

**24-40 STEINWAY STREET
QUEENS, NEW YORK**

Remedial Action Work Plan

**NYC VCP Project Number 17CVCP007Q
OER Project Number 15EHAZ128Q**

Prepared For:

Prince Club LLC
3631 Prince Street
Flushing, NY 11354

Prepared By:

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July 2016

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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, Andrew Levenbaum, 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 site located at 24-40 Steinway Street, Astoria, New York, [OER Site No. 15EHAZ128Q]. I certify to the following:

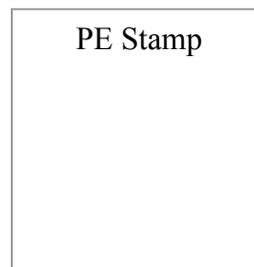
- I have reviewed this document and the Stipulation List, to which my signature and seal are affixed.
- Engineering Controls developed for this remedial action were designed by me or a person under my direct supervision and designed to achieve the goals established in this Remedial Action Work Plan for 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

PE License Number

Signature

Date



I, Paul Stewart, am a Qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the site located at 24-40 Steinway Street, Astoria, New York, [OER Site No. 15EHAZ128Q]. 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

QEP Signature

Date

EXECUTIVE SUMMARY

Prince Club LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 4,750-square foot site located at 24-40 Steinway Street in the Astoria section of Queens, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

Site Location and Background

The Site is located at 24-40 Steinway Street in the Astoria section in Queens, New York and is identified as Block 654 and Lot 59 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 4,750-square feet and is bounded by a one-story Mosque to the north, a one-story restaurant to the south, Steinway Street followed by 4 and 5 story apartment buildings and convenience store to the east, and a 4-story apartment building to the west. Currently, the Site contains a vacant one-story commercial building and partially concrete-covered paved yard. A map of the site boundary is shown in Figure 2.

Summary of Redevelopment Plan

The proposed future use of the Site will consist of a 7-story mixed-use elevator building with 4 one-bedroom and 10 two-bedroom residential units. Layout of the proposed site development is presented in Figure 3. The current zoning designation is C4-2A and the building is classified as an O1-Office Building. The proposed use is consistent with existing zoning for the property.

The cellar will contain a healthcare facility and rooms for building services including utilities and storage. A basement above the cellar will contain retail commercial space. The first floor will contain valet parking for 10 vehicles and the second through sixth floors will contain the residential units. A recreational area and boiler room will be located on the roof.

The maximum building height is 155 ft. The building will contain a centrally located elevator shaft. The gross and net square footage of the Treatment Healthcare Facility in the cellar is 3,689.71 and 3,228.25 square feet respectively. The gross and net square footage of the commercial retail space in the basement is 3,042.46 and 2,787.26 square feet respectively.

The existing building will be demolished during development. With the exception of the existing cellar, excavation of the entire property is necessary to build the foundation and construct the lower levels of the building. The maximum excavation depth is expected to be approximately 10 feet below ground surface. Approximately 1,400 cubic yards of excavated material is expected to be generated during development.

Summary of Surrounding Property

The Site is bounded by a one-story Mosque to the north, a one-story restaurant to the south, Steinway Street followed by 4 and 5 story apartment buildings and convenience store to the east, and a 4-story apartment building to the west.

Summary of Past Site Uses and Areas of Concern

The building was previously used as commercial office space and is classified as an O1 office building. The owner is listed as Prince Club, LLC. The entire property is identified as an AOC due to its hazardous materials e-designation.

Summary of Work Performed under the Remedial Investigation

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed five soil borings across the entire project Site, and collected ten soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three soil vapor probes around Site perimeter and collected three samples for chemical analysis.

Summary of Findings of Remedial Investigation

1. Elevation of the property is approximately 68 feet above mean sea level across the site.
2. Depth to groundwater was in excess of 23 feet below ground surface at the Site.
3. Groundwater flow is generally from southwest to the northeast beneath the Site.
4. Depth to bedrock is approximately 160 feet beneath the Site.
5. The stratigraphy of the site, from the surface down, consists of 40 feet of Upper Glacial aquifer underlain by 120 feet of Raritan confining unit followed by crystalline metamorphic or igneous bedrock.
6. Analytical results were compared to NYSDEC 6NYCRR Part 375-6.8 Unrestricted Use Soil Cleanup Objectives (SCOs) and Restricted Residential Use SCOs. The RI showed trace concentrations of volatile organic compounds and semi-volatile organic compounds beneath the site, and all concentrations were below the Unrestricted Use Soil Cleanup Objectives (UUSCO's). The metals including lead (maximum of 1,060 mg/Kg), and mercury (maximum of 0.45 mg/Kg) were detected above Unrestricted Residential Use SCOs within the two shallow soil samples. Several other metals were detected at trace concentrations. Two pesticides including 4,4-DDT (max. of 12 µg/Kg) and 4,4-DDE (max. of 7.3 µg/Kg) were detected slightly exceeding Unrestricted Use SCOs. Overall, soil chemistry is unremarkable and does not indicate any disposal of hazardous materials.
7. Three attempts were made to collect groundwater samples beneath the property. Due to access issues and drilling through existing basement slab, a portable Geoprobe-style drilling equipment was utilized to depths of 23 feet bgs. Groundwater was not encountered in any of three temporary well points.
8. Soil vapor samples collected during the RI were compared to the compounds listed in New York State Department of Health (NYSDOH) Vapor Intrusion Matrices. Soil vapor sample results indicated petroleum related VOCs and chlorinated VOCs at trace concentrations. Highest concentrations were detected for toluene at 18 µg/m³. Petroleum-related VOCs (BTEX) were detected at a maximum concentration of 44 µg/m³. The chlorinated VOCs - 1,1,1-trichloroethane (TCA), trichloroethylene (TCE),

tetrachloroethylene (PCE) and carbon tetrachloride were not detected in any of the three soil vapor samples.

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 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Unrestricted Use (Track 1) SCOs.
The entire footprint of the building area will be fully built out at the Site. The excavation will extend to a depth of approximately 10 feet below grade for development purposes. A small portion of property will be excavated to the depth of 15 feet below grade for elevator pits. Approximately 2000 tons 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 during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with UST's and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. 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.
11. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of Track 1 SCOs.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. 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.
14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
15. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and lists any changes from this RAWP.

If Track 1 Unrestricted Use SCOs are not achieved, the following construction elements implemented as part of new development will constitute Engineering and Institutional Controls:

16. As part of development, construction of an engineered composite cover consisting of a twenty-seven inch reinforced concrete building slab with 7/8 inch rebar spaced twelve inches apart.
17. As part of development, installation of a vapor barrier system consisting of vapor barrier 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

Vaporblock Plus vapor barrier manufactured by Raven Industries below the slab throughout the full building area and a 20-mil Vaporblock Plus vapor barrier manufactured by Raven Industries outside all sub-grade foundation sidewalls. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration.

18. If Track 1 Unrestricted Use SCOs are not achieved, the property will continue to maintain E-designation for hazardous materials with NYCDOB.

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 Address: 24-40 Steinway Street, Astoria, New York
- NYC Voluntary Cleanup Program Project Number: 17CVCP007Q

Project Contacts:

- OER Project Manager: Isabel McRae, 212-788-8841
- Site Project Manager: Mark Gelband, 516-441-5800 Ext. 104
- Site Safety Officer: Yisong Yang, 516-441-5800 Ext. 108
- 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

Prince Club LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program and/or in the “E” Designation Program to investigate and remediate a property located at 24-40 Steinway Street in the Astoria section of Queens, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, and complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 Site Location and Background

The Site is located at 24-40 Steinway Street in the Astoria section in Queens, New York and is identified as Block 654 and Lot 59 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 4,750-square feet and is bounded by a one-story Mosque to the north, a one-story restaurant to the south, Steinway Street followed by 4 and 5 story apartment buildings and convenience store to the east, and a 4-story apartment building to the west. Currently, the Site contains a vacant one-story commercial building and partially concrete-covered paved yard. A map of the site boundary is shown in Figure 2.

1.2 Redevelopment Plan

The proposed future use of the Site will consist of a 7-story mixed-use elevator building with 4 one-bedroom and 10 two-bedroom residential units. Layout of the proposed site development is presented in Figure 3. The current zoning designation is C4-2A and the building is classified as an O1-Office Building. The proposed use is consistent with existing zoning for the property.

The cellar will contain a healthcare facility and rooms for building services including utilities and storage. A basement above the cellar will contain retail commercial space. The first floor will contain valet parking for 10 vehicles and the second through sixth floors will contain the residential units. A recreational area and boiler room will be located on the roof.

The maximum building height is 155 ft. The building will contain a centrally located elevator shaft. The gross and net square footage of the Treatment Healthcare Facility in the cellar is 3,689.71 and 3,228.25 square feet respectively. The gross and net square footage of the commercial retail space in the basement is 3,042.46 and 2,787.26 square feet respectively.

The existing building will be demolished during development. With the exception of the existing cellar, excavation of the entire property is necessary to build the foundation and construct the lower levels of the building. The maximum excavation depth is expected to be approximately 10 feet below ground surface. Approximately 1,400 cubic yards of excavated material is expected to be generated during development.

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

1.3 Description of Surrounding Property

The surrounding buildings are residential, commercial and mixed-use. There is light industrial usage in the general vicinity. No sensitive receptors such as schools, hospitals, or day care facilities are identified within a 250 to 500-foot radius of the property. Figure 1 shows the surrounding land usage.

1.4 Summary of Past Site Uses and Areas of Concern

The building was previously used as commercial office space and is classified as an O1 office building. The owner is listed as Prince Club, LLC. The entire property is identified as an AOC due to its hazardous materials e-designation.

1.5 Summary of Work Performed under the Remedial Investigation

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

2. Installed five soil borings across the entire project Site, and collected ten soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three soil vapor probes around Site perimeter and collected three samples for chemical 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, 24-40 Steinway Street, Queens, New York”, dated April 2016 (RIR).

1. Elevation of the property is approximately 68 feet above mean sea level across the Site.
2. Depth to groundwater according to the USGS is approximately 50 feet bgs at the Site.
3. Groundwater flow is generally from southwest to the northeast beneath the Site.
4. Depth to bedrock is approximately 160 feet beneath the Site.
5. The stratigraphy of the site, from the surface down, consists of 40 feet of Upper Glacial aquifer underlain by 120 feet of Raritan confining unit followed by crystalline metamorphic or igneous bedrock.
6. Analytical results were compared to NYSDEC 6NYCRR Part 375-6.8 Unrestricted Use Soil Cleanup Objectives (SCOs) and Restricted Residential Use SCOs. The RI showed trace concentrations of volatile organic compounds and semi-volatile organic compounds beneath the Site, and all concentrations were below the Unrestricted Use Soil Cleanup Objectives (UUSCO’s). The metals including lead (maximum of 1,060 mg/Kg), and mercury (maximum of 0.45 mg/Kg) were detected above Unrestricted Residential Use SCOs within the two shallow soil samples. Several other metals were detected at trace concentrations. Two pesticides including 4,4-DDT (max. of 12 µg/Kg) and 4,4-DDE (max. of 7.3 µg/Kg) were detected slightly exceeding Unrestricted Use SCOs. Overall, soil chemistry is unremarkable and does not indicate any disposal of hazardous materials.

7. Three attempts were made to collect groundwater samples beneath the property. Due to access issues and drilling through existing basement slab, a portable Geoprobe-style drilling equipment was utilized to depths of 23 feet bgs. Groundwater was not encountered in any of three temporary well points.
8. Soil vapor samples collected during the RI were compared to the compounds listed in New York State Department of Health (NYSDOH) Vapor Intrusion Matrices. Soil vapor sample results indicated petroleum related VOCs and chlorinated VOCs at trace concentrations. Highest concentrations were detected for toluene at 18 $\mu\text{g}/\text{m}^3$. Petroleum-related VOCs (BTEX) were detected at a maximum concentration of 44 $\mu\text{g}/\text{m}^3$. The chlorinated VOCs - 1,1,1-trichloroethane (TCA), trichloroethylene (TCE), tetrachloroethylene (PCE) and carbon tetrachloride were not detected in any of the three soil vapor samples.

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 exposure to contaminants volatilizing from 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.

- No Engineering or Institutional Controls are required for a Track 1 cleanup. However, “as part of development, a vapor barrier and a composite cover system would be installed to prevent potential exposures from soil vapor in the future.”

Alternative 2:

- Establishment of Site Specific (Track 4) 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 10 feet across the entire Site with an elevator pit that will extend to 15 feet bgs. 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.
- Placement of a composite cover system over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a 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 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 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 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 both Alternatives, 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.

Alternative 2 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. 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.

Both Alternative 1 and 2 have similar short-term effectiveness during their implementation, as each requires excavation of historic fill material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short-term impacts could potentially be higher for Alternative 1 since excavation of greater amounts of historical fill material would take place. However, focused attention to means and methods during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize the overall impact of these activities.

An additional short-term adverse impact and risks to the community associated with both 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 both 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 above Track 1 Unrestricted Use SCO's. Removal of on-Site contaminant sources will also prevent future groundwater contamination.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs; installing a composite cover system across the Site; maintaining use restrictions; establishing an SMP to ensure long-term management of ICs and ECs; and maintaining registration as an E-designated property to memorialize these controls for the long term. The SMP would 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 continue to provide the required level of protection.

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 would remove a greater total mass of contaminants from the Site. The removal of soil to 10 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 1 foot below grade during the RI, and the new building requires excavation of the entire Site to a depth of 10 feet, the costs associated with both Alternative 1 and Alternative 2 will likely be comparable. Costs associated with Alternative 1 could potentially be higher than Alternative 2 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 shoring/underpinning, disposal of additional soil, and import of clean soil for backfill. However, long-term costs for

Alternative 2 are likely higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

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 1. 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 a 7-story mixed-use elevator building with 18 dwelling units and parking on the first floor. The basement will contain retail commercial space and beneath the basement is a cellar with a healthcare facility and building services rooms. Following remediation, the Site will meet either Track 1 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 are residential, commercial and mixed-use. There is light industrial usage in the general vicinity. The development would remediate a vacant contaminated lot and provide a modern mixed-use building. The proposed development would clean up the property and make it safer, create new employment opportunities, 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 4 Site-Specific 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 1, Unrestricted Use. Data generated during the site investigation support the conclusion that Alternative 1 is achievable and, in the event that post remedial sampling confirm Alternative 1 cleanup levels have been achieved, that Alternative will be implemented.

The Alternative 1 remedy will remove all soil/fill exceeding Unrestricted Use SCOs throughout the Site, which will be confirmed with post-excavation sampling. If soil/fill containing analytes at concentrations above Track 1 Unrestricted 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 1 Unrestricted Use SCOs.

No Engineering Controls are required for a Track 1 cleanup. A concrete slab covering the entire site and vapor proofing membrane would be installed as part of standard building development and are not considered part of the remedy. Additional soil vapor management is not required.

4.0 Remedial Action

4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is Alternative 1 the Track 1 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 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Unrestricted Use (Track 1) SCOs.
The entire footprint of the building area will be fully built out at the Site. The excavation will extend to a depth of approximately 10 feet below grade for development purposes. A small portion of property will be excavated to the depth of 15 feet below grade for elevator pits. Approximately 2,000 tons 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 during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with UST's and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. 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.
11. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of Track 1 SCOs.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. 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.
14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
15. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and lists any changes from this RAWP.

If Track 1 Unrestricted Use SCOs are not achieved, the following construction elements implemented as part of new development will constitute Engineering and Institutional Controls:

16. As part of development, construction of an engineered composite cover consisting of a twenty-seven inch reinforced concrete building slab with 7/8 inch rebar spaced twelve inches apart.
17. As part of development, installation of a vapor barrier system consisting of vapor barrier 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

Vaporblock Plus vapor barrier manufactured by Raven Industries below the slab throughout the full building area and a 20-mil Vaporblock Plus vapor barrier manufactured by Raven Industries outside all sub-grade foundation sidewalls. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration.

18. If Track 1 Unrestricted Use SCOs are not achieved, the property will continue to maintain E-designation for hazardous materials with NYCDOB.

4.2 Soil Cleanup Objectives and Soil/ Fill Management

Track 1 SCOs are proposed for this project and SCO's are defined in 6 NYCRR Part 375, Table 6.8(a) Track 1 Unrestricted Use. If Track 1 SCO's are not achieved, the following Track 4 Site-Specific SCO's:

<u>Contaminant</u>	<u>Site-Specific SCO's</u>
Lead	1,000 ppm
Mercury	1.5 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 3. 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

The entire footprint of the building area will be fully built out at the Site. The excavation will extend to a depth of approximately 10 feet below grade for development purposes. A small portion of property will be excavated to the depth of 15 feet below grade for elevator pits. The location of planned excavations is shown in the redevelopment plans presented as Figure 3. The total quantity of soil/fill expected to be excavated and disposed off-Site is 2,000 tons. 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.

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. Three confirmation samples will be collected from the base of the excavation at locations to be determined by OER. To evaluate attainment of Track 4 site-specific SCOs, analytes will include those for which SCOs have been developed, including Lead and Mercury according to analytical methods described above. If Track 1 Unrestricted Use SCOs are pursued, samples will be analyzed for VOCs, SVOCs, pesticides, PCBs and metals according to analytical methods described above.

Hotspot End-point Sampling

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.

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

The fundamental QA objective with respect to accuracy, precision and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol for all data generated.

Soil samples will be analyzed for VOCs by EPA Method 8260; SVOCs by EPA Method 8270; TAL Metals by EPA Method 6010 and Pesticides and PCBS by EPA Method 8081/8082. The soil samples will be compared to the NYSDEC standards for Unrestricted Use Soil Cleanup Objectives, Restricted Residential Soil Cleanup Objectives and Commercial Soil Cleanup Objective (UUSCO, RRSCO and CSCO).

Collected samples will be appropriately packaged, placed in coolers and shipped via laboratory courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or “cold-paks” to maintain a temperature of 4°C. The holding times for VOCs, SVOCs, Pesticides and PCBs are 14 days from sample collection and TAL Metals have a holding time of 6 months with the exception of mercury, which is 28 days.

Dedicated disposable sampling materials 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-dedicated sampling equipment will consist of the following:

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

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

Import of Soils

Soil import is not planned on this project.

Reuse of Onsite Soils

Soil reuse is not planned on this project.

4.3 Engineering Controls

The remedial action will achieve Track 1 Unrestricted Use SCOs and no Engineering Controls are required. However, the following design elements will be incorporated into the project as part of the development:

- (1) Composite Cover System
- (2) Soil Vapor Barrier System

If Track 1 is not achieved, these elements will constitute Engineering Controls that will be employed in the remedial action to address residual contamination remaining at the Site.

Composite Cover System

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system will be comprised of a twenty-seven inch reinforced concrete building slab with 7/8 inch rebar spaced twelve inches apart. A figure that shows the typical design for the remedial cover type used on this Site and the location of each cover type built at the Site will be provided under separate cover.

The composite cover system will be a permanent engineering control. The system 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 residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the Remedial Action Report.

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 20-mil Vaporblock Plus co-extruded barrier consisting of a seven-layer polyethylene and EVOH resins manufactured by Raven Industries or an equivalent 20-mil vapor barrier.

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.

A plan view showing the location of the proposed vapor barrier system and typical design sections for the vapor barrier on slab and sidewalls will be provided under separate cover. Product specification sheets are provided in Appendix 5. 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 Track 1 remedial action is proposed and Institutional Controls are not required. If a Track 1 remedial action is not achieved, Institutional Controls (IC's) will be incorporated in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. 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:

- Continued registration of the E-Designation for the property. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the SMP which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- 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 and commercial use and will not be used for a higher level of use without prior approval by OER.

4.5 Site Management Plan

A Track 1 remedial action is proposed and Site Management is not required. If a Track 1 remedial action is not achieved, Site Management will be required and will be the last phase of remediation. Site Management will begin with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the

RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the 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.

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

Soil: Lead (1,060 mg/kg) identified above its applicable Track 2 Restricted Commercial Use SCOs .

Nature, Extent, Fate and Transport of Contaminants

The shallow soil exhibited a concentration of Lead above the Track 2 Restricted Commercial Use SCO in soil boring SB-3. The soil boring SB-3 was located proximate to the northeast property boundary. No VOCs, SVOCs, Pesticides or PCBs were detected above the Restricted Residential Soil Cleanup Objectives. The soil vapor did not exhibit exceedances above the NYSDOH guidance values in the three soil vapor samples collected.

Soil: Lead, Mercury and two Pesticides were detected above their respective Unrestricted Use SCOs in shallow soil sample SB-1 (0-2'). Lead was detected above the CSCO in shallow soil sample SB-3 (0-2').

Receptor Populations

On-Site Receptors: The site is currently vacant and access to the Site is restricted through locked doors to the site. Onsite receptors are limited to trespassers, site representatives and visitors granted access to the property. During construction, potential on-site receptors include construction workers, site representatives, and visitors. Under proposed future conditions, potential on-site receptors include adult and child building residents, workers and visitors.

Off-Site Receptors: Potential off-site receptors within a 500 foot radius of the Site include adult and child residents; commercial and construction workers; pedestrians; and trespassers based on the following land uses within 500 feet of the Site:

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 capped with concrete/asphalt with soil/fill exposed in portions of the rear courtyard. Site access is restricted therefore, the potential exposure pathways from ingestion, inhalation, or dermal absorption of soil/ fill is controlled. 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 vacant however, a building with a basement is present that potentially could accumulate soil vapor.

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 1 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 are potential complete exposure pathways that require mitigation during implementation of the remedy. There are no complete exposure pathways under future conditions after the site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide surface cover, and a subsurface vapor barrier system for the building. Under current conditions, on-Site exposure pathways exist for those with access to the Site and trespassers. 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. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened.

5.0 Remedial Action Management

5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Paul Stewart, President of Advanced Cleanup Technologies. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Andrew Levenbaum (PE) and Paul Stewart (QEP).

5.2 Site Security

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

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 4. The Site Safety Coordinator will be Yisong Yang. 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 as follows:

Drive southwest on Steinway Street;

Turn right on 28th Avenue;

Turn right on 37th Street;

Turn right on Astoria Boulevard South;

Merge onto I-278, Brooklyn Queens Expressway.

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 1 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.

