOC	ND	0.002
Dibenzofuran	SVOC	ND	NA
Dibenzo-a,h-Anthracene	SVOC	ND	NA
Diethyl Phthalate	SVOC	ND	50
Dimethyl Phthalate	SVOC	ND	50
Di-n-Butyl Phthalate	SVOC	ND	50
Dinitrotoluene(2,4-/2,6-)	SVOC	ND	NA
Di-n-Octyl Phthalate	SVOC	ND	NA
Fluoranthene	SVOC	ND	50
Fluorene	SVOC	ND	50
Hexachlorobenzene	SVOC	ND	0.04
Hexachlorocyclopentadiene	SVOC	ND	5
Hexachloroethane	SVOC	ND	5
Indeno(1,2,3-cd)Pyrene	SVOC	ND	0.002

Table 2: Groundwater Analytical Results

Third Avenue,
Bronx, NY

Parameter Name	Parameter ID	GW-1	NYSDEC TOGS 1.1.1 Water Quality Standards
Sample ID		L1529895-19	
Date		11/12/2015	
Unit		µg/L	
Isophorone	SVOC	ND	50
Nitrobenzene	SVOC	ND	0.4
N-Nitroso-di-n-Propylamine	SVOC	ND	NA
N-Nitrosodiphenylamine	SVOC	ND	50
Pentachlorophenol	SVOC	ND	NA
Phenanthrene	SVOC	ND	50
Phenol	SVOC	ND	1
Pyrene	SVOC	ND	NA
4,4-DDD	PESTICIDE	ND	0.3
4,4-DDE	PESTICIDE	ND	0.2
4,4-DDT	PESTICIDE	ND	0.2
Aldrin	PESTICIDE	ND	MDL
alpha-BHC	PESTICIDE	ND	0.01
Alpha Chlordane	PESTICIDE	ND	NA
beta-BHC	PESTICIDE	ND	0.04
Chlordane	PESTICIDE	ND	NA
delta-BHC	PESTICIDE	ND	0.04
Dieldrin	PESTICIDE	ND	0.004
Endosulfan	PESTICIDE	ND	NA
Endosulfan I	PESTICIDE	ND	NA
Endosulfan II	PESTICIDE	ND	NA
Endosulfan Sulfate	PESTICIDE	ND	NA
Endrin	PESTICIDE	ND	MDL
gamma-BHC	PESTICIDE	ND	0.05
Gamma Chlordane	PESTICIDE	ND	NA
Heptachlor	PESTICIDE	ND	0.04
Heptachlor Epoxide	PESTICIDE	ND	0.03
Methoxychlor	PESTICIDE	ND	35
Toxaphene	PESTICIDE	ND	0.06
Aroclor 1016	PCB	ND	NA
Aroclor 1221	PCB	ND	NA
Aroclor 1232	PCB	ND	NA
Aroclor 1242	PCB	ND	NA
Aroclor 1248	PCB	ND	NA
Aroclor 1254	PCB	ND	NA
Aroclor 1260	PCB	ND	NA
Aroclor 1262	PCB	ND	NA
Aroclor 1268	PCB	ND	NA
Total PCBs	PCB	0.9	0.9
Unit		mg/L	
Aluminum, Al	METAL	40.5	0.1
Antimony, Sb	METAL	0.00014 J	0.003
Arsenic, As	METAL	0.0056	0.025
Barium, Ba	METAL	1.266	1
Beryllium, Be	METAL	0.00455	0.003
Cadmium, Cd	METAL	0.001	0.005
Calcium, Ca	METAL	465	NA
Chromium, Cr	METAL	0.09624	0.05
Cobalt, Co	METAL	0.06342	NA
Copper, Cu	METAL	0.2762	0.2
Iron, Fe	METAL	90.2	0.3
Lead, Pb	METAL	0.05001	0.025
Magnesium, Mg	METAL	105	35,000
Manganese, Mn	METAL	7.124	0.3
Mercury, Hg	METAL	ND	0.0007
Nickel, Ni	METAL	0.108	0.1
Potassium, K	METAL	13.2	NA
Selenium, Se	METAL	0.00975	0.01
Silver, Ag	METAL	0.00014 J	0.05
Sodium, Na	METAL	141	20,000
Thallium, Tl	METAL	0.00357	0.0005
Vanadium, V	METAL	0.1048	NA
Zinc, Zn	METAL	0.289	2

Table 2: Groundwater Analytical Results

Third Avenue,
Bronx, NY

Parameter Name	Parameter ID	GW-1	NYSDEC TOGS 1.1.1 Water Quality Standards
Sample ID		L1529895-19	
Date		11/12/2015	
Unit		µg/L	
Aluminum, Dissolved	METAL	0.0234	0.1
Antimony, Dissolved	METAL	ND	0.003
Arsenic, Dissolved	METAL	0.0008	0.025
Barium, Dissolved	METAL	0.1894	1
Beryllium, Dissolved	METAL	ND	0.003
Cadmium, Dissolved	METAL	ND	0.005
Calcium, Dissolved	METAL	233	NA
Chromium, Dissolved	METAL	0.00478 J	0.05
Cobalt, Dissolved	METAL	0.00498	NA
Copper, Dissolved	METAL	0.00576	0.2
Iron, Dissolved	METAL	0.585	0.3
Lead, Dissolved	METAL	0.00077 J	0.025
Magnesium, Dissolved	METAL	35.6	35,000
Manganese, Dissolved	METAL	1.65	0.3
Mercury, Dissolved	METAL	ND	0.0007
Nickel, Dissolved	METAL	0.01091	0.1
Potassium, Dissolved	METAL	13.9	NA
Selenium, Dissolved	METAL	ND	0.01
Silver, Dissolved	METAL	ND	0.05
Sodium, Dissolved	METAL	95.9	20,000
Thallium, Dissolved	METAL	ND	0.0005
Vanadium, Dissolved	METAL	ND	NA
Zinc, Dissolved	METAL	0.01666 J	2

Notes:

ug/L = micrograms per liter

mg/L = milligrams per liter

Table 3: Soil and Sub-Slab Vapor Analytical Results

Third Avenue,
Bronx, NY

Parameter Name	SV-1	SV-2	SV-3	SV-4	SV-5	SV-6	SSV-1	NYSDOH Matrix 1/2	NYSDOH Indoor/Outdoor Air Guidelines Values	USEPA 2001: BASE Indoor Air Concentrations (90th Percentile)
Sample ID	L1530119-01	L1530119-02	L1530119-03	L1530119-04	L1530119-05	L1530119-06	L1530119-07			
Date	11/16/2015	11/16/2015	11/16/2015	11/16/2015	11/16/2015	11/16/2015	11/16/2015			
Unit	ug/m3									
1,1,1-Trichloroethane	1.46	ND	ND	ND	1.13	ND	ND	Mon./Mit./<100	-	20.6
1,1,2,2-Tetrachloroethane	ND	-	-	NA						
1,1,2-Trichloroethane	ND	-	-	1.5						
1,1-Dichloroethane	ND	-	-	0.7						
1,1-Dichloroethene	ND	-	-	1.4						
1,2,4-Trichlorobenzene	ND	-	-	-						
1,2,4-Trimethylbenzene	ND	1.82	1.95	1.23	1.16	ND	1.1	-	-	9.5
1,2-Dibromoethane	ND	-	-	1.5						
1,2-Dichlorobenzene	ND	-	-	1.2						
1,2-Dichloroethane	ND	-	-	0.9						
1,2-Dichloropropane	ND	-	-	1.6						
1,3,5-Trimethylbenzene	ND	-	-	3.7						
1,3-Butadiene	ND	ND	ND	0.531	2.35	15.7	ND	-	-	3
1,3-Dichlorobenzene	ND	-	-	-						
1,4-Dichlorobenzene	ND	-	-	5.5						
1,4-Dioxane	ND	-	-	NA						
2,2,4-Trimethylpentane	3.57	2.2	ND	3.47	4.03	ND	1.2	-	-	NA
2-Butanone	4.48	3.75	2.8	3.27	4.84	7.93	ND	-	-	12
2-Hexanone	ND	ND	ND	ND	6.07	ND	ND	-	-	NA
3-Chloropropene	ND	-	-	NA						
4-Ethyltoluene	ND	-	-	3.6						
4-Methyl-2-pentanone	ND	-	-	6						
Acetone	105	86.5	54.9	67	122	184	6.41	-	-	98.9
Benzene	0.84	0.914	1.29	1.06	1.56	ND	ND	-	-	9.4
Benzyl chloride	ND	-	-	6.8						
Bromodichloromethane	ND	ND	ND	2.51	5.25	ND	ND	-	-	NA
Bromoform	ND	-	-	NA						
Bromomethane	ND	-	-	1.7						
Carbon disulfide	ND	6.94	3.49	5.95	25.1	103	ND	-	-	4.2
Carbon tetrachloride	ND	Mon./Mit./<5	-	1.3						
Chlorobenzene	ND	-	-	0.9						
Chloroethane	ND	-	-	1.1						
Chloroform	26.1	26.7	3.95	118	305	38.8	17.6	-	-	1.1
Chloromethane	ND	-	-	3.7						
cis-1,2-Dichloroethene	ND	-	-	1.9						
cis-1,3-Dichloropropene	ND	-	-	2.3						
Cyclohexane	1.06	1.26	4.51	ND	1.15	8.92	ND	-	-	NA
Dibromochloromethane	ND	-	-	-						
Dichlorodifluoromethane	1.63	1.36	1.63	2.34	11	ND	1.91	-	-	16.5
Ethanol	22.2	20.3	16.2	17.5	26.2	40.5	9.7	-	-	210
Ethyl Acetate	ND	-	-	5.4						
Ethylbenzene	2.36	2.44	2.45	2.25	2.3	ND	1.98	-	-	5.7
Freon-113	ND	-	-	-						
Freon-114	ND	ND	ND	ND	2.08	ND	ND	-	-	NA
Heptane	1.38	1.03	2.61	1.55	2.01	3.22	ND	-	-	NA
Hexachlorobutadiene	ND	-	-	6.8						
Isopropanol	2.44	4.35	3.07	4.15	7.18	ND	1.27	-	-	250
Methyl tert butyl ether	ND	-	-	11.5						
Methylene chloride	4.79	2.65	3.02	4.55	5.38	7.75	ND	-	60	10
n-Hexane	1.02	ND	5	1.35	3.29	17.7	ND	-	-	10.2
o-Xylene	2.37	2.86	2.79	2.1	2.46	3.13	2.55	-	-	7.9
p/m-Xylene	7.64	8.86	8.73	6.95	7.77	9.51	7.56	-	-	22.2
Styrene	1.77	1.46	1.1	1.72	1.27	ND	1.23	-	-	1.9
Tertiary butyl Alcohol	17.9	12.9	9.67	11.2	16.6	18.1	3.94	-	-	-
Tetrachloroethene	ND	ND	ND	ND	ND	ND	59.3	Mon./Mit./<100	30.0	15.9
Tetrahydrofuran	1.52	ND	ND	ND	1.68	ND	ND	-	-	NA
Toluene	14.4	26.2	16.5	15.8	14.5	14.9	9.01	-	-	43
trans-1,2-Dichloroethene	ND	-	-	NA						
trans-1,3-Dichloropropene	ND	-	-	1.3						
Trichloroethene	ND	ND	ND	ND	ND	ND	1.6	Mon./Mit./<5	5.0	4.2
Trichlorofluoromethane	11.9	2.68	6.41	67.4	61.8	29.9	7.81	-	-	18.1
Vinyl bromide	ND	-	-	NA						
Vinyl chloride	ND	-	-	<1.9						
Total BTEX	27.6	41.3	31.8	28.2	28.6	27.5	21.1	-	-	-

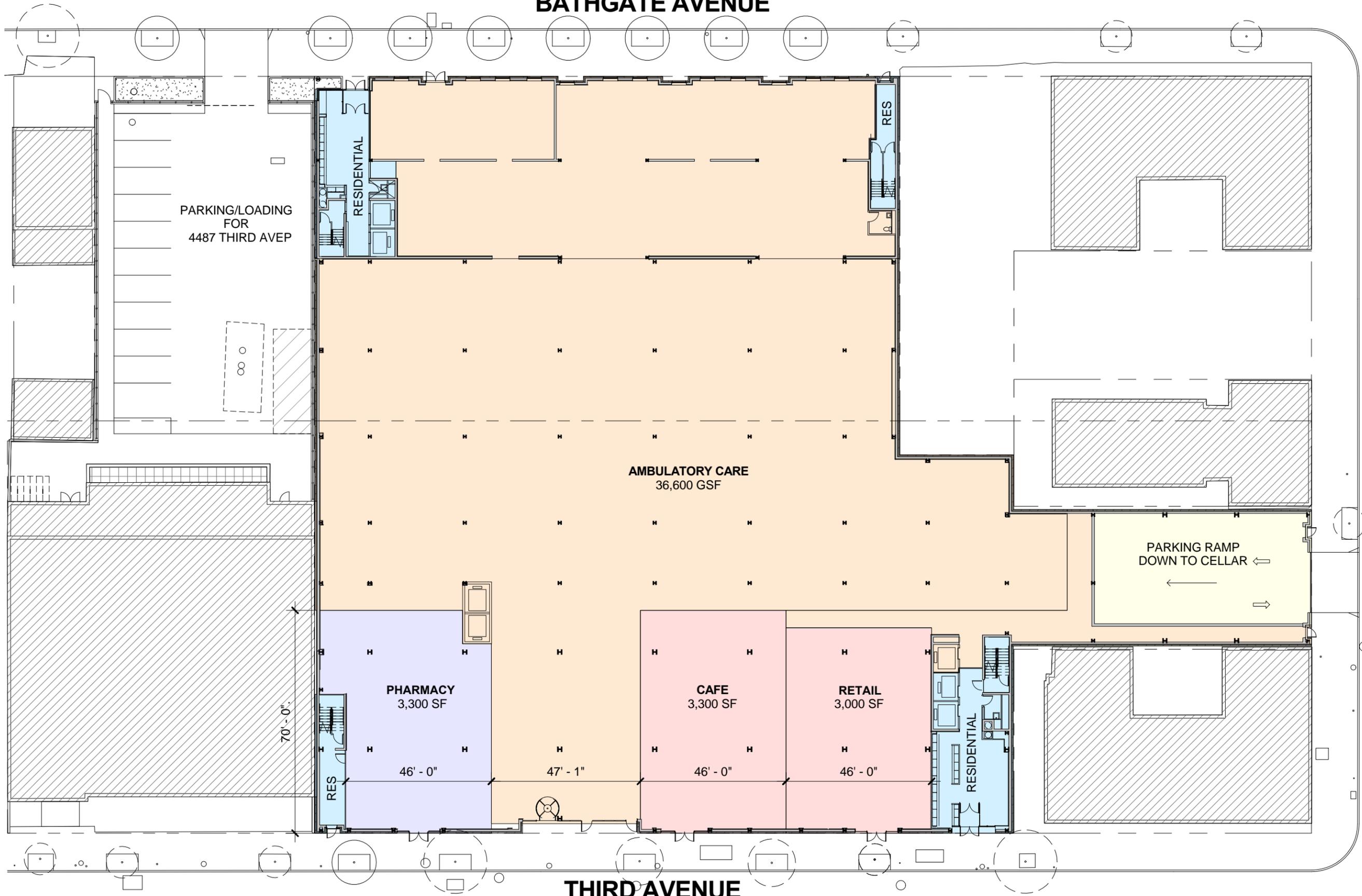
Notes:

ug/m3 = micrograms per cubic meter

APPENDIX 1

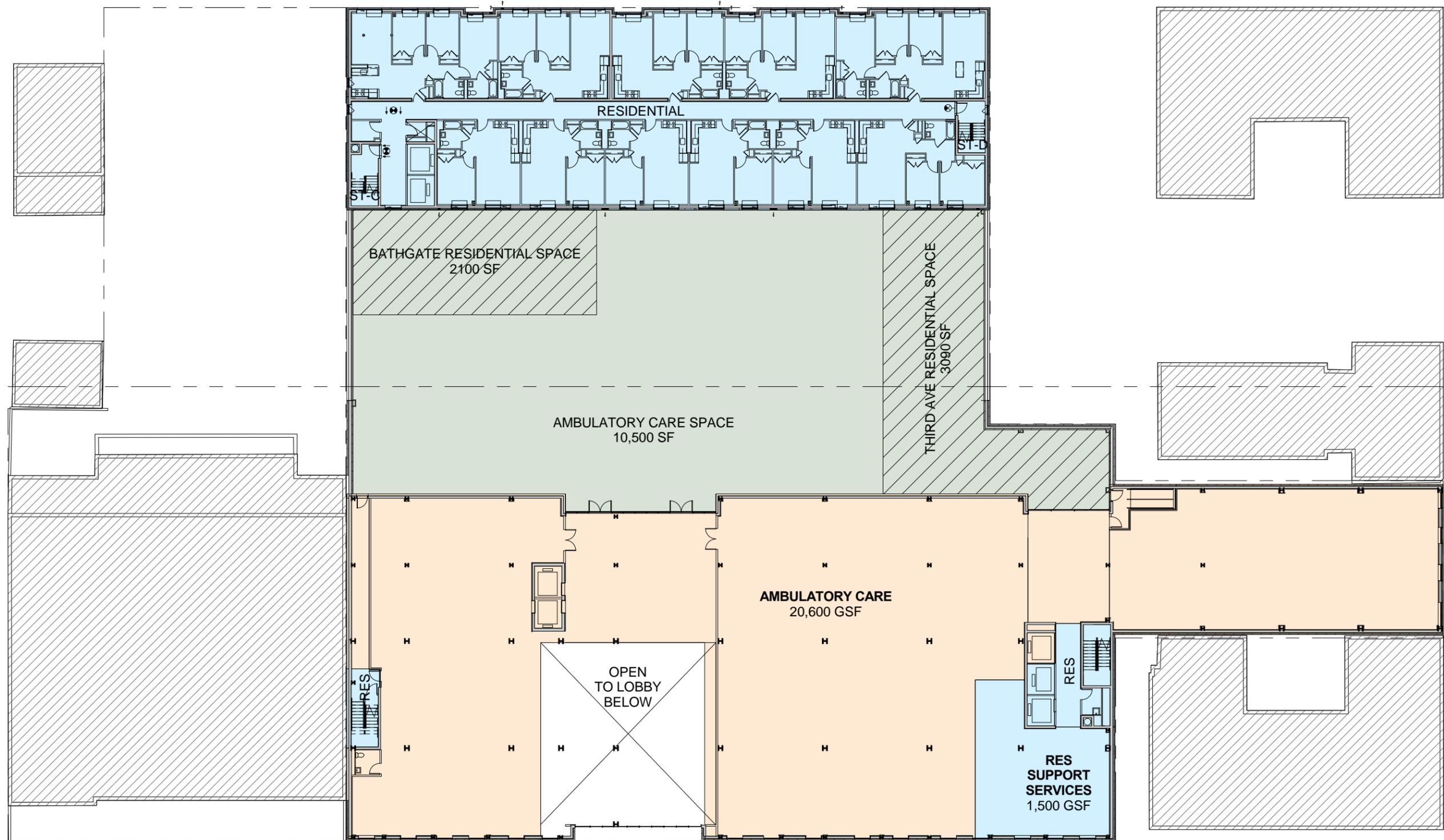
PROPOSED DEVELOPMENT PLANS

BATHGATE AVENUE



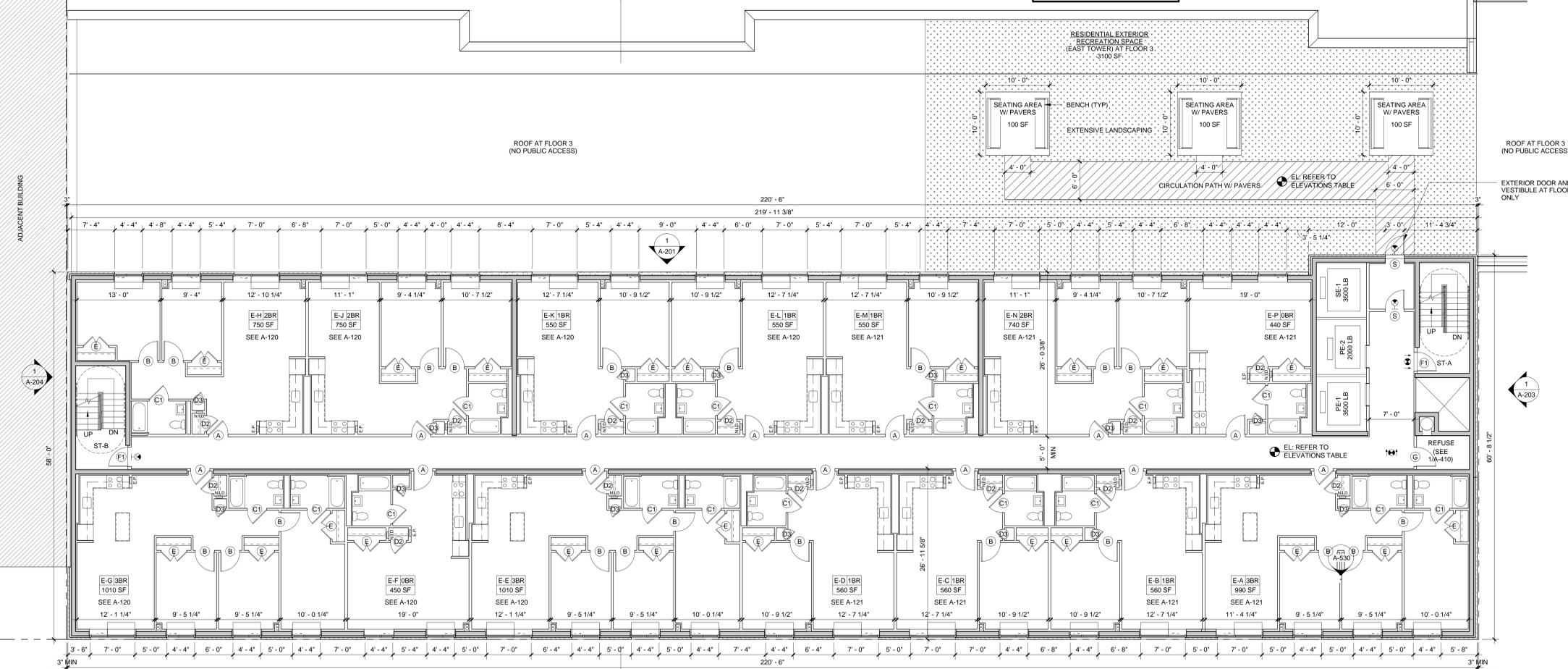
EAST 183RD STREET

THIRD AVENUE

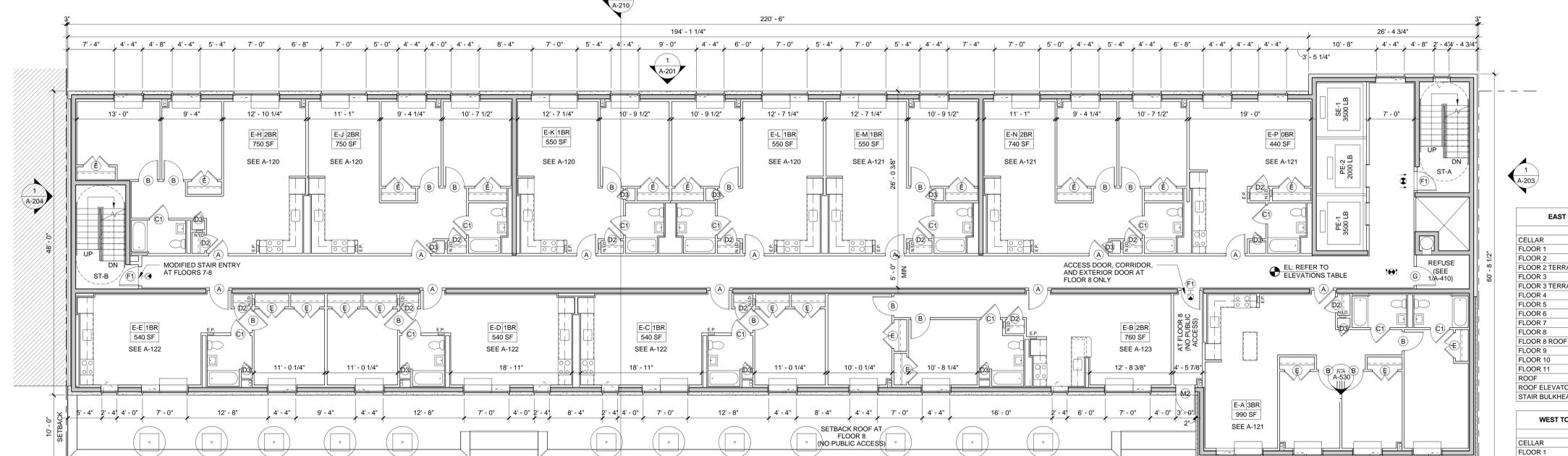


QUALITY HOUSING REQUIRED RECREATION
 EXTERIOR RECREATION SPACE: 3,100 SF
 TOTAL RECREATION SPACE: 3,100 SF
 REQUIRED RECREATION SPACE: 3,089 SF
 3,089 < 3,100 COMPLIES

100 SF x 3 = 300 SF
 300 SF / 15 SF PER OCCUPANT =
 20 OCCUPANTS MAX



1 Floors 3-7 Plan - East Tower
 1/8" = 1'-0"



2 Floors 8-11 Plan - East Tower
 1/8" = 1'-0"

EAST TOWER (THIRD AVE) - FLOOR ELEVATIONS

	T.O. STRUCTURE	T.O. FINISH
CELLAR	-10' - 10"	-10' - 10"
FLOOR 1	SEE PLAN	SEE PLAN
FLOOR 2	+17' - 10"	+17' - 11 1/2"
FLOOR 2 TERRACE	+17' - 1"	+17' - 11 1/2"
FLOOR 3	+32' - 6"	+32' - 7"
FLOOR 3 TERRACE	+31' - 9"	+32' - 7"
FLOOR 4	+41' - 10"	+41' - 11"
FLOOR 5	+51' - 2"	+51' - 3"
FLOOR 6	+60' - 6"	+60' - 7"
FLOOR 7	+69' - 10"	+69' - 11"
FLOOR 8	+81' - 2"	+81' - 3"
FLOOR 8 ROOF	+81' - 2"	+90' - 7"
FLOOR 9	+90' - 6"	+90' - 11"
FLOOR 10	+99' - 10"	+99' - 11"
FLOOR 11	+109' - 2"	+109' - 3"
ROOF	+119' - 2"	+120' - 0"
ROOF ELEVATOR LOBBY	+119' - 10"	+120' - 0"
STAIR BULKHEAD ROOF	+129' - 2"	

WEST TOWER (BATHGATE AVE) - FLOOR ELEVATIONS

	T.O. STRUCTURE	T.O. FINISH
CELLAR	-10' - 10"	-10' - 10"
FLOOR 1	SEE PLAN	SEE PLAN
FLOOR 2	+13' - 10"	+13' - 11"
FLOOR 2 TERRACE	+13' - 1"	+13' - 11"
FLOOR 3	+22' - 10"	+22' - 11"
FLOOR 4	+31' - 10"	+31' - 11"
FLOOR 5	+40' - 10"	+40' - 11"
FLOOR 6	+49' - 10"	+49' - 11"
FLOOR 7	+59' - 10"	+59' - 11"
FLOOR 7 TERRACE	+59' - 1"	+59' - 11"
ROOF	+68' - 10"	+68' - 11"
STAIR BULKHEAD ROOF	+77' - 10"	
MECH BULKHEAD ROOF	+79' - 10"	

St. Barnabas North
 4511 Third Avenue, Bronx, NY 10457

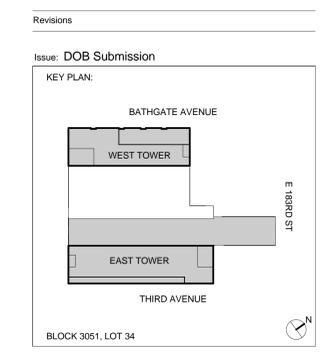
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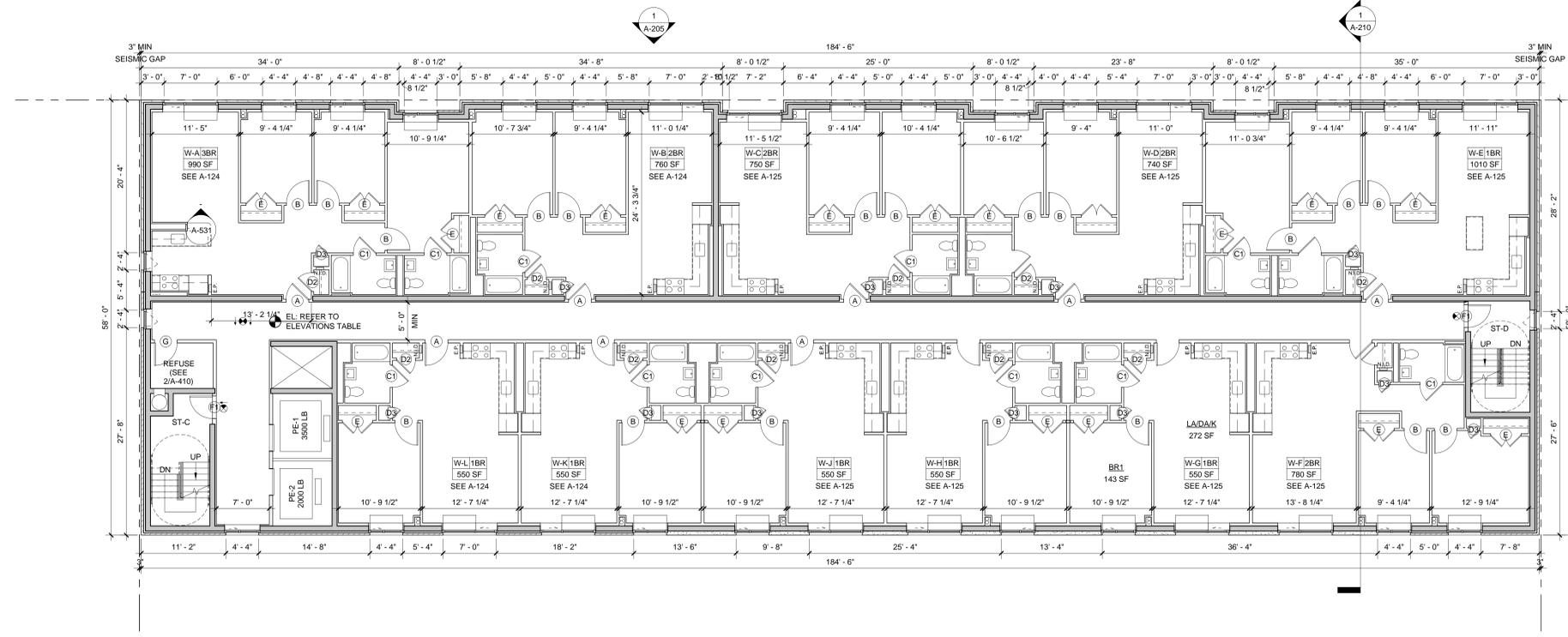


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**Floors 3-7 Plan and
 Floors 8-11 Plan - East
 Tower**

