

510 EAST 185TH STREET

BROOKLYN, NEW YORK

Remedial Action Work Plan

NYC VCP Site Number: 16CVCP055X

NYC E-Designation Site Number: 16HAZ194X

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REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

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

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

CERTIFICATION

I, James R. Holzmacher P.E., am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 510 East 185th Street Site 16CVCP055X.

I, Philip Hoffken Jr. am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 510 East 185th Street Site 16CVCP055X.

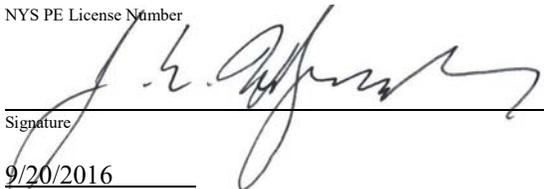
I certify that this Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site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

J. Robert Holzmacher P.E.

Name

66054

NYS PE License Number



Signature

9/20/2016

Date



Heather Sonnenberg

QEP Name



QEP Signature

9/20/2016

Date

EXECUTIVE SUMMARY

Ratan Realty, LLC has enrolled in the New York City Voluntary Brownfield Cleanup Program (NYC VCP) to investigate and remediate a 21,250-square foot site located at 510 East 185th Street in Bronx, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms to applicable laws and regulations.

Site Location and Current Usage

The Site is located at 510 East 185th Street in the Belmont section in Bronx, New York and is identified as Block 3053 and Lot 28 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 21,250-square feet and is bounded by East 185th Street to the north, 2325 Bathgate Avenue and 505 East 184th Street properties to the south, Bathgate Avenue to the east, and Bassford Avenue to the west. A map of the site boundary is shown in Figure 2.

Currently, the Site is a vacant commercial store that was formerly used as a night club, restaurant/food store and retail shops. There is a small mechanical room located at the corner of Bathgate Avenue and East 185th Street, with access through bilco doors in the sidewalk along Bathgate Avenue.

Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of three hotels [Ramada Hotel (BLDG A) and a Sleep Inn/Mainstay Suite Hotel (BLDG B)]. BLDG B will be occupied with Sleep Inn occupying the first three floors and the cellar with Mainstay Suite occupying floors four through nine. BLDG B will contain nine floors and a cellar while BLDG A will contain seven floors and a cellar. BLDG B will occupy approximately 6,150 square feet with BLDG A occupying 6,846 square feet. Both building A and building B will have lower level cellar parking consisting of a

total of 23 parking spaces. Layout of the proposed site development is presented in Appendix 5. Figure 3 shows the anticipated excavation depths across the property.

BLDG A will have frontage along 73' of Bathgate Avenue and 100' of East 185th Street. The remaining part of the property along Bathgate Avenue will contain the onsite parking. The hotel is to be constructed with an elevated first floor and a multi-level cellar. The proposed construction is to have the lobby located along East 185th Street. The lobby will be the only part of BLDG A that will be on grade level. Once past the lobby either a set of stairs or elevators will be needed to reach the first floor. The first floor will contain eight guestrooms and a mechanical room. The second floor will contain 12 guestrooms, while floors three through seven will each contain eleven guestrooms with a mechanical room. The roof will have the elevator machine rooms and the staircase bulkheads. Five guestrooms will be located in the cellar along with a laundry room, fitness room, breakfast area, various mechanical rooms and onsite parking. The parking area will be in the rear of the building, adjacent to the 2325 Bathgate Avenue property with the guestrooms in the middle and the mechanical rooms below the lobby.

The cellar is anticipated to have two separate elevations below grade. The guestrooms, laundry room, fitness room, and breakfast area will descend approximately four feet below grade. The remaining portion of the cellar, occupied by the mechanical rooms will descend twelve feet below grade. Excavation for this multi-level cellar is anticipated to require the removal of 1,340 cubic yards of in place material.

BLDG B will occupy 80'2" of East 185th Street and 54' 6" of Bassford Avenue. The remaining portion of the property along Bassford will be for the onsite parking and access to the parking. The parking lot for BLDG B and BLDG A will be shared although BLDG B parking lot will be approximately 3.5' lower and connected by a ramp.