Remedial Action Report Certification

I, [name], am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the [site name (address)] site, site number [VCP site number]. I certify to the following:

- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial action Work Plan and (2) are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated [date] and Stipulations in a letter dated [date] were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name

PE License Number

Signature

Date

PE Stamp

I, [name], am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the [site name (address)] site, site number [VCP site number]. I certify to the following:

- The OER-approved Remedial Action Work Plan dated August 15, 2012 and Stipulations in a letter dated September 10, 2014 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

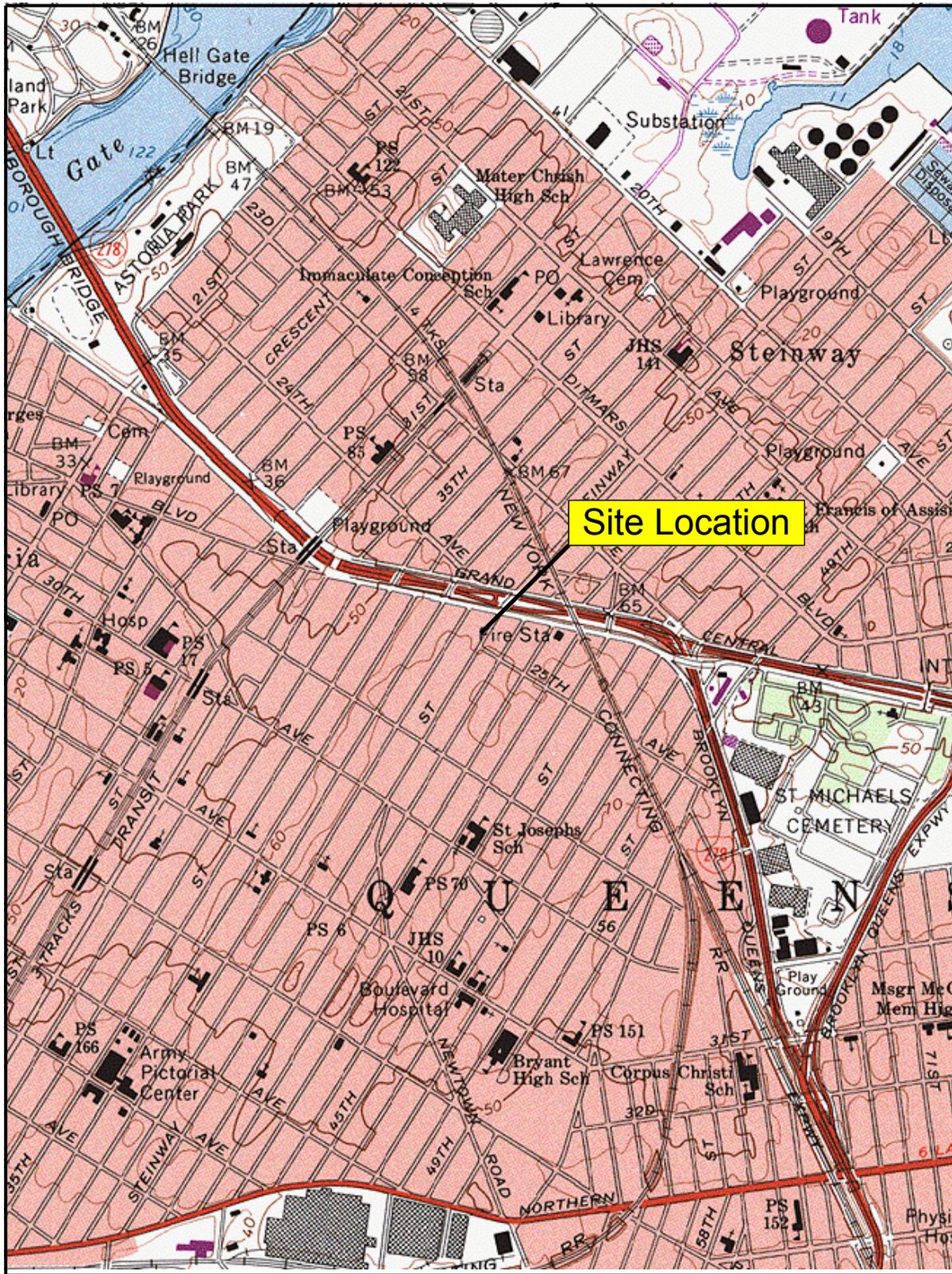
QEP Signature

Date

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 10 month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	4 weeks
Fact Sheet 2 announcing start of remedy	0	1 week
Mobilization	4	9 weeks
Remedial Excavation	9	27 weeks
Demobilization	36	9 weeks
Submit Remedial Action Report	45	4 weeks



From USGS 7.7 Minute Topographic
Central Park, NY Quadrangle

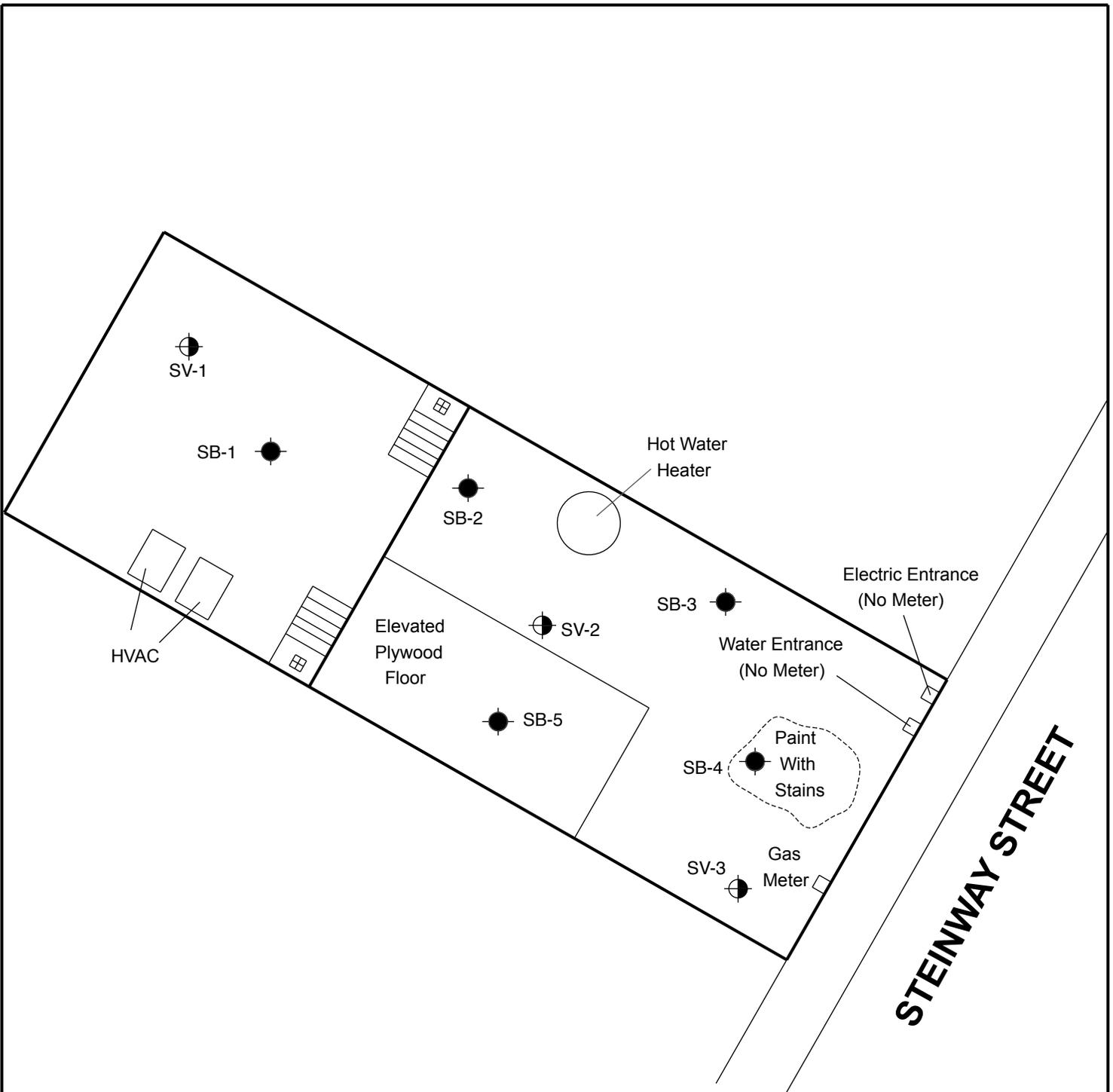


Locational Diagram

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS

110 Main Street, Suite 103, Port Washington, New York 11050
Tel: 516-441-5800 Fax: 516-441-5511

Project No.: 8530-ASNY	Figure No.: 1
Date: 10/06/2015	Scale: Not To Scale



STEINWAY STREET

Legend

- 
SB-3 Soil Boring
- 
SV-1 Soil Vapor Point
- 
 Floor Drain / Storm Drain



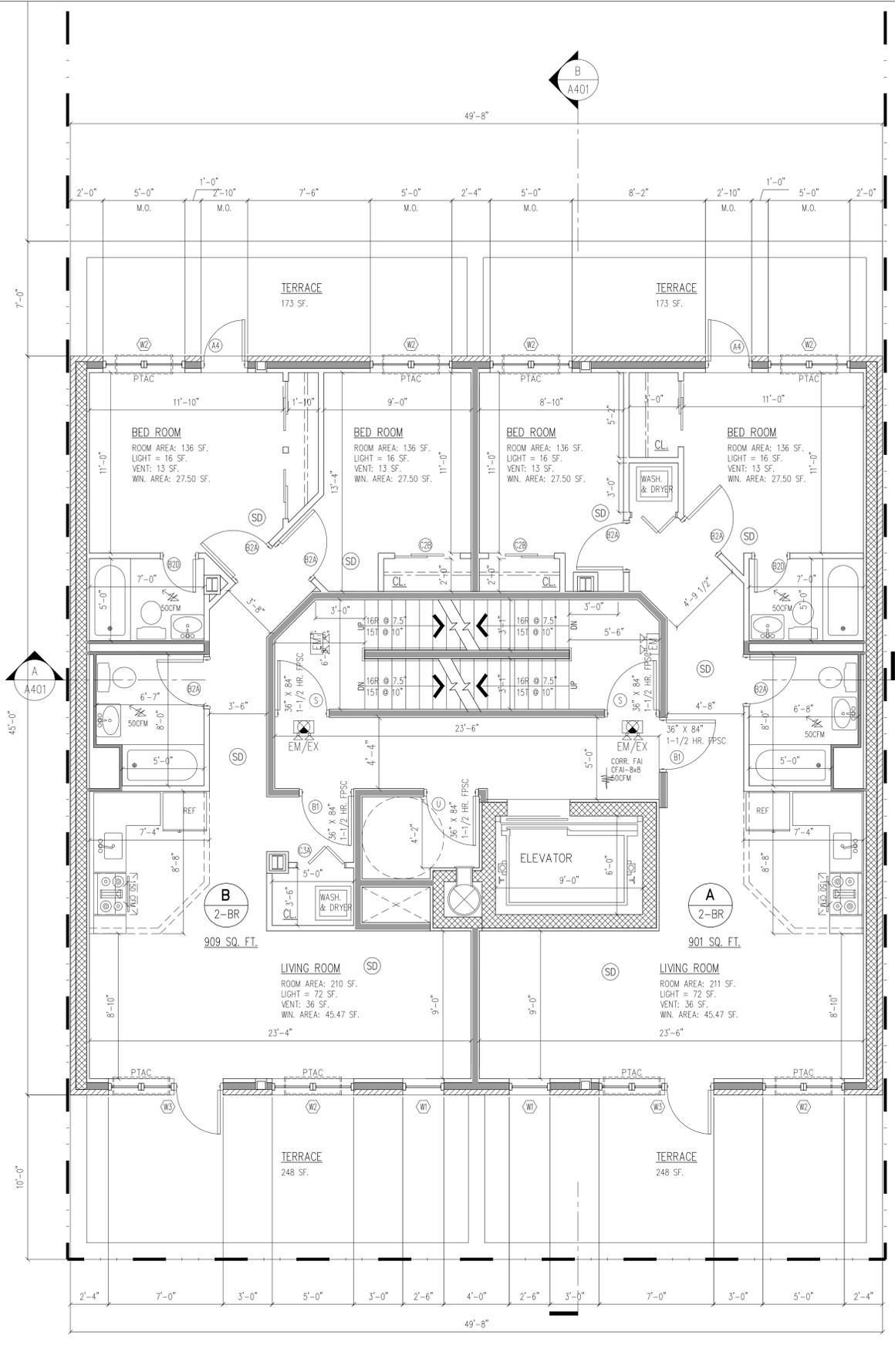
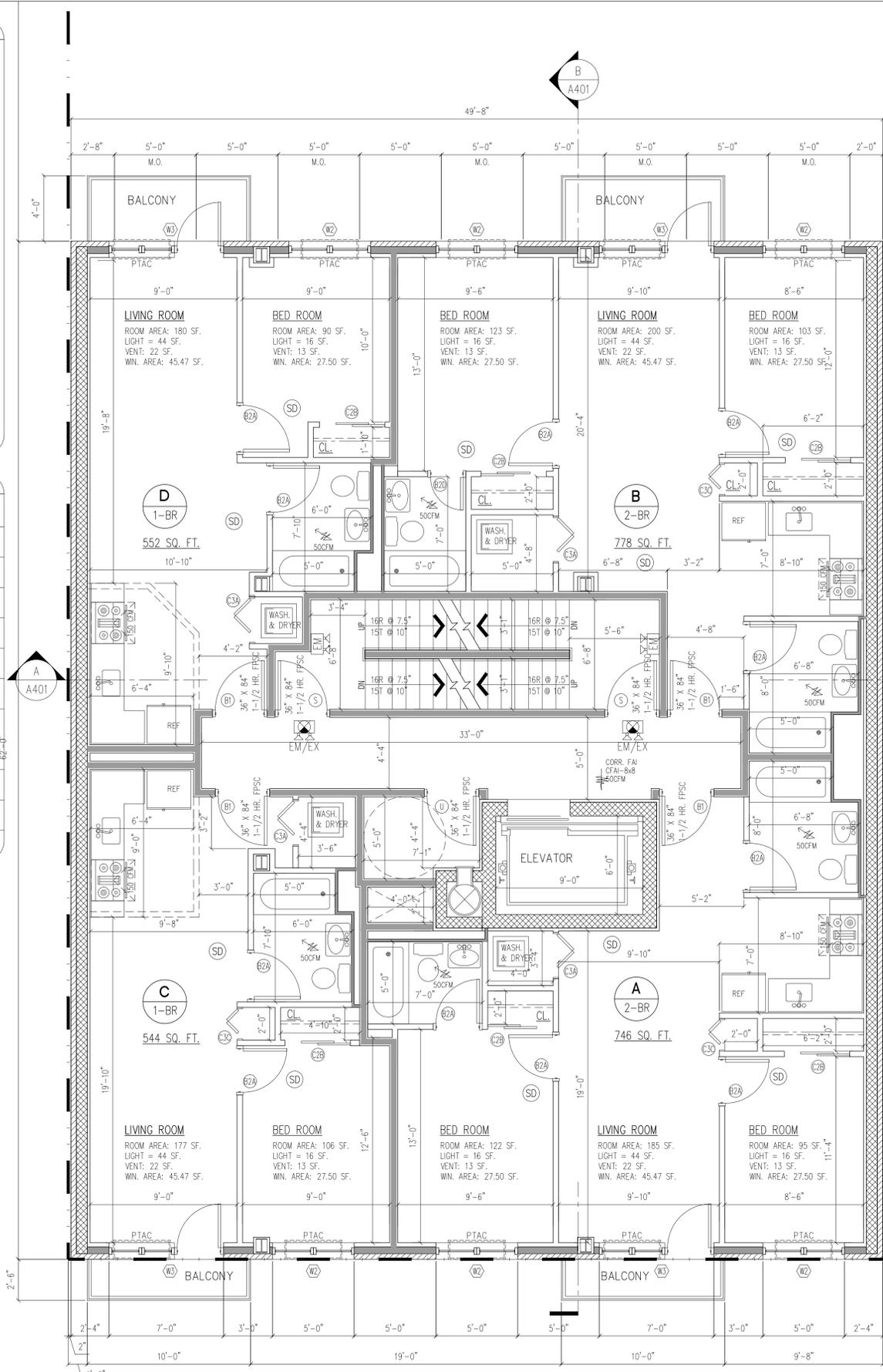
Sampling Diagram	
	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 8530-ASNY	Figure No.: 2
Date: 07/20/2016	Scale: Not To Scale

CONSTRUCTION LEGEND

- ELEVATION OR SECTION NUMBER
DRAWING NUMBER
- DETAIL PLAN OR DETAIL NUMBER
DRAWING NUMBER
- REINF. POURED CONCRETE WALL -
SEE PLAN FOR THICKNESS
- CONCRETE BLOCK WALL -
SEE PLAN FOR THICKNESS
- PARTITION TYPE -
SEE PARTITION
SCHEDULE A-501
- 2 HR FIRE RATED
PARTITION
- DOOR NUMBER - SEE DOOR
SCHEDULE ON SHEET A-601 FOR
HARDWARE, TYPE & SIZE
- WINDOW TYPE - SEE SCHEDULE
ON SHEET A-601 FOR SPECS
- INDICATE SMOKE DETECTOR AND
CARBON MONOXIDE DETECTOR
- EXIT LIGHT
- EMERGENCY LIGHT
- INDICATE EMERGENCY LIGHT
WITH EXIT SIGN
- INDICATE EMERGENCY LIGHT
WITH EXIT SIGN (WITH DIRECTION)

PARTITION SCHEDULE

- INTERIOR PARTITION
 - 1-HOUR RATED
NON-BEARING DEMISING PARTITION
 - 2-HOUR RATED
NON-BEARING PARTITION
 - 2-HOUR RATED INTERIOR
PARTITION
 - 4" CMU INTERIOR PARTITION NON-BEARING
2-HR-RATED (FINISHED BOTH SIDE)
 - 3-HOUR RATED MASONRY
INTERIOR PARTITION
 - RATED PLUMBING/
DUCT CHASE PARTITION
 - 2-HOUR RATED EXTERIOR
LOAD BEARING WALL FURRED PARTITION
WITH FACE BRICK
 - 2-HOUR RATED EXTERIOR
METAL STUD FURRED PARTITION
WITH FACE BRICK
 - 2-HOUR RATED EXTERIOR
LOAD BEARING WALL
WITH FACE BRICK
- SEE DRAWING A501 FOR PARTITION
DETAILS.
- ALL INTERIOR PARTITIONS ARE TYPE "A" UNLESS
OTHERWISE NOTED



CLIENT:
PRINCE CLUB LLC
36-31 PRINCE STREET,
FLUSHING, NEW YORK 11354

ARCHITECT:
TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358
(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE
ENGINEER:

MEP
ENGINEER:

9-3-15	SUBMITTED TO DOB/FILING	
DATE:	REV.	DESCRIPTION:

PROJECT:
**PROPOSED A 7-STORY
MIXED USE RESIDENTIAL
BUILDING**
24-38 STEINWAY STREET,
ASTORIA, NY 11103

DRAWING TITLE:
**2nd THRU. 5th FLOOR PLAN
6th FLOOR PLAN
CONSTRUCTION LEGEND**

DATE: 08/01/2015 PROJECT # 20150126
 SEAL: REGISTERED ARCHITECT DRAWN BY: KT
 CHKD. BY: CT
 DRAWING #:
A-202.00
 6 OF 19

CLIENT:

PRINCE CLUB LLC

36-31 PRINCE STREET,
FLUSHING, NEW YORK 11354

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE
ENGINEER:

MEP
ENGINEER:



FRONT ELEVATION (EAST)

SCALE: 3/16" = 1'-0"

SIDE ELEVATION (NORTH)

SCALE: 3/16" = 1'-0"

9-3-15		SUBMITTED TO DOB/FILING
DATE:	REV.	DESCRIPTION:

PROJECT:

**PROPOSED A 7-STORY
MIXED USE RESIDENTIAL
BUILDING**

24-38 STEINWAY STREET,
ASTORIA, NY 11103

DRAWING TITLE :

**FRONT ELEVATION
SIDE ELEVATION**

DATE: 08/01/2015	PROJECT # 20150126
------------------	--------------------

SEALED ARCHITECTURE:	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #:



A-301.00

CLIENT:

PRINCE CLUB LLC

36-31 PRINCE STREET,
FLUSHING, NEW YORK 11354

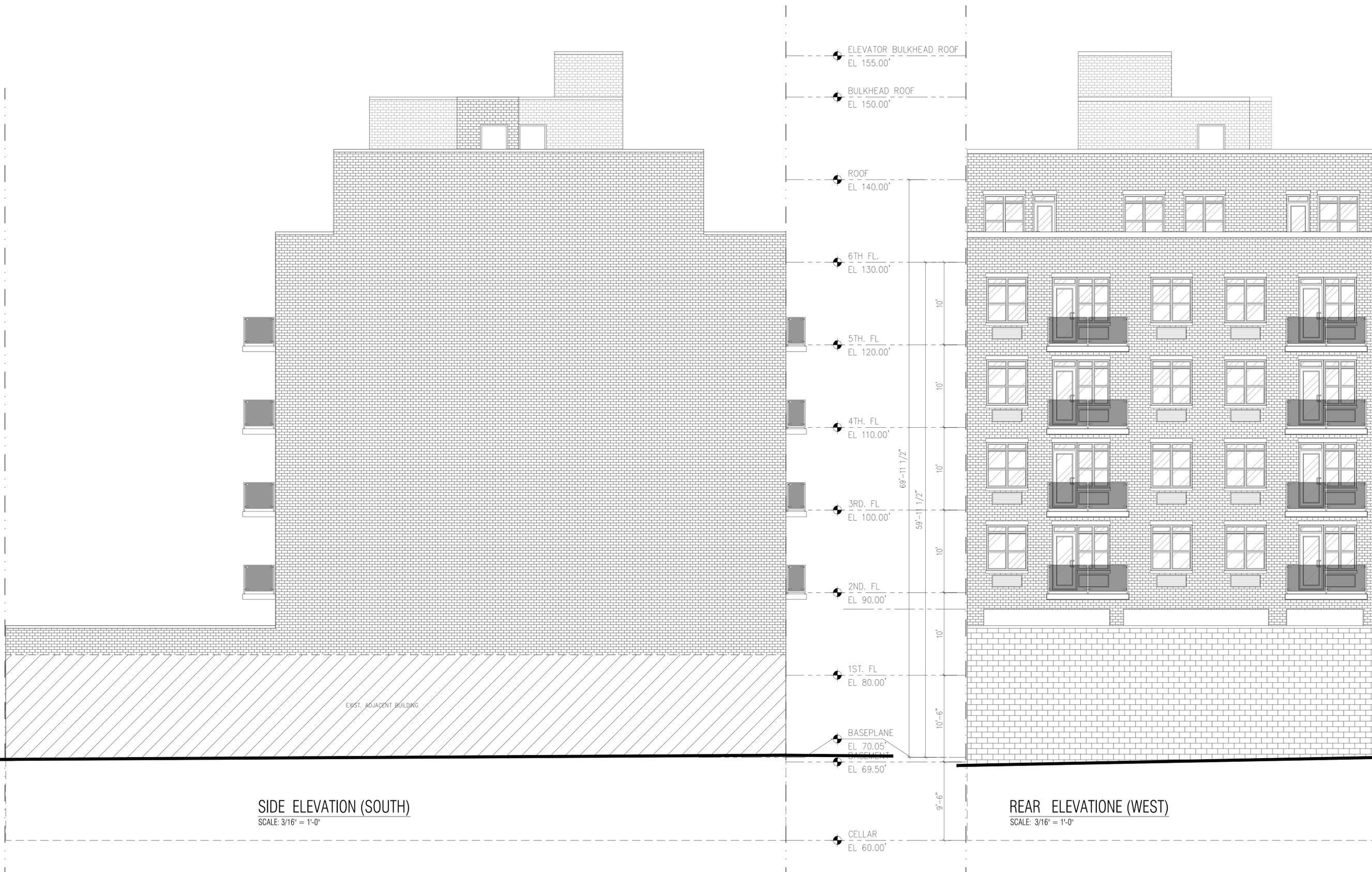
ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE
ENGINEER:

MEP
ENGINEER:



SIDE ELEVATION (SOUTH)
SCALE: 3/16" = 1'-0"

REAR ELEVATION (WEST)
SCALE: 3/16" = 1'-0"

9-3-15		SUBMITTED TO DOB/FILING
DATE:	REV.	DESCRIPTION:

PROJECT:

**PROPOSED A 7-STORY
MIXED USE RESIDENTIAL
BUILDING**

24-38 STEINWAY STREET,
ASTORIA, NY 11103

DRAWING TITLE :

**REAR ELEVATION
SIDE ELEVATION**

DATE: 08/01/2015 PROJECT #: 20150126

SEALED ARCHITECTURE: DRAWN BY: KT

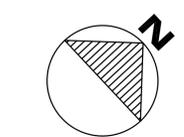
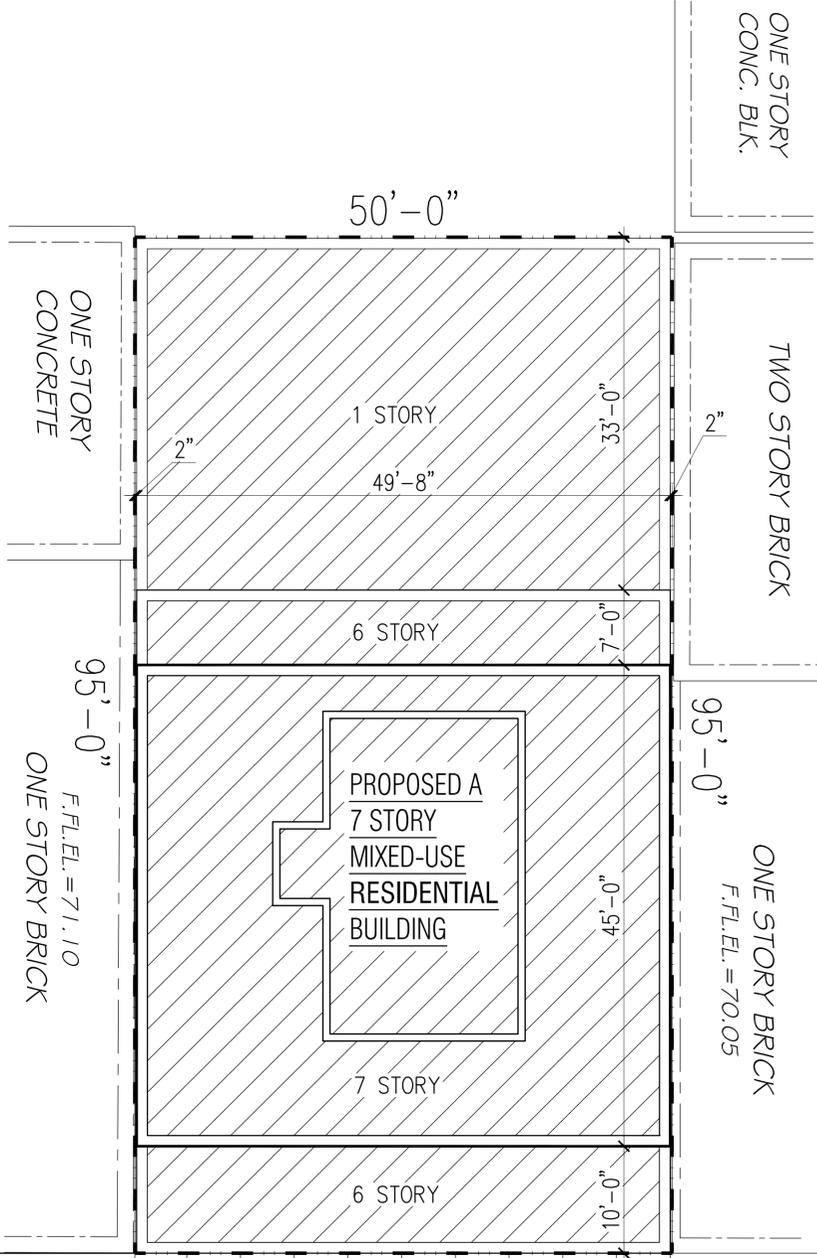
REGISTERED ARCHITECT: CHKD. BY: CT

DRAWING #:

A-302.00

9 OF 19





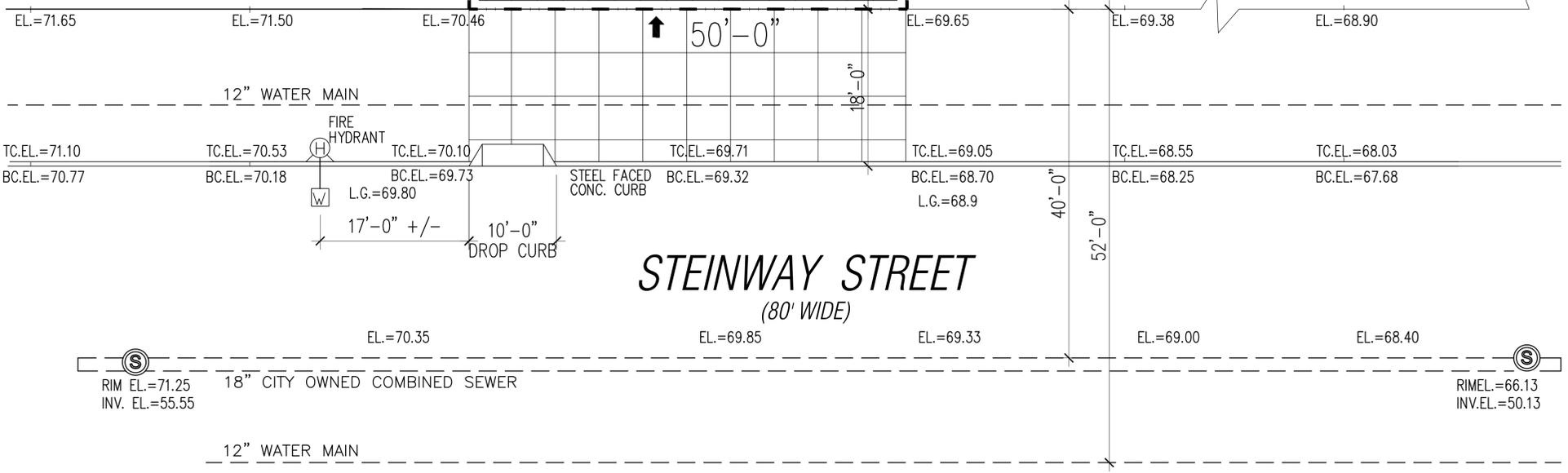
PLOT PLAN

SCALE: 1/16"=1'-0"
 BLOCK: 654
 LOT #: 59
 HOUSE #: 24-38
 ZONING DISTRICT: C4-2A
 MAP: 9c
 LOT AREA: 4,750 SQ.FT.
 CONSTRUCTION CLASS: IB



NOTE: ELEVATIONS REFER TO NAVD88 DATUM

ASTORIA BOULEVARD



STEINWAY STREET
(80' WIDE)

203'-5³/₄"

70°06'04"

EL.=71.65 EL.=71.50 EL.=70.46 EL.=69.65 EL.=69.38 EL.=68.90

12" WATER MAIN

TC.EL.=71.10 TC.EL.=70.53 TC.EL.=70.10 TC.EL.=69.71 TC.EL.=69.05 TC.EL.=68.55 TC.EL.=68.03

BC.EL.=70.77 BC.EL.=70.18 BC.EL.=69.73 BC.EL.=69.32 BC.EL.=68.70 BC.EL.=68.25 BC.EL.=67.68

FIRE HYDRANT
 L.G.=69.80
 17'-0" +/-
 10'-0" DROP CURB

STEEL FACED CONC. CURB

EL.=70.35 EL.=69.85 EL.=69.33 EL.=69.00 EL.=68.40

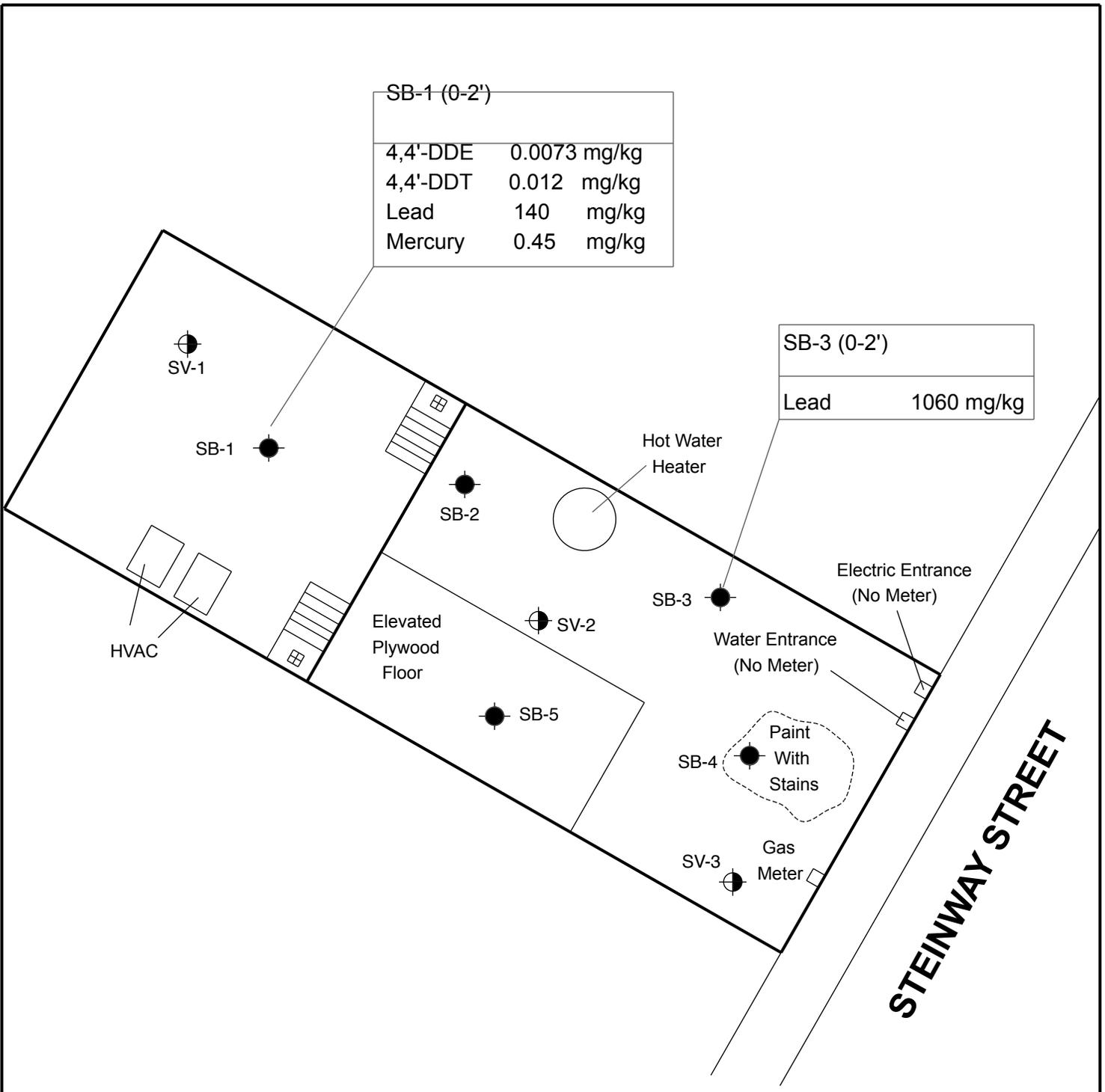
18" CITY OWNED COMBINED SEWER
 RIM EL.=71.25
 INV. EL.=55.55

RIM EL.=66.13
 INV. EL.=50.13

12" WATER MAIN

SB-1 (0-2')	
4,4'-DDE	0.0073 mg/kg
4,4'-DDT	0.012 mg/kg
Lead	140 mg/kg
Mercury	0.45 mg/kg

SB-3 (0-2')	
Lead	1060 mg/kg

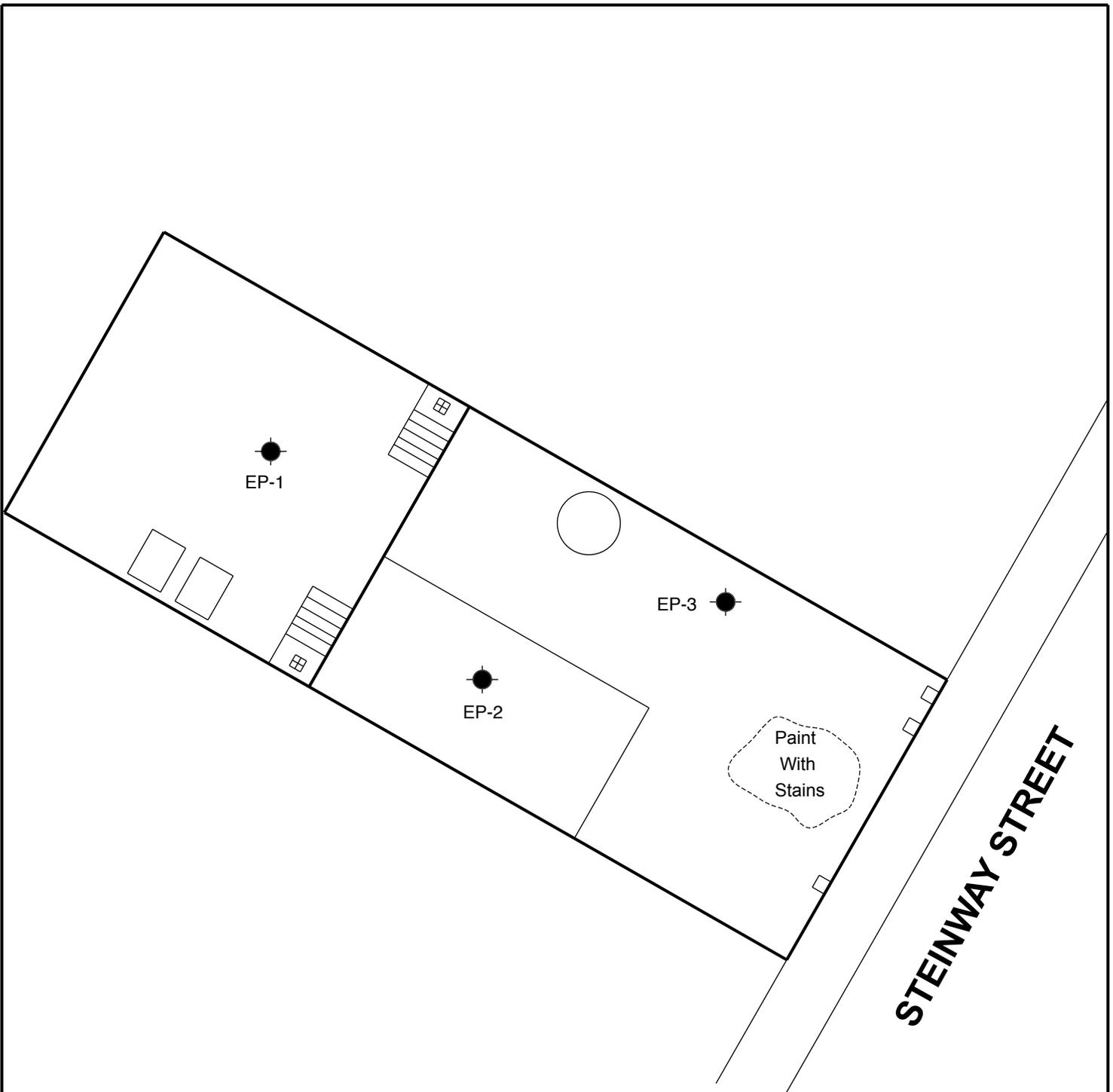


Legend

-  SB-3 Soil Boring
-  SV-1 Soil Vapor Point
-  Floor Drain / Storm Drain



Soil Exceedance Diagram	
	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 8530-ASNY	Figure No.: 4
Date: 07/20/2016	Scale: Not To Scale



Legend



EP-1

Proposed Endpoint Location



Proposed Endpoint Sampling Diagram	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 8530-ASNY	Figure No.: 5
Date: 07/20/2016	Scale: Not To Scale

TABLES

Table 1														
Volatile Organic Compounds in Soil (mg/kg-dry)														
EPA Method 8260														
24-20 Steinway Street														
Astoria, NY														
ACT Project No.: 8530-ASNY														
Sample ID	CAS Number	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Commercial	SB-1 (0-2')		SB-1 (10-12')		SB-2 (0-2')		SB-2 (2-4')		SB-3 (0-2')	
					1/12/16	1/12/16	1/12/16	1/12/16	1/12/16	1/12/16	1/12/16	1/12/16		
Compound					Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, NIDEP/TCL/Part 375 List		mg/kg	mg/kg	mg/kg	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Dilution Factor					1		1		1		1		1	
1,1,1,2-Tetrachloroethane	630-20-6	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,1,1-Trichloroethane	71-55-6	0.68	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,1,2,2-Tetrachloroethane	79-34-5	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,1,2-Trichloroethane	79-00-5	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,1-Dichloroethane	75-34-3	0.27	26	240	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,1-Dichloroethylene	75-35-4	0.33	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2,3-Trichlorobenzene	87-61-6	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2,3-Trichloropropane	96-18-4	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2,4-Trichlorobenzene	120-82-1	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2,4-Trimethylbenzene	95-63-6	3.6	52	190	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2-Dibromo-3-chloropropane	96-12-8	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2-Dibromoethane	106-93-4	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2-Dichlorobenzene	95-50-1	1.1	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2-Dichloroethane	107-06-2	0.02	3.1	30	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,2-Dichloropropane	78-87-5	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,3,5-Trimethylbenzene	108-67-8	8.4	52	190	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,3-Dichlorobenzene	541-73-1	2.4	49	280	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,4-Dichlorobenzene	106-46-7	1.8	13	130	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
1,4-Dioxane	123-91-1	0.1	13	130	0.052	U	0.057	U	0.045	U	0.046	U	0.050	U
2-Butanone	78-93-3	0.12	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
2-Hexanone	591-78-6	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
4-Methyl-2-pentanone	108-10-1	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Acetone	67-64-1	0.05	100	500	0.0070	J	0.0057	U	0.0050	J	0.0046	U	0.0050	U
Acrolein	107-02-8	~	~	~	0.0052	U	0.0057	U	0.0045	U	0.0046	U	0.0050	U
Acrylonitrile	107-13-1	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Benzene	71-43-2	0.06	4.8	44	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Bromochloromethane	74-97-5	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Bromodichloromethane	75-27-4	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Bromoform	75-25-2	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Bromomethane	74-83-9	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Carbon disulfide	75-15-0	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Carbon tetrachloride	56-23-5	0.76	2.4	22	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Chlorobenzene	108-90-7	1.1	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Chloroethane	75-00-3	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Chloroform	67-66-3	0.37	49	350	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Chloromethane	74-87-3	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
cis-1,2-Dichloroethylene	156-59-2	0.25	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
cis-1,3-Dichloropropylene	10061-01-5	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Cyclohexane	110-82-7	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Dibromochloromethane	124-48-1	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Dibromomethane	74-95-3	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Dichlorodifluoromethane	75-71-8	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Ethyl Benzene	100-41-4	1	41	390	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Hexachlorobutadiene	87-68-3	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Isopropylbenzene	98-82-8	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Methyl acetate	79-20-9	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Methyl tert-butyl ether (MTBE)	1634-04-4	0.93	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Methylcyclohexane	108-87-2	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Methylene chloride	75-09-2	0.05	100	500	0.0052	U	0.0057	U	0.0045	U	0.0046	U	0.0050	U
n-Butylbenzene	104-51-8	12	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
n-Propylbenzene	103-65-1	3.9	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
o-Xylene	95-47-6	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
p- & m- Xylenes	179601-23-1	~	~	~	0.0052	U	0.0057	U	0.0045	U	0.0046	U	0.0050	U
p-Isopropyltoluene	99-87-6	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
sec-Butylbenzene	135-98-8	11	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Styrene	100-42-5	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
tert-Butyl alcohol (TBA)	75-65-0	~	~	~	0.0052	U	0.0057	U	0.0045	U	0.0023	U	0.0025	U
tert-Butylbenzene	98-06-6	5.9	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Tetrachloroethylene	127-18-4	1.3	19	150	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Toluene	108-88-3	0.7	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
trans-1,2-Dichloroethylene	156-60-5	0.19	100	500	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
trans-1,3-Dichloropropylene	10061-02-6	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Trichloroethylene	79-01-6	0.47	21	200	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Trichlorofluoromethane	75-69-4	~	~	~	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Vinyl Chloride	75-01-4	0.02	0.9	13	0.0026	U	0.0029	U	0.0023	U	0.0023	U	0.0025	U
Xylenes, Total	1330-20-7	0.26	100	500	0.0078	U	0.0086	U	0.0068	U	0.0069	U	0.0075	U

Table 1 continued
Volatile Organic Compounds in Soil (mg/kg-dry)
EPA Method 8260
24-40 Steinway Street
Astoria, NY 11103
ACT Project No.: 8530-ASNY