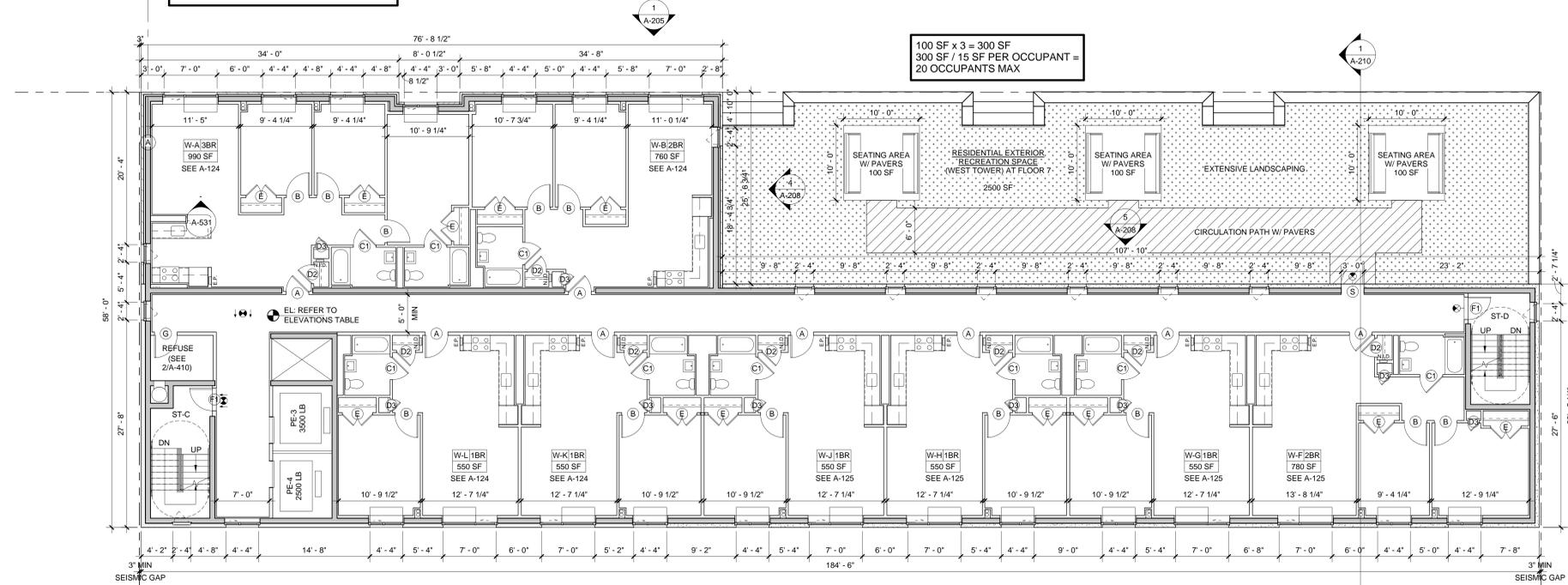
Date 12/18/15
 Scale As indicated
 Drawn By
 Checked By
 Project No. 1425
 Sheet No. A-116.00





1 Floors 2-6 Plan - West Tower
1/8" = 1'-0"

QUALITY HOUSING REQUIRED RECREATION
 EXTERIOR RECREATION SPACE: 2,500 SF
 TOTAL RECREATION SPACE: 2,500 SF
 REQUIRED RECREATION SPACE: 2,071 SF
 2,071 < 2,500 COMPLIES



2 Floor 7 Plan - West Tower
1/8" = 1'-0"

EAST TOWER (THIRD AVE) - FLOOR ELEVATIONS

	T.O. STRUCTURE	T.O. FINISH
CELLAR	-10' - 10"	-10' - 10"
FLOOR 1	SEE PLAN	SEE PLAN
FLOOR 2	+17' - 10"	+17' - 11 1/2"
FLOOR 2 TERRACE	+17' - 1"	+17' - 11 1/2"
FLOOR 3	+32' - 6"	+32' - 7"
FLOOR 3 TERRACE	+31' - 9"	+32' - 7"
FLOOR 4	+41' - 10"	+41' - 11"
FLOOR 5	+51' - 2"	+51' - 3"
FLOOR 6	+60' - 6"	+60' - 7"
FLOOR 7	+69' - 10"	+69' - 11"
FLOOR 8	+81' - 2"	+81' - 3"
FLOOR 8 ROOF	+81' - 2"	+81' - 3"
FLOOR 9	+90' - 6"	+90' - 7"
FLOOR 10	+99' - 10"	+99' - 11"
FLOOR 11	+109' - 2"	+109' - 3"
ROOF	+119' - 2"	+120' - 0"
ROOF ELEVATOR LOBBY	+119' - 10"	+120' - 0"
STAIR BULKHEAD ROOF	+129' - 2"	

WEST TOWER (BATHGATE AVE) - FLOOR ELEVATIONS

	T.O. STRUCTURE	T.O. FINISH
CELLAR	-10' - 10"	-10' - 10"
FLOOR 1	SEE PLAN	SEE PLAN
FLOOR 2	+13' - 10"	+13' - 11"
FLOOR 2 TERRACE	+13' - 1"	+13' - 11"
FLOOR 3	+22' - 10"	+22' - 11"
FLOOR 4	+31' - 10"	+31' - 11"
FLOOR 5	+40' - 10"	+40' - 11"
FLOOR 6	+49' - 10"	+49' - 11"
FLOOR 7	+59' - 10"	+59' - 11"
FLOOR 7 TERRACE	+59' - 1"	+59' - 11"
ROOF	+68' - 10"	+68' - 11"
STAIR BULKHEAD ROOF	+77' - 10"	
MECH BULKHEAD ROOF	+79' - 10"	

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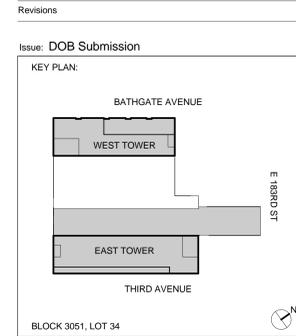
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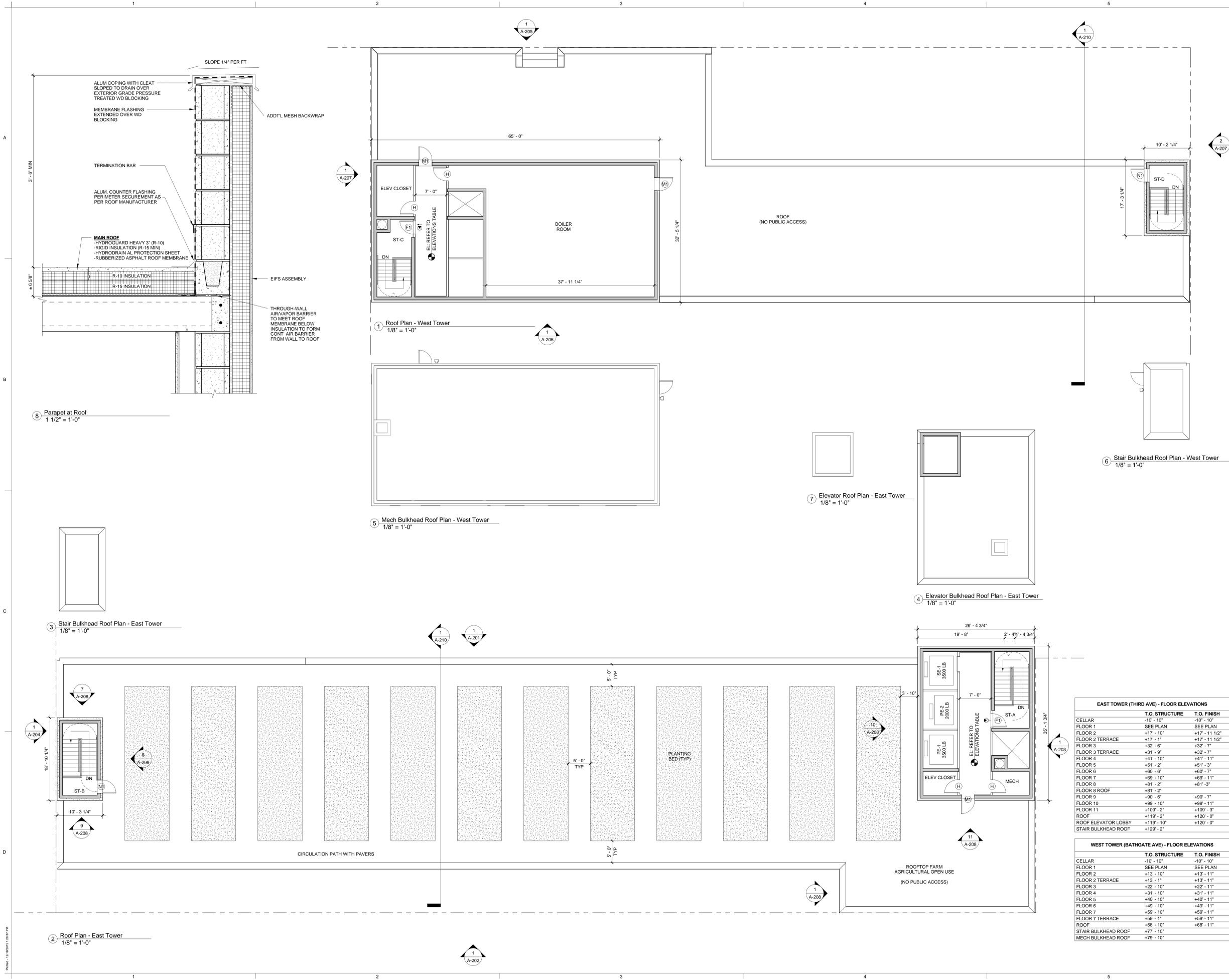
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Floors 2-6 Plan and Floor 7 Plan - West Tower

Date 12/18/15
 Scale As indicated
 Drawn By
 Checked By
 Project No. 1425
 Sheet No. 12 of 62



A-117.00

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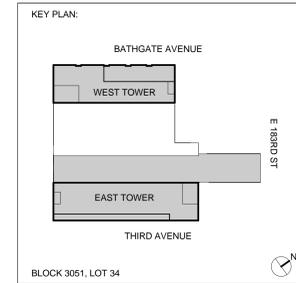
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Revisions

Issue: DOB Submission



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Roof Plans - West and East Towers

Date: 12/18/15
Scale: As indicated
Drawn By:
Checked By:
Project No.: 1425
Sheet No.:



A-118.00

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APPENDIX 2

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and STB Owners LLC and STB Retail Owners LLC 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, STB Owners LLC and STB Retail Owners LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (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, Isabel McRae at (212)-341-2034, 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 online. Internet access to view OER's document repositories is available at public libraries. 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. The library nearest the Site is:

New York Public Library
610 E 186th St. Bronx, New York
718-933-6410

Sunday: Closed

Monday – Thursday: 10AM – 7PM

Friday – Saturday: 10AM – 5PM

Digital Documentation: NYC OER requires the use of digital documents in our repository as a means of minimizing paper use while also increasing convenience in access and ease of use.

Issues of Public Concern: Enrollee is required to identify whether there are specific issues of concern to stakeholders proximate to the project site. Such issues include but are not limited to interests of Environmental Justice communities. This section should list any site-specific issues of public concern and the method that they will be used resolved them. If needed, contact OER for additional guidance on how to identify issues of public concern.

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

descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be reviewed and approved by OER prior to distribution and mailed by the Enrollee. 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. 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 3

SUSTAINABILITY STATEMENT

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

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.

Reuse of Clean, Recyclable Materials and Reduced Consumption of Non-

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

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.

The installation of a waterproofing / vapor barrier system throughout the proposed building basement slab and foundation walls will eliminate the risk of future migration of soil vapor contamination from potential off-Site sources. An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

Stormwater Retention: Stormwater retention improves water quality by lowering the rate of combined stormwater 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 stormwater 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: STB Owners LLC and STB Retail Owners LLC is participating in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program: STB Owners LLC and STB Retail Owners LLC 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 4

SOIL/MATERIALS MANAGEMENT PLAN

1.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the final remedial report. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of final signoff by OER.

1.2 Stockpile Methods

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials.

Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event.

Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

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

1.3 Characterization of Excavated Materials

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

1.4 Materials Excavation, Load-Out, and Departure

The PE/QEP overseeing the remedial action will:

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

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

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

1.5 Off-Site Materials Transport

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

Outbound truck transport routes are described in the remedial report. 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 New York City 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 final remedial report.

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 final remedial report.

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 final remedial report. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the final remedial report. 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 (SCOs) established in this plan may be reused on-Site. The SCOs for on-Site reuse are listed in Section 4.2 of this cleanup plan. '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 land with comparable levels of contaminants in soil/fill material, compliant with applicable laws and regulations, 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 remedial plan are followed. The expected location for placement of reused material is shown in Section 4.2.

The project will aim to reduce the consumption of virgin materials by substituting pre-existing soil from the Site whenever possible. An estimate of the quantity (in tons) of reused soil will be quantified and reported in the RAR.

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. Imported soils will not exceed groundwater protection standards established in Part 375. Imported soils for Track 1 remedial action projects will not exceed Track 1 SCO's.

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 remedial plan. The final remedial report 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.
- All material will be subject to source screening and chemical 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 final remedial report. 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 Stormwater Pollution Prevention

Applicable laws and regulations pertaining to stormwater pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this remedial plan (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 for Unknown Contamination Sources

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 this remedial plan.

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 this remedial plan.

Other Nuisances

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

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

APPENDIX 5

CONSTRUCTION HEALTH AND SAFETY PLAN

CONSTRUCTION HEALTH & SAFETY PLAN

March 28, 2016

Submitted for:

Saint Barnabas Hospital
Third Avenue
Bronx, New York 10457
(Block 3051 - Lots 28, 34, 40, 41, 43 and 45)
OER Project Number 15HAN401X

Submitted to:

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

Prepared for:

STB Owners LLC
1865 Palmer Avenue. Ste 203
Larchmont, NY 10358

Submitted by:

Impact Environmental Closures, Inc.
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IE Project Number: 7313



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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 agrees 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 subcontractor 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 <i>Impact Environmental</i>	Greg Mendez-Chicas	(O) 631-269-8800 (C) 631-252-5480
Field Operations Leader <i>Impact Environmental</i>	Stephanie Pollert	(O) 631-269-8800 (C) 631-552.9244
Site Health & Safety Officer <i>Impact Environmental</i>	Kurt Pfaffenberger	(O) 631-269-8800 (C) 631-334-1431

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 are 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 HASP will include material excavation with hydraulic equipment and hand tools, the manual sorting of materials, the transporting and loading of materials onto trucks for off-site transport, and if necessary, soil/fill sampling. 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°C (20°F), including wind chill factor, heated warming shelters (tents, cabins, company vehicles, rest rooms, etc.) shall be made available nearby and the worker should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, irritability, or euphoria, are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing shall be removed and the remainder of the clothing loosened to permit sweat evaporation. A change of dry work clothing shall be provided as necessary to prevent workers from returning to their work with wet clothing.

Dehydration, or the loss of body fluids, occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities. Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of a diuretic and circulatory effect (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 face piece respirator. The fit test must be performed before the respirator is used and must be repeated at least annually and whenever a

different respirator face piece 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, pesticides, and metals. 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 are 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-10 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 15-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 can 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-10 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 below 150 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-10 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

<i>Photoionization Detector (PID)</i>	
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

<i>Combustible Gas Indicator (CGI)</i>	
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

<i>Real Time Particulate Detection Meter</i>	
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 potentiate 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 Questionnaire 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 10.4).