BLDG B will also have an elevated first floor. Entrance to the hotel will be at the corner to East 185th Street and Bassford Avenue. Once past the lobby elevators or a staircase will be required to get to the first floor, approximately 4' higher than the lobby grade. The first floor will contain thirteen guestrooms. The second and third floor will contain seventeen guestrooms, while floors four through eight will each contain nine guestrooms with a mechanical room. The roof will have the elevator machine rooms and the staircase bulkheads. Six guestrooms will be

located in the cellar along with a meeting room, employee breakroom, laundry room, fitness room, breakfast area, various mechanical rooms and onsite parking.

The cellar is anticipated to have three separate elevations below grade. The parking lot will descend approximately four to five feet below grade. The guestrooms, laundry room, fitness room, and breakfast area will descend approximately six to seven feet below grade. The remaining portion of the cellar, occupied by the mechanical rooms will descend ten feet below grade. Excavation for this multi-level cellar is anticipated to require the removal of 3,306 cubic yards of in place material.

The current zoning designation is M1-4/R7A. The zoning designation M1-4 is typically characterized by one- or two-story warehouses with loading bays. M1 districts typically include light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. Offices, hotels and most retail uses are also permitted. Zoning description R7A requires the following of the contextual Quality Housing regulations, mandatory in R7A districts, typically produce high lot coverage, seven- and eight-story apartment buildings, and blending with existing buildings in many established neighborhoods. Off-street parking is not allowed in front of a building. Parking is required for 50% of all dwelling units. The proposed use is consistent with existing zoning for the property.

As required by the zoning documents, there are 15' setbacks along East 185th Street, Bassford Avenue and Bathgate Avenue.

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

Summary of Environmental Findings

1. Elevation of the property ranges from 70.63 feet to 77.30 feet.
2. Depth to groundwater ranges from 15 to 22 feet at the Site.
3. Groundwater flow is generally from east-southeast to west-northwest beneath the Site.
4. Depth to bedrock is approximately 50 to 65 feet at the Site.

5. The stratigraphy of the site, from the surface down, consists of four feet of historic fill underlain by twenty-one feet of a geologic unit consisting of mainly fine grained sand and silt.
6. Soil boring sample results were compared to NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted Residential Use Soil Cleanup Standards (RRSCO) as presented in 6NYCRR Part 375-6.8. Soil/fill samples collected during the RI showed no VOCs, SVOCs, pesticides or PCBs detected above Track 1 Unrestricted Use SCOs. In the shallow soil samples three metals including barium (max. concentration of 651 ppm), lead (max. concentration of 215 ppm), and zinc (max. concentration of 328 ppm) exceeded their respective Unrestricted Use SCOs. Of these exceedances barium exceeded the Restricted-Commercial SCO of 400 ppm in SB-3. In the deeper soil samples, four metals including lead (max. concentration of 313 ppm), manganese (max. concentration of 2,720 ppm), mercury (max. concentration of 0.291 ppm), and zinc (max. concentration of 380 ppm) exceeded their respective Unrestricted Use SCOs. Of these exceedances only manganese exceeded the Restricted-Residential SCO of 2,000 ppm in SB-2. Overall, soil chemistry is unremarkable.
7. Groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the RI showed no SVOCs, Pesticides, or PCBs at concentrations exceeding their respective GQSs. The VOC methylene chloride (max. concentration of 6.9 ppb) was detected exceeding its GQS of 5.0 ppb. This compound, a laboratory cleaning agent, was also detected in the trip blank indicating that methylene chloride is a laboratory contaminant and not indicative of a groundwater issue. Several metals were identified in groundwater, but only four metals including magnesium (max. concentration of 47.0 ppm), manganese (max. concentration of 0.347 ppm), and sodium (max. concentration of 64.8 ppm) were detected at concentrations exceeding their GQS.
8. Soil vapor results collected during the Subsurface Investigation were compared to the compounds listed in the Indoor Air Guidance Values and the Vapor Intrusion Matrices 1 and 2 detailed in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion, dated October 2006. Soil vapor samples collected during