Sample ID	CAS Number	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Commercial	SB-3 (2-4')		SB-4 (0-2')		SB-4 (2-4')		SB-5 (0-2')		SB-5 (2-4')	
					1/13/16	Q	1/13/16	Q	1/13/16	Q	1/12/16	Q	1/12/16	Q
Compound	CAS Number	mg/kg	mg/kg	mg/kg	mg/kg	Q								
Volatile Organics, NJDEP/TCL/Part 375 List														
Dilution Factor														
					1		1		1		1		1	
1,1,1,2-Tetrachloroethane	630-20-6	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,1,1-Trichloroethane	71-55-6	0.68	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,1,2,2-Tetrachloroethane	79-34-5	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,1,2-Trichloroethane	79-00-5	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,1-Dichloroethane	75-34-3	0.27	26	240	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,1-Dichloroethylene	75-35-4	0.33	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2,3-Trichlorobenzene	87-61-6	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2,3-Trichloropropane	96-18-4	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2,4-Trichlorobenzene	120-82-1	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2,4-Trimethylbenzene	95-63-6	3.6	52	190	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2-Dibromo-3-chloropropane	96-12-8	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2-Dibromoethane	106-93-4	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2-Dichlorobenzene	95-50-1	1.1	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2-Dichloroethane	107-06-2	0.02	3.1	30	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,2-Dichloropropane	78-87-5	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,3,5-Trimethylbenzene	108-67-8	8.4	52	190	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,3-Dichlorobenzene	541-73-1	2.4	49	280	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,4-Dichlorobenzene	106-46-7	1.8	13	130	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
1,4-Dioxane	123-91-1	0.1	13	130	0.044	U	0.041	U	0.043	U	0.045	U	0.041	U
2-Butanone	78-93-3	0.12	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
2-Hexanone	591-78-6	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
4-Methyl-2-pentanone	108-10-1	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Acetone	67-64-1	0.05	100	500	0.0062	J	0.0041	U	0.0043	U	0.0062	J	0.0041	U
Acrolein	107-02-8	~	~	~	0.0044	U	0.0041	U	0.0043	U	0.0045	U	0.0041	U
Acrylonitrile	107-13-1	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Benzene	71-43-2	0.06	4.8	44	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Bromochloromethane	74-97-5	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Bromodichloromethane	75-27-4	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Bromoforn	75-25-2	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Bromomethane	74-83-9	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Carbon disulfide	75-15-0	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Carbon tetrachloride	56-23-5	0.76	2.4	22	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Chlorobenzene	108-90-7	1.1	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Chloroethane	75-00-3	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Chloroform	67-66-3	0.37	49	350	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Chloromethane	74-87-3	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
cis-1,2-Dichloroethylene	156-59-2	0.25	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
cis-1,3-Dichloropropylene	10061-01-5	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Cyclohexane	110-82-7	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Dibromochloromethane	124-48-1	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Dibromomethane	74-95-3	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Dichlorodifluoromethane	75-71-8	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Ethyl Benzene	100-41-4	1	41	390	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Hexachlorobutadiene	87-68-3	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Isopropylbenzene	98-82-8	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Methyl acetate	79-20-9	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Methyl tert-butyl ether (MTBE)	1634-04-4	0.93	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Methylcyclohexane	108-87-2	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Methylene chloride	75-09-2	0.05	100	500	0.0044	U	0.0041	U	0.0043	U	0.0045	U	0.0041	U
n-Butylbenzene	104-51-8	12	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
n-Propylbenzene	103-65-1	3.9	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
p-Xylene	95-47-6	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
p- & m- Xylenes	179601-23-1	~	~	~	0.0044	U	0.0041	U	0.0043	U	0.0045	U	0.0041	U
p-Isopropyltoluene	99-87-6	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
sec-Butylbenzene	135-98-8	11	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Styrene	100-42-5	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
tert-Butyl alcohol (TBA)	75-65-0	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
tert-Butylbenzene	98-06-6	5.9	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Tetrachloroethylene	127-18-4	1.3	19	150	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Toluene	108-88-3	0.7	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
trans-1,2-Dichloroethylene	156-60-5	0.19	100	500	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
trans-1,3-Dichloropropylene	10061-02-6	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Trichloroethylene	79-01-6	0.47	21	200	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Trichlorofluoromethane	75-69-4	~	~	~	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Vinyl Chloride	75-01-4	0.02	0.9	13	0.0022	U	0.0021	U	0.0021	U	0.0022	U	0.0021	U
Xylenes, Total	1330-20-7	0.26	100	500	0.0066	U	0.0062	U	0.0064	U	0.0067	U	0.0062	U

Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NT=this indicates the analyte was not a target for this sample
*=this indicates that no regulatory limit has been established for this analyte

Table 2														
Semi-Volatile Organic Compounds in Soil (mg/kg-dry)														
EPA Method 8270														
24-20 Steinway Street														
Astoria, NY														
ACT Project No.: 8530-ASNY														
Sample ID		NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Commercial	SB-1 (0-2')		SB-1 (10-12')		SB-2 (0-2')		SB-2 (2-4')		SB-3 (0-2')	
Sampling Date					1/12/16		1/12/16		1/12/16		1/12/16		1/13/16	
Compound	CAS Number				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semi-Volatiles, NDEP/TCL/Part 375 List		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
Dilution Factor						1	1	1	1	1	1	1	1	1
1,1'-Biphenyl	92-52-4	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
1,2,4,5-Tetrachlorobenzene	95-94-3	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
1,2,4-Trichlorobenzene	120-82-1	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
1,2-Dichlorobenzene	95-50-1	1.1	100	500	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
1,2-Diphenylhydrazine (as Azobenzene)	122-66-7	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
1,3-Dichlorobenzene	541-73-1	2.4	49	280	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
1,4-Dichlorobenzene	106-46-7	1.8	13	130	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
2,3,4,6-Tetrachlorophenol	58-90-2	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
2,4,5-Trichlorophenol	95-95-4	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2,4,6-Trichlorophenol	88-06-2	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2,4-Dichlorophenol	120-83-2	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2,4-Dimethylphenol	105-67-9	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2,4-Dinitrophenol	51-28-5	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
2,4-Dinitrotoluene	121-14-2	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2,6-Dinitrotoluene	606-20-2	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2-Chloronaphthalene	91-58-7	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2-Chlorophenol	95-57-8	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2-Methylnaphthalene	91-57-6	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
2-Methylphenol	95-48-7	0.33	100	500	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
2-Nitroaniline	88-74-4	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
2-Nitrophenol	88-75-5	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
3- & 4-Methylphenols	65794-96-9	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
3,3'-Dichlorobenzidine	91-94-1	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
3-Nitroaniline	99-09-2	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
4,6-Dinitro-2-methylphenol	534-52-1	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
4-Bromophenyl phenyl ether	101-55-3	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
4-Chloro-3-methylphenol	59-50-7	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
4-Chloroaniline	106-47-8	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
4-Chlorophenyl phenyl ether	7005-72-3	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
4-Nitroaniline	100-01-6	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
4-Nitrophenol	100-02-7	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
Acenaphthene	83-32-9	20	100	500	0.027	U	0.023	U	0.072	U	0.022	U	0.023	U
Acenaphthylene	208-96-8	100	100	500	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
Acetophenone	98-86-2	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Aniline	62-53-3	~	~	~	~	0.11	U	0.090	U	0.091	U	0.089	U	0.090
Anthracene	120-12-7	100	100	500	0.027	U	0.023	U	0.111	U	0.022	U	0.023	U
Atrazine	1912-24-9	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Benzaldehyde	100-52-7	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Benzidine	92-87-5	~	~	~	~	0.11	U	0.090	U	0.091	U	0.089	U	0.090
Benzo(a)anthracene	56-55-3	1	1	5.6	0.067	U	0.023	U	0.245	U	0.022	U	0.023	U
Benzo(a)pyrene	50-32-8	1	1	1	0.061	U	0.023	U	0.17	U	0.022	U	0.023	U
Benzo(b)fluoranthene	205-99-2	1	1	5.6	0.057	U	0.023	U	0.186	U	0.022	U	0.023	U
Benzo(g,h,i)perylene	191-24-2	100	100	500	0.037	J	0.023	U	0.088	U	0.022	U	0.023	U
Benzo(k)fluoranthene	207-08-9	0.8	3.9	56	0.058	U	0.023	U	0.166	U	0.022	U	0.023	U
Benzoic acid	65-85-0	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Benzyl alcohol	100-51-6	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Benzyl butyl phthalate	85-68-7	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Bis(2-chloroethoxy)methane	111-91-1	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Bis(2-chloroethyl)ether	111-44-4	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Bis(2-chloroisopropyl)ether	108-60-1	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Bis(2-ethylhexyl)phthalate	117-81-7	~	~	~	~	0.058	U	0.023	U	0.023	U	0.022	U	0.023
Caprolactam	105-60-2	~	~	~	~	0.053	U	0.045	U	0.045	U	0.045	U	0.045
Carbazole	86-74-8	~	~	~	~	0.027	U	0.023	U	0.056	U	0.022	U	0.023
Chrysene	218-01-9	1	3.9	56	0.069	U	0.023	U	0.240	U	0.022	U	0.023	U
Dibenzo(a,h)anthracene	53-70-3	0.33	0.33	0.56	0.027	U	0.023	U	0.047	U	0.022	U	0.023	U
Dibenzofuran	132-64-9	7	59	350	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
Diethyl phthalate	84-66-2	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Dimethyl phthalate	131-11-3	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Di-n-butyl phthalate	84-74-2	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Di-n-octyl phthalate	117-84-0	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Fluoranthene	206-44-0	100	100	500	0.143	U	0.023	U	0.473	U	0.022	U	0.023	U
Fluorene	86-73-7	30	100	500	0.027	U	0.023	U	0.060	U	0.022	U	0.023	U
Hexachlorobenzene	118-74-1	0.33	1.2	6	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
Hexachlorobutadiene	87-68-3	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Hexachlorocyclopentadiene	77-47-4	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Hexachloroethane	67-72-1	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	0.5	5.6	0.036	J	0.023	U	0.086	U	0.022	U	0.023	U
Isophorone	78-59-1	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Naphthalene	91-20-3	12	100	500	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
Nitrobenzene	98-95-3	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
N-Nitrosodimethylamine	62-75-9	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
N-nitroso-di-n-propylamine	621-64-7	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
N-Nitrosodiphenylamine	86-30-6	~	~	~	~	0.027	U	0.023	U	0.023	U	0.022	U	0.023
Pentachlorophenol	87-86-5	0.8	6.7	6.7	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
Phenanthrene	85-01-8	100	100	500	0.087	U	0.023	U	0.534	U	0.022	U	0.023	U
Phenol	108-95-2	0.33	100	500	0.027	U	0.023	U	0.023	U	0.022	U	0.023	U
Pyrene	129-00-0	100	100	500	0.114	U	0.023	U	0.381	U	0.022	U	0.023	U

Table 2 continued														
Semi-Volatile Organic Compounds in Soil (mg/kg-dry)														
EPA Method 8270														
24-20 Steinway Street														
Astoria, NY														
ACT Project No.: 8530-ASNY														
Sample ID	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Commercial	SB-3 (2-4')		SB-4 (0-2')		SB-4 (2-4')		SB-5 (0-2')		SB-5 (2-4')		
				1/13/16	1/13/16	1/13/16	1/13/16	1/12/16	1/12/16	1/12/16	1/12/16			
Sampling Date	CAS Number	mg/Kg	mg/Kg	mg/Kg	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Compound	CAS Number	mg/Kg	mg/Kg	mg/Kg	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Semi-Volatiles, NIDEP/TCL/Part 375 List														
Dilution Factor														
1,1'-Biphenyl	92-52-4	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
1,2,4,5-Tetrachlorobenzene	95-94-3	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
1,2,4-Trichlorobenzene	120-82-1	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
1,2-Dichlorobenzene	95-50-1	1.1	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
1,2-Diphenylhydrazine (as Azobenzene)	122-66-7	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
1,3-Dichlorobenzene	541-73-1	2.4	49	280	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
1,4-Dichlorobenzene	106-46-7	1.8	13	130	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2,3,4,6-Tetrachlorophenol	58-90-2	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
2,4,5-Trichlorophenol	95-95-4	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2,4,6-Trichlorophenol	88-06-2	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2,4-Dichlorophenol	120-83-2	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2,4-Dimethylphenol	105-67-9	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2,4-Dinitrophenol	51-28-5	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
2,4-Dinitrotoluene	121-14-2	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2,6-Dinitrotoluene	606-20-2	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2-Chloronaphthalene	91-58-7	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2-Chlorophenol	95-57-8	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2-Methylnaphthalene	91-57-6	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2-Methylphenol	95-48-7	0.33	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
2-Nitroaniline	88-74-4	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
2-Nitrophenol	88-75-5	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
3- & 4-Methylphenols	65794-96-9	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
3,3'-Dichlorobenzidine	91-94-1	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
3-Nitroaniline	99-09-2	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
4,6-Dinitro-2-methylphenol	534-52-1	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
4-Bromophenyl phenyl ether	101-55-3	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
4-Chloro-3-methylphenol	59-50-7	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
4-Chloroaniline	106-47-8	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
4-Chlorophenyl phenyl ether	7005-72-3	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
4-Nitroaniline	100-01-6	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
4-Nitrophenol	100-02-7	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
Acenaphthene	83-32-9	20	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Acenaphthylene	208-96-8	100	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Acetophenone	98-86-2	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Aniline	62-53-3	~	~	~	0.090	U	0.089	U	0.087	U	0.088	U	0.088	U
Anthracene	120-12-7	100	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Atrazine	1912-24-9	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Benzaldehyde	100-52-7	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Benzidine	92-87-5	~	~	~	0.090	U	0.089	U	0.087	U	0.088	U	0.088	U
Benzo(a)anthracene	56-55-3	1	1	5.6	0.023	U	0.066	U	0.022	U	0.022	U	0.022	U
Benzo(a)pyrene	50-32-8	1	1	1	0.023	U	0.056	U	0.022	U	0.022	U	0.022	U
Benzo(b)fluoranthene	205-99-2	1	1	5.6	0.023	U	0.047	U	0.022	U	0.022	U	0.022	U
Benzo(g,h,i)perylene	191-24-2	100	100	500	0.023	U	0.027	U	0.022	U	0.022	U	0.022	U
Benzo(k)fluoranthene	207-08-9	0.8	3.9	56	0.023	U	0.056	U	0.022	U	0.022	U	0.022	U
Benzoic acid	65-85-0	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Benzyl alcohol	100-51-6	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Benzyl butyl phthalate	85-68-7	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Bis(2-chloroethoxy)methane	111-91-1	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Bis(2-chloroethyl)ether	111-44-4	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Bis(2-chloroisopropyl)ether	108-60-1	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Bis(2-ethylhexyl)phthalate	117-81-7	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Caprolactam	105-60-2	~	~	~	0.045	U	0.044	U	0.043	U	0.044	U	0.044	U
Carbazole	86-74-8	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Chrysene	218-01-9	1	3.9	56	0.023	U	0.064	U	0.022	U	0.022	U	0.022	U
Dibenz(a,h)anthracene	53-70-3	0.33	0.33	0.56	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Dibenzofuran	132-64-9	7	59	350	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Diethyl phthalate	84-66-2	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Dimethyl phthalate	131-11-3	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Di-n-butyl phthalate	84-74-2	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Di-n-octyl phthalate	117-84-0	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Fluoranthene	206-44-0	100	100	500	0.023	U	0.102	U	0.022	U	0.022	U	0.022	U
Fluorene	86-73-7	30	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Hexachlorobenzene	118-74-1	0.33	1.2	6	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Hexachlorobutadiene	87-68-3	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Hexachlorocyclopentadiene	77-47-4	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Hexachloroethane	67-72-1	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	0.5	5.6	0.023	U	0.027	U	0.022	U	0.022	U	0.022	U
Isophorone	78-59-1	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Naphthalene	91-20-3	12	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Nitrobenzene	98-95-3	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
N-Nitrosodimethylamine	62-75-9	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
N-nitroso-di-n-propylamine	621-64-7	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
N-Nitrosodiphenylamine	86-30-6	~	~	~	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Pentachlorophenol	87-86-5	0.8	6.7	6.7	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Phenanthrene	85-01-8	100	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Phenol	108-95-2	0.33	100	500	0.023	U	0.022	U	0.022	U	0.022	U	0.022	U
Pyrene	129-00-0	100	100	500	0.023	U	0.085	U	0.022	U	0.022	U	0.022	U

Bold values signify detections

U=analyte not detected at or above the level indicated

B=analyte found in the analysis batch blank

E=result is estimated and cannot be accurately reported due to levels encountered or interferences

NT=this indicates the analyte was not a target for this sample

~this indicates that no regulatory limit has been established for this analyte

Table 3														
Pesticides and PCBs in Soil (mg/kg-dry)														
EPA Method 8081/8082														
24-20 Steinway Street														
Astoria, NY														
ACT Project No.: 8530-ASNY														
Sample ID		NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Commercial	SB-1 (0-2)		SB-1 (10-12)		SB-2 (0-2)		SB-2 (2-4)		SB-3 (0-2)	
Sampling Date					1/12/16		1/12/16		1/12/16		1/12/16		1/12/16	
Compound	CAS Number				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, NIDEP/TCL/Part 375 Dilution Factor		mg/Kg	mg/Kg	mg/Kg	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
4,4'-DDD	72-54-8	0.0033	13	92	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
4,4'-DDE	72-55-9	0.0033	8.9	62	0.0073	D	0.0018	U	0.0018	U	0.0018	U	0.0018	U
4,4'-DDT	50-29-3	0.0033	7.9	47	0.012	D	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Aldrin	309-00-2	0.005	0.097	0.68	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
alpha-BHC	319-84-6	0.02	0.48	3.4	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
alpha-Chlordan	5103-71-9	0.094	4.2	24	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
beta-BHC	319-85-7	0.036	0.36	3	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Chlordane, tota	57-74-9	~	~	~	0.084	U	0.071	U	0.072	U	0.071	U	0.071	U
delta-BHC	319-86-8	0.04	100	500	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Dieldrin	60-57-1	0.005	0.2	1.4	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Endosulfan I	959-98-8	2.4	24	200	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Endosulfan II	33213-65-9	2.4	24	200	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Endosulfan suff	1031-07-8	2.4	24	200	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Endrin	72-20-8	0.014	11	89	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Endrin aldehyd	7421-93-4	~	~	~	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Endrin ketone	53494-70-5	~	~	~	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
gamma-BHC (U	58-89-9	0.1	1.3	9.2	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
gamma-Chlord	5566-34-7	~	~	~	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Heptachlor	76-44-8	0.042	2.1	15	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Heptachlor epc	1024-57-3	~	~	~	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Methoxychlor	72-43-5	~	~	~	0.0021	U	0.0018	U	0.0018	U	0.0018	U	0.0018	U
Toxaphene	8001-35-2	~	~	~	0.21	U	0.18	U	0.18	U	0.18	U	0.18	U
Polychlorinated Biphenyls (PCB) Dilution Factor		mg/Kg	mg/Kg	mg/Kg	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Aroclor 1016	12674-11-2	~	~	~	0.021	U	0.018	U	0.018	U	0.018	U	0.018	U
Aroclor 1221	11104-28-2	~	~	~	0.021	U	0.018	U	0.018	U	0.018	U	0.018	U
Aroclor 1232	11141-16-5	~	~	~	0.021	U	0.018	U	0.018	U	0.018	U	0.018	U
Aroclor 1242	53469-21-9	~	~	~	0.021	U	0.018	U	0.018	U	0.018	U	0.018	U
Aroclor 1248	12672-29-6	~	~	~	0.021	U	0.018	U	0.018	U	0.018	U	0.018	U
Aroclor 1254	11097-69-1	~	~	~	0.021	U	0.018	U	0.018	U	0.018	U	0.018	U
Aroclor 1260	11096-82-5	~	~	~	0.021	U	0.018	U	0.018	U	0.018	U	0.018	U
Total PCBs	1336-36-3	0.1	1	1	0.021	U	0.018	U	0.018	U	0.018	U	0.018	U

Table 3 continued														
Pesticides and PCBs in Soil (mg/kg-dry)														
EPA Method 8081/8082														
24-20 Steinway Street														
Astoria, NY														
ACT Project No.: 8530-ASNY														
Sample ID		NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Commercial	SB-3 (2-4)		SB-4 (0-2)		SB-4 (2-4)		SB-5 (0-2)		SB-5 (2-4)	
Sampling Date					1/13/16		1/13/16		1/13/16		1/12/16		1/12/16	
Compound	CAS Number				Result	Q								
Pesticides, NIDEP/TCL/Part 375 Dilution Factor		mg/Kg	mg/Kg	mg/Kg	mg/kg									
4,4'-DDD	72-54-8	0.0033	13	92	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
4,4'-DDE	72-55-9	0.0033	8.9	62	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
4,4'-DDT	50-29-3	0.0033	7.9	47	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Aldrin	309-00-2	0.005	0.097	0.68	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
alpha-BHC	319-84-6	0.02	0.48	3.4	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
alpha-Chlordan	5103-71-9	0.094	4.2	24	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
beta-BHC	319-85-7	0.036	0.36	3	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Chlordane, tota	57-74-9	~	~	~	0.071	U	0.070	U	0.069	U	0.070	U	0.070	U
delta-BHC	319-86-8	0.04	100	500	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Dieldrin	60-57-1	0.005	0.2	1.4	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Endosulfan I	959-98-8	2.4	24	200	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Endosulfan II	33213-65-9	2.4	24	200	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Endosulfan suff	1031-07-8	2.4	24	200	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Endrin	72-20-8	0.014	11	89	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Endrin aldehyd	7421-93-4	~	~	~	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Endrin ketone	53494-70-5	~	~	~	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
gamma-BHC (U	58-89-9	0.1	1.3	9.2	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
gamma-Chlord	5566-34-7	~	~	~	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Heptachlor	76-44-8	0.042	2.1	15	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Heptachlor epc	1024-57-3	~	~	~	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Methoxychlor	72-43-5	~	~	~	0.0018	U	0.0018	U	0.0017	U	0.0017	U	0.0018	U
Toxaphene	8001-35-2	~	~	~	0.18	U	0.18	U	0.17	U	0.17	U	0.18	U
Polychlorinated Biphenyls (PCB) Dilution Factor		mg/Kg	mg/Kg	mg/Kg	mg/kg									
Aroclor 1016	12674-11-2	~	~	~	0.018	U	0.018	U	0.017	U	0.018	U	0.018	U
Aroclor 1221	11104-28-2	~	~	~	0.018	U	0.018	U	0.017	U	0.018	U	0.018	U
Aroclor 1232	11141-16-5	~	~	~	0.018	U	0.018	U	0.017	U	0.018	U	0.018	U
Aroclor 1242	53469-21-9	~	~	~	0.018	U	0.018	U	0.017	U	0.018	U	0.018	U
Aroclor 1248	12672-29-6	~	~	~	0.018	U	0.018	U	0.017	U	0.018	U	0.018	U
Aroclor 1254	11097-69-1	~	~	~	0.018	U	0.018	U	0.017	U	0.018	U	0.018	U
Aroclor 1260	11096-82-5	~	~	~	0.018	U	0.018	U	0.017	U	0.018	U	0.018	U
Total PCBs	1336-36-3	0.1	1	1	0.018	U	0.018	U	0.017	U	0.018	U	0.018	U

NOTES:
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
N=this indicates the analyte was not a target for this sample
~=this indicates that no regulatory limit has been established for this analyte

Table 4														
Metals in Soil (mg/kg-dry)														
EPA Method 6010														
24-40 Steinway Street														
Astoria, NY 11103														
ACT Project No.: 8530-ASNY														
Sample ID		NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Commercial	SB-1 (0-2')		SB-1 (10-12')		SB-2 (0-2')		SB-2 (2-4')		SB-3 (0-2')	
Sampling Date					1/12/16		1/12/16		1/12/16		1/12/16		1/13/16	
Compound	CAS Number				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals, Target Analyte		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
Dilution Factor					1	1	1	1	1	1	1	1	1	1
Aluminum	7429-90-5	~	~	~	15,300	8,890	9,220	9,320	9,150	9,150	9,150	9,150	9,150	9,150
Antimony	7440-36-0	~	~	~	0.64	U 0.54	U 0.55	U 0.54	U 0.54	U 0.54	U 0.54	U 0.54	U 0.54	U 0.54
Arsenic	7440-38-2	13	16	16	5.60	1.43	1.74	1.07	1.48	1.07	1.07	1.07	1.48	1.48
Barium	7440-39-3	350	400	400	89.70	58.60	76.80	60.70	51.10	60.70	60.70	60.70	51.10	51.10
Beryllium	7440-41-7	7.2	72	590	0.79	0.11	0.16	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Cadmium	7440-43-9	2.5	4.3	9.3	0.38	U 0.32	U 0.33	U 0.32	U 0.33	0.32	0.32	0.32	0.33	0.33
Calcium	7440-70-2	~	~	~	2,720	1,150	1,150	826	1,490	1,150	1,150	1,150	1,490	1,490
Chromium	7440-47-3	~	~	~	15.30	18.90	16	16.50	21.10	16	16	16	21.10	21.10
Cobalt	7440-48-4	~	~	~	6.45	6.53	5.84	6.28	7	6.53	6.53	6.53	7	7
Copper	7440-50-8	50	270	270	25.60	21.30	22.20	15.20	19.90	22.20	22.20	22.20	19.90	19.90
Iron	7439-89-6	~	~	~	16,900	15,700	13,200	13,900	16,000	15,700	15,700	15,700	16,000	16,000
Lead	7439-92-1	63	400	1000	140	3.36	32.10	2.98	1,050	3.36	3.36	3.36	1,050	1,050
Magnesium	7439-95-4	~	~	~	2,310	2,480	2,480	2,130	2,740	2,480	2,480	2,480	2,740	2,740
Manganese	7439-96-5	1600	2000	10000	698	362	288	443	329	362	362	362	329	329
Nickel	7440-02-0	30	310	310	13.90	14	13.50	11.90	13.10	14	14	14	13.10	13.10
Potassium	7440-09-7	~	~	~	473	1,140	859	931	1,150	1,140	1,140	1,140	1,150	1,150
Selenium	7782-49-2	3.9	180	1500	1.36	1.21	1.53	1.32	1.98	1.21	1.21	1.21	1.98	1.98
Silver	7440-22-4	2	180	1500	0.64	U 0.54	U 0.55	U 0.54	U 0.54	0.54	0.54	0.54	0.54	0.54
Sodium	7440-23-5	~	~	~	54.70	77.90	91.60	87.20	92	77.90	77.90	77.90	92	92
Thallium	7440-28-0	~	~	~	1.27	U 1.08	U 1.09	U 1.07	U 1.08	1.08	1.08	1.08	1.08	1.08
Vanadium	7440-62-2	~	~	~	23.80	25	21.50	27.60	28	25	25	25	28	28
Zinc	7440-66-6	109	10000	10000	70.90	24	42.90	19	24.20	70.90	70.90	70.90	24.20	24.20
Mercury by 7473		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
Dilution Factor					1	1	1	1	1	1	1	1	1	1
Mercury	7439-97-6	0.18	0.81	2.8	0.45	0.032	U 0.033	U 0.032	U 0.032	0.032	0.032	0.032	0.032	0.032