10.1.1 Pesticides & PCB's Pesticides

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

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

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

=== Contractor Identification ===

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

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

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

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

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

CAS:71-55-6
RTECS #:KJ2975000
Other REC Limits:450 PPM STEL
OSHA PEL:350 PPM
ACGIH TLV:1910 MG/CUM
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS
Ozone Depleting Chemical:1

Ingred Name:METHANOL (METHYL ALCOHOL), COLUMBIAN SPIRITS

CAS:67-56-1
RTECS #:PC1400000
Fraction by Wt: 99.2%
Other REC Limits:200 PPM
OSHA PEL:260 MG/CUM
ACGIH TLV:262 MG/CUM (SKIN)
EPA Rpt Qty:5000 LBS
DOT Rpt Qty:5000 LBS

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

CAS:12674-11-2
RTECS #:TQ1351000
Other REC Limits:0.001 MG/CUM NIOSH
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

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

CAS:53469-21-9
RTECS #:TQ1356000
Other REC Limits:0.001 MG/CUM NIOSH
OSHA PEL:1 MG/CUM
ACGIH TLV:1 MG/CUM
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

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

CAS:12672-29-6
RTECS #:TQ1358000
Other REC Limits:0.001 MG/CUM NIOSH
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

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

CAS:11097-69-1
RTECS #:TQ1360000
Other REC Limits:0.001 MG/CUM NIOSH
OSHA PEL:0.5 MG/CUM (SKIN)
ACGIH TLV:0.5 MG/CUM (SKIN)
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:POLYCHLORINATED BIPHENYL, PCB, AROCLOR 1260, (CL 60%)
CARCINOGEN BY NTP & IARC.
CAS:11096-82-5
RTECS #:TQ1362000
Other REC Limits:0.001 MG/CUM NIOSH
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:ALDRIN
CAS:309-00-2
RTECS #:IO2100000
OSHA PEL:0.25 MG/CUM
ACGIH TLV:0.25 MG/CUM (SKIN)
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:CHLORDANE (SUSPECTED HUMAN CARCINOGEN)
CAS:57-74-9
RTECS #:PB9800000
Other REC Limits:0.5 MG/CUM (SKIN)
OSHA PEL:0.5 MG/CUM
ACGIH TLV:0.5 MG/CUM
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:DDT ISOMERS (DICHLORODIPHENYL-TRICHLOROETHANE) (SUSPECTED
HUMAN CARCINOGEN)
CAS:50-29-3
RTECS #:KJ3325000
ACGIH TLV:1 MG/CUM (SKIN)
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:1,1,1-TRICHLORO-2- O-CHLOROPHENYL-2- P-CHLOROPHENYL-ETHANE
CAS:789-02-6
RTECS #:KH7910000

Ingred Name:4,4'-DDE
CAS:72-55-9
RTECS #:KV9450000
Other REC Limits:1 MG/CUM
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:ETHYLENE,
1,1-DICHLORO-2-(O-CHLOROPHENYL)-2-(P-CHLOROPHENYL)-
CAS:3424-82-6
RTECS #:KV9454000

Ingred Name:4,4'-DDD
CAS:72-54-8
RTECS #:KI0700000
Other REC Limits:1 MG/CUM

EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

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

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

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

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

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

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

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

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

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:YES
Health Hazards Acute and Chronic:PRIMARY IRRITANT. IRRITATES & DAMAGES ALL TISSUES. MAY CAUSE LIVER, KIDNEY & LUNG DAMAGE, CARDIAC ARRHYTHMIA. MAY SENSITIZE THE HEART TO EPINEPHRINE. SKIN: ALLERGIC DERMATITIS OR CHLORACNE. MAY CAUSE C ANGER 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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particular situation.

10.1.2 PCBs Material Safety Data Sheet

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

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

Product ID:P103F337,POLYCHLORINATED BIPHENYLS (PCBS)
MSDS Date:10/15/1985
FSC:5910
NIIN:00-086-2688
MSDS Number: BCYGD
=== Responsible Party ===
Company Name:AEROVOC INC.
Address:740 BELLEVILLE AVE
City:NEW BEDFORD
State:MA
ZIP:02745
Country:US
Info Phone Num:508-994-9607

Emergency Phone Num:508-994-9607
Preparer's Name:JOHN H. CRADDOCK
CAGE: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% CHLORINATED. CHRONIC: TESTS HAVE NOT
DEMONSTRATED CHRONIC HUMAN ILLNESSES SUCH AS
CANCER/NEUROLOGICAL/CARDIOVASCULAR EFFECTS.
Explanation of Carcinogenicity:NTP: LISTED AC. ANTICIPATED TO BE

CARCINOGENS. IARC: LISTED 2A. PROBABLY CARCINOGENIC TO HUMANS.
OSHA; NOT LISTED.

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

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

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

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

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

Flash Point:383F,195C
Extinguishing Media:NONE SPECIFIED BY MANUFACTURER.
Fire Fighting Procedures:STANDARD FIRE FIGHTING WEARING APPAREL AND
SCAB SHOULD BE WORN WHEN FIGHTING FIRES INVOLVING FIRES INVOLVING
EXPOSURE TO CHEMICAL COMBUSTION PRODUCTS.
Unusual Fire/Explosion Hazard:AT TEMPERATURE IN RANGE OF 600-650C IN
PRESENCE OF EXCESS OXYGEN PCBS MAY FORM POLYCHLORINATED
DIBENZOFURANS (PCDFS).

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

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

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

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

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

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

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

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

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

Protective Gloves:WEAR APPROPRIATE PROTECTIVE GLOVES.

Eye Protection:WEAR CHEMICAL SPLASH GOGGLES,FACESHIELD.

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

Work Hygienic Practices:WASH AFTER HANDLING AND BEFORE EATING,DRINKING,SMOKING.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 BASED ON LOCAL, STATE AND FEDERAL REGULATIONS.

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10.1.3 Chlorinated Solvent

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

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

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

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

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

Ingred Name:PHENOL
CAS:108-95-2
RTECS #:SJ3325000
Fraction by Wt: 17%
OSHA PEL:5 PPM
ACGIH TLV:5 PPM

EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

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

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

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

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

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

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

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

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

Spill Release Procedures:RINSE WITH WATER

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

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

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

HCC:T4
Boiling Pt:B.P. Text:120F

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

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

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

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

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

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

10.1.4 Degreaser Solvent

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

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

Product ID:DEGREASER SOLVENT
MSDS Date:09/23/1997
FSC:7930
NIIN:01-436-7893
MSDS Number: CGNPC
=== Responsible Party ===
Company Name:P-T TECHNOLOGIES, INC.
Address:108 4TH AVE. S.
City:SAFETY HARBOR
State:FL
ZIP:34695
Country:US
Info Phone Num:800-441-7874
Emergency Phone Num:800-441-7874
CAGE:0JVH6
=== Contractor Identification ===
Company Name:P-T TECHNOLOGIES INC

Address:108 4TH AVENUE, SOUTH
Box:City:SAFETY HARBOR
State:FL
ZIP:34695
Country:US
Phone:813-726-4644
CAGE:0JVH6

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Protective Gloves:SOLVENT RESISTANT

Eye Protection:SAFETY GLASSES

Supplemental Safety and Health

NK

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

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

Vapor Pres:<1 @ 20C

Vapor Density:>1 AIR=1

Spec Gravity:0.76

VOC Pounds/Gallon:756

pH:NA

Evaporation Rate & Reference:3.2 N BUAC = 100

Solubility in Water:NON-MISCIBLE

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

Percent Volatiles by Volume:100

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

Stability Indicator/Materials to Avoid:YES

STRONG OXIDIZING AGENTS

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

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

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

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

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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 capfuls 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. Studies have shown that tetrachloroethylene has not caused cancer in exposed workers. The studies have serious weaknesses such as mixed exposures. In tests with rats and mice, it appeared that tissue destruction or peroxisome proliferation rather than genetic mechanisms were the cause of the observed increases in normally occurring cancers. The oral mouse TDLo that

was tumorigenic was 195 gm/kg/50W-I.

Teratogenicity: Has caused musculoskeletal abnormalities. Has caused morphological transformation at a dose of 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 depleters. This material does not contain any Class 2 Ozone depleters.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 127-18-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 127-18-4 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 127-18-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, and 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/vapor/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:TW
 A 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 O
 EL-FINLAND:TWA 50 ppm (335 mg/m3);STEL 75 ppm (520 mg/m3);Skin OEL-FR
 ANCE:TWA 50 ppm (335 mg/m3) OEL-GERMANY:TWA 50 ppm (345 mg/m3);Carcin-
 ogen 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-RUSS
 IA:TWA 50 ppm;STEL 10 mg/m3 OEL-SWEDEN:TWA 10 ppm (70 mg/m3);STEL 25
 ppm (170 mg/m3) OEL-SWITZERLAND:TWA 50 ppm (345 mg/m3);STEL 100 ppm; Skin OEL-THAILAND:TWA 100
 ppm; STEL 200 ppm OEL-UNITED KINGDOM:TWA 50
 ppm (335 mg/m3);STEL 15 ppm OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA
 check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 6/17/1999

Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

10.1.6 Zinc Material Safety Data Sheet

Section 1 Identification			
Product Number:	C2980	Health:	1
Product Name:	Zinc Metal Reagent Grade, Powder (dust)	Flammability	2

Trade/Chemical Synonyms		Reactivity	1
Formula:	Zn	Hazard Rating:	
RTECS:	ZG8600000	Least Slight Moderate High Extreme	
C.A.S	CAS# 7740-66-6	0 1 2 3 4	
		NA = Not Applicable NE = Not Established	

Section 2 Component Mixture

Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
<input type="checkbox"/>	Zinc Metal	CAS# 7740-66-6	100%	W/W	OSHA TWA 5 mg/mf

Section 3 Hazard Identification (Also see section 11)

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

Section 4 First Aid Measures

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

FIRST AID: CALL A PHYSICIAN. SKIN: Wash exposed area with soap and water.
 EYES: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen
 INGESTION: If swallowed, seek medical attention. Never give anything by mouth to an unconscious person.

Section 5 Fire Fighting Measures

Fire Extinguisher Type: Smother with dry powder (i.e.: sand, sodium chloride, magnesium oxide).
 Fire/Explosion Hazards: Dust, in moist air can generate sufficient heat to ignite the hydrogen gas released. Metal burns at high temperatures.
 Fire Fighting Procedure: Avoid water. Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

Section 6 Accidental Release Measures

Avoid water. Remove all sources of ignition. Ventilate area of leak or spill. Wear respiratory protection. Do not disperse dust into air. Use non-sparking tools to pick up and place in closed dry container.

Section 7 Handling and Storage

Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.

Section 8 Exposure Controls & Personal Protection

Respiratory Protection: NIOSH/MSHA-approved respirator
 Ventilation: Mechanical: 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 metallic powder / no odor Lower Flamm. Limit in Air: N/E
 Flash Point: information not available Upper Flamm. Limit in Air: N/E

Section 10 Stability and Reactivity Information

Stability: Stable Conditions to Avoid: Heat and moisture
 Materials to Avoid:
 Hazardous Decomposition Products:
 Hydrogen gas, Zinc oxide fumes
 Hazardous Polymerization: Will Not Occur
 Condition to Avoid: None known

Section 11 Additional Information

Conditions aggravated/Target organs: Persons with preexisting skin or respiratory disorders may be more susceptible. Acute: Irritation possible to skin, eyes, lungs, mucous membranes, and GI tract. If heated fumes may cause "zinc fume fever". Chronic: None known.

DOT Classification: Zinc Dust, 4.3, UN1436, PG II

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No:0 Date Entered: 9/1/2005 Approved by: WPF

10.1.7 Magnesium Material Safety Data Sheet

Section 1 Identification

Product Number:	C2009	Health:	1
Product Name:	Magnesium Laboratory Grade, Turnings	Flammability:	2
Trade/Chemical Synonyms:		Reactivity:	2
Formula:	Mg	Hazard Rating:	
RTECS:	OM2100000	Least Slight Moderate High Extreme	
C.A.S	CAS# 7439-95-4	0 1 2 3 4	
		NA = Not Applicable NE = Not Established	

Section 2 Component Mixture

Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
<input type="checkbox"/>	Magnesium	CAS# 7439-95-4	100%	W/W	None established

Section 3 Hazard Identification (Also see section 11)

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

Section 4 First Aid Measures

Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

FIRST AID: SKIN: Wash exposed area with soap and water. If irritation persists, seek medical attention.

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

INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

Section 5 Fire Fighting Measures

Fire Extinguisher Type: Melting flux/dry sand &/or metal exting pwdr. DO NOT USE WATER!

Fire/Explosion Hazards: Dangerous in the form of dust or flakes. When heated in air to near melting point, may ignite and burn.

Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

Section 6 Accidental Release Measures

Remove all sources of ignition wear protective equipment. Clean up in a manner that doesn't disperse dust. Sweep up and containerize for later reclamation.

Section 7 Handling and Storage

Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.

Section 8 Exposure Controls & Personal Protection

Respiratory Protection:NIOSH/MSHA-approved respirator

Ventilation: Mechanical: Hand Protection: Wear appropriate gloves to prevent skin exposure
Local Exhaust: Eye Protection: Face Shield and chem worker goggles

Other Protective Equipment: Wear appropriate clothing to prevent skin exposure

Section 9 Physical and Chemical Properties

Melting Point:	649 ° C	Specific Gravity	1.74
Boiling Point:	1110° C	Percent Volatile by Volume:	N/A
Vapor Pressure:	1mm@621°	Evaporation Rate:	N/A
Vapor Density:	information not available	Evaporation Standard:	
Solubility in Water:	Not soluble	Auto ignition Temperature:	Not applicable
Appearance and Odor:	Silver solid, odorless	Lower Flamm. Limit in Air:	Not applicable
Flash Point:	Not known	Upper Flamm. Limit in Air:	Not applicable

Section 10 Stability and Reactivity Information

Stability: Stable Conditions to Avoid: Moisture, Incompatible substances
Materials to Avoid:
Oxides, carbonates, cyanides, chlorinated hydrocarbons
Hazardous Decomposition Products:
Fire produces toxic fumes and vapors
Hazardous Polymerization:Will Not Occur
Condition to Avoid:None known

Section 11 Additional Information

Inhalation of dust may irritate respiratory tract and may cause coughing, chest pain, and fever. Ingestion may cause stomach pain and diarrhea. Particles imbedded in the skin may cause eruptions. Molten magnesium may cause serious burns. Conditions aggravated/target organs: Persons with pre-existing eye, skin, or respiratory conditions may be more susceptible.

DOT Classification: Magnesium Turnings, 4.1, UN1869, PG III

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No:1

Date Entered: 9/1/2005

Approved by: WPF

10.1.8 Copper Material Safety Data Sheet

Section 1 Identification															
Product Number:	C1610														
Product Name:	Copper Reagent A.C.S., Granular														
Trade/Chemical Synonyms															
Formula:	Cu														
RTECS:	GL5325000														
C.A.S	CAS# 7440-50-8														
<table border="1"> <tr> <td>Health:</td> <td>1</td> </tr> <tr> <td>Flammability</td> <td>0</td> </tr> <tr> <td>Reactivity</td> <td>0</td> </tr> <tr> <td colspan="2">Hazard Rating:</td> </tr> <tr> <td colspan="2">Least Slight Moderate High Extreme</td> </tr> <tr> <td colspan="2">0 1 2 3 4</td> </tr> <tr> <td colspan="2">NA = Not Applicable NE = Not Established</td> </tr> </table>		Health:	1	Flammability	0	Reactivity	0	Hazard Rating:		Least Slight Moderate High Extreme		0 1 2 3 4		NA = Not Applicable NE = Not Established	
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:
<input type="checkbox"/>	Copper	CAS# 7440-50-8	100%	W/W	OSHA TWA 1 mg (Cu)/mf (dust, mist)

Section 3 Hazard Identification (Also see section 11)
 Generally not hazardous in normal handling, however good laboratory practices should always be used. Avoid long term exposure to skin or by inhalation.

Section 4 First Aid Measures
 Generally not hazardous in normal handling, however good laboratory practices should always be used. Avoid long term exposure to skin or by inhalation.
 FIRST AID: SKIN: Wash exposed area with soap and water. If irritation persists, seek medical attention.
 EYES: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen
 INGESTION: Give several glasses of milk or water. Vomiting may occur spontaneously, but it is not necessary to induce. Never give anything by mouth to an unconscious person.

Section 5 Fire Fighting Measures
 Fire Extinguisher Type: Any means suitable for extinguishing surrounding fire
 Fire/Explosion Hazards: None Known.
 Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

Section 6 Accidental Release Measures
 Sweep up and place in suitable (fiberboard) containers for reclamation or later disposal.

Section 7 Handling and Storage
 Store in a cool dry place. This Material is not considered hazardous. Handle using safe laboratory practices.