the RI showed low levels of petroleum related compounds with the highest total concentration of BTEX at 139.5 µg/m³. Acetone was detected in six of the seven soil vapor samples collected, with a maximum concentration of 477 ug/m³. Chloroform was detected in six of the seven soil vapor samples collected, with a maximum concentration of 109 ug/m³. Chlorinated VOCs were detected at elevated concentrations including Tetrachloroethylene detected in six of the seven samples ranging from 4.58 ug/m³ to 14.2 ug/m³ and Trichlorofluoromethane detected in all seven soil vapor samples ranging from 2.51 ug/m³ to 1,050 ug/m³. Carbon tetrachloride was not detected. 1,1,1-Trichloroethane (max at 2.8 ug/m³) and Trichloroethene (max at 1.72 ug/m³) were detected below Vapor Intrusion Matrices established by the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006.

Summary of the Remedy

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establish Track 4, Site Specific 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 Site Specific SCOs. For development purposes, the entire site will be excavated to a depth between seven feet to thirteen feet below grade. The depth of excavation depends on the location of excavation, because adjacent grade topography is not level. Approximately, 1,800 cubic yards of soils will be excavated and removed from this site.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site;
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials;
9. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations;
10. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities;
11. Collection and analysis of five end-point samples to determine the performance of the remedy with respect to attainment of SCOs;
12. construction and maintenance of an engineered composite cover consisting of concrete foundation footings, building slab, and foundation walls of approved DOB thickness will occupy the entire site to prevent human exposure to residual soil/fill remaining under the Site;
13. Installation of a vapor barrier system beneath the building slab and outside foundation sidewalls below grade.
14. Installation of a passive SSDS.
15. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.

18. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and if Track 1 SCOs are not achieved, describes all Engineering and Institutional Controls to be implemented at the Site.
19. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
20. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

COMMUNITY PROTECTION STATEMENT

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

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

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

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

Qualitative Human Health Exposure Assessment. An important part of the cleanup planning for the Site is the performance of a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.

Health and Safety Plan. This cleanup plan includes a Health and Safety Plan that is designed to protect community residents and on-Site workers. The elements of this plan are in compliance with safety requirements of the United States Occupational Safety and Health Administration. This plan includes many protective elements including those discussed below.

Site Safety Coordinator. This project has a designated Site safety coordinator to implement the Health and Safety Plan. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is Heather V. Sonnenberg and can be reached at 631-234-2220 ext. 111.

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 NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager Anish Gandhi at 201-912-7859 or Victor Rathod at 973-418-4949 or NYC Office of Environmental Remediation Project Manager William Wong at 212-341-0659.

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

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

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

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

Complaint Management. The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager Anish Gandhi at 201-912-7859 or Victor Rathod at 973-418-4949, the NYC Office of Environmental Remediation Project Manager William Wong at 212-341-0659, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

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

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

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

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

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

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

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

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

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

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

REMEDIAL ACTION WORK PLAN

1.0 SITE BACKGROUND

Ratan Realty, LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 510 East 185th Street in the Belmont section of Bronx, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 SITE LOCATION AND CURRENT USAGE

The Site is located at 510 East 185th Street in the Belmont section in Bronx, New York and is identified as Block 3053 and Lot 28 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 21,250-square feet and is bounded by East 185th Street to the north, 2325 Bathgate Avenue and 505 East 184th Street properties to the south, Bathgate Avenue to the east, and Bassford Avenue to the west. A map of the site boundary is shown in Figure 2.

Currently, the Site is a vacant commercial store that has been formerly used as a night club, restaurant/food store and retail shops. There is a small mechanical room located at the corner of Bathgate Avenue and East 185th Street, with access through bilco doors in the sidewalk along Bathgate Avenue.