Table 4 continued														
Metals in Soil (mg/kg-dry)														
EPA Method 6010														
24-40 Steinway Street														
Astoria, NY 11103														
ACT Project No.: 8530-ASNY														
Sample ID		NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Commercial	SB-3 (2-4')		SB-4 (0-2')		SB-4 (2-4')		SB-5 (0-2')		SB-5 (2-4')	
Sampling Date					1/13/16		1/13/16		1/13/16		1/12/16		1/12/16	
Compound	CAS Number				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals, Target Analyte		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
Dilution Factor					1	1	1	1	1	1	1	1	1	1
Aluminum	7429-90-5	~	~	~	8,960	8,670	5,650	9,200	6,430	8,670	8,670	8,670	6,430	6,430
Antimony	7440-36-0	~	~	~	0.54	U 0.53	U 0.52	U 0.53	U 0.53	0.53	0.53	0.53	0.53	0.53
Arsenic	7440-38-2	13	16	16	1.08	1.87	1.10	1.08	1.06	1.87	1.87	1.87	1.06	1.06
Barium	7440-39-3	350	400	400	52.50	47.70	30.10	43.40	33.30	47.70	47.70	47.70	33.30	33.30
Beryllium	7440-41-7	7.2	72	590	0.11	U 0.12	U 0.10	U 0.11	U 0.11	0.11	0.11	0.11	0.11	0.11
Cadmium	7440-43-9	2.5	4.3	9.3	0.32	U 0.32	U 0.31	U 0.32	U 0.32	0.32	0.32	0.32	0.32	0.32
Calcium	7440-70-2	~	~	~	1,250	1,990	1,230	2,640	2,340	1,990	1,990	1,990	2,340	2,340
Chromium	7440-47-3	~	~	~	21.90	20.50	16.40	19.30	13.90	20.50	20.50	20.50	13.90	13.90
Cobalt	7440-48-4	~	~	~	7.36	6.79	5	6.96	6.38	6.79	6.79	6.79	6.38	6.38
Copper	7440-50-8	50	270	270	19.70	19.80	14.60	19.50	17	19.80	19.80	19.80	17	17
Iron	7439-89-6	~	~	~	16,200	15,200	13,000	15,700	14,600	15,200	15,200	15,200	14,600	14,600
Lead	7439-92-1	63	400	1000	3.54	34.20	2.87	4.47	2.88	3.54	3.54	3.54	2.88	2.88
Magnesium	7439-95-4	~	~	~	2,480	2,310	1,990	3,570	2,480	2,310	2,310	2,310	2,480	2,480
Manganese	7439-96-5	1600	2000	10000	289	250	215	275	292	289	289	289	275	275
Nickel	7440-02-0	30	310	310	13.70	14.60	9.65	14.90	9.83	14.60	14.60	14.60	9.83	9.83
Potassium	7440-09-7	~	~	~	1,400	947	997	1,640	921	947	947	947	921	921
Selenium	7782-49-2	3.9	180	1500	2.08	1.65	1.69	1.81	1.12	1.65	1.65	1.65	1.12	1.12
Silver	7440-22-4	2	180	1500	0.54	U 0.53	U 0.52	U 0.53	U 0.53	0.53	0.53	0.53	0.53	0.53
Sodium	7440-23-5	~	~	~	103	143	150	266	164	143	143	143	164	164
Thallium	7440-28-0	~	~	~	1.08	U 1.07	U 1.04	U 1.06	U 1.06	1.07	1.07	1.07	1.06	1.06
Vanadium	7440-62-2	~	~	~	31.40	18.40	23.30	30	23.50	18.40	18.40	18.40	30	30
Zinc	7440-66-6	109	10000	10000	23.50	38.10	17.70	24	22.80	23.50	23.50	23.50	22.80	22.80
Mercury by 7473		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
Dilution Factor					1	1	1	1	1	1	1	1	1	1
Mercury	7439-97-6	0.18	0.81	2.8	0.032	U 0.032	U 0.031	U 0.032	U 0.032	0.032	0.032	0.032	0.032	0.032

Bold values signify detections
Highlighted values signify detection above guidance value
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
I=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NT=this indicates the analyte was not a target for this sample
~=this indicates that no regulatory limit has been established for this analyte

Table 5
Volatile Organic Compounds in Soil Vapor (ug/m3)
EPA Method TO-15
24-20 Steinway Street
Astoria, NY
ACT Project No.: 8530-ASNY

Sample ID Sample Date	NYSDOH Soil Vapor Guideline	SV-1	SV-2	SV-3
		1/13/16	1/13/16	1/13/16
1,1,1,2-Tetrachloroethane	NA	<0.69	<0.69	<5.8
1,1,1-Trichloroethane	100 ²	<0.55	<0.55	<4.6
1,1,2,2-Tetrachloroethane	NA	<0.69	<0.69	<5.8
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	<0.77	<0.77	<6.4
1,1,2-Trichloroethane	NA	<0.55	<0.55	<4.6
1,1-Dichloroethane	NA	<0.4	<0.4	<3.4
1,1-Dichloroethylene	100 ²	<0.4	<0.4	<3.3
1,2,4-Trichlorobenzene	NA	<0.74	<0.74	<6.2
1,2,4-Trimethylbenzene	NA	1.9	5.1	<4.1
1,2-Dibromoethane	NA	<0.77	<0.77	<6.5
1,2-Dichlorobenzene	NA	<0.6	<0.6	<5.1
1,2-Dichloroethane	NA	<0.4	<0.4	<3.4
1,2-Dichloropropane	NA	<0.46	<0.46	<3.9
1,2-Dichlorotetrafluoroethane	NA	<0.7	<0.7	<5.9
1,3,5-Trimethylbenzene	NA	0.49	1.5	<4.1
1,3-Butadiene	NA	<1.3	<1.3	<11
1,3-Dichlorobenzene	NA	<0.6	<0.6	<5.1
1,3-Dichloropropene	NA	<0.46	<0.46	<3.9
1,4-Dichlorobenzene	NA	<0.6	<0.6	<5.1
1,4-Dioxane	NA	<0.72	<0.72	<6.1
2-Butanone	NA	2.0	3.5	<2.5
2-Hexanone	NA	<0.82	<0.82	<6.9
3-Chloropropene	NA	<1.6	<1.6	<13
4-Methyl-2-pentanone	NA	<0.41	<0.41	<3.4
Acetone	NA	4.0	11	12
Acrylonitrile	NA	<0.22	<0.22	<1.8
Benzene	NA	0.86	3.1	2.7
Benzyl Chloride	NA	<0.52	<0.52	<4.3
Bromodichloromethane	NA	<0.62	<0.62	<5.2
Bromoform	NA	<1	<1	<8.7
Bromomethane	NA	<0.39	<0.39	<3.3
Carbon disulfide	NA	<0.31	<0.31	<2.6
Carbon tetrachloride	5 ¹	<0.16	<0.16	<1.3
Chlorobenzene	NA	<0.46	<0.46	<3.9
Chloroethane	NA	<0.26	<0.26	<2.2
Chloroform	NA	<0.49	<0.49	<4.1
Chloromethane	NA	<0.21	<0.21	<1.7
cis-1,2-Dichloroethylene	100 ²	<0.4	<0.4	<3.3
cis-1,3-Dichloropropylene	NA	<0.45	<0.45	<3.8
Cyclohexane	NA	0.41	2.3	<2.9
Dibromochloromethane	NA	<0.8	<0.8	<6.7
Dichlorodifluoromethane	NA	1.1	1.3	4.2
Ethyl acetate	NA	<0.72	<0.72	<6.1
Ethylbenzene	NA	1.1	3.3	<3.6
Hexachlorobutadiene	NA	<1.1	<1.1	<9
Isopropanol	NA	<0.49	<0.49	<4.1
Methyl Methacrylate	NA	<0.41	<0.41	<3.4
Methyl tert-butyl ether	NA	<0.36	<0.36	<3
Methylene chloride	NA	4.0	9.6	<5.8
n-Heptane	NA	1.1	5.9	4.8
n-Hexane	NA	3.0	14	5.9
Xylenes (o)	NA	1.6	4.9	<3.6
Xylenes (m&p)	NA	5.5	15	<7.3
p-Ethyltoluene	NA	1.6	4.7	<4.1
Propylene	NA	<0.17	1.0	<1.4
Styrene	NA	<0.43	<0.43	<3.6
Tetrachloroethylene	30 ²	0.88	0.47	<1.4
Tetrahydrofuran	NA	1.1	<0.59	<5
Toluene	NA	5.8	18	<10
trans-1,2-Dichloroethylene	NA	<0.4	<0.4	<3.3
trans-1,3-Dichloropropylene	NA	<0.45	<0.45	<3.8
Trichloroethylene	2 ¹	<0.13	<0.13	<1.1
Trichlorofluoromethane	NA	0.56	0.90	<4.7
Vinyl acetate	NA	<0.35	<0.35	<3
Vinyl bromide	NA	<0.44	<0.44	<3.7
Vinyl chloride	5 ¹	<0.26	<0.26	<2.1

¹ Matrix 1, NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006)

² Matrix 2, NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006)

Bolded values signify detection above method detection limit

NA = Guidance Value Not Available

APPENDIX 1

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and Prince Club 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, Prince Club 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, 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:

Queens Library at Broadway
4020 Broadway
Long Island City, NY 11103
(718) 721-2462

Monday: 9:00 AM – 8:00 PM

Friday: 10:00 AM – 6:00 PM

Tuesday: 1:00 – 6:00 PM

Saturday: 10:00 AM – 5:00 PM

Wednesday: 10:00 AM – 6:00 PM

Sunday: Closed

Thursday: 12:00 – 8:00 PM

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: Prince Club LLC 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.

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 2

SUSTAINABILITY STATEMENT

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

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. 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.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency:

Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings. Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

Conversion to Clean Fuels: Use of clean fuel improves NYC's air quality by reducing harmful emissions. Natural gas will be utilized for fuel in the new building.

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

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

within the property or by influx of contamination from off-Site. An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

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: Prince Club 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: Prince Club 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 3

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. 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 4

CONSTRUCTION HEALTH AND SAFETY PLAN



**CONSTRUCTION
HEALTH AND SAFETY PLAN**

**24-40 Steinway Street
Astoria, NY 11103
Block 654, Lots 59**

ACT Project No. 8530-ASNY

July 6th, 2016

Prepared for:

**Wen Ye
Prince Club LLC
3631 Prince Street
Flushing, NY 11354**

Prepared by:

**Advanced Cleanup Technologies, Inc.
110 Main Street, Suite 103
Port Washington, NY 11050**



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1.0 INTRODUCTION

The construction of a 7 story mixed-use residential and commercial building is being proposed at the property located at 24-40 Steinway Street, Astoria, New York (“the Site”). This Construction Health and Safety Plan (CHASP) has been prepared to identify site-specific health and safety procedures to be followed by on-site contractors during remedial activities at the site. All activities performed under this CHASP are targeted to comply with Occupational Safety and Health Administration (OSHA) Regulations 29 CFR Part 1910, *et seq.*

1.1 Purpose

The purpose of this CHASP is to provide the contractors’ field personnel, and other visitors with an understanding of the potential chemical and physical hazards that exist or may arise while portions of this project are being performed. The primary objective is to ensure the well being of all field personnel and the community surrounding this site. A copy of this CHASP will be available to anyone that requests it. Visiting 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.

All on-site personnel shall familiarize themselves with the contents of this CHASP and the remedial activities planned for the site. Personnel choosing not to comply with this CHASP will be removed from the worksite.

1.2 Site Description

The Site is located at 24-40 Steinway Street, Astoria, NY in the northern section of Queens County, New York and is identified as Block 654 and Lots 59 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 4,750-square feet and is located along the western side of Steinway Street between Astoria Boulevard to the north and 28th Avenue to the south. To the north of the property is a one-story Mosque. South of the property is a one-story commercial building occupied by a restaurant. To the east of the property is Steinway Street followed by a



five-story mixed-use building with apartments above a convenience store and a four-story residential apartment building and to the west is a four-story residential apartment building. A map of the site boundary is shown in Figure 2. Currently, the Site is a vacant commercial building.

1.3 Environmental Concerns

Advanced Cleanup Technologies completed a Phase I Environmental Site Assessment on October 20, 2015. The Phase I identifies the property as of 1898 consisting of undeveloped land. By 1936, three one-story commercial buildings were constructed. By 1967, the buildings had been replaced with a one-story commercial building, which remained through 2006.

A Remedial Investigation Report was prepared by Advanced Cleanup Technologies and was dated April 2016. Soil/fill samples collected during the RI showed trace concentrations of volatile organic compounds and semi-volatile organic compounds beneath the site, and all concentrations were below the Unrestricted Use Soil Cleanup Objectives (UUSCO's). The metals including lead (maximum of 1,060 mg/Kg), and mercury (maximum of 0.45 mg/Kg) were detected above Unrestricted Residential Use SCOs within the two shallow soil samples. Several other metals were detected at trace concentrations. Two pesticides including 4,4-DDT (max. of 12 µg/Kg) and 4,4-DDE (max. of 7.3 µg/Kg) were detected slightly exceeding Unrestricted Use SCOs. Soil vapor sample results indicated petroleum related VOCs and chlorinated VOCs at trace concentrations. Highest concentrations were detected for toluene at 18 µg/m³. Petroleum-related VOCs (BTEX) were detected at a maximum concentration of 44 µg/m³.

2.0 SITE PERSONNEL

All on-site personnel shall have training in accordance with the regulations codified at 29 CFR 1910.20. The Site Supervisor will maintain proof that the qualifications of the on-site personnel comply with these regulations, prior to them being allowed to be included in the on-Site workforce.

All on-site personnel shall familiarize themselves with the contents of the CHASP, the scope of the Remedial Action Work Plan (RAWP) for the Site and attend a daily site specific health and



safety briefing prior to the commencement of work activities. Personnel choosing not to comply with this CHASP will be removed from the worksite.

ACT's Site Supervisor will have oversight responsibility over the project to ensure that this CHASP is properly implemented and that ACT and its subcontractors adhere to all OSHA regulations and other established industry health and safety practices.

Each contractor will designate an on-site individual responsible for health and safety issues relating to excavation and construction activities. Each contractor will communicate to the Site Supervisor the name of this individual and what specific actions are to be taken by each contractor during that work day that will be required to comply with the CHASP.

The Site Supervisor will coordinate the activities of all other contractors on-site so as not to jeopardize the health and safety of any personnel on-site. In addition, the Site Supervisor will continually monitor and inspect personnel and equipment for compliance with established safe work practices.

A list of the pertinent personnel authorized to supervise site health and safety operations is presented below:

Title	Name	Telephone Number
Site Supervisor ACT	Tim Young	516-640-2947 (Mobile)
Project Manager ACT	Mark Gelband	516-441-5800, Ext. 104 718-577-7639 (Mobile)
Health and Safety Officer ACT	Yisong Yang	516-441-5800, Ext. 108 718-508-2970 (Mobile)

3.0 PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) is divided into the following four categories based on the degree of protection afforded:

- Level A: This PPE level will be selected when the greatest level of skin, respiratory, and eye protection is required. It includes positive pressure, full face-piece self-contained breathing apparatus (SCBA), or NIOSH-approved positive pressure supplied air respirator with escape SCBA and a totally-encapsulating chemical-protective suit.
- Level B: This PPE level will be selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is needed. It includes positive pressure, full face-piece SCBA, or NIOSH-approved positive pressure supplied air respirator with escape SCBA and hooded chemical-resistant clothing such as overalls and long-sleeved jacket, coveralls, one or two-piece chemical-splash suit or disposable chemical-resistant overalls.
- Level C: This PPE level will be selected when the concentration(s) and type(s) of airborne substance(s) present in the work area is known and the criteria for using air purifying respirators are met. It includes full-face or half-mask, NIOSH-approved air purifying respirators and hooded chemical-resistant clothing such as overalls and long-sleeved jacket, coveralls, one or two-piece chemical-splash suit or disposable chemical-resistant overalls.
- Level D: This PPE level will be selected for nuisance contamination only. It includes coveralls, gloves, chemical-resistant steel toe and shank boots, safety glasses or chemical splash goggles, hard hat, escape mask and face shield.

PPE shall be selected in accordance with the site air monitoring program (Section 5.3), OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH-approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and



foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection.

Before site personnel are required to use any respirator with a negative or positive pressure tight-fitting face-piece, the personnel will be fit tested with the same make, model, style, and size of respirator that will be used. The fit test shall be administered using only an OSHA-accepted fit test protocol. The OSHA-accepted fit test protocols and procedures provided for in 29 CFR 1910.120 are contained in Appendix B of this CHASP.

All Site workers will be required to participate in a comprehensive PPE program. The PPE program will consist of daily “Tailgate” Health and Safety meetings, proper inspection, donning, use, maintenance, storage and decontamination of protective clothing and equipment, use of protective equipment in temperature extremes and monitoring of co-workers and the work environment.

The Site Supervisor will determine the level of protection required for all field activities and whether the level of protection should be upgraded. It is anticipated that all on-site activities will be conducted in Level D PPE, unless otherwise upgraded by the Site Supervisor. Changes in the level of protection will be recorded in the dedicated site logbook along with the rationale for the changes.

4.0 HAZARD EVALUATION

4.1 Chemical Exposure

A list of chemicals including VOCs, metals and pesticides that are present in subsurface soil at the Site is provided in Table 1. These types of contaminants at the detected concentrations represent a low to moderate potential for exposure. The standards listed in the table represent Immediate Danger to Life and Health (IDLH), Time-Weighted Average (TWA) and Short-Term Exposure Limit (STEL).

The primary routes of exposure for these chemicals are inhalation, ingestion and absorption through the skin and mucous membranes. The health risks associated with the exposure to these substances during construction activities will be minimized through a combination of education, personal protection equipment (PPE) and dust control measures.

4.2 Temperature Hazards

4.2.1 Heat Exposure Hazards

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

Heat Rash

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

Heat Cramps

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

Heat Exhaustion

Exhaustion results from increased stress on the vital organs of the body in the effort to meet the body's cooling demands. Signs include shallow breathing; pale, cool, moist skin; profuse sweating; and dizziness.

Heat Stroke

Heat stroke results from an 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, coma, and death.

The following procedures should be followed to prevent or control heat stroke:

- 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. Provide shelter against heat and direct sunlight to protect personnel. Take breaks in shaded areas.
- D. Rotate workers utilizing protective clothing during hot weather.
- E. Establish a work regime that will provide adequate rest periods, with personnel working in shifts.

4.2.2 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 (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).



4.3 Fire Prevention

One portable fire extinguisher with a rating (ratio) of 20 pound A/B/C will be conspicuously and centrally located at the site. Portable extinguishers will be properly tagged with inspection dates and maintained in accordance with standard maintenance procedures for portable fire extinguishers. The following fire prevention guidelines are to be followed:

- 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.

4.4 Operation of Heavy Equipment

When operating or working around heavy equipment, the Site Supervisor will ensure that site personnel conform to this CHASP to include the wearing of proper clothing such as hard hats and safety glasses. Any specific health and safety issues relating to the equipment to be used on-site that work day, will be covered in the daily health and safety briefing.

5.0 MANAGEMENT AND PLANNING

5.1 General Site Control

The Site Supervisor will establish a command post within the Site. A perimeter site fence, as required by the New York City Department of Buildings, will be erected to define the limits of the Site. All work must be performed within the site fence. Flagmen and traffic control will be provided as required at all times.



The Site will be left hazard-free at the end of each work day. In addition, all fence gates will be operable and locked in a closed position, all site fencing will be properly standing or braced and site lighting will be operational. The property owner will provide site security during off-work hours.

During site excavation, worker exposure to potential hazardous substances will be minimized through Health and Safety Communication (Section 5.2), Decontamination Procedures (Section 5.3) and Dust Control Methods (Section 5.3).

5.2 Health and Safety Communication

The relatively small size of the work area makes normal verbal communication the primary mode of communication for the project. In the event that verbal communication is impossible the following hand signals will be used.

Gripping a partners wrist = “Leave area immediately”

Hands on top of head = “ I need assistance”

Thumbs up = “OK; I’m alright; I understand”

Thumbs down = “No; Negative”

Daily Health and Safety Meetings will address a list of tasks to be performed that day, the equipment and machinery involved, and any hazards identified with this type of activity. Workers will be given the opportunity to list out additional perceived hazards, and discuss safe work practices while in these operations. The daily safety meeting will also be an opportunity to review the work performed the previous day, any hazards encountered, mitigating actions taken, and suggestions for future improvement.

5.3 Air Monitoring

This section of the CHASP discusses air monitoring that will be performed to address community and site personnel concerns of possible exposures due to airborne migration of suspected contaminants that may be encountered during on-site field activities.

Periodic air monitoring will be performed for VOCs at the perimeter of the work area once every two hours during field activities. Continuous air monitoring will be performed for VOCs during all ground intrusive activities such as soil excavation, loading and offsite transport. All ambient air readings will be recorded and provided as an appendix in the P.E.-certified Remedial Closure Report.

5.3.1 Community Air Monitoring

Periodic air monitoring for VOCs at the perimeter of the work area will be accomplished as follows:

- VOCs will be monitored at the upwind perimeter of the work area at the start of each work day and periodically thereafter to establish background conditions. The monitoring will be performed utilizing a Photovac 2020 portable Photoionization Detector (PID) equipped with a 10.6 eV lamp capable of detecting the types of contaminants known or suspected to be present.
- VOCs will be monitored at the downwind perimeter of the work area daily at 2 hour intervals. If ambient air concentrations of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background, work activities will be 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 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 work area 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.