Section 8 Exposure Controls & Personal Protection
 Respiratory Protection: None required
 Mechanical: Hand Protection: Wear appropriate gloves to prevent skin exposure
 Ventilation: Local Exhaust: Eye Protection: Splash Goggles
 Other Protective Equipment: Wear appropriate clothing to prevent skin exposure

Section 9 Physical and Chemical Properties

Melting Point:	1083°C	Specific Gravity	8.94
Boiling Point:	2595°C	Percent Volatile by Volume:	N/A
Vapor Pressure:	1 mm Hg @1628°C	Evaporation Rate:	N/A
Vapor Density:	N/A	Evaporation Standard:	
Solubility in Water:	Insoluble	Auto ignition Temperature:	Not applicable
Appearance and Odor:	Reddish, lustrous metal	Lower Flamm. Limit in Air:	Not applicable
Flash Point:	N/A	Upper Flamm. Limit in Air:	Not applicable

Section 10 Stability and Reactivity Information

Stability: Stable Conditions to Avoid: Avoid contact with incompatible materials.
 Materials to Avoid:
 Acetylene, magnesium metal (as copper dust)
 Hazardous Decomposition Products:
 None
 Hazardous Polymerization: Will Not Occur
 Condition to Avoid: None known

Section 11 Additional Information

Can irritate eyes, mucous membranes, and pharynx. Can cause nausea, ulcer perforation, metal taste and dermatitis. Conditions aggravated/target organs: Persons with pre-existing eye, skin, or respiratory conditions may be more susceptible

DOT Classification: Not Regulated

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No: 0.1

Date Entered: 9/1/2005

Approved by: WPF

10.1.9 Cadmium Material Safety Data Sheet

Section 1 Identification

Product Number:	C1407	Health:	2
Product Name:	Cadmium Chloride Reagent A.C.S., Crystal	Flammability	0
Trade/Chemical Synonyms		Reactivity	0
Formula:	CdCl ₂ · 1/2 H ₂ O	Hazard Rating:	
RTECS:	EV0178000	Least Slight Moderate High Extreme	
C.A.S	CAS# 7790-78-5	0 1 2 3 4	
		NA = Not Applicable NE = Not Established	

Section 2 Component Mixture

Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
<input type="checkbox"/>	Cadmium Chloride	CAS# 7790-78-5	100%	W/W	OSHA TWA 0.2 mg/mf (Cd)

Section 3 Hazard Identification (Also see section 11)

May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.

Section 4 First Aid Measures

May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.

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

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

INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

Section 5 Fire Fighting Measures

Fire Extinguisher Type: Any means suitable for extinguishing surrounding fire

Fire/Explosion Hazards: Thermal decomposition produces highly toxic fumes.

Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

Section 6 Accidental Release Measures

Evacuate area. Wear self-contained breathing apparatus and protective clothing. Eliminate all sources of ignition.

Section 7 Handling and Storage

Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.

Section 8 Exposure Controls & Personal Protection

Respiratory Protection:NIOSH/MSHA-approved respirator

Ventilation: Mechanical: 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:	568° C	Specific Gravity	Information not available
Boiling Point:	960° C	Percent Volatile by Volume:	0
Vapor Pressure:	10mm @ 656°C	Evaporation Rate:	0
Vapor Density:	Information not available	Evaporation Standard:	
Solubility in Water:	Soluble	Auto ignition Temperature:	Not applicable
Appearance and Odor:	Colorless crystals , odorless	Lower Flamm. Limit in Air:	Not applicable
Flash Point:	N/A	Upper Flamm. Limit in Air:	Not applicable

Section 10 Stability and Reactivity Information

Stability: Stable Conditions to Avoid: None known
Materials to Avoid:
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.

10.1.10 Diesel Engine Oil Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: N9000 DIESEL ENGINE OIL

SUPPLIER: EXXON MOBIL CORPORATION

3225 GALLOWS RD.

FAIRFAX, VA 22037

24 - Hour Health and Safety Emergency (call collect): 609-737-4411

24 - Hour Transportation Emergency (Primary) CHEMTREC: 800-424-9300

(Secondary) 281-834-3296

Product and Technical Information: 800-443-9966

MSDS Fax on Demand: 613-228-1467, other MSDS information: 856-224-4644

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: BASE OIL AND ADDITIVES

GLOBALLY REPORTABLE MSDS INGREDIENTS:

Substance Name	Approx. Wt%
----------------	-------------

CALCIUM ALKYLENE PHENATE	1-5
--------------------------	-----

SULFIDE CARBONATE

(OVERBASED) (122384-87-6)

CALCIUM LONG-CHAIN ALKARYL	1-5
----------------------------	-----

SULFONATES (LOW OVERBASED)

(156619-82-8)

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.

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.

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

6. ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES: Report spills/releases as required to appropriate authorities. U.S. Coast Guard and EPA regulations require immediate reporting of spills/releases that could reach any waterway including intermittent dry creeks. Report spill/release to Coast Guard National Response Center toll free number (800)424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

LAND SPILL: Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping or contain spilled material with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

WATER SPILL: Confine the spill immediately with booms. Warn other ships in the vicinity. Notify port and other relevant authorities. Remove from the surface by skimming or with suitable absorbents. If permitted by regulatory authorities the use of suitable dispersants should be considered where recommended in local oil spill procedures.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewers, water sources or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation.

PERSONAL PRECAUTIONS: See Section 8

7. HANDLING AND STORAGE

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 unlabeled 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.

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.

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

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.

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 ectotoxicity data (LL50 >1000 mg/L) indicates that adverse effects to aquatic organisms are not expected from this product. When released into the environment, adsorption to sediment and soil will be the predominant behavior.

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.

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.

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
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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

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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

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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.

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Reactivity Data

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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.

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Health Hazard Data

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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 DISTURBANCES. CHRONIC:PERIPHERAL 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.

=====
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.
=====

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 SPECIFIED 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

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Label Required: YES
Technical Review Date: 21OCT94
Label Status: F
Common Name: LEAD-FREE GASOLINE; NO-LEAD GASOLINE
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE:EYE:IRRIT @ HIGH VAP LEVELS OR DIRECT CONTACT W/FLUID. SKIN:IRRIT ON PROLONG CONTACT W/LIQ, DERM RESULTING FROM DEFATTING NATURE OF LIQ. SYSTEMATIC:CNS EFFECTS (NARCOSIS) @ HIGH VAP LEVELS; MUC MEMBRANE IRRIT, PNEUMONIA. INGEST:GASTROINTESTINAL DISTURBANCES. CHRONIC:PERIPHERAL NERVOUS SYS EFFECTS, BLOOD ALTERATIONS. 1ST AID:EYE:FLUSH FOR @ LEAST 15MINS W/WATER. SKIN:THOROUGHLY WASH AREA W/ SOAP & WATER. INHAL:REMOVE FROM CONTAMINATED AREA. ADMINISTER ARTIFICIAL RESP IF NECESSARY. CALL PHYSICIAN. INGEST:GIVE A VEGETABLE OIL TO RETARD ABSORPTION. DO NOT INDUCE VOMITING. CALL PHYSICIAN. FATAL DOSE ADULT HUMAN APPROX 350G, CHILD APPROX 10-13G.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: BELL FUELS, INC
Label Street: 4116 WEST PATERSON AVE
Label City: CHICAGO
Label State: IL
Label Zip Code: 60646
Label Country: US
Label Emergency Number: 312-286-0200

10.1.12 Lead Material Safety Data Sheet

SECTION 1. GENERAL INFORMATION

FREE ELEMENTAL LEAD; LEAD SALTS

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	C.A.S. Number	Occupational Exposure Limits (OELs)		LD 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 NAMENot a regulated product in ingot form.
TRANSPORT CANADA AND U.S. DOT CLASSIFICATIONNot Applicable
TRANSPORT CANADA AND U.S. DOT PINNot Applicable
MARINE POLLUTANTNo
IMO CLASSIFICATIONNot Regulated

SECTION 15. REGULATORY INFORMATION

U.S.

Ingredient Listed on TSCA Inventory.....Yes

Hazardous Under Hazard Communication Standard.....Yes

CERCLA Section 103 Hazardous SubstancesLead 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

2. HAZARDOUS INGREDIENTS

Hazardous Components % OSHA/PEL ACGIH/TLV Sec. 313
Arsenic 0-100 10 ug/m³ 0.01 mg/m³ Yes

3. PHYSICAL DATA

Boiling Point: 613 °C (Sublimes) **Melting Point:** 817 °C
Vapor Density (Air=1): N/A **Vapor Pressure:** 1mm @ 372 °C
Solubility in H₂O: Insoluble % **Volatiles:** 0
Appearance and Odor: Steel-grey brittle solid, no odor. **Specific gravity (H₂O=1):** 5.72gm/cc

4. FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A **Autoignition Temp:** N/A
Flammability: Lower: N/A **Upper:** N/A

Extinguishing Media: Do not use water. Use carbon dioxide, dry chemical extinguishing agents, dry sand, dry ground dolomite.
Special Firefighting Procedures: Use NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing if involved in fire.

Unusual Fire and Explosion Hazard: Slight explosion hazard in the form of a dust when exposed to flame. Moderate fire hazard in the form of dust when exposed to heat or flame or by chemical reaction.

5. HEALTH HAZARD INFORMATION

Effects of Exposure:

Acute arsenic poisoning (from ingestion) results in marked irritation of the stomach and intestines with nausea, vomiting and diarrhea. In severe cases the vomitus and stools are bloody and the patient goes into collapse and shock with weak, rapid pulse, cold sweats, coma and death. Chronic arsenic poisoning, whether through ingestion or inhalation, may manifest itself in many different ways. There may be disturbances of the digestive system such as loss of appetite, cramps, nausea, constipation or diarrhea. Liver damage may occur, resulting in jaundice. Disturbances of the blood, kidneys and nervous system are not infrequent. Arsenic can cause a variety of skin abnormalities including itching, pigmentation and even cancerous changes. A characteristic of arsenic poisoning is the great variety of symptoms that can be produced. A recognized carcinogen of the skin, lungs, liver. An experimental carcinogen of the mouth, esophagus, larynx, bladder and para nasal sinus. (Sax, Dangerous Properties of Industrial Materials)

Acute Effects:

Inhalation: Causes irritation of mucous membranes and respiratory tract, metallic taste, pharyngitis, bloody nose, perforation of the nasal septum.

Ingestion: May cause vomiting, diarrhea and nausea.

Skin: Causes moderate irritation, skin sensitization.

Eye: Causes moderate irritation.

Chronic Effects:

Inhalation: May cause cancer (skin and lung).

Ingestion: May cause cancer (skin and lung).

Skin: Can cause eczematous dermatitis, pigmentation, hyperkeratosis.

Eye: None known

Other Health Hazards: There is evidence that arsenic may cross the placental barrier. Arsenic is a neurotoxin. Poisoning may affect the heart, GI system, kidneys and liver.

Routes of Entry: Inhalation, ingestion.

Medical Conditions Generally Aggravated by Exposure: No data

Carcinogenicity: NTP: Yes IARC: Yes OSHA: Yes

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: No specific information available, one should obtain medical attention.

INGESTION: No data available but one should obtain medical attention.

SKIN: Remove contaminated clothing, flood skin with large amounts of water. If irritation persists seek medical attention.

EYE: Immediately flush eyes, including under eyelids, with large amounts of water for at least 15 minutes. Call a physician.

6. REACTIVITY DATA

Stability: Stable

Conditions to Avoid: Incompatibles, exposure to air.

Incompatibility (Materials to Avoid): Acids, acid fumes, oxidizing agents, halogens, heat, palladium, zinc, platinum, nitrogen trichloride, silver nitrate, acetylenes, chlorosylamine, chromium (VI) oxide, sodium peroxide, dirubidium 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.

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.

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/m³.

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.

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			Health:	2
Product Name:	Selenium Metal 99.5% Powder			Flammability	1
Trade/Chemical Synonyms				Reactivity	0
Formula:	Se			Hazard Rating:	
RTECS:	VS7700000			Least Slight Moderate High Extreme	
C.A.S	CAS# 7782-49-2			0 1 2 3 4	
NA = Not Applicable NE = Not Established					
Section 2 Component Mixture					
Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
<input type="checkbox"/>	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, and difficulty in breathing. Chronic: none are specified by manufacturer. Target organs: upper respiratory tract and eyes. Conditions aggravated/target organs. Persons with pre-existing eye, skin or respiratory conditions may be more susceptible.

DOT Classification: Selenium compounds n.o.s. (Selenium powder), 6.1, UN3283, PG III

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No:0.1

Date Entered: 9/1/2006

Approved by: WPF

10.1.15Nickel Material Safety Data Sheet

Section 1 Identification

Product Number:	C2156	Health:	3
Product Name:	Nickel Metal Laboratory Grade, Shot	Flammability	0
Trade/Chemical Synonyms		Reactivity	0
Formula:	Ni	Hazard Rating:	
RTECS:	QR5950000	Least Slight Moderate High Extreme	
C.A.S	CAS# 7440-02-0	0 1 2 3 4	
		NA = Not Applicable NE = Not Established	

Section 2 Component Mixture

Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
<input type="checkbox"/>	Nickel Metal	CAS# 7440-02-0	100	W/W	OSHA TWA 1 mg/mf

Section 3 Hazard Identification (Also see section 11)

May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.

Section 4 First Aid Measures

May be fatal if inhaled, swallowed or absorbed thru the skin Avoid all contact. Use with adequate ventilation. Wash thoroughly after use. Keep container closed.

FIRST AID: CALL A PHYSICIAN. SKIN: Remove contaminated clothing. Wash exposed area with soap and water.

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

INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

Section 5 Fire Fighting Measures

Fire Extinguisher Type: Use agents for metal, such as graphite

Fire/Explosion Hazards: Dust at sufficient concentrations can form explosive mixtures with air.

Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

Section 6 Accidental Release Measures

Evacuate area. Wear self-contained breathing apparatus and protective clothing. Eliminate all sources of ignition.

Section 7 Handling and Storage

Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.

Section 8 Exposure Controls & Personal Protection

Respiratory Protection: NIOSH/MSHA-approved respirator

Ventilation: Mechanical:

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:	1455° C	Specific Gravity	8.9
Boiling Point:	2732° C	Percent Volatile by Volume:	N/A
Vapor Pressure:	1 @ 1810° C	Evaporation Rate:	N/A
Vapor Density:	N/A	Evaporation Standard:	
Solubility in Water:	Insoluble	Auto ignition Temperature:	Not applicable
Appearance and Odor:	Silvery white metallic powder	Lower Flamm. Limit in Air:	Not applicable
Flash Point:	N/A	Upper Flamm. Limit in Air:	Not applicable

Section 10 Stability and Reactivity Information

Stability: Stable Conditions to Avoid: Avoid contact with incompatible materials.

Materials to Avoid:
mineral acids, strong oxidizers

Hazardous Decomposition Products:
 Hydrogen gas
 Hazardous Polymerization: Will Not Occur
 Condition to Avoid: None known

Section 11 Additional Information

Dust may irritate eyes skin and respiratory tract. Conditions aggravated: Asthma, emphysema, etc. Persons with pre-existing eye, skin or respiratory conditions may be more susceptible.

DOT Classification: Not Regulated

DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.

Revision No: 0 Date Entered: 9/1/2006 Approved by: WPF

10.1.16 Chromium Material Safety Data Sheet

Section 1 Identification

Product Number:	C1503	Health:	2
Product Name:	Chromium	Flammability	1
Trade/Chemical Synonyms		Reactivity	0
Formula:	Cr	Hazard Rating:	
RTECS:	GB4200000	Least Slight Moderate High Extreme	
C.A.S	CAS# 7440-47-3	0	1 2 3 4
		NA = Not Applicable NE = Not Established	

Section 2 Component Mixture

Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
<input type="checkbox"/>	Chromium	CAS# 7440-47-3	100%	w/w	OSHA TWA 1 mg/mf

Section 3 Hazard Identification (Also see section 11)

May be harmful if swallowed. May cause irritation. Avoid breathing vapors, or dusts. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

Section 4 First Aid Measures

May be harmful if swallowed. May cause irritation. Avoid breathing vapors, or dusts. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

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

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

INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.

Section 5 Fire Fighting Measures

Fire Extinguisher Type: Carbon Dioxide, dry chemical or sand. Do not disturb burning metal while extinguishing the fire.

Fire/Explosion Hazards: Dust at sufficient concentrations can form explosive mixtures with air.

Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

Section 6 Accidental Release Measures	
Sweep up and place in suitable (fiberboard) containers for reclamation or later disposal.	
Section 7 Handling and Storage	
Precautions such as the use of inert atmosphere are advisable when sizing material to minus 100 mesh and when 50% is minus 200 mesh	
Section 8 Exposure Controls & Personal Protection	
Respiratory Protection: NIOSH/MSHA-approved respirator	
Ventilation:	Mechanical: <input type="checkbox"/> Hand Protection: NIOSH Approved Gloves Local Exhaust: <input checked="" type="checkbox"/> 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	Health:	3
Product Name:	Calcium Metal Reagent Grade	Flammability	3
Trade/Chemical Synonyms		Reactivity	2

Formula:	Ca	Hazard Rating: Least Slight Moderate High Extreme 0 1 2 3 4 NA = Not Applicable NE = Not Established
RTECS:	EV8040000	
C.A.S	CAS# 7440-70-2	

Section 2 Component Mixture					
Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
<input type="checkbox"/>	Calcium Metal	CAS# 7440-70-2	100 %	W/W	None established

Section 3 Hazard Identification (Also see section 11)
 Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

Section 4 First Aid Measures
 Keep away from heat and ignition sources. Harmful if swallowed. Avoid breathing vapors. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.
 FIRST AID: CALL A PHYSICIAN. SKIN: In case of contact, immediately flush skin with water for at least 15 minutes while removing contaminated clothing and shoes. Thoroughly clean clothing and shoes before reuse.
 EYES: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen
 INGESTION: Give several glasses of milk or water. Vomiting may occur spontaneously, but DO NOT INDUCE! Never give anything by mouth to an unconscious person.