1.2 PROPOSED REDEVELOPMENT PLAN

The proposed future use of the Site will consist of three hotels; Ramada Hotel (BLDG A) Sleep Inn Hotel (BLDG B) and Mainstay Suite Hotel (BLDG B). Sleep Inn Hotel will occupy a portion of the cellar and the first three floors. The Mainstay Suite Hotel will occupy floors four

through nine. The Sleep Inn Hotel is intended to be used for short term hotel guests and the Mainstay Suite Hotel is intended to be used as apartments. The hotels will share a common wall with BLDG A occupying approximately 4,269 square feet and BLDG B occupying 4,324 square feet. The remaining 12,818 square feet will be occupied by a common parking lot on the lower level of the basement. The layout of the proposed site development is presented in Appendix 5. Figure 3 shows the anticipated excavation depths of the entire property.

BLDG A will have frontage along 54' 6" of Bathgate Avenue and 78' 4" of East 185th Street. The remaining part of the property along Bathgate Avenue will contain the onsite parking, and access to the parking structure. The hotel is to be constructed with an elevated first floor and a multi-level cellar. The proposed construction is to have the lobby located along East 185th Street. The lobby will be the only part of BLDG A that will be on grade level. Once past the lobby either a set of stairs or elevators will be needed to reach the first floor. The first floor will contain eight guestrooms and a mechanical room. The second and third floor will contain 12 guestrooms, while floors four through seven will each contain eleven guestrooms with a mechanical room. The roof will have the elevator machine rooms and the staircase bulkheads. Five guestrooms will be located in the cellar along with a laundry room, fitness room, breakfast area, various mechanical rooms and onsite parking. The parking area will be in the rear of the building, adjacent to the 2325 Bathgate Avenue property with the guestrooms in the middle and the mechanical rooms below the lobby.

The cellar is anticipated to have three separate elevations below grade. The parking lot will descend approximately four to five feet below grade. The guestrooms, laundry room, fitness room, and breakfast area will descend approximately six to seven feet below grade. The remaining portion of the cellar, occupied by the mechanical rooms will descend ten feet below grade. Excavation for this multi-level cellar is anticipated to require the removal of 1,100 cubic yards of in place material.

BLDG B will occupy 80' 2" of East 185th Street and 54' 6" of Bassford Avenue. The remaining portion of the property along Bassford will be for the onsite parking and access to the parking. The parking lot for BLDG B and BLDG A will be shared although BLDG B parking lot will be approximately 3.5' lower and connected by a ramp.

BLDG B will also have an elevated first floor. Entrance to the hotel will be at the corner to East 185th Street and Bassford Avenue. Once past the lobby elevators or a staircase will be required to get to the first floor, approximately 4' higher than the lobby grade. The first floor will contain thirteen guestrooms, an entrance seating area, and two offices. The second and third floor will contain seventeen guestrooms, while floors four through eight will each contain nine guestrooms. The roof will have the elevator machine rooms and the staircase bulkheads. Six guestrooms will be located in the cellar along with a meeting room, employee breakroom, laundry room, fitness room, breakfast area, various mechanical rooms and onsite parking.

The cellar is anticipated to have three separate elevations below grade. The parking lot will descend approximately four to five feet below grade. The guestrooms, laundry room, fitness room, and breakfast area will descend approximately six to seven feet below grade. The remaining portion of the cellar, occupied by the mechanical rooms will descend ten feet below grade. Excavation for this multi-level cellar is anticipated to require the removal of 700 cubic yards of in place material.

The current zoning designation is M1-4/R7A. The zoning designation M1-4 is typically characterized by one- or two-story warehouses with loading bays. M1 districts typically include light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. Offices, hotels and most retail uses are also permitted. Zoning description R7A requires the following of the contextual Quality Housing regulations, mandatory in R7A districts, typically produce high lot coverage, seven- and eight-story apartment buildings, and blending with existing buildings in many established neighborhoods. Off-street parking is not allowed in front of a building. Parking is required for 50% of all dwelling units. The proposed use is consistent with existing zoning for the property.