5.3.2 Activity-Specific Air Monitoring

Continuous air monitoring will be conducted inside the work area for VOC levels during all ground-intrusive activities, such as soil excavation, loading and offsite transport in accordance with 29 CFR 1910.120(h). Continuous air monitoring will also be performed utilizing a Photovac 2020 PID. Continuous air monitoring will be performed in the following manner:

- Volatile organic compounds will be monitored inside the work area of construction and health and safety personnel on a continuous basis. The PID will be programmed to calculate 15-minute running average concentrations. If ambient air concentrations of total organic vapors inside the work area exceed 5 ppm above background, work activities will be 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 inside the work area 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 inside the work area 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.

5.4 Dust Control

Each contractor shall control any dust generated on-site that may be produced during work activities. Dust control measures will be employed to ensure that there is no off-site migration of dust into the community by use of a stream of water applied through a fine spray nozzle. The NYC hydrant used for a water source will be fitted with a RPZ control device to prevent inadvertent contamination of the public water supply. In addition, a solid barrier fence will be installed around the perimeter of the property to control any fugitive migration of dust.



5.5 Spill Control and Prevention

Spills associated with site activities may be attributed to project specific heavy equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material.

Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

5.6 Decontamination Procedures

Contaminants will be removed from personnel and equipment through a decontamination regiment. Workers will be required to remove any contaminated PPE before leaving the Site. Work boots, safety glasses, hard hats and work gloves will be washed in a two percent Alconox Solution, followed by three consecutive clean water rinses. All wash and rinse water will be containerized into a DOT drum. Gross contaminants will be brushed from worker's clothing before leaving the Site. A station for hand washing will also be set up.

Decontamination of heavy equipment will also be required before leaving the Site. Excavator buckets and vehicle wheels or tracks will be brushed clean with a broom, before being moved off-site. Reusable hand tools will be washed in a two percent Alconox solution, followed by a series of clean water rinses. All wash and rinse water will be containerized in appropriate steel drums for proper disposal.

5.7 Soil Disposal

Any contaminated soil (organic or inorganic constituents) encountered during the remedial activities will be segregated, stockpiled on-site onto polyethylene sheeting, and covered with polyethylene sheeting to prevent exposure to workers and the community until proper transportation and disposal in accordance with all NYSDEC Regulations is arranged.



6.0 EMERGENCY MEDICAL CARE AND PROCEDURES

If a personnel accident occurs on-site requiring emergency care, immediate care will be administered appropriate to the injury in accordance with established Red Cross procedures and practices. In the event of serious injury to on-site personnel, the Emergency Medical Service of the City of New York (EMS) will be summoned to remove the injured individual to the nearest medical facility for treatment as follows.

Ambulance:	911
Emergency Medical:	911
Fire Department:	911
Mount Sinai Hospital Queens:	(718) 932-1000
Police Department:	911
Poison Control Center:	(516) 542-2323

The nearest emergency medical facility is 25-10 30th Avenue, Queens, NY 11102, which is located 0.9 miles from the Site. A map of the route to this hospital is attached. The directions to this medical facility from the Site are as follows:

- **Head southwest on Steinway Street toward 28th Avenue;**
- **Turn Right on 30th Avenue;**
- **Mount Sinai Hospital Queens is located on the Left.**

OSHA approved First Aid Kits will be maintained on-Site along with a First Aid blanket for treating shock, and will be readily accessible to all workers if an emergency occurs. The emergency signal for evacuation of personnel from the Site will be three (3) long blasts of a vehicle horn with the off-site rallying point designated as the corner of 25th Avenue and Steinway Street. If in the event of a fire, explosion or other life-threatening incident on-site, the emergency signal above will be sounded and all personnel will evacuate the Site. The appropriate New York City emergency personnel (fire, police, etc.) will be immediately notified.



All injuries, no matter how slight, will be reported to the site safety supervisor immediately. The Site Supervisor will complete an accident report for all incidents. Some injuries, such as severe lacerations or burns, may require immediate treatment. Unless required due to immediate danger, seriously injured persons should not be moved without direction from attending medical personnel. The Site Supervisor will record occupational injuries and illnesses within 48 hours of occurrence, as required by statute.

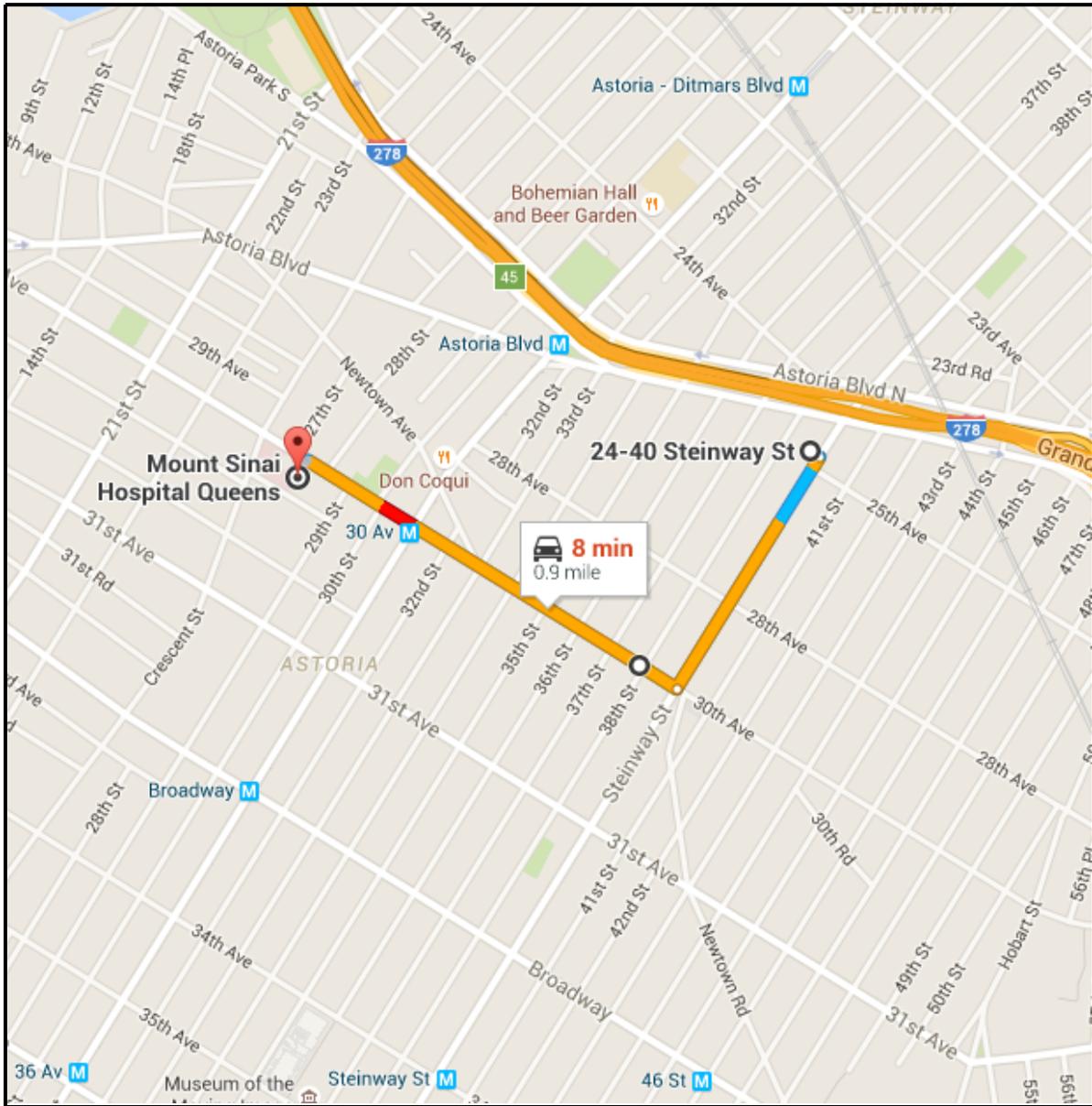
Table 1
NIOSH Exposure Limits

TABLE 1
NIOSH Exposure Limits (mg/m³)¹

Chemical	IDLH	TWA	STEL
Benzene	1625	1.63	8.13
Toluene	1900	375	560
Ethylbenzene	3530	435	545
Xylenes	3970	435	655
Naphthalene	1250	50	75
Acenaphthene	N.L.	N.L.	N.L.
Anthracene	N.L.	N.L.	N.L.
Pyrene	N.L.	N.L.	N.L.
Chrysene	N.L.	N.L.	N.L.
Benzo(b)Fluoranthene	N.L.	N.L.	N.L.
Benzo(a)Pyrene	N.L.	N.L.	N.L.
Benzo(ghi)Perylene	N.L.	N.L.	N.L.
Polychlorinated Biphenyl	5.0	0.5	N.L.
Aldrin	25	0.25	N.L.
Endrin	2	0.1	N.L.
Chlordane	100	0.5	N.L.
Toxaphene	200	0.5	N.L.
DDT	500	1	N.L.
Silver	10	0.01	N.L.
Barium	1100	0.5	N.L.
Cadmium	9	0.05	N.L.
Selenium	1	0.2	N.L.
Lead	100	0.05	N.L.
Mercury	10	0.05	N.L.
Arsenic	5	0.01	N.L.
Chromium	250	0.5	N.L.

¹ All values taken from NIOSH International Chemical Safety Cards
([Http://www.cdc.gov/niosh/ipcsneng/nengname.html](http://www.cdc.gov/niosh/ipcsneng/nengname.html))
N.L..... None Listed

FIGURE 1
HOSPITAL ROUTE



Souce: Google Maps



<h3>Hospital Route</h3> <p>Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS</p>	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 8530-ASNY	Figure No.: 1
Date: 07/08/2016	Scale: Not To Scale

Appendix A
Chemical Safety Cards

International Chemical Safety Cards

BENZENE

ICSC: 0015






Cyclohexatriene
Benzol
C₆H₆
Molecular mass: 78.1



ICSC # 0015
CAS # 71-43-2
RTECS # CY1400000
UN # 1114
EC # 601-020-00-8
June 05, 2003 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames. NO sparks, and NO smoking	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive. Risk of fire and explosion: see Chemical Dangers.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools. Prevent build-up of electrostatic charges (e.g. by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea. Shortness of breath. Convulsions. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin. Redness. Pain. (Further see Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Redness. Pain.	Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Sore throat. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING

<p>Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.</p>	<p>Fireproof. Separated from food and feedstuffs oxidants halogens</p>	<p>Do not transport with food and feedstuffs. Note: E F symbol T symbol R: 45-46-11-36/38-48/23/24/25-65 S: 53-45 UN Hazard Class: 3 UN Packing Group: II</p>
SEE IMPORTANT INFORMATION ON BACK		
ICSC: 0015	<p>Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values</p>	

International Chemical Safety Cards

BENZENE

ICSC: 0015

<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</p> <p>PHYSICAL DANGERS: The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p>CHEMICAL DANGERS: Reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Attacks plastic and rubber.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.5 ppm as TWA 2.5 ppm as STEL (skin) A1 BEI (ACGIH 2004). MAK: H Carcinogen category: 1 Germ cell mutagen group: 3A (DFG 2004). OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm See <u>Appendix F</u> NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See <u>Appendix A</u> NIOSH IDLH: Ca 500 ppm See: <u>71432</u></p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation through the skin and by ingestion</p> <p>INHALATION RISK: A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system, resulting in lowering of consciousness Exposure far above the occupational exposure limit value may result in unconsciousness death</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The liquid defats the skin. The substance may have effects on the bone marrow immune system, resulting in a decrease of blood cells. This substance is carcinogenic to humans.</p>
PHYSICAL PROPERTIES	<p>Boiling point: 80°C Melting point: 6°C Relative density (water = 1): 0.88 Solubility in water, g/100 ml at 25°C: 0.18 Vapour pressure, kPa at 20°C: 10 Relative vapour density (air = 1): 2.7</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2 Flash point: -11°C c.c. Auto-ignition temperature: 498°C Explosive limits, vol% in air: 1.2-8.0 Octanol/water partition coefficient as log Pow:</p>

2.13

ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms.	
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NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1114 / 30GF1-II
NFPA Code: H2; F3; R0

ADDITIONAL INFORMATION

ICSC: 0015

(C) IPCS, CEC, 1994

BENZENE

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International Chemical Safety Cards

TOLUENE

ICSC: 0078






Methylbenzene
Toluol
Phenylmethane
C₆H₅CH₃ / C₇H₈
Molecular mass: 92.1



ICSC # 0078
 CAS # 108-88-3
 RTECS # XSS250000
 UN # 1294
 EC # 601-021-00-3
 October 10, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II
SEE IMPORTANT INFORMATION ON BACK		
Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		

ICSC: 0078

International Chemical Safety Cards

TOLUENE

ICSC: 0078

I M P O R T A N T A D V I S I O N S	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</p> <p>PHYSICAL DANGERS: The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p>CHEMICAL DANGERS: Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: Pregnancy risk group: C (DFG 2004). EU OEL: 192 mg/m³ 50 ppm as TWA 384 mg/m³ 100 ppm as STEL (skin) (EU 2006). OSHA PEL: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak) NIOSH REL: TWA 100 ppm (375 mg/m³) ST 150 ppm (560 mg/m³) NIOSH IDLH: 500 ppm See: 108883</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p>INHALATION RISK: A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the central nervous system. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmia and unconsciousness.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
<p>PHYSICAL PROPERTIES</p>	<p>Boiling point: 111°C Melting point: -95°C Relative density (water = 1): 0.87 Solubility in water: none</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 4°C c.c. Auto-ignition temperature: 480°C</p>

Vapour pressure, kPa at 25°C: 3.8
Relative vapour density (air = 1): 3.1

Explosive limits, vol% in air: 1.1-7.1
Octanol/water partition coefficient as log Pow:
2.69

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms.



NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect. Card has been partly updated in October 2004: see sections Occupational Exposure Limits, EU classification, Emergency Response. Card has been partly updated in October 2006: see section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-30S1294
NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0078

TOLUENE

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International Chemical Safety Cards

ETHYLBENZENE

ICSC: 0268






Ethylbenzol
Phenylethane
EB
C₈H₁₀/C₆H₅C₂H₅
Molecular mass: 106.2



ICSC # 0268
CAS # 100-41-4
RTECS # DA0700000
UN # 1175
EC # 601-023-00-4
November 23, 2007 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Dry powder. Foam. Carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging or handling.	In case of fire: keep drums, etc.. cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
•INHALATION	Cough. Sore throat. Dizziness. Drowsiness. Headache.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain. Irritation: deleted at update Nov 07 - only at very high levels.	Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation in the throat and chest. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Ventilation. Collect leaking		Fireproof. Separated from strong oxidants. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	F symbol Xn symbol R: 11-20

Liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer Do NOT let this chemical enter the environment.

S: 2-16-24/25-29
 UN Hazard Class: 3
 UN Packing Group: II
 Signal: Danger
 Flame-Excl mark-Health haz
 Highly flammable liquid and vapour
 May be harmful if swallowed
 Harmful if inhaled vapour
 Causes mild skin irritation
 Causes eye irritation
 Suspected of causing cancer
 May cause respiratory irritation
 May cause drowsiness or dizziness
 May be harmful if swallowed and enters airways
 Toxic to aquatic life

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0268

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the international version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ICSC: 0268

ETHYLBENZENE

I M P O R T A N T I N F O R M A T I O N	<p>PHYSICAL STATE: APPEARANCE: COLOURLESS LIQUID, WITH AROMATIC ODOUR.</p> <p>PHYSICAL DANGERS: The vapour mixes well with air, explosive mixtures are easily formed.</p> <p>CHEMICAL DANGERS: Reacts with strong oxidants. Attacks plastic and rubber.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 100 ppm as TWA 125 ppm as STEL A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2007). EU OEL: 442 mg/m³ 100 ppm as TWA 884 mg/m³ 200 ppm as STEL (skin) (EU 2006). OSHA PEL†: TWA 100 ppm (435 mg/m³) NIOSH REL: TWA 100 ppm (435 mg/m³) ST 125 ppm (545 mg/m³) NIOSH IDLH: 800 ppm 10%LEL See: 100414</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its vapour, and by ingestion.</p> <p>INHALATION RISK: A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure above the OEL could cause lowering of consciousness.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is possibly carcinogenic to humans. The substance may have effects on the kidneys and liver, resulting in impaired functions Repeated contact with skin may cause dryness and cracking.</p>
	<p>PHYSICAL PROPERTIES</p> <p>Boiling point: 136°C Melting point: -95°C Relative density (water = 1): 0.9</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.03 Flash point: 18°C e.t.</p>

Solubility in water, g/100 ml at 20°C: 0.015
 Vapour pressure, kPa at 20°C: 0.9
 Relative vapour density (air = 1): 3.7

Auto-ignition temperature: 432°C
 Explosive limits, vol% in air: 1.0-6.7
 Octanol/water partition coefficient as log Pow: 3.1
 Viscosity, mm²/s at 25 °C: 0.6

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.



NOTES

The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-305 1135 or 30GF1- H+II
 NFPA Code: H2; F3; R0

ADDITIONAL INFORMATION

ICSC: 0268

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ETHYLBENZENE

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International Chemical Safety Cards

ICSC: 0086

p-XYLENE



para-Xylene
 1,4-Dimethylbenzene
 p-Xylol
 $C_6H_4(CH_3)_2 / C_8H_{10}$
 Molecular mass: 106.2



ICSC # 0086
 CAS # 106-42-3
 RTECS # ZB2625000
 UN # 1307
 EC # 601-022-00-9
 August 03, 2002 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g. by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PAC KAGING & LABELLING
Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as		Fireproof. Separated from strong oxidants and strong acids	Note: C Xn symbol

possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

R: 10-20/21-38
 S: 2-25
 UN Hazard Class: 3
 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0086

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C)IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

p-XYLENE

ICSC: 0086

I M P O R T A N T A C T I O N S	PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	PHYSICAL DANGERS: As a result of flow, agitation, etc., electrostatic charges can be generated.	INHALATION RISK: A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.
I N F O R M A T I O N	CHEMICAL DANGERS: Reacts with strong acids strong oxidants	EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes and the skin. The substance may cause effects on the central nervous system if this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.
	OCCUPATIONAL EXPOSURE LIMITS: TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL: TWA 100 ppm (435 mg/m ³) NIOSH REL: TWA 100 ppm (435 mg/m ³) ST 150 ppm (655 mg/m ³) NIOSH IDLH: 900 ppm See: 95476	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The liquid defats the skin. The substance may have effects on the central nervous system. Animal tests show that this substance possibly causes toxicity to human reproduction or development.
PHYSICAL PROPERTIES	Boiling point: 138°C Melting point: 13°C Relative density (water = 1): 0.86 Solubility in water: none Vapour pressure, kPa at 20°C: 0.9	Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 27°C c.c. Auto-ignition temperature: 528°C Explosive limits, vol% in air: 1.1-7.0 Octanol/water partition coefficient as log Pow: 3.15
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms.	
NOTES		



Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III
NFPA Code: H 2; F 3; R 0;

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

ADDITIONAL INFORMATION

ICSC: 0086

(C) IPCS, CEC, 1994

p-XYLENE

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International Chemical Safety Cards

NAPHTHALENE

ICSC: 0667



Naphthene
 $C_{10}H_8$
 Molecular mass: 128.18

ICSC # 0667
 CAS # 91-20-3
 RTECS # QJ0525000
 UN # 1334 (solid); 2304 (molten)
 EC # 601-052-00-2
 April 21, 2005 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! (Further see Inhalation).	Protective gloves.	Rinse skin with plenty of water or shower.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, food and feedstuffs. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant Xn symbol N symbol R: 22-40-50/53 S: 2-36/37-46-60-61	

UN Hazard Class: 4.1
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0667

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPSC CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

ICSC: 0667

NAPHTHALENE

<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: WHITE SOLID IN VARIOUS FORMS, WITH CHARACTERISTIC ODOUR.</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p>
	<p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p>	<p>INHALATION RISK: A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.</p>
<p>PHYSICAL PROPERTIES</p>	<p>CHEMICAL DANGERS: On combustion, forms irritating and toxic gases. Reacts with strong oxidants</p>	<p>EFFECTS OF SHORT-TERM EXPOSURE: The substance may cause effects on the blood, resulting in lesions of blood cells (haemolysis) See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.</p>
	<p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 10 ppm as TWA 15 ppm as STEL (skin) A4 (not classifiable as a human carcinogen); (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004). OSHA PEL: TWA 10 ppm (50 mg/m³) NIOSH REL: TWA 10 ppm (50 mg/m³) ST 15 ppm (75 mg/m³) NIOSH IDLH: 250 ppm Sec: 91203</p>	<p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the blood, resulting in chronic haemolytic anaemia. The substance may have effects on the eyes, resulting in the development of cataract. This substance is possibly carcinogenic to humans.</p>
<p>ENVIRONMENTAL DATA</p>	<p>Boiling point: 218°C Sublimation slowly at room temperature Melting point: 80°C Density: 1.16 g/cm³ Solubility in water, g/100 ml at 25°C: none</p>	<p>Vapour pressure, Pa at 25°C: 11 Relative vapour density (air = 1): 4.42 Flash point: 80°C c.c. Auto-ignition temperature: 540°C Explosive limits, vol% in air: 0.9-5.9 Octanol/water partition coefficient as log Pow: 3.3</p>
<p>NOTES</p> <p>Some individuals may be more sensitive to the effect of naphthalene on blood cells. Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF 1 -II+III (solid); 41 S2304 (molten) NFPA Code: H2; F2; R0;</p>		



ADDITIONAL INFORMATION

ICSC: 0667

NAPHTHALENE

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International Chemical Safety Cards

ACENAPHTHENE

ICSC: 1674



1,2-Dihydroacenaphthylene
 1,8-Ethylenenaphthalene
 $C_{12}H_{10}$
 Molecular mass: 154.2

ICSC # 1674
 CAS # 83-32-9
 RTECS # AB1000000
 UN # 3077
 October 12, 2006 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system. dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See NOTES.	PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Personal protection: P2 filter respirator for harmful particles. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers: if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.		Separated from strong oxidants Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	UN Hazard Class: 9 UN Packing Group: III Signal: Warning Enviro Very toxic to aquatic life with long lasting effects
SEE IMPORTANT INFORMATION ON BACK			

ICSC: 1674

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ACENAPHTHENE

ICSC: 1674

I M P O R T A N T D A T A	PHYSICAL STATE; APPEARANCE: WHITE TO BEIGE CRYSTALS	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.
	PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.	INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed.
	CHEMICAL DANGERS: On combustion, forms toxic gases including carbon monoxide. Reacts with strong oxidants.	EFFECTS OF SHORT-TERM EXPOSURE:
	OCCUPATIONAL EXPOSURE LIMITS: TLV not established. MAK not established.	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: See Notes.
PHYSICAL PROPERTIES	Boiling point: 279°C Melting point: 95°C Density: 1.2 g/cm ³ Solubility in water, g/100 ml at 25°C: 0.0004	Vapour pressure, Pa at 25°C: 0.3 Relative vapour density (air = 1): 5.3 Flash point: 135°C o.c. Auto-ignition temperature: >450 °C Octanol/water partition coefficient as log Pow: 3.9 - 4.5
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment.	
NOTES		
Acenaphthene occurs as a pure substance and also as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.		
Transport Emergency Card: TEC (R)-90GM7-III		
ADDITIONAL INFORMATION		