Section 5 Fire Fighting Measures
 Fire Extinguisher Type: G-1 powder, Pyrene, Dry lime(not limestone)
 Fire/Explosion Hazards: Evolves hydrogen gas when heated or in contact with acids, moisture. Finely divided calcium is considered pyrophoric and will explode if ignited.
 Fire Fighting Procedure: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

Section 6 Accidental Release Measures
 Collect spilled material for reclamation or disposal in sealed containers.

Section 7 Handling and Storage
 Store in a cool dry well ventilated area. Keep away from heat and flame. Do not get in eyes, on skin, or on clothing.

Section 8 Exposure Controls & Personal Protection
 Respiratory Protection:NIOSH/MSHA-approved respirator
 Ventilation: Mechanical: Hand Protection: Wear appropriate gloves to prevent skin exposure
 Local Exhaust: 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, Alkali 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 irritation. If inhaled can cause irritation to mucous membranes. If ingested can cause burns of mouth and esophagus. If comes in contact with skin or eyes wash with water. If inhaled remove to fresh air. If ingested, Do not induce vomiting. For all above situation get medical assistance immediately. Persons with pre-existing disorders may be more susceptible			
DOT Classification: Calcium, 4.3, UN1401, PG II			
DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.			
Revision No:0		Date Entered: 9/1/2006	Approved by: WPF

10.1.18 Beryllium Material Safety Data Sheet

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Beryllia Ceramic

SYNONYMS

MANUFACTURER

Beryllium Oxide

Beryllia

Thermalox Brush Ceramic Products, Inc.

6100 S. Tucson Boulevard

Tucson, Arizona 85706

Phone: (520) 746-0699

Fax: (520) 573-9077 CHEMICAL FAMILY Beryllium Compound

Transportation Emergency

Call Chemtrec at: CUSTOMER SERVICE

Domestic: (800) 424-9300 Brush Wellman Inc.

International: (703) 527-3887 Product Stewardship Department

Other Emergency 17876 St. Clair Avenue

Call Brush Wellman at: (800) 862-4118 Cleveland, Ohio 44110

Phone: (800) 862-4118

Revised: 01-12-06 Fax: (216) 383-4091

Replaces: MSDS C10 (01-13-03) Websites www.brushwellman.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL COMPOSITION (Percent by Weight)

BRUSH WELLMAN PRODUCT

CONSTITUENTS CAS Numbers Beryllia Ceramic

Beryllium Oxide 1304-56-9 100

Hazard Communication regulations of the U.S. Occupational Safety and Health Administration apply to this product.

NOTE: As used in this Material Safety Data Sheet, the term "particulate" refers to dust, mist, fume, fragments, particles and/or powder.

3. HAZARD IDENTIFICATION

3.1 EMERGENCY OVERVIEW

White solid, which poses little or no immediate hazard in solid form. See label in Section 16. If the material is involved in a fire; pressure-demand self-contained breathing apparatus and protective clothing must be worn by persons potentially exposed to the airborne particulate during or after a fire.

3.2 POTENTIAL HEALTH EFFECTS

Exposure to the elements listed in Section 2 by inhalation, ingestion, and skin contact can occur when sintering, machining, grinding, sanding, abrasive cutting, polishing, laser scribing and trimming, chemical etching, crushing, or otherwise abrading the surface of this material in a manner which generates particulate. Volatile beryllium hydroxide can be formed when firing solid BeO parts at temperatures greater than 900°C in a moist atmosphere such as in a hydrogen atmosphere sintering furnace. Exposure may also occur during repair or maintenance activities on contaminated equipment such as: furnace rebuilding, maintenance or repair of air cleaning equipment, structural renovation, etc. Particulate depositing on hands, gloves, and clothing, can be transferred to the breathing zone and inhaled during normal hand to face motions such as rubbing of the nose or eyes, sneezing, coughing, etc.

3.2.1. Inhalation

Beryllium Oxide: The beryllium in this product is not known to cause acute health effects. Inhaling particulate containing beryllium may cause a serious, chronic lung disease called Chronic Beryllium Disease (CBD) in some individuals. See section 3.2.5 Chronic (long-term health effects).

3.2.2. Ingestion

Ingestion can occur from hand, clothing, food and drink contact with particulate during hand to mouth activities such as eating, drinking, smoking, nail biting, etc. Beryllium Oxide: The health effect of ingestion of beryllium in the form found in this product is unknown.

3.2.3. Skin

Skin contact with this material may cause, in some sensitive individuals, an allergic dermal response. Skin contact may cause irritation. Symptoms include redness, itching and pain. Beryllium Oxide: Particulate that becomes lodged under the skin has the potential to induce sensitization and skin lesions.

3.2.4. Eyes

Exposure may result from direct contact with airborne particulate or contact to the eye with contaminated hands or clothing. Damage can result from irritation or mechanical injury to the eyes by particulate.

3.2.5. Chronic (long-term health effects)

Beryllium Oxide: Inhaling particulate containing beryllium may cause a serious, chronic lung disease called chronic beryllium disease (CBD) in some individuals. Over time lung disease can be fatal. Chronic beryllium disease is a hypersensitivity or allergic condition in which the tissues of the lungs become inflamed. This inflammation, sometimes with accompanying fibrosis (scarring), may restrict the exchange of oxygen between the lungs and the bloodstream. Medical science suggests that CBD may be related to genetic factors.

3.2.6. Carcinogenic References

Beryllium Oxide: The International Agency for Research on Cancer (IARC) lists beryllium as a Group 1 – Known Human Carcinogen. The National Toxicology Program (NTP) lists beryllium as known to be human carcinogens. The ACGIH lists beryllium as an A1 – Confirmed Human Carcinogen. IARC lists beryllium as a known human carcinogen (Group1) and notes that the work environment of workers involved in refining, machining and producing beryllium metal was associated with an increased risk of lung cancer, "the greater excess was in workers hired before 1950 when exposures to beryllium in the work place were relatively uncontrolled and much higher than in subsequent decades"; and "the highest risk for lung cancer being observed among individuals diagnosed with acute beryllium-induced pneumonitis, who represent a group that had the most intense exposure to beryllium." IARC further noted that "Prior to 1950, exposure to beryllium in working environments was usually very high, and concentrations exceeding 1 mg/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.

8.2 WORK PRACTICES

Develop work practices and procedures that prevent particulate from coming in contact with worker skin, hair, or personal clothing. If work practices and/or procedures are ineffective in controlling airborne exposure or visual particulate from deposition on skin, hair, or clothing, provide appropriate cleaning/washing facilities. Procedures should be written that clearly communicate the facility's requirements for protective clothing and personal hygiene. These clothing and personal hygiene requirements help keep particulate from being spread to non-production areas or from being taken home by the worker. Never use compressed air to clean work clothing or other surfaces.

Fabrication processes may leave a residue of particulate on the surface of parts, products or equipment that could result in employee exposure during subsequent material handling activities. As necessary, clean loose particulate from parts between processing steps. As a standard hygiene practice, wash hands before eating or smoking.

To prevent exposure, remove surface scale or oxidation formed on cast or heat treated products in an adequately ventilated process prior to working the surface.

8.3 WET METHODS

Machining operations conducted under a flood of liquid coolant require complete hooded containment and local exhaust ventilation. Openings into the hood must be baffled to prevent release of fast moving particulate. The cycling through a machine of liquid lubricant/coolant containing finely divided beryllium particulate in suspension can result in the concentration building to a point where the particulate may become airborne during use. Prevent coolant from splashing onto floor areas, external structures or operators' clothing. Utilize a coolant filtering system to remove particulate from the coolant.

8.4 RESPIRATORY PROTECTION

When airborne exposures exceed or have the potential to exceed the occupational limits shown in Section 8.13, approved respirators must be used as specified by an Industrial Hygienist or other qualified professional. Respirator users must be medically evaluated to determine if they are physically capable of wearing a respirator. Quantitative and/or qualitative fit testing and respirator training must be satisfactorily completed by all personnel prior to respirator use. Users of tight fitting respirators must be clean shaven on those areas of the face where the respirator seal contacts the face. Exposure to unknown concentrations of particulate requires the wearing of a pressure-demand airline respirator or pressure-demand self-contained breathing apparatus (SCBA). Use pressure-demand airline respirators when performing jobs with high potential exposures such as changing filters in a baghouse air cleaning device.

8.5 OTHER PROTECTIVE EQUIPMENT

Protective overgarments or work clothing must be worn by persons who may become contaminated with particulate during activities such as machining, furnace rebuilding, air cleaning equipment filter changes, maintenance, furnace tending, etc. Contaminated work clothing and overgarments must be managed in a controlled manner to prevent secondary exposure to workers of third parties, to prevent the spread of particulate to other areas, and to prevent particulate from being taken home by workers.

8.6 PROTECTIVE GLOVES

Wear gloves to prevent contact with particulate or solutions. Wear gloves to prevent metal cuts and skin abrasions during handling.

8.7 EYE PROTECTION

Wear safety glasses, goggles, face shield, or welder's helmet when risk of eye injury is present, particularly during melting, casting, machining, grinding, welding, powder handling, etc.

8.8 HOUSEKEEPING

Use vacuum and wet cleaning methods for particulate removal from surfaces. Be certain to de-energize electrical systems, as necessary, before beginning wet cleaning. Use vacuum cleaners with high efficiency particulate air (HEPA). Do not use compressed air, brooms, or conventional vacuum cleaners to remove particulate from surfaces as this activity can result in elevated exposures to airborne particulate. Follow the manufacturer's instructions when performing maintenance on HEPA filtered vacuums used to clean hazardous materials.

8.9 MAINTENANCE

During repair or maintenance activities the potential exists for exposures to particulate in excess of the occupational standards. Under these circumstances, protecting workers can require the use of specific work practices or procedures involving the combined use of ventilation, wet and vacuum cleaning methods, respiratory protection, decontamination, special protective clothing, and when necessary, restricted work zones.

8.10 EXPOSURE CHARACTERIZATION

Determine exposure to airborne particulate by air sampling in the employee breathing zone, work area, and department. Utilize an Industrial Hygienist or other qualified professional to specify the frequency and type of air sampling. Develop and utilize a sampling strategy which identifies the extent of exposure variation and provides statistical confidence in the results. Conduct an exposure risk assessment of processes to determine if conditions or situations exist which dictate the need for additional controls or improved work practices. Make air sample results available to employees.

8.11 MEDICAL SURVEILLANCE

Beryllium Oxide: Medical surveillance for beryllium health effects includes (1) skin examination, (2) respiratory history, (3) examination of the lungs, (4) lung function tests (FVC and FEV1), and (5) periodic chest x-ray. In addition, a specialized, specific, immunological blood test, the beryllium blood lymphocyte proliferation test (BLPT), is available to assist in the diagnosis of beryllium related reactions. Individuals who have an abnormal BLPT are normally referred to a lung specialist for additional specific tests to determine if chronic beryllium disease is present. Note: Substantial inter- and intra-laboratory disagreement exists among the laboratories that conduct this test. The BLPT does not at this time meet the criteria for a screening test. Despite its limitations however, the BLPT remains a useful disease surveillance tool.

8.12 RISK FACTORS

Specific genetic factors have been identified and have been shown to increase an individual's susceptibility to CBD. Medical testing is available to detect genetic factors in individuals.

8.13 OCCUPATIONAL EXPOSURE LIMITS

CONSTITUENTS	OSHA*			ACGIH*		NIOSH RTECS NUMBER
	PEL	CEILING	PEAK	TLV	TLV-STEL	
Beryllium Oxide (as Be)	0.002	0.005	0.025	0.002	0.01	DS4025000

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Boiling Point (°F):	Not Applicable	Radioactivity:	Not Applicable
Evaporation Rate:	Not Applicable	Solubility:	None
Freezing Point (°F):	Not Applicable	Sublimes At (°F):	Not Applicable
Odor:	None	Vapor Density (Air = 1):	Not Applicable
pH:	Not Applicable	Vapor Pressure (mmHg):	Not Applicable
Physical State:	Solid	% Volatiles By Volume:	None
Color:	White	Melting Point (°F):	4455 (BeO)
Density (lb/in ³):	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

1. GENERAL INFORMATION

Synonyms: Quicksilver; hydrargyrum; Liquid Silver
CAS No.: 7439-97-6
Molecular Weight: 200.59
Chemical Formula: Hg

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient CAS No Percent Hazardous

Mercury 7439-97-6 90 - 100% Yes

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. Gastrointestinal uptake of mercury is less than 5% but its ability to penetrate tissues presents some hazard. Initial symptoms may be thirst, possible abdominal discomfort.

Skin Contact:

Causes irritation and burns to skin. Symptoms include redness and pain. May cause skin allergy and sensitization. Can be absorbed through the skin with symptoms to parallel ingestion.

Eye Contact:

Causes irritation and burns to eyes. Symptoms include redness, pain, blurred vision; may cause serious and permanent eye damage.

Chronic Exposure:

Chronic exposure through any route can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn gray in color. A suspected reproductive hazard; may damage the developing fetus and decrease fertility in males and females.

Aggravation of Pre-existing Conditions:

Persons with nervous disorders, or impaired kidney or respiratory function, or a history of allergies or a known sensitization to mercury may be more susceptible to the effects of the substance.

4. FIRST AID MEASURES

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. FIRE FIGHTING MEASURES

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode. Undergoes hazardous reactions in the presence of heat and sparks or ignition. Smoke may contain toxic mercury or mercuric oxide. Smoke may contain toxic mercury or mercuric oxide.

6. ACCIDENTAL RELEASE MEASURES

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapor.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate misting. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Do not flush to sewer. US Regulations

(CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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.

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.

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

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.

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 3

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.

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.

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

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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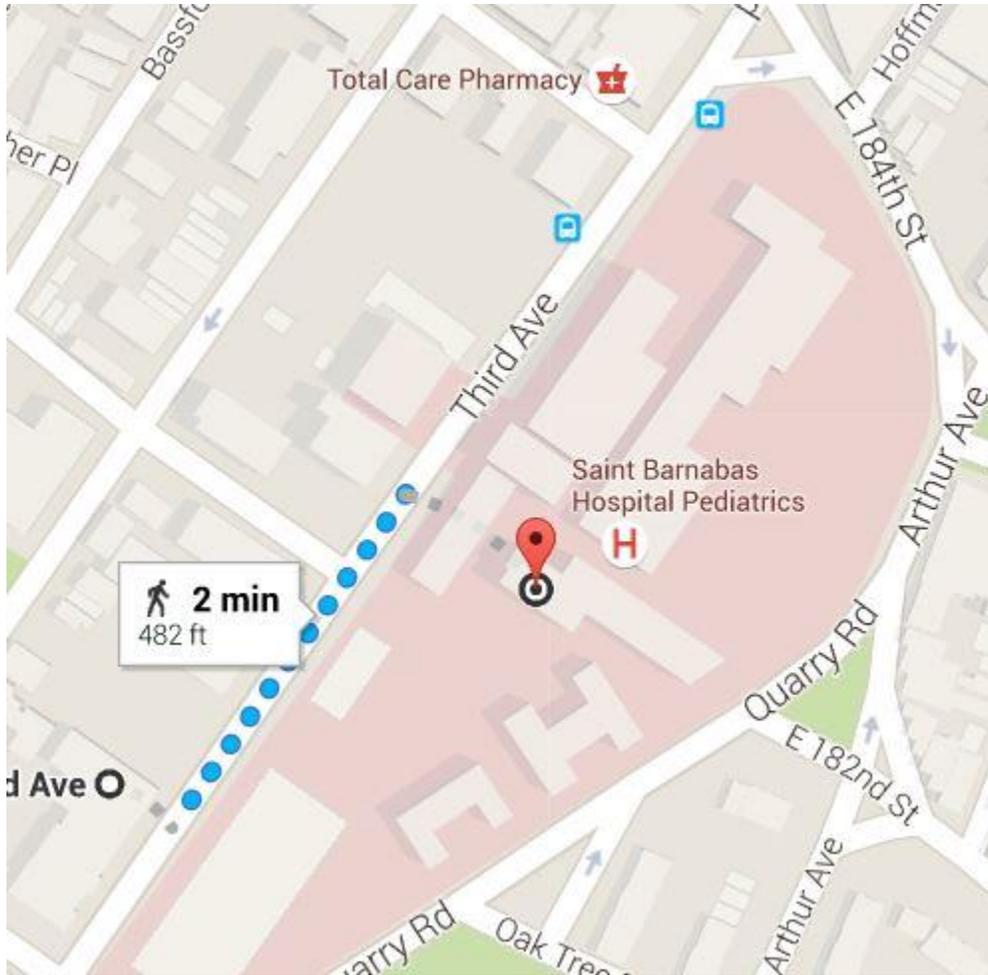
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10.2 Emergency Contact Information

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

<i>Emergency:</i>	911	
<i>Hospital:</i>	(718) 960-6497	St. Barnabas Hospital
<i>Police:</i>	911	Police
<i>Fire Department:</i>	911	NYFD
<i>Chemtrec:</i>	800-424-9300	
<i>Poison Control Center:</i>	800-336-6997	
<i>National Response Center:</i>	800-424-8802	
<i>US EPA (24-hour hotline):</i>	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.