As required by the zoning documents, there are 15' setbacks along East 185th Street, Bassford Avenue and Bathgate Avenue.

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

1.3 DESCRIPTION OF SURROUNDING PROPERTY

Directly north of the subject property across East 185th Street is 4615 Third Ave occupied by MVP Car Wash, 4599 Third Ave occupied by H & H Tire Shop, and 520 East 185th Street a residential apartment; to the west, is Bassford Avenue with residential properties located at 2319 - 2329 Bassford Avenue beyond; to the south is the residential apartment building 505 East 184th Street and the residential house 2325 Bathgate Avenue; and to the east, beyond Bathgate Avenue is 2328 Bathgate Avenue and 4565 3rd Avenue.

To the west-southwest along East 183rd Street, is Public School 159 Luis Munoz Marin Building. This school is located about 356 feet from the site. The western adjacent property to this school is Washington Park.

Figure 2 shows the surrounding land usage.

1.4 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, 510 East 185th Street*”, dated January, 2016 (RIR).

According to NYC Oasis information, this building was built in 1963. According to the NYC Department of Buildings, this building was built in 1965. According to Certificate of Occupancy dated 1965: Factory, Offices, Men and Women Locker Room & Laboratories. According to Certificate of Occupancy dated 1977: Offices, Loading and Storage. According to Certificate of Occupancy dated 1990: Warehouse, Wholesale Establishment and Loading. According to Certificate of Occupancy dated 2009: Store, Eating and Drinking Establishment. According to Certificate of Occupancy dated 2010: Retail Stores, Contractors Establishment, Warehouse and Loading, Storage and Shipping, Retail Stores, Eating and Drinking Establishment. A City Directory Abstract Search was conducted and a Property Shark Phone Record Search was conducted. According to Sanborn History Maps, the subject property is depicted as dwelling, store/dwelling, vacant in the 1910's, vacant from the 1940's to the 1950's, warehouse from the 1970's to 2003, commercial from 2004 to 2007.

Mr. Philip Hoffken Jr. and Ms. Lauren Fisher of JRH were on-site three times to conduct activities associated with the RIR, and Mr. Hoffken did a walk through the site to assess the accessibility for drilling contractor. There was no evidence of surficial contamination or activities that would cause such - consistent with the Phase I ESA.

Summary of the Work Performed under the Remedial Investigation

Ratan Realty, LLC performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed nine soil borings across the entire project Site, and collected eighteen soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed four groundwater monitoring wells throughout the Site to establish groundwater flow and collected four groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed seven soil vapor probes around Site perimeter and collected seven samples for chemical analysis.

Summary of Environmental Findings

1. Elevation of the property ranges from 70.63 feet to 77.30 feet.
2. Depth to groundwater ranges from 15 to 22 feet at the Site.
3. Groundwater flow is generally from east-southeast to west-northwest beneath the Site.
4. Depth to bedrock is approximately 50 to 65 feet at the Site.
5. The stratigraphy of the site, from the surface down, consists of four feet of historic fill underlain by twenty-one feet of a geologic unit consisting of mainly fine grained sand and silt.
6. Soil boring sample results were compared to NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted Residential Use Soil Cleanup Standards (RRSCO) as presented in 6NYCRR Part 375-6.8. Soil/fill samples collected during the RI showed no VOCs,

SVOCs, pesticides or PCBs detected above Track 1 Unrestricted Use SCOs. In the shallow soil samples three metals including barium (max. concentration of 651 ppm), lead (max. concentration of 215 ppm), and zinc (max. concentration of 328 ppm) exceeded their respective Unrestricted Use SCOs. Of these exceedances barium exceeded the Restricted-Commercial SCO of 400 ppm in SB-3. In the deeper soil samples, four metals including lead (max. concentration of 313 ppm), manganese (max. concentration of 2,720 ppm), mercury (max. concentration of 0.291 ppm), and zinc (max. concentration of 380 ppm) exceeded their respective Unrestricted Use SCOs. Of these exceedances only manganese exceeded the Restricted-Residential SCO of 2,000 ppm in SB-2. Overall, soil chemistry is unremarkable.

7. Groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the RI showed no SVOCs, Pesticides, or PCBs at concentrations exceeding their respective GQSs. The VOC methylene chloride (max. concentration of 6.9 ppb) was detected exceeding its GQS of 5.0 ppb. This compound, a laboratory cleaning agent, was also detected in the trip blank indicating that methylene chloride is a laboratory contaminant and not indicative of a groundwater issue. Several metals were identified in groundwater, but only four metals including magnesium (max. concentration of 47.0 ppm), manganese (max. concentration of 0.347 ppm), and sodium (max. concentration of 64.8 ppm) were detected at concentrations exceeding their GQS.

8. Soil vapor results collected during the Subsurface Investigation were compared to the compounds listed in the Indoor Air Guidance Values and the Vapor Intrusion Matrices 1 and 2 detailed in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion, dated October 2006. Soil vapor samples collected during the RI showed low levels of petroleum related compounds with the highest total concentration of BTEX at 139.5 µg/m³. Acetone was detected in six of the seven soil vapor samples collected, with a maximum concentration of 477 ug/m³. Chloroform was detected in six of the seven soil vapor samples collected, with a maximum concentration of 109 ug/m³. Chlorinated VOCs were detected at elevated concentrations including Tetrachloroethylene detected in six of the seven samples ranging from 4.58 ug/m³ to 14.2 ug/m³ and Trichlorofluoromethane detected in all seven soil vapor samples ranging from 2.51 ug/m³ to 1,050 ug/m³. Carbon tetrachloride was not detected. 1,1,1-Trichloroethane (max at 2.8 ug/m³) and Trichloroethene (max at 1.72 ug/m³)

were detected below Vapor Intrusion Matrices established by the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006.

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

2.0 REMEDIAL ACTION OBJECTIVES

Based on the results of the RI, the following Remedial Action Objectives (RAOs) have been identified for this Site:

Groundwater

- Prevent off-Site migration of contaminated groundwater above applicable groundwater standards.

Soil

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

Soil Vapor

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

3.0 REMEDIAL ALTERNATIVES ANALYSIS

The goal of the remedy selection process 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 of Remedy.

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 involves:

- 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. Based on the results of the Remedial Investigation, it is expected that this alternative would be achieved by excavating for development which will extend to depths slightly deeper than identified locations of contaminants. If soil/ fill

containing analytes at concentrations above Track 1 Unrestricted SCOs is still present at the base of the excavation after removal of all soil required for the development construction is complete, additional excavation will be performed to meet Track 1 Unrestricted SCOs.

- No Engineering or Institutional Controls are required for a Track 1 cleanup, but a soil vapor barrier below the building slab and along the vertical foundation walls will be installed as part of development to prevent potential exposures from soil vapor in the future; and
- As part of development, a final cover will be placed over the entire Site.

Alternative 2 involves:

- Establishment of Site Specific Use (Track 4) Soil Cleanup Objectives (SCOs);
- Removal of all soil/fill exceeding Site Specific (Track 4) SCOs and confirmation that Site Specific (Track 4)SCOs have been achieved with post-excavation endpoint sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would be achieved by excavating for development which will extend to depths slightly deeper than identified locations of contaminants. If soil/ fill containing analytes at concentrations above Site Specific (Track 4) SCOs is still present at the base of the excavation after removal of all soil required for the development construction is complete, additional excavation will be performed to meet Site Specific (Track 4)SCOs;
- Placement of a composite cover system over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a soil vapor barrier system beneath the building slab and along foundation side walls to prevent future potential exposures from soil vapor;
- Installation of a Sub Slab Depressurization System (SSDS) beneath the entire new building footprint to prevent any potential future exposures from soil vapor;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of sensitive 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
- Continued registration with an "E" Designation to memorialize the remedial action and the Engineering and Institutional Controls required by this RAWP.