ICSC: 1674

ACENAPHTHENE

(C) IPCS, CEC, 1994

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International Chemical Safety Cards

ANTHRACENE

ICSC: 0825



Anthracin
 Paranaphthalene
 $C_{14}H_{10} / (C_6H_4CH)_2$
 Molecular mass: 178.2

ICSC # 0825
 CAS # 120-12-7
 RTECS # CA9350000
 March 24, 1999 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	in case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough. Sore throat.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles, face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain.	Do not eat, drink, or smoke during work.	Rinse mouth. Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place Do NOT let this chemical enter the environment (Extra personal protection: P2 filter respirator for harmful particles).		Separated from strong oxidants. Well closed.	
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 0825		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values	

International Chemical Safety Cards

ANTHRACENE

ICSC: 0825

I M P O R T A N T A C T I O N S	PHYSICAL STATE; APPEARANCE: WHITE CRYSTALS OR FLAKES.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation.
	PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	CHEMICAL DANGERS: The substance decomposes on heating, under influence of strong oxidants producing acrid, toxic fume, causing fire and explosion hazard.	EFFECTS OF SHORT-TERM EXPOSURE: The substance slightly irritates the skin and the respiratory tract.
	OCCUPATIONAL EXPOSURE LIMITS: TLV not established.	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis under the influence of UV light.
PHYSICAL PROPERTIES	Boiling point: 342°C Melting point: 218°C Density: 1.25-1.28 g/cm ³ Solubility in water, g/100 ml at 20 °C: 0.00013 Vapour pressure, Pa at 25°C: 0.08	Relative vapour density (air = 1): 6.15 Flash point: 121°C Auto-ignition temperature: 538°C Explosive limits, vol% in air: 0.6-? Octanol/water partition coefficient as log Pow: 4.5 (calculated)
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.	
NOTES		
Green oil, Tetra-olive N2G are trade names.		NFPA Code: H0; F1; R;
ADDITIONAL INFORMATION		
ICSC: 0825		ANTHRACENE
(C) IPCS, CEC, 1994		
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International Chemical Safety Cards

PYRENE

ICSC: 1474



Benzo (d,e,f) phenanthrene
 beta-Pyrene
C16H10
 Molecular mass: 202.26

ICSC # 1474
 CAS # 129-00-0
 RTECS # UR2450000
 November 27, 2003 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Water spray, carbon dioxide, dry powder, alcohol-resistant foam, foam.
EXPLOSION			
EXPOSURE			
•INHALATION		Avoid inhalation of dust	Fresh air, rest.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Sweep spilled substance into containers: if appropriate, moisten first to prevent dusting. Carefully collect remainder Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles.)	Separated from strong oxidants. Keep in a well-ventilated room.	Do not transport with food and feedstuffs.	
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 1474	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		

International Chemical Safety Cards

PYRENE

ICSC: 1474

I M P O R T A N T A C T I O N S A R E R E D I C A T E D A S A N D H A Z A R D O U S A N D I N J U R Y P R E V E N T I O N S S H O U L D B E C O N S I D E R E D I N O R D E R O F P R I O R I T Y A N D T H E I M P O R T A N C E O F T H E I N F O R M A T I O N P R O V I D E N T I F I E D I N T H I S C A R D S H O U L D B E C O N S I D E R E D I N O R D E R O F P R I O R I T Y A N D T H E I M P O R T A N C E O F T H E I N F O R M A T I O N P R O V I D E N T I F I E D I N T H I S C A R D	PHYSICAL STATE; APPEARANCE: YELLOW COLOURLESS SOLID IN VARIOUS FORMS	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation through the skin and by ingestion
	PHYSICAL DANGERS: CHEMICAL DANGERS: The substance decomposes on heating producing irritating fumes	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.
OCCUPATIONAL EXPOSURE LIMITS: TLV not established. MAK not established.	EFFECTS OF SHORT-TERM EXPOSURE: Exposure to sun may provoke an irritating effect of pyrene on skin and lead to chronic skin discoloration.	
	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:	
PHYSICAL PROPERTIES	Boiling point: 404°C Melting point: 151°C Density: 1.27 g/cm ³	Solubility in water: 0.135 mg/l at 25°C Vapour pressure, Pa at °C: 0.08 Octanol/water partition coefficient as log Pow: 4.88
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in crustacea, in fish, in milk, in algae and in molluscs. It is strongly advised that this substance does not enter the environment.	
NOTES		
Pyrene is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, pyrene may be encountered as a laboratory chemical in its pure form. Health effects of exposure to the substance have not been investigated adequately. See ICSC 1415 Coal-tar pitch.		
ADDITIONAL INFORMATION		
ICSC: 1474		PYRENE
(C) IPCS, CEC, 1994		
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the	

irrelevant legislation in the country of use. The only modifications made to produce the U.S. version is
inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHRYSENE

ICSC: 1672



Benzoaphenanthrene
 1,2-Benzophenanthrene
 1,2,5,6-Dibenzonaphthalene
 $C_{18}H_{12}$
 Molecular mass: 228.3

ICSC # 1672
 CAS # 218-01-9
 RTECS # GC0700000
 UN # 3077
 EC # 601-048-00-0
 October 12, 2006 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.		Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III

Signal: Warning
 Health haz-Enviro
 Suspected of causing cancer
 Very toxic to aquatic life
 Toxic to aquatic life with long lasting effects

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1672

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the international version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

ICSC: 1672

CHRYSENE

I M P O R T A N T A I N F O R M A T I O N	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS TO BEIGE CRYSTALS OR POWDER</p> <p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p> <p>CHEMICAL DANGERS: The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK: skin absorption (H); Carcinogen category: 2 (DFG 2007).</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p>INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed</p> <p>EFFECTS OF SHORT-TERM EXPOSURE:</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is possibly carcinogenic to humans.</p>
	<p>PHYSICAL PROPERTIES</p> <p>Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm³</p> <p>Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9</p>	
<p>ENVIRONMENTAL DATA</p> <p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.</p>		

NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.

Transport Emergency Card: TEC (R)-90GM7-III
Card has been partially updated in January 2008: see Occupational Exposure Limits.

ADDITIONAL INFORMATION

ICSC: 1672

(C) IPCS, CEC, 1994

CHRYSENE

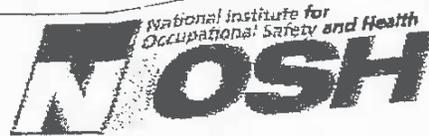
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International Chemical Safety Cards

ICSC: 0720

BENZO(b)FLUORANTHENE



Benz(e)acephenanthrylene
 2,3-Benzofluoranthene
 Benzo(e)fluoranthene
 3,4-Benzofluoranthene
 $C_{20}H_{12}$
 Molecular mass: 252.3

ICSC # 0720
 CAS # 205-99-2
 RTECS # CU1400000
 EC # 601-034-00-4
 March 25, 1999 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible). Then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T: 53-45-60-61 N: 53-45-60-61 R: 45-50/53 S: 53-45-60-61	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

I M P O R T A N T D A T A	PHYSICAL STATE; APPEARANCE: COLOURLESS CRYSTALS PHYSICAL DANGERS: CHEMICAL DANGERS: Upon heating, toxic fumes are formed.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and through the skin. INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	OCCUPATIONAL EXPOSURE LIMITS: TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2; (DFG 2004).	EFFECTS OF SHORT-TERM EXPOSURE: EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is possibly carcinogenic to humans. May cause genetic damage in humans.
PHYSICAL PROPERTIES	Boiling point: 481°C Melting point: 168°C Solubility in water: none	Octanol/water partition coefficient as log Pow: 6.12
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality.	
NOTES		
Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m ³ . Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.		
ADDITIONAL INFORMATION		
ICSC: 0720	BENZO(b)FLUORANTHENE	
(C) IPCS, CEC, 1994		



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International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104



Benz(a)pyrene
 3,4-Benzopyrene
 Benzo(d,e,f)chrysene
 $C_{20}H_{12}$
 Molecular mass: 252.3

ICSC # 0104
 CAS # 50-32-8
 RTECS # DJ3675000
 EC # 601-032-00-3
 October 17, 2005 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible). Then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder,	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61	

then remove to safe place.

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0104

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

ICSC: 0104

BENZO(a)PYRENE

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: PALE-YELLOW CRYSTALS</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: Reacts with strong oxidants causing fire and explosion hazard.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005). MAK: Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE:</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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PHYSICAL PROPERTIES	<p>Boiling point: 496°C Melting point: 178.1°C Density: 1.4 g/cm³</p>	<p>Solubility in water: none (<0.1 g/100 ml) Vapour pressure: negligible Octanol/water partition coefficient as log Pow: 6.04</p>
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ENVIRONMENTAL DATA	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.</p>	
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NOTES

Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

ADDITIONAL INFORMATION

ICSC: 0104

BENZO(a)PYRENE

(C) IPCS, CEC, 1994

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International Chemical Safety Cards

BENZO(ghi)PERYLENE

ICSC: 0739






1,12-Benzoperylene
1,12-Benzperylene
C₂₂H₁₂
Molecular mass: 276.3



ICSC # 0739
CAS # 191-24-2
RTECS # DI6200500
October 18, 1999 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	NO open flames.	In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work	Rinse mouth. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.		Well closed.	
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 0739		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPSC CEC 1991. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

International Chemical Safety Cards

BENZO(ghi)PERYLENE

ICSC: 0739

I M P O R T A N T I N F O R M A T I O N	PHYSICAL STATE; APPEARANCE: PALE YELLOW-GREEN CRYSTALS.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
	PHYSICAL DANGERS:	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	CHEMICAL DANGERS: Upon heating, toxic fumes are formed.	EFFECTS OF SHORT-TERM EXPOSURE:
	OCCUPATIONAL EXPOSURE LIMITS: TLV not established.	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
PHYSICAL PROPERTIES	Boiling point: 550°C Melting point: 278°C Density: 1.3 g/cm ³	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.58
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air and water.	
NOTES		
Benzo(ghi)perylene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. Data are insufficiently available on the effect of this substance on human health, therefore utmost care must be taken.		
ADDITIONAL INFORMATION		
ICSC: 0739		BENZO(ghi)PERYLENE
(C) IPCS, CEC, 1994		
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	



International Chemical Safety Cards

POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939



Chlorobiphenyl (54% chlorine)
 Chlorodiphenyl (54% chlorine)
 PCB
 Molecular mass: 327 (average)

ICSC # 0939
 CAS # 11097-69-1
 RTECS # TO1360000
 UN # 2315
 EC # 602-039-00-4
 October 20, 1999 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: powder, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
•INHALATION		Ventilation.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Headache, Numbness.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Consult an expert! Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Separated from food and feedstuffs. Cool, Dry. Keep in a well-ventilated room.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. *Severe *marine pollutant. *Note: C *Xn symbol *N symbol *R: 33-50/53 *S: 2-35-60-61 UN Hazard Class: 9 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0939

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (IPCS/CEC 1994). No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939

I M	PHYSICAL STATE; APPEARANCE: LIGHT YELLOW VISCOUS LIQUID.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.
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P O R T A N T I N F O R M A T I O N	<p>PHYSICAL DANGERS:</p>	<p>INHALATION RISK: A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C</p>
	<p>CHEMICAL DANGERS: The substance decomposes in a fire producing irritating and toxic gases</p>	<p>EFFECTS OF SHORT-TERM EXPOSURE:</p>
	<p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.5 mg/m³ as TWA (skin) A3 (ACGIH 2004). MAK: 0.05 ppm & 70 mg/m³ 14 Peak Irritation category: II(8) Carcinogen category: 3B Pregnancy risk group: E (DFG 2004). OSHA PEL: TWA 0.5 mg/m³ skin NIOSH REL* Ca TWA 0.001 mg/m³ See Appendix A *Note The REL also applies to other PCBs. NIOSH IDLH: Ca 5 mg/m³ See: IDLH INDEX</p>	<p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
PHYSICAL PROPERTIES	<p>Relative density (water = 1): 1.5 Solubility in water: none</p>	<p>Vapour pressure, Pa at 25°C: 0.01 Octanol/water partition coefficient as log Pow: 6.30 (estimated)</p>
ENVIRONMENTAL DATA	<p>In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment.</p>	
NOTES		
<p>Changes into a resinous state (pour point) at 10°C. Distillation range: 365°-390°C.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-90GM2-II-L</p>		
ADDITIONAL INFORMATION		
ICSC: 0939	POLYCHLORINATED BIPHENYL (AROCOR 1254)	
	(C) IPCS, CEC, 1994	
IMPORTANT LEGAL NOTICE:	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values</p>	

International Chemical Safety Cards

ALDRIN

ICSC: 0774








1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-exo-1,4-endo-5,8-dimethanonaphthalene
 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-,
 (1alpha,4alpha,4aβ,5alpha,8alpha,8aβ)
 HDDN
 $C_{12}H_8Cl_6$
 Molecular mass: 364.9

ICSC # 0774
 CAS # 309-00-2
 RTECS # IO2100000
 UN # 2761
 EC # 602-048-00-3
 March 26, 1998 Validated




TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
•INHALATION	(See Ingestion).	Ventilation (not if powder).	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! See Ingestion.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Convulsions. Dizziness. Headache. Nausea. Vomiting. Muscle twitching.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 24/25-40-48/24/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II
SEE IMPORTANT INFORMATION ON BACK		
<p style="text-align: center;">Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p> <p>ICSC: 0774</p>		

International Chemical Safety Cards

ALDRIN

ICSC: 0774

<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS CRYSTALS</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: The substance decomposes on heating producing toxic and corrosive fumes including hydrogen chloride. Reacts with acids and oxidants. Attacks many metals in presence of water.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.25 mg/m³ (as TWA), A3 (skin) (ACGIH 1997). MAK: (Inhalable fraction) 0.25 mg/m³ skin absorption (H); Peak limitation category: II(8) (DFG 2006). OSHA PEL: TWA 0.25 mg/m³ skin NIOSH REL: Ca TWA 0.25 mg/m³ skin See <u>Appendix A</u> NIOSH IDLH: Ca 25 mg/m³ See: <u>309002</u></p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body through the skin and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance may cause effects on the central nervous system, resulting in convulsions. The effects may be delayed. Medical observation is indicated.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.</p>
<p>PHYSICAL PROPERTIES</p>	<p>Boiling point at 0.27kPa: 145°C Melting point: 104-105°C Density: 1.6 g/cm³</p>	<p>Solubility in water: none Vapour pressure, Pa at 20°C: 0.009 Octanol/water partition coefficient as log Pow: 7.4</p>
<p>ENVIRONMENTAL DATA</p>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds, honey bees. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists</p> 	

in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.

NOTES

Other melting points: 49-60°C (technical grade). Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. The recommendations on this Card also apply to ICSC 0787 (dieldrin). Aldrec, Aldrex, Aldrite, Aldron, Aldrosol, Algran, Alttox, Drinox, Octalene, Seedrin, and Toxadrin are trade names.

Transport Emergency Card: TEC (R)-61G41b.
NFPA Code: H2; F0; R0;

Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.

ADDITIONAL INFORMATION

ICSC: 0774

ALDRIN

(C) IPCS, CEC, 1994

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International Chemical Safety Cards

ENDRIN

ICSC: 1023








National Institute for Occupational Safety and Health

C₁₂H₈Cl₆O
Molecular mass: 380.9

ICSC # 1023
CAS # 72-20-8
RTECS # IO1575000
UN # 2761
EC # 602-051-00-X
March 10, 2000 Validated




TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	(See Ingestion).	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Dizziness. Weakness. Headache. Nausea. Vomiting. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection:		Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. T+ symbol N symbol R: 24-28-50/53

chemical protection suit including self-contained breathing apparatus).

S: 1/2-22-36/37-45-60-61
UN Hazard Class: 6.1
UN Packing Group: I

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1023

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

ICSC: 1023

ENDRIN

I M P O R T A N T A I N F O R M A T I O N	PHYSICAL STATE; APPEARANCE: WHITE CRYSTALS	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	PHYSICAL DANGERS:	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying or when dispersed, especially if powdered.
	CHEMICAL DANGERS: The substance decomposes on heating above 245°C, producing hydrogen chloride phosgene	EFFECTS OF SHORT-TERM EXPOSURE: The substance may cause effects on the central nervous system, resulting in convulsions and death. The effects may be delayed. Medical observation is indicated.
	OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.1 mg/m ³ (skin) (ACGIH 2000). OSHA PEL: TWA 0.1 mg/m ³ skin NIOSH REL: TWA 0.1 mg/m ³ skin NIOSH IDLH: 2 mg/m ³ See: 72208	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
PHYSICAL PROPERTIES	Decomposes below boiling point at 245°C Melting point: 200°C Density: 1.7 g/cm ³	Solubility in water, g/100 ml at 25°C: none Vapour pressure, Pa at 25°C: negligible Octanol/water partition coefficient as log Pow: 5.34
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees birds mammals It is strongly advised not to let the chemical enter into the environment because it persists in the environment. In the food chain important to humans, bioaccumulation takes place, specifically in fish seafood Avoid release to the environment in circumstances different to normal use.	
NOTES		
If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Transport Emergency Card: TEC (R)-61G41a		



NFPA Code: H3; F0; R; 0	
ADDITIONAL INFORMATION	
ICSC: 1023	ENDRIN
(C) IPCS, CEC, 1994	
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740



1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene
 1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene



Molecular mass: 409.8

ICSC # 0740
 CAS # 57-74-9
 UN # 2996
 EC # 602-047-00-8
 March 26, 1998 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Alcohol-resistant foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	(See Ingestion).	Breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Confusion. Convulsions. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: chemical protection suit		Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs bases and incompatible materials See Chemical Dangers. Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. Xn symbol N symbol

including self-contained breathing apparatus.

R: 21/22-40-50/53
S: 2-36/37-60-61
UN Hazard Class: 6.1
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0740

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740

I M P O R T A N T D A T A	PHYSICAL STATE; APPEARANCE: TECHNICAL: LIGHT YELLOW TO AMBER VISCOUS LIQUID	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	PHYSICAL DANGERS:	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.
P H Y S I C A L P R O P E R T I E S	CHEMICAL DANGERS: The substance decomposes on burning, on contact with bases producing toxic fumes including phosgene hydrogen chloride Attacks iron, zinc, plastic, rubber and coatings.	EFFECTS OF SHORT-TERM EXPOSURE: Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.
	OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.5 mg/m ³ as TWA (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004). MAK: (Inhalable fraction) 0.5 mg/m ³ Peak limitation category: II(8); skin absorption (H); Carcinogen category: 3B; (DFG 2004). OSHA PEL: TWA 0.5 mg/m ³ skin NIOSH REL: Ca TWA 0.5 mg/m ³ skin See Appendix A NIOSH IDLH: Ca 100 mg/m ³ See: 57749	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the liver immune system, resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.
P H Y S I C A L P R O P E R T I E S	Boiling point at 0.27kPa: 175°C Relative density (water = 1): 1.59-1.63 Solubility in water: none	Vapour pressure, Pa at 25°C: 0.0013 Octanol/water partition coefficient as log Pow: 2.78
E N V I R O N M E N T A L D A T A	The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to soil organisms, honey bees. It is strongly advised that this substance does not enter the environment. The substance may cause long-term effects in the aquatic environment.	
NOTES		
If the substance is formulated with solvents also consult the ICSCs of these materials. Carrier solvents used in commercial formulations may change physical and toxicological properties. Belt, Chlor Kil, Chiortox, Corodan, Gold Crest, Intox,		



Kypchlor, Niran, Octachlor, Sydane, Synklor, Termi-Ded, Topiclор, and Toxichlor are trade names. Also consult ICSC 0743 Heptachlor.

Transport Emergency Card: TEC (R)-61GT6-III

ADDITIONAL INFORMATION

ICSC: 0740

CHLORDANE (TECHNICAL PRODUCT)

(C) IPCS, CEC, 1994

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September 2005

NIOSH Pocket Guide to Chemical Hazards

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Chlorinated camphene

CAS 8001-35-2

$C_{10}H_{10}Cl_8$

RTECS [XW525000](#)

Synonyms & Trade Names

Chlorocamphene, Octachlorocamphene, Polychlorocamphene, Toxaphene

DOT ID & Guide

2761 1.5.1

Exposure Limits

NIOSH REL: Ca [skin] [See Appendix A](#)

OSHA PEL: TWA 0.5 mg/m³ [skin]

IDLH Ca [200 mg/m³] See: [8001352](#)

Conversion

Physical Description

Amber, waxy solid with a mild, piney, chlorine- and camphor-like odor. [insecticide]

MW 413.8

BP: Decomposes

MLT: 149-194°F

Sol: 0.0003%

VP(77°F): 0.4 mmHg

IP: ?

Sp.Gr: 1.65

F.P: NA

UEL: NA

LEL: NA

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities

Strong oxidizers [Note: Slightly corrosive to metals under moist conditions.]