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

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 A).

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 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 10.2.1.
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	Wash off skin with a large amount of water immediately. Remove any

(Petroleum, Gasoline, etc.)	affected clothing and rewash skin using soap, if available. Transport person to a medical facility if necessary.
Skin Contact / Corrosive Contaminant (Acids, Hydrogen Peroxide, etc.)	Wash off skin with a large amount of water immediately. Remove any 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 B). 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 A). Follow-up procedures will include investigation of each accident or near-miss by the safety supervisor to assure that no similar accidents occur in the future.

APPENDIX A

Accident Report Form

Employee Accident Report

EMPLOYEE

Name _____ SS# _____ Emp ID# _____

Home Address _____

Street _____ city _____ zip code _____ phone _____

Sex: M F Birth Date _____ Age: _____ Employment Status: Full time _____ Part time _____ % _____

Job Title _____ Time in Present Position _____ Yrs _____ Months _____

Department _____ Work Address _____

building/room # _____ phone _____

Supervisor _____

name _____ building/room # _____ phone _____

Accident Date _____ Time _____ am/pm Location _____

What were you doing and using (tools, chemicals, equipment, etc.) when the accident occurred? Describe what happened.

Was this part of your normal job duty? _____ Yes _____ No

Parts of body affected or injured _____

Witnesses: _____ / _____

Report prepared by (if different from the injured employee) _____

name

phone

name

phone

name

phone

I understand that it is my right to apply for Workers' Compensation benefits and that I have two years from the date of this accident to do so. For more information regarding workers' compensation, call the New York State Department of Labor. I also authorize release of medical information regarding this accident to the Prime Contractors claim administrators.

EMPLOYEE SIGNATURE: _____ DATE: _____

SUPERVISOR/CHARGE PERSON

This accident was reported to me on _____ at _____ Cost Center/Dept # _____

(date) _____ (time) _____

IS FURTHER INVESTIGATION REQUIRED? _____ Yes _____ No

Supervisor/Charge Person Signature _____ Date _____

HEALTH CARE PROVIDER

Treated by: _____

print name

signature

Address _____

name of facility

street

city

state

zip code

phone

Hospitalized overnight as inpatient? _____ yes _____ no (if emergency room only mark no)

Diagnosis/Assessment _____

Parts of body affected _____

Reaggravation of previous work injury? _____ yes _____ no Date of initial injury _____

APPENDIX B

OSHA Form 200-Occupational Injuries & Illnesses

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

Summary of Work-Related Injuries and Illnesses

Note: You can type input into this form and save it. Because the forms in this recordkeeping package are "fillable/writable" PDF documents, you can type into the input form fields and then save your inputs using the [free Adobe PDF Reader](#).

Year 20__



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 work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

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 Part 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
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

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

Injury and Illness Types

Total number of . . .	
(M)	
(1) Injuries _____	(4) Poisonings _____
(2) Skin disorders _____	(5) Hearing loss _____
(3) Respiratory conditions _____	(6) All other illnesses _____

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

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instructions, 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 other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

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., 3715) _____

OR _____

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

Employment information (If you don't have these figures, see the Worksheet on the next page to estimate.)

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 ____ / ____ / ____

Save In [] [] [] []

OSHA's Form 301 Injury and Illness Incident Report

Note: You can type input into this form and save it. Because the forms in this recordkeeping package are "fillable/writable" PDF documents, you can type into the input form fields and then save your inputs using the free Adobe PDF Reader. In addition, the forms are programmed to auto-calculate as appropriate.

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 the printout or insert additional form pages in the PDF, and then use as many as you need.

Information about the employee

- 1) Full name _____
- 2) Street _____
- 3) City _____ State _____ ZIP _____
- 4) Date of birth _____
Month Day Year
- 5) Date hired _____
Month Day Year
 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 _____
Month Day Year
- 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 _____
Month Day Year

Completed by _____
Title _____
Phone _____ - _____ - _____ Date _____
Month Day Year

Page 1 of 1

Save In _____

Add a Form _____

Re _____

APPENDIX C

Safety Meeting Sheet

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/m³
Temperature Range:	°F		Background Reading (organic vapors) ppm
Calibration Dates:	Particulate Meters: _____		Photoionization Detector: _____
Action	Organic vapors: > 5ppm above background levels/ 15 minute readings		
Level/Response:	Particulates: 0.100 mg/m ³ above up wind reading/15 minute period		

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

APPENDIX E

Agreement and Acknowledgement Statement

HEALTH AND SAFETY BRIEFING STATEMENT

The following personnel were present at a pre-job safety briefing conducted at _____(time) on _____ (date) at _____(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 F

Respirator Medical Evaluation Questionnaire

Attachment 4

**Appendix C to 1910.134:OSHA Respirator Medical Evaluation Questionnaire
(Mandatory)**

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Can you read (circle one): Yes No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date: _____

2. Your name: _____

3. Your age (to nearest year): _____

4. Sex (circle one): Male Female

5. Your height: _____ ft. _____ in.

6. Your weight: _____ lbs.

7. Your job title: _____

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____

9. The best time to phone you at this number: _____

10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes No

11. Check the type of respirator you will use (you can check more than one category):

a. _____ N, R, or P disposable respirator (filter-mask, non-cartridge type only).

b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes No

If "yes," what type(s): _____

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been

selected to use any type of respirator (please circle "yes" or "no").

1. Do you currently smoke tobacco, or have you smoked tobacco in the last month: Yes
No

2. Have you ever had any of the following conditions?

- a. Seizures (fits): Yes No
- b. Diabetes (sugar disease): Yes No
- c. Allergic reactions that interfere with your breathing: Yes No
- d. Claustrophobia (fear of closed-in places): Yes No
- e. Trouble smelling odors (except when you had a cold): Yes No

3. Have you ever had any of the following pulmonary or lung problems?

- a. Asbestosis: Yes No
- b. Asthma: Yes No
- c. Chronic bronchitis: Yes No
- d. Emphysema: Yes No
- e. Pneumonia: Yes No
- f. Tuberculosis: Yes No
- g. Silicosis: Yes No
- h. Pneumothorax (collapsed lung): Yes No
- i. Lung cancer: Yes No
- j. Broken ribs: Yes No
- k. Any chest injuries or surgeries: Yes No
- l. Any other lung problem that you've been told about: Yes No

4. Do you currently have any of the following symptoms of pulmonary or lung illness?

- a. Shortness of breath: Yes No
- b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes No
- c. Shortness of breath when walking with other people at an ordinary pace on level ground: . . Yes No
- d. Have to stop for breath when walking at your own pace on level ground: Yes No
- e. Shortness of breath when washing or dressing yourself: Yes No
- f. Shortness of breath that interferes with your job: Yes No
- g. Coughing that produces phlegm (thick sputum): Yes No
- h. Coughing that wakes you early in the morning: Yes No
- i. Coughing that occurs mostly when you are lying down: Yes No
- j. Coughing up blood in the last month: Yes No
- k. Wheezing: Yes No
- l. Wheezing that interferes with your job: Yes No
- m. Chest pain when you breathe deeply: Yes No
- n. Any other symptoms that you think may be related to lung problems: Yes No

5. Have you ever had any of the following cardiovascular or heart problems?

- a. Heart attack: Yes No
- b. Stroke: Yes No
- c. Angina: Yes No
- d. Heart failure: Yes No
- e. Swelling in your legs or feet (not caused by walking): Yes No
- f. Heart arrhythmia (heart beating irregularly): Yes No
- g. High blood pressure: Yes No
- h. Any other heart problem that you've been told about: Yes No

6. Have you ever had any of the following cardiovascular or heart symptoms?
- a. Frequent pain or tightness in your chest: Yes No
 - b. Pain or tightness in your chest during physical activity: Yes No
 - c. Pain or tightness in your chest that interferes with your job: Yes No
 - d. In the past two years, have you noticed your heart skipping or missing a beat: Yes No
 - e. Heartburn or indigestion that is not related to eating: Yes No
 - f. Any other symptoms that you think may be related to heart or circulation problems: Yes No
7. Do you currently take medication for any of the following problems?
- a. Breathing or lung problems: Yes No
 - b. Heart trouble: Yes No
 - c. Blood pressure: Yes No
 - d. Seizures (fits): Yes No
8. Has your wearing a respirator caused any of the following problems? (If you've never used a respirator, check the following space ___ and go to question 9:)
- a. Eye irritation: Yes No
 - b. Skin allergies or rashes: Yes No
 - c. Anxiety that occurs only when you use the respirator: Yes No
 - d. Unusual weakness or fatigue: Yes No
 - e. Any other problem that interferes with your use of a respirator: Yes No
9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes No
- Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.**
10. Have you ever lost vision in either eye (temporarily or permanently): Yes No
11. Do you currently have any of the following vision problems?
- a. Wear contact lenses: Yes No
 - b. Wear glasses: Yes No
 - c. Color blind: Yes No
 - d. Any other eye or vision problem: Yes No
12. Have you ever had an injury to your ears, including a broken ear drum: Yes No
13. Do you currently have any of the following hearing problems?
- a. Difficulty hearing: Yes No
 - b. Wear a hearing aid: Yes No
 - c. Any other hearing or ear problem: Yes No
14. Have you ever had a back injury: Yes No
15. Do you currently have any of the following musculoskeletal problems?
- a. Weakness in any of your arms, hands, legs, or feet: Yes No
 - b. Back pain: Yes No
 - c. Difficulty fully moving your arms and legs: Yes No
 - d. Pain or stiffness when you lean forward or backward at the waist: Yes No
 - e. Difficulty fully moving your head up or down: Yes No
 - f. Difficulty fully moving your head side to side: Yes No
 - g. Difficulty bending at your knees: Yes No
 - h. Difficulty squatting to the ground: Yes No

- i. Difficulty climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes No
- j. Any other muscle or skeletal problem that interferes with using a respirator: Yes No

Part B Any of the following questions, and other questions not listed, may be added to the questionnaire at

the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal

amounts of oxygen: Yes No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes No

If "yes," name the chemicals if you know them: _____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

- a. Asbestos: Yes No
- b. Silica (e.g., in sandblasting): Yes No
- c. Tungsten/cobalt (e.g., grinding or welding this material): Yes No
- d. Beryllium: Yes No
- e. Aluminum: Yes No
- f. Coal (for example, mining): Yes No
- g. Iron: Yes No
- h. Tin: Yes No
- i. Dusty environments: Yes No
- j. Any other hazardous exposures: Yes No

If "yes," describe these exposures: _____

4. List any second jobs or side businesses you have: _____

5. List your previous occupations: _____

6. List your current and previous hobbies: _____

7. Have you been in the military services? Yes No

If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes No

8. Have you ever worked on a HAZMAT team? Yes No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes No

If "yes," name the medications if you know them: _____

10. Will you be using any of the following items with your respirator(s)?

a. HEPA Filters: Yes No

b. Canisters (for example, gas masks): Yes No

c. Cartridges: Yes No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:

a. Escape only (no rescue): Yes No

b. Emergency rescue only: Yes No

c. Less than 5 hours per week: Yes No

d. Less than 2 hours per day: Yes No

e. 2 to 4 hours per day: Yes No

f. Over 4 hours per day: Yes No

12. During the period you are using the respirator(s), is your work effort:

a. Light (less than 200 kcal per hour): Yes No

If "yes," how long does this period last during the average shift: _____ hrs. _____ mins.

Examples of a light work effort are sitting while writing, typing, drafting, or performing light assembly work; or

standing while operating a drill press (1-3 lbs.) or controlling machines.

b. Moderate (200 to 350 kcal per hour): Yes No

If "yes," how long does this period last during the average shift: _____ hrs. _____ mins.

Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at

trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

c. Heavy (above 350 kcal per hour): Yes No

If "yes," how long does this period last during the average shift: _____ hrs. _____ mins.

Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working

on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade

about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and or equipment (other than the respirator) when you're using your

respirator: Yes No

If "yes," describe this protective clothing and or equipment: _____

14. Will you be working under hot conditions (temperature exceeding 77 deg. F): Yes No

15. Will you be working under humid conditions: Yes No

16. Describe the work you'll be doing while you're using your respirator(s):

17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):

18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of the second toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of the third toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

The name of any other toxic substances that you'll be exposed to while using your respirator:

19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

**Apéndice C: Cuestionario de Evaluación Médico obligado por la OSHA
(La agencia de seguridad y salud ocupacional)**

Parte 29 CFR 1910.134 Mandatorio para Protección del Sistema Respiratorio

Marque con un círculo para indicar sus respuestas a cada pregunta.

Para el empleado: Puede usted leer (circule uno): Sí o No

Su patrón debe dejarlo responder estas preguntas durante horas de trabajo o en un tiempo y lugar que sea conveniente para usted. Para mantener este cuestionario confidencial, su patrón o supervisor no debe ver o revisar sus respuestas. Su patrón debe informarle a quien dar o enviar este cuestionario para ser revisado por un profesional de sanidad con licencia autorizado por el estado.

Parte A. Sección 1. (Mandatorio). La siguiente información debe de ser proveida por cada empleado que ha

sido seleccionado para usar cualquier tipo de respirador (escriba claro por favor).

1. Fecha : _____
2. Nombre: _____
3. Edad: _____
4. Su sexo (circule uno) Masculino o Femenino
5. Altura: _____ pies _____ pulgadas
6. Peso: _____ libras
7. Su ocupación, título o tipo de trabajo: _____
8. Número de teléfono al donde pueda ser llamado por un profesional de sanidad con licencia que revisara este cuestionario (incluya el área): _____
9. Indique la hora mas conveniente para llamarle a este numero: _____
10. ¿Le ha informado su patrón como comunicarse con el profesional de sanidad con licencia que va a revisar este cuestionario (circule una respuesta)? Sí o No
11. Anote el tipo de equipo protector respiratorio que va utilizar (puede anotar mas de una categoría)
 - a. _____ Respirador disponible de clase N, R, o P (por ejemplo: respirador de filtro mecánico, respirador sin cartucho)
 - b. _____ Otros tipos (respirador con cartucho químico, máscara con cartucho químico, máscara con manguera con soplador (PAPR), máscara con manguera sin soplador (SAR), aparato respiratorio autónomos (SCBA)).
12. ¿Ha usado algun tipo de respirador ? Sí o No

Si ha usado equipo protector respiratorio, que tipo(s) ha utilizado:

Parte A. Seccion 2. (Mandatorio): Preguntas del 1 al 9 deben ser contestadas por cada empleado que fue seleccionado a usar cualquier tipo de respirador. Marque con un circulo para indicar sus respuestas.