Measurement Methods

NIOSH [5039](#)

See: [NMAM](#) or [OSHA Methods](#)

Personal Protection & Sanitation (See protection codes)

Skin: Prevent skin contact
 Eyes: Prevent eye contact
 Wash skin: When contaminated/Daily
 Remove: When wet or contaminated
 Change: Daily
 Provide: Eyewash, Quick drench

First Aid (See procedures)

Eye: Irrigate immediately
 Skin: Soap wash promptly
 Breathing: Respiratory support
 Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
 (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

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

Symptoms Nausea, confusion, agitation, tremor, convulsions, unconsciousness; dry, red skin; [potential occupational carcinogen]

Target Organs central nervous system, skin

Cancer Site [in animals: liver cancer]

International Chemical Safety Cards

DDT

ICSC: 0034



Dichlorodiphenyltrichloroethane
 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
 2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane
 1,1'-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)
 p,p'-DDT
C14H9Cl5
 Molecular mass: 354.5



ICSC # 0034
 CAS # 50-29-3
 RTECS # KJ3325000
 UN # 2761
 EC # 602-045-00-7
 April 20, 2004 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames	Powder, water spray, foam, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
EYES	Redness	Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION	Tremors, Diarrhoea, Dizziness, Headache, Vomiting, Numbness, Paresthesias, Hypersensitibility, Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.		Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedsuffs See Chemical Danger.	Do not transport with food and feedsuffs. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III
SEE IMPORTANT INFORMATION ON BACK			

ICSC: 0034

Prepared in the context of co-operation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS/CEC (1991). No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

DDT

ICSC: 0034

See also: [INTRODUCTION](#) See ICSC CARD: [0843](#)

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<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS CRYSTALS WHITE POWDER. TECHNICAL PRODUCT IS WAXY SOLID.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with aluminum and iron.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 1 mg/m³ as TWA A3 (ACGIH 2004). MAK: 1 mg/m³ H Peak limitation category: II(8) (DFG 2003). OSHA PEL TWA 1 mg/m³ skin NIOSH REL: Ca TWA 0.5 mg/m³ See Appendix A NIOSH IDLH: Ca 500 mg/m³ See: 50293</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: May cause mechanical irritation. The substance may cause effects on the central nervous system, resulting in convulsions and respiratory depression. Exposure at high levels may result in death. Medical observation is indicated.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
<p>PHYSICAL PROPERTIES</p>	<p>Boiling point: 260°C Melting point: 109°C Density: 1.6 g/cm³</p>	<p>Solubility in water: poor Octanol/water partition coefficient as log Pow: 6.36</p>
<p>ENVIRONMENTAL DATA</p>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</p>	
<p>NOTES</p>		
<p>Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Consult national legislation. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotam, Zeidam, Dicophane, Neocid are trade names.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61GT7-III</p>		
<p>ADDITIONAL INFORMATION</p>		
<p>ICSC: 0034</p>	<p>DDT</p>	
<p>(C) IPCS, CEC, 1994</p>		
<p>IMPORTANT LEGAL NOTICE:</p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>	

International Chemical Safety Cards

SILVER

ICSC: 0810



Argentum
C.I. 77820
Ag

ICSC # 0810
CAS # 7440-22-4
IRTECS # VW3500000
September 10, 1997 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible, except as powder.		
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Rinse skin with plenty of water or shower.
•EYES		Safety spectacles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Separated from ammonia, strong hydrogen peroxide solutions, strong acids.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0810

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the international version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

SILVER

ICSC: 0810

I M P O R T A N T I N F O R M A T I O N	<p>PHYSICAL STATE; APPEARANCE: WHITE METAL. TURNS DARK ON EXPOSURE TO OZONE, HYDROGEN SULFIDE OR SULFUR.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: Shock-sensitive compounds are formed with acetylene. Reacts with acids causing fire hazard. Contact with strong hydrogen peroxide solution will cause violent decomposition to oxygen gas. Contact with ammonia may cause formation of compounds that are explosive when dry.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV (metal): 0.1 mg/m³ (ACGIH 1997). EU OEL: 0.1 mg/m³ as TWA (EU 2000). OSHA PEL: TWA 0.01 mg/m³ NIOSH REL: TWA 0.01 mg/m³ NIOSH IDLH: 10 mg/m³ (as Ag) See: <u>IDLH INDEX</u></p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: Inhalation of high amounts of metallic silver vapours may cause lung damage with pulmonary oedema.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may cause a grey-blue discoloration of the eyes, nose, throat and skin (argyria/argyrosis).</p>
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PHYSICAL PROPERTIES	Boiling point: 2212°C Melting point: 962°C	Relative density (water = 1): 10.5 Solubility in water: none
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ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to aquatic organisms.	
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NOTES

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

ADDITIONAL INFORMATION

ICSC: 0810	(C) IPCS, CEC, 1994	SILVER
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International Chemical Safety Cards

BARIUM

ICSC: 1052



Ba
Atomic mass: 137.3

ICSC # 1052
CAS # 7440-39-3
RTECS # CO8370000
UN # 1400
October 20, 1999 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable. Many reactions may cause fire or explosion.	NO open flames, NO sparks, and NO smoking. NO contact with water.	Special powder, dry sand, NO hydrous agents. NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system; dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT wash away into sewer.	Separated from halogenated solvents, strong oxidants, acids. Dry. Keep under inert gas, oil or oxygen-free liquid.	UN Hazard Class: 4.3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1052

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BARIUM

ICSC: 1052

I M P O R T A N T A C T I O N S	PHYSICAL STATE; APPEARANCE: YELLOWISH TO WHITE LUSTROUS SOLID IN VARIOUS FORMS.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by ingestion.	
	PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.	INHALATION RISK:	
	CHEMICAL DANGERS: The substance may spontaneously ignite on contact with air (if in powder form). The substance is a strong reducing agent and reacts violently with oxidants and acids. Reacts violently with halogenated solvents. Reacts with water, forming flammable/explosive gas (hydrogen - see ICSC0001), causing fire and explosion hazard.	EFFECTS OF SHORT-TERM EXPOSURE: The substance irritates the eyes, the skin and the respiratory tract.	
	OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.5 mg/m ³ (as TWA) (ACGIH 1999).	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:	
	PHYSICAL PROPERTIES	Boiling point: 1640°C Melting point: 725°C Density: 3.6 g/cm ³	Solubility in water: reaction
	ENVIRONMENTAL DATA		
	NOTES		
	Reacts violently with fire extinguishing agents such as water, bicarbonate, powder, foam, and carbon dioxide. Rinse contaminated clothes (fire hazard) with plenty of water.		
	Transport Emergency Card: TEC (R)-43G12		
	ADDITIONAL INFORMATION		
ICSC: 1052	BARIUM		
(C) IPCS, CEC, 1994			
IMPORTANT LEGAL	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views		

NOTICE:

of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ICSC: 0020

CADMIUM



Cd
Atomic mass: 112.4



ICSC # 0020
CAS # 7440-43-9
RTECS # EU9800000
UN # 2570
EC # 048-002-00-0
April 22, 2005 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system. dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	Immediately rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.		Fireproof. Dry. Keep under inert gas. Separated from ignition sources, oxidants acids, food and feedstuffs	Airtight, unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E, T-symbols N symbol

R: 45-26-48/23/25-62-63-68-50/53
 S: 53-45-60-61
 UN Hazard Class: 6.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0020

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CADMIUM

ICSC: 0020

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.</p> <p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p> <p>CHEMICAL DANGERS: Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001). Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium, causing fire and explosion hazard.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: (Total dust) 0.01 mg/m³ (Respirable fraction) 0.002 mg/m³ as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL*: 1910.1027 TWA 0.005 mg/m³ *Note: The PEL applies to all Cadmium compounds (as Cd). NIOSH REL*: Ca See Appendix A *Note: The REL applies to all Cadmium compounds (as Cd). NIOSH IDLH: Ca 9 mg/m³ (as Cd) See: <u>IDLH INDEX</u></p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p>INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The fume is irritating to the respiratory tract. Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys, resulting in kidney impairment. This substance is carcinogenic to humans.</p>
	<p>PHYSICAL PROPERTIES</p> <p>Boiling point: 765°C Melting point: 321°C Density: 8.6 g/cm³</p>	<p>Solubility in water: none Auto-ignition temperature: (cadmium metal dust) 250°C</p>
ENVIRONMENTAL DATA		
NOTES		

Reacts violently with fire extinguishing agents such as water, foam, carbon dioxide and halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

ADDITIONAL INFORMATION

ICSC: 0020

CADMIUM

(C) IPCS, CEC, 1994

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LEGAL
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International Chemical Safety Cards

SELENIUM

ICSC: 0072



Se
(powder)

ICSC # 0072
 CAS # 7782-49-2
 RTECS # VS7700000
 EC # 034-001-00-2
 April 26, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with oxidants.	Powder, AFFF, foam, carbon dioxide. NO water
EXPLOSION	Risk of fire and explosion on contact with oxidants.		
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•INHALATION	Irritation of nose. Cough. Dizziness. Headache. Laboured breathing. Nausea. Sore throat. Vomiting. Weakness. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness. Skin burns. Pain. Discolouration.	Protective gloves. Protective clothing.	Rinse skin with plenty of water or shower. Refer for medical attention. Remove and isolate contaminated clothes.
•EYES	Redness. Pain. Blurred vision.	Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible). then take to a doctor.
•INGESTION	Metallic taste. Diarrhoea. Chills. Fever. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.		Fireproof. Separated from strong oxidants, strong acids, food and feedstuffs Dry.	Airtight. Do not transport with food and feedstuffs. T symbol R: 23/25-33-53 S: 1/2-20/21-28-45-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0072 Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the international version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

SELENIUM

ICSC: 0072

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: ODOURLESS SOLID IN VARIOUS FORMS. DARK RED-BROWN TO BLUISH-BLACK AMORPHOUS SOLID OR RED TRANSPARENT CRYSTALS OR METALLIC GREY TO BLACK CRYSTALS.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: Upon heating, toxic fumes are formed. Reacts violently with oxidants strong acids Reacts with water at 50°C forming flammable/explosive gas (hydrogen - see ICSC0001) and selenious acids. Reacts with incandescence on gentle heating with phosphorous and metals such as nickel, zinc, sodium, potassium, platinum.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.2 mg/m³ as TWA (ACGIH 2004). MAK: (Inhalable fraction) 0.05 mg/m³ Peak limitation category: II(4); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004). OSHA PEL*: TWA 0.2 mg/m³ *Note: The PEL also applies to other selenium compounds (as Se) except Selenium hexafluoride. NIOSH REL*: TWA 0.2 mg/m³ *Note: The REL also applies to other selenium compounds (as Se) except Selenium hexafluoride. NIOSH IDLH: 1 mg/m³ (as Se) See: 7782492</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes and the respiratory tract. Inhalation of dust may cause lung oedema (see Notes). Inhalation of fume may cause symptoms of asphyxiation, chills and fever and bronchitis. The effects may be delayed.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the respiratory tract, gastrointestinal tract, and skin, resulting in nausea, vomiting, cough, yellowish skin discoloration, loss of nails, garlic breath and bad teeth.</p>
PHYSICAL PROPERTIES	<p>Boiling point: 685°C Melting point: 170-217°C Relative density (water = 1): 4.8</p>	<p>Solubility in water: none Vapour pressure, Pa at 20°C: 0.1</p>
ENVIRONMENTAL DATA		
NOTES		
Do NOT take working clothes home.		
ADDITIONAL INFORMATION		

ICSC: 0072

SELENIUM

(C) IPCS, CEC, 1994

**IMPORTANT
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NOTICE:**

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International Chemical Safety Cards

LEAD

ICSC: 0052

 			
Lead metal Plumbum Pb (powder)			
ICSC # 0052 CAS # 7439-92-1 RTECS # QF7525000 August 10, 2002 Validated			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST; AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.		Separated from food and feedstuffs incompatible materials See Chemical Dangers.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0052

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

LEAD

ICSC: 0052

I M P O R T A N T D A T A	PHYSICAL STATE; APPEARANCE: BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation and by ingestion.
	PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.	INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.
	CHEMICAL DANGERS: On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.	EFFECTS OF SHORT-TERM EXPOSURE: EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys, resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development. This substance is probably carcinogenic to humans. fast track change Oct 06 - IARC 2A.
	OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.05 mg/m ³ as TWA A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004). MAK: Carcinogen category: 2; Germ cell mutagen group: 3A; (DFG 2006). EU OEL: as TWA 0.15 mg/m ³ (EU 2002). OSHA PEL*: 1910.1025 TWA 0.050 mg/m ³ See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) – see Appendix C. NIOSH REL*: TWA 0.050 mg/m ³ See Appendix C *Note: The REL also applies to other lead compounds (as Pb) – see Appendix C. NIOSH IDLH: 100 mg/m ³ (as Pb) See: 7439921	
PHYSICAL PROPERTIES	Boiling point: 1740°C Melting point: 327.5°C	Density: 11.34 g/cm ³ Solubility in water: none
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.	
NOTES		
Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Card has been partly updated in April 2005. See section Occupational Exposure Limits. Card has been partly updated in October 2006: see section Occupational Exposure Limits, Effects Long Tem Exposure.		



ADDITIONAL INFORMATION	
ICSC: 0052	LEAD
(C) IPCS, CEC, 1994	
IMPORTANT LEGAL NOTICE:	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

International Chemical Safety Cards

MERCURY

ICSC: 0056



Quicksilver
Liquid silver
Hg

ICSC # 0056
CAS # 7439-97-6
RTECS # OV4550000
UN # 2809
EC # 080-001-00-0
April 22, 2004 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in		Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	Special material. Do not transport with food and feedstuffs. T symbol

Useable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.

UN symbol
 R: 23-33-50/53
 S: 1/2-7-45-60-61
 UN Hazard Class: 8
 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0056

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MERCURY

ICSC: 0056

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.025 mg/m³ as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 0.1 mg/m³ Sh Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003). OSHA PEL: C 0.1 mg/m³ NIOSH REL: Hg Vapor: TWA 0.05 mg/m³ skin Other: C 0.1 mg/m³ skin NIOSH IDLH: 10 mg/m³ (as Hg) See: 7439976</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!</p> <p>INHALATION RISK: A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the central nervous system, kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
	<p>PHYSICAL PROPERTIES</p> <p>Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none</p>	<p>Vapour pressure - Pa at 20°C: 0.26 Relative vapour density (air = 1): 6.93 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009</p>
<p>ENVIRONMENTAL DATA</p>	<p>The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.</p> 	
<p>NOTES</p>		

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

ADDITIONAL INFORMATION

ICSC: 0056

MERCURY

(C) IPCS, CEC, 1994

**IMPORTANT
LEGAL
NOTICE:**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ICSC: 0013

ARSENIC



Grey arsenic
As
Atomic mass: 74.9

ICSC # 0013
CAS # 7440-38-2
RTECS # CG0525000
UN # 1558
EC # 033-001-00-X
October 18, 1999 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat. Shortness of breath. Weakness. See Ingestion.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING

Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol N symbol R: 23/25-50/53 S: 1/2-20/21-28-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II
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SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013 Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the international version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

ARSENIC

ICSC: 0013

I M P O R T A N T A R T I C L E	PHYSICAL STATE; APPEARANCE: ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.
	PHYSICAL DANGERS:	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.
	CHEMICAL DANGERS: Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce	EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys, resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.
	OCCUPATIONAL EXPOSURE LIMITS: OSHA PEL: 1910.1018 TWA 0.010 mg/m ³ NIOSH REL: Ca C 0.002 mg/m ³ 15-minute See Appendix A NIOSH IDLH: Ca 5 mg/m ³ (as As) See: 7440382 TLV: 0.01 mg/m ³ as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004). MAK: Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow, resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.
PHYSICAL PROPERTIES	Sublimation point: 613°C Density: 5.7 g/cm ³	Solubility in water: none

ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.	
NOTES		
The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222). Transport Emergency Card: TEC (R)-61GT5-II		
ADDITIONAL INFORMATION		
ICSC: 0013	ARSENIC	
(C) IPCS, CEC, 1994		
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

International Chemical Safety Cards

CHROMIUM

ICSC: 0029



Chrome
Cr
Atomic mass: 52.0
(powder)

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000
October 27, 2004 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust: closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.			

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0029

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ICSC: 0029

CHROMIUM

<p>I M P O R T A N T A T T A</p>	<p>PHYSICAL STATE: APPEARANCE: GREY POWDER</p> <p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p> <p>CHEMICAL DANGERS: Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances, causing fire and explosion hazard.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004). MAK not established. OSHA PEL*: TWA 1 mg/m³ See Appendix C *Note: The PEL also applies to insoluble chromium salts. NIOSH REL: TWA 0.5 mg/m³ See Appendix C NIOSH IDLH: 250 mg/m³ (as Cr) See: 7440473</p>	<p>ROUTES OF EXPOSURE:</p> <p>INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: May cause mechanical irritation to the eyes and the respiratory tract.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</p>
<p>PHYSICAL PROPERTIES</p>	<p>Boiling point: 2642°C Melting point: 1900°C Density: 7.15 g/cm³</p>	<p>Solubility in water: none</p>
<p>ENVIRONMENTAL DATA</p>	<p>NOTES</p> <p>The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.</p>	
<p>ADDITIONAL INFORMATION</p>		
<p style="text-align: right;">CHROMIUM</p>		
<p>ICSC: 0029 (C) IPCS, CEC, 1994</p>		
<p>IMPORTANT LEGAL NOTICE:</p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>	

Appendix B

Respirator Fit Test Procedures

Appendix A to Sec. 1910.120--Personal Protective Equipment Test Methods

This appendix sets forth the non-mandatory examples of tests which may be used to evaluate compliance with Sec. 1910.120 (g)(4) (ii) and (iii). Other tests and other challenge agents may be used to evaluate compliance.

A. Totally-encapsulating chemical protective suit pressure test

1.0--Scope

1.1 This practice measures the ability of a gas tight totally-encapsulating chemical protective suit material, seams, and closures to maintain a fixed positive pressure. The results of this practice allow the gas tight integrity of a totally-encapsulating chemical protective suit to be evaluated.

1.2 Resistance of the suit materials to permeation, penetration, and degradation by specific hazardous substances is not determined by this test method.

2.0--Definition of terms

2.1 Totally-encapsulated chemical protective suit (TECP suit) means a full body garment which is constructed of protective clothing materials; covers the wearer's torso, head, arms, legs and respirator; may cover the wearer's hands and feet with tightly attached gloves and boots; completely encloses the wearer and respirator by itself or in combination with the wearer's gloves and boots.

2.2 Protective clothing material means any material or combination of materials used in an item of clothing for the purpose of isolating parts of the body from direct contact with a potentially hazardous liquid or gaseous chemicals.

2.3 Gas tight means, for the purpose of this test method, the limited flow of a gas under pressure from the inside of a TECP suit to atmosphere at a prescribed pressure and time interval.

3.0--Summary of test method

3.1 The TECP suit is visually inspected and modified for the test. The test apparatus is attached to the suit to permit inflation to

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the pre-test suit expansion pressure for removal of suit wrinkles and creases. The pressure is lowered to the test pressure and monitored for three minutes. If the pressure drop is excessive, the TECP suit fails the test and is removed from service. The test is repeated after leak location and repair.

4.0--Required Supplies

4.1 Source of compressed air.

4.2 Test apparatus for suit testing, including a pressure measurement device with a sensitivity of at least $\frac{1}{4}$ inch water gauge.

4.3 Vent valve closure plugs or sealing tape.

4.4 Soapy water solution and soft brush.

4.5 Stop watch or appropriate timing device.

5.0--Safety Precautions

5.1 Care shall be taken to provide the correct pressure safety devices required for the source of compressed air used.

6.0--Test Procedure

6.1 Prior to each test, the tester shall perform a visual inspection of the suit. Check the suit for seam integrity by visually examining the

8.1.4 Records shall be kept for each pressure test even if repairs are being made at the test location.

Caution

Visually inspect all parts of the suit to be sure they are positioned correctly and secured tightly before putting the suit back into service. Special care should be taken to examine each exhaust valve to make sure it is not blocked.

Care should also be exercised to assure that the inside and outside of the suit is completely dry before it is put into storage.

B. Totally-encapsulating chemical protective suit qualitative leak test

1.0--Scope

1.1 This practice semi-qualitatively tests gas tight totally-encapsulating chemical protective suit integrity by detecting inward leakage of ammonia vapor. Since no modifications are made to the suit to carry out

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this test, the results from this practice provide a realistic test for the integrity of the entire suit.

1.2 Resistance of the suit materials to permeation, penetration, and degradation is not determined by this test method. ASTM test methods are available to test suit materials for these characteristics and the tests are usually conducted by the manufacturers of the suits.

2.0--Definition of terms

2.1 Totally-encapsulated chemical protective suit (TECP suit) means a full body garment which is constructed of protective clothing materials; covers the wearer's torso, head, arms, legs and respirator; may cover the wearer's hands and feet with tightly attached gloves and boots; completely encloses the wearer and respirator by itself or in combination with the wearer's gloves, and boots.

2.2 Protective clothing material means any material or combination of materials used in an item of clothing for the purpose of isolating parts of the body from direct contact with a potentially hazardous liquid or gaseous chemicals.

2.3 Gas tight means, for the purpose of this test method, the limited flow of a gas under pressure from the inside of a TECP suit to atmosphere at a prescribed pressure and time interval.

2.4 Intrusion Coefficient means a number expressing the level of protection provided by a gas tight totally-encapsulating chemical protective suit. The intrusion coefficient is calculated by dividing the test room challenge agent concentration by the concentration of challenge agent found inside the suit. The accuracy of the intrusion coefficient is dependent on the challenge agent monitoring methods. The larger the intrusion coefficient the greater the protection provided by the TECP suit.

3.0--Summary of recommended practice

3.1 The volume of concentrated aqueous ammonia solution (ammonia hydroxide NH_4OH) required to generate the test atmosphere is determined using the directions outlined in 6.1. The suit is donned by a person wearing the appropriate respiratory equipment (either a positive pressure self-contained breathing apparatus or a positive pressure supplied air respirator) and worn inside the enclosed test room. The

exhaust of the ammonia test atmosphere after the test(s) are completed.

5.5 Individuals shall be medically screened for the use of respiratory protection and checked for allergies to ammonia before participating in this test procedure.

6.0--Test procedure

6.1.1 Measure the test area to the nearest foot and calculate its volume in cubic feet. Multiply the test area volume by 0.2 milliliters of concentrated aqueous ammonia solution per cubic foot of test area volume to determine the approximate volume of concentrated aqueous ammonia required to generate 1000 ppm in the test area.

6.1.2 Measure this volume from the supply of concentrated aqueous ammonia and place it into a closed plastic container.

6.1.3 Place the container, several high range ammonia detector tubes, and the pump in the clean test pan and locate it near the test area entry door so that the suited individual has easy access to these supplies.

6.2.1 In a non-contaminated atmosphere, open a pre-sealed ammonia indicator strip and fasten one end of the strip to the inside of the suit face shield lens where it can be seen by the wearer. Moisten the indicator strip with distilled water. Care shall be taken not to contaminate the detector part of the indicator paper by touching it. A small piece of masking tape or equivalent should be used to attach the indicator strip to the interior of the suit face shield.

6.2.2 If problems are encountered with this method of attachment, the indicator strip can be attached to the outside of the respirator face piece lens being used during the test.

6.3 Don the respiratory protective device normally used with the suit, and then don the TECP suit to be tested. Check to be sure all openings which are intended to be sealed (zippers, gloves, etc.) are completely sealed. DO NOT, however, plug off any venting valves.

6.4 Step into the enclosed test room such as a closet, bathroom, or test booth, equipped with an exhaust fan. No air should be exhausted from the chamber during the test because this will dilute the ammonia challenge concentrations.

6.5 Open the container with the pre-measured volume of concentrated aqueous ammonia within the enclosed test room, and pour the liquid into the empty plastic test pan. Wait two minutes to allow for adequate volatilization of the concentrated aqueous ammonia. A small mixing fan can be used near the evaporation pan to increase the evaporation rate of the ammonia solution.

6.6 After two minutes a determination of the ammonia concentration within the chamber should be made using the high range colorimetric detector tube. A concentration of 1000 ppm ammonia or greater shall be generated before the exercises are started.

6.7 To test the integrity of the suit the following four minute exercise protocol should be followed:

6.7.1 Raising the arms above the head with at least 15 raising motions completed in one minute.

6.7.2 Walking in place for one minute with at least 15 raising motions of each leg in a one-minute period.

6.7.3 Touching the toes with a least 10 complete motions of the arms from above the head to touching of the toes in a one-minute period.

6.7.4 Knee bends with at least 10 complete standing and squatting motions in a one-minute period.

6.8 If at any time during the test the colorimetric indicating paper should change colors, the test should be stopped and section 6.10 and 6.12 initiated (See] 4.2).

Visually inspect all parts of the suit to be sure they are positioned correctly and secured tightly before putting the suit back into service. Special care should be taken to examine each exhaust valve to make sure it is not blocked.

Care should also be exercised to assure that the inside and outside of the suit is completely dry before it is put into storage.

APPENDIX 5

MANUFACTURER SPECIFICATIONS FOR VAPOR BARRIER

VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

RAVEN
INDUSTRIES

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 VBP 20

APPLICATIONS

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

VaporBlock® Plus™
UNDERSLAB VAPOR RETARDER / GAS BARRIER

VAPORBLOCK® PLUS™ VBP20



Under-Slab Vapor / Gas Barrier

PROPERTIES	TEST METHOD	VAPORBLOCK PLUS 20	
		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)
(AFTER CONDITIONING) PERMS (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.

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



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



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1/11 EFD 1125