1. ¿Corrientemente fuma tabaco, o ha fumado tabaco durante el ultimo mes? Sí o No
2. ¿Ha tenido algunas de las siguientes condiciones medicas?
 - a. Convulsiones : Sí o No
 - b. Diabetes (azucar en la sangre): Sí o No
 - c. Reacciones alergicas que no lo deja respirar: Sí o No
 - d. Claustrofobia (miedo de estar en espacios cerrados): Sí o No
 - e. Dificultad oliendo excepto cuando ha cogido un resfriado: Sí o No
3. ¿Ha tenido algunas de los siguientes problemas pulmonares?
 - a. Asbestosis: Sí o No
 - b. Asma: Sí o No
 - c. Bronquitis cronica: Sí o No
 - d. Emfisema: Sí o No
 - e. Pulmonía: Sí o No
 - f. Tuberculosis: Sí o No
 - g. Silicosis: Sí o No
 - h. Neumotorax (pulmon colapsado): Sí o No
 - i. Cáncer en los pulmones: Sí o No
 - j. Costillas quebradas: Sí o No
 - k. Injuria o cirujía en el pecho: Sí o No
 - l. Algun otro problema de los pulmones que le ha dicho su medico: Sí o No
4. ¿Corrientemente tiene alguno de los siguientes síntomas o enfermedades en sus pulmones?
 - a. Respiración dificultosa Sí o No
 - b. Respiración dificultosa cuando camina rapido sobre terreno plano o subiendo una colina: Sí o No
 - c. Respiración dificultosa cuando camina normalmente con otras personas sobre terreno plano: Sí o No
 - d. Cuando camina normalmente en terreno plano se encuentra corto de resuello? Sí o No
 - e. Respiración dificultosa cuando se esta bañando o vistiendo: Sí o No
 - f. Respiración dificultosa que lo impede trabajar: Sí o No
 - g. Tos con flema: Sí o No
 - h. Tos que lo despierta temprano en la mañana: Sí o No
 - i. Tos que ocurre cuando esta acostado: Sí o No
 - j. Ha tosido sangre en el ultimo mes: Sí o No
 - k. Silbar o respirar con mucha dificultad: Sí o No
 - l. Silbar que lo impede trabajar: Sí o No
 - m. Dolor del pecho cuando respira profundamente: Sí o No
 - n. Otros síntomas que crea usted estar relacionados a los pulmones: Sí o No
5. ¿Ha tenido algunos de los siguientes problemas con el corazón?
 - a. Ataque cardiaco: Sí o No
 - b. Ataque cerebrovascular: Sí o No
 - c. Dolor en el pecho: Sí o No
 - d. Falla de corazón: Sí o No
 - e. Hinchazón en las piernas o pies (que no sea por caminar): Sí o No
 - f. Latidos irregulares del corazón: Sí o No
 - g. Alta presión: Sí o No
 - h. Algun otro problema cardio-vascular o cardiaco: Sí o No
6. ¿Ha tenido algunos de los siguientes síntomas causados por su corazón?
 - a. Dolor de pecho frecuente o pecho apretado: Sí o No
 - b. Dolor o pecho apretado durante actividad fisica: Sí o No

- c. Dolor o pecho apretado que no lo deja trabajar normalmente: Sí o No
- d. En los últimos dos años ha notado que su corazón late irregularmente: Sí o No
- e. Dolor en el pecho o indigestión que no es relacionado a la comida: Sí o No
- f. Algunos otros síntomas que usted piensa ser causado por problemas de su corazón o de su circulación. Sí o No

7. ¿Esta tomando medicina por alguno de los siguientes problemas?

- a. Respiración dificultosa: Sí o No
- b. Problemas del corazón: Sí o No
- c. Alta presión : Sí o No
- d. Convulsiones: Sí o No

8. ¿Le ha causado alguno de los siguientes problemas usando el respirador? (si no ha usado un respirador, deje

esta pregunta en blanco__ y continúe con pregunta 9).

- a. Irritación de los ojos: Sí o No
- b. Alergias del cutis o sarpullido: Sí o No
- c. Ansiedad que ocurre solamente cuando usa el respirador: Sí o No
- d. Debilidad, falta de vigor o fatiga des acostumbrada: Sí o No
- e. Algun otro problema que le impida utilizar su respirador: Sí o No

9. ¿Le gustaría hablar con el profesional de sanidad con licencia autorizado por el estado que revisara este cuestionario sobre sus respuestas? Sí o No

Las preguntas del 10 al 15 deben ser contestadas por los empleados seleccionados para usar una máscara con cartucho químico o aparato respiratorio autónomo (SCBA). Los empleados que usan otro tipo de respirador no tienen que contestar estas preguntas.

10. ¿Ha perdido la vista en cualquiera de sus ojos (temporalmente o permanente): Sí o No

11. ¿Corrientemente tiene algunos de los siguientes problemas con su vista?

- a. Usa lentes de contacto: Sí o No
- b. Usa lentes: Sí o No
- c. Daltoniano (dificultad distinguiendo colores): Sí o No
- d. Tiene algún problema con sus ojos o su vista: Sí o No

12. ¿Ha tenido daño en sus oídos incluyendo rotura del tímpano: Sí o No

13. ¿Corrientemente tiene uno de las siguientes problemas para oír?

- a. Dificultad oyendo: Sí o No
- b. Usa un aparato para oír: Sí o No
- c. Tiene algun otro problema con sus oídos o dificultad escuchando: Sí o No

14. ¿Se ha dañado o lastimado su espalda? Sí o No

15. ¿Tiene uno de los siguientes problemas de su aparato muscular or esqueleto?

- a. Debilidad en sus brazos, manos, piernas o pies : Sí o No
- b. Dolor de espalda: Sí o No
- c. Dificultad para mover sus brazos y piernas completamente: Sí o No
- d. Dolor o engarrotamiento cuando se inclina para adelante o para atrás: Sí o No
- e. Dificultad para mover su cabeza para arriba o para abajo completamente: Sí o No
- f. Dificultad para mover su cabeza de lado a lado: Sí o No
- g. Dificultad para agacharse doblando sus rodillas: Sí o No
- h. Dificultad para agacharse hasta tocar el piso: Sí o No
- i. Dificultad subiendo escaleras cargando mas de 25 libras: Sí o No
- j. Alguno problema muscular o con sus huesos que le evite usar un respirador: Sí o No

Parte B - Las siguientes preguntas pueden ser agregadas al cuestionario a discrecion del profesional de sanidad con licencia autorizado por el estado.

1. ¿Esta trabajando en las alturas arriba de 5,000 pies o en sitios que tienen menos oxígeno de lo normal? Sí o No

Si la respuesta es "Sí", se ha sentido mareado, o ha tenido dificultad respirando, palpitaciones, o cualquier otro síntoma que usted no tiene cuando no está trabajando bajo estas condiciones: Sí o No

2. ¿En el trabajo o en su casa, ha estado expuesto a solventes o contaminantes peligrosos en el aire (por ejemplo, humos, neblina o polvos) o ha tenido contacto del cutis con químicas peligrosas? Sí o No

Escriba las químicas y productos con las que ha estado expuesto, si sabe cuales son: _____

3. ¿Ha trabajado con los siguientes materiales o las condiciones anotadas abajo?:

a. Asbestos: Sí o No

b. Sílice (Limpiar mediante un chorro de arena): Sí o No

c. Tungsteno/Cobalto (pulverizar o soldadura): Sí o No

d. Berilio: Sí o No

e. Aluminio: Sí o No

f. Carbón de piedra (minando): Sí o No

g. Hierro: Sí o No

h. Estaño: Sí o No

i. Ambiente polvoriento: Sí o No

j. Otra exposicion peligrosa: Sí o No

Describe las exposiciones peligrosas: _____

4. ¿Tiene usted otro trabajo o un negocio aparte de este? _____

5. Apunte su previos trabajos: _____

6. Apunte sus pasatiempos: _____

7. ¿Tiene servicio militar? Sí o No

Si la respuesta es "Sí", ha estado expuesto a agentes químicos o biológicos durante entrenamiento o combate: Sí o No

8. ¿Alguna vez ha trabajado en un equipo de HAZMAT (equipo respondedor a incidentes de materiales peligrosos con emergencia)? Sí o No

9. ¿Esta tomando alguna medicina que no haya mencionado en este cuestionario (incluyendo remedios caseros o medicinas que compra sin receta)? Sí o No

Si la respuesta es "Sí", cuales son _____

10. ¿Va a usar algunas de las siguientes partes con su respirador?

a. filtros HEPA (filtro de alta eficiencia que remueve partículas tóxicas en la atmósfera): Sí o No

b. Canastillo (por ejemplo, máscara para gas): Sí o No

c. Cartuchos: Sí o No

11. ¿Cuántas veces espera usar un respirador?

a. Para salir de peligro solamente (no rescates): Sí o No

b. Recates de emergencia solamente: Sí o No

c. Menos de 5 horas *por semana*: Sí o No

d. Menos de 2 horas *por día*: Sí o No

e. 2 a 4 horas *por día*: Sí o No

f. Mas de 4 horas *por día*: Sí o No

12. ¿Durante el tiempo de usar el respirador, su trabajo es...?

a. **Ligero** (menos de 200 kcal por hora): Sí o No

No

Si la respuesta es "sí", cuanto tiempo dura la obra _____ horas _____ minutos

Ejemplos de trabajos ligeros: estar sentado escribiendo, escribiendo a máquina, diseñando, trabajando la línea de

montaje, o estar parado gobernando un taladro o máquinas:

b. **Moderado** (200-350 kcal por hora): Sí o No

Si la respuesta es "sí" cuanto tiempo dura en promedio por jornada _____ horas _____ minutos

Ejemplos de trabajos moderados : sentado clavando o archivando; manejando un camión o autobús en trafico

pesado; estar de pie taladrando, clavando, trabajando la línea de montaje, o transfiriendo una carga (de 35 libras)

a la altura de la cintura; caminando sobre tierra plana a 2 millas por hora o bajando a 3 millas por hora; empujando una carretilla con una carga pesada (de 100 libras) sobre terreno plano.

c. **Pesado** (mas de 350 kcal por hora): Sí o No

No

Si la respuesta es "sí" cuanto tiempo dura en promedio por jornada _____ horas _____ minutos

Ejemplos de trabajos pesados: levantando cargas pesadas (mas de 50 libras) desde el piso hasta la altura de la

cintura o los hombros; trabajando cargando o descargando; transpalar; estar de pie trabajando de albañil o demenuzando moldes; subiendo a 2 millas por hora; subiendo la escalera con una carga pesada (mas de 50 libras).

13. ¿Va a estar usando ropa o equipo protectivo cuando use el respirador? Sí o No

No

Si la respuesta es "sí" describa que va a estar

usando _____

14. ¿Va a estar trabajando en condiciones calurosas (temperatura mas de 77 grados F)? Sí o No

No

15. ¿Va a estar trabajando en condiciones húmedas? Sí o No

16. Describa el tipo de trabajo que va a estar usted haciendo cuando use el respirador.

17. Describa cualquier situación especial o peligrosa que pueda encontrar cuando este usando el respirador (por ejemplo, espacios encerrados, gases que lo puedan matar, etc.)

18. Provea la siguiente información si la sabe, por cada sustancia tóxica que usted va a estar expuesto cuando

este usando el respirador(s):

Nombre de la primera sustancia tóxica _____

Máximo nivel de exposición por jornada de trabajo _____

Tiempo de exposición por jornada _____

Nombre de la segunda sustancia tóxica _____

Máximo nivel de exposición por jornada de trabajo _____

Tiempo de exposición por jornada _____

Nombre de la tercera sustancia tóxica _____

Máximo nivel de exposición por jornada de trabajo _____

Tiempo de exposición por jornada _____

El nombre de cualquier sustancia tóxica que usted va a estar expuesto cuando este usted usando el respirador _____

19. Describa alguna responsabilidad especial que usted va a tener cuando usted este usado el respirador(s) que pueda afectar la seguridad o la vida de otros (por ejemplo, rescate, seguridad).

Appendix 6:

Manufacturer Specifications for Waterproofing / Vapor Barrier

VAPORBLOCK® PLUS™ VBP20

UNDER-SLAB VAPOR / GAS BARRIER

PRODUCT DESCRIPTION

VaporBlock® Plus™ 20 is a seven-layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock® Plus™ 20 is a highly resilient underslab / vertical wall barrier designed to restrict naturally occurring gases such as radon and/or methane from migrating through the ground and concrete slab. VaporBlock® Plus™ 20 is more than 100 times less permeable than typical high-performance polyethylene vapor retarders against Methane, Radon and other harmful VOCs.

VaporBlock® Plus™ 20 is one of the most effective underslab gas barriers in the building industry today far exceeding ASTM E-1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. Available in a 20 (Class A) mil thicknesses designed to meet the most stringent requirements. VaporBlock® Plus™ 20 is produced within the strict guidelines of our ISO 9001:2008 Certified Management System.

PRODUCT USE

VaporBlock® Plus™ 20 resists gas and moisture migration into the building envelop when properly installed to provide protection from toxic/harmful chemicals. It can be installed as part of a passive or active control system extending across the entire building including floors, walls and crawl spaces. When installed as a passive system it is recommended to also include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans.

VaporBlock® Plus™ 20 works to protect your flooring and other moisture-sensitive furnishings in the building's interior from moisture and water vapor migration, greatly reducing condensation, mold and degradation.

SIZE & PACKAGING

VaporBlock® Plus™ 20 is available in 10' x 150' rolls to maximize coverage. All rolls are folded on heavy-duty cores for ease in handling and installation. Other custom sizes with factory welded seams are available based on minimum volume requirements. Installation instructions and ASTM E-1745 classifications accompany each roll.



Under-Slab Vapor/Gas Retarder

PRODUCT

PART

VaporBlock® Plus™ 20 VBP20

APPLICATIONS

Radon Barrier	Under-Slab Vapor Retarder
Methane Barrier	Foundation Wall Vapor Retarder
VOC Barrier	



VAPORBLOCK® PLUS™ VBP20

UNDER-SLAB VAPOR / GAS BARRIER

		VAPORBLOCK® PLUS™ 20	
PROPERTIES	TEST METHOD	IMPERIAL	METRIC
APPEARANCE		White/Gold	
THICKNESS, NOMINAL		20 mil	0.51 mm
WEIGHT		102 lbs/MSF	498 g/m ²
CLASSIFICATION	ASTM E 1745	CLASS A, B & C	
TENSILE STRENGTH LBF/IN (N/CM) AVERAGE MD & TD (NEW MATERIAL)	ASTM E 154 Section 9 (D-882)	58 lbf	102 N
IMPACT RESISTANCE	ASTM D 1709	2600 g	
MAXIMUM USE TEMPERATURE		180° F	82° C
MINIMUM USE TEMPERATURE		-70° F	-57° C
PERMEANCE (NEW MATERIAL)	ASTM E 154 Section 7 ASTM E 96 Procedure B	0.0098 Perms grains/(ft ² ·hr·in·Hg)	0.0064 Perms g/(24hr·m ² ·mm Hg)
PERMEANCE (AFTER CONDITIONING) (SAME MEASUREMENT AS ABOVE PERMEANCE)	ASTM E 154 Section 8, E96 Section 11, E96 Section 12, E96 Section 13, E96	0.0079 0.0079 0.0097 0.0113	0.0052 0.0052 0.0064 0.0074
WVTR	ASTM E 96 Procedure B	0.0040 grains/hr·ft ²	0.0028 gm/hr·m ²
RADON DIFFUSION COEFFICIENT	K124/02/95	< 1.1 x 10 ⁻¹³ m ² /s	
METHANE PERMEANCE	ASTM D 1434	< 1.7 x 10 ⁻¹⁰ m ² /d·atm 0.32 GTR (Gas Transmission Rate) ml/m ² ·D·ATM	

VaporBlock® Plus™ Placement

All instructions on architectural or structural drawings should be reviewed and followed.
Detailed installation instructions accompany each roll of VaporBlock® Plus™ and can also be located on our website.
ASTM E-1643 also provides general installation information for vapor retarders.



VaporBlock® Plus™ is a seven-layer co-extruded barrier made using high quality virgin-grade polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission.



Scan QR Code to download current technical data sheets via the Raven website.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance, odor transmission, longevity as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. RAVEN INDUSTRIES MAKES NO WARRANTIES AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage. Limited Warranty available at www.RavenEFD.com

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