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 SCOs 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 the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Site Specific (Track 4) SCOs, as well as by placement of Institutional and Engineering Controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. The SSDS system, along with the vapor barrier system would mitigate any vapor from entering the building. Implementing Institutional Controls including a Site Management Plan and continuing the "E" Designation on the property would ensure that the composite cover system remains intact and protective of public health. Establishment of Site Specific (Track 4) SCOs 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 system and installation of a SSDS.

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 SCOs and Protection of Groundwater SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system beneath the building's basement slab and continuing the vapor barrier along subgrade foundation walls, as part of development. In addition, Alternative 1 would include installation of a passive SSDS as part of development.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to meet Site Specific (Track 4) SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system beneath the building basement slab and along subgrade foundation walls, as well as installing an active SSDS. 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 effects on public health and the environment during implementation of the remedial action, including protection of the community, environmental impacts, time until remedial response objectives are achieved, and protection of workers during remedial actions.

Short-term impacts would be higher for Alternative 1 as additional soils would be required to achieve Track 1 Unrestricted Use SCOs. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. 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. Approximately 100, 30-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and 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 ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

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

Alternative 2 would provide long-term effectiveness by removing on-Site contamination and attaining Site Specific (Track 4) 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 an "E" Designation 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. Both alternatives would result in removal of soil contamination exceeding the SCOs providing the highest level, most effective and permanent remedy over the long-term with respect to a remedy for contaminated soil, which will eliminate any migration to groundwater. Potential sources of soil vapor and groundwater contamination will also be eliminated as part of the remedy.

Reduction of toxicity, mobility, or volume of contaminated material

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that

are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 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 all historic fill at the Site, and all remaining on-Site soil/fill beneath the building will meet Site Specific (Track 4)_SCOs. Alternative 1 would remove a greater total mass of contaminants from the Site.

Implementability

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

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 4 feet below grade during the RI, and the new building redevelopment plan will require excavation depths from 1 foot to 11 feet below grade, in order to remove the historic fill across the site some areas may need to be over excavated and the reuse of soil may be needed. The initial costs associated with Alternative 1 would be slightly higher than Alternative 2 as it involves additional removal of soil/fill and disposal across the Site. If additional soil/fill with analytes above Track 1 Unrestricted Use SCOs is encountered but below Site Specific (Track 4) SCOs remain after excavation required for development long-term costs for Alternative 2 would likely be higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

The remedial plan creates an approach that couples the remedial action with the redevelopment of the Site, lowering total costs. The remedial plan is also cost effective in that it will take into consideration the selection of the closest and most appropriate disposal facilities to reduce transportation and disposal costs during excavation of historic fill and other soils during 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 construction of two new commercial buildings, one 7-stories and an 8-story building that will be used as a hotel, both with full basements. Following remediation, the Site will meet either Track 1 Unrestricted Use or Site Specific (Track 4) 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 Site is located in a developed urban area of Bronx consisting primarily of residential and commercial buildings. The development would remediate one vacant contaminated lot and provide a modern building. The proposed development would clean up the property and make it safer, create new employment opportunities, living and working space 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 Site Specific (Track 4) 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. 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. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix 2.

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establish Track 4, Site Specific 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 Site Specific SCOs. For development purposes, the entire site will be excavated to a depth between seven feet to thirteen feet below grade. The depth of excavation depends on the location of excavation, because adjacent grade topography is not level. Approximately, 1,800 cubic yards of soils will be excavated and removed from this site.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site;

8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials;
9. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations;
10. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities;
11. Collection and analysis of five end-point samples to determine the performance of the remedy with respect to attainment of SCOs;
12. construction and maintenance of an engineered composite cover consisting of concrete foundation footings, building slab, and foundation walls of approved DOB thickness will occupy the entire site to prevent human exposure to residual soil/fill remaining under the Site;
13. Installation of a vapor barrier system beneath the building slab and outside foundation sidewalls below grade.
14. Installation of a passive SSDS.
15. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
18. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and if Track 1 SCOs are not achieved, describes all Engineering and Institutional Controls to be implemented at the Site.
19. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.

20. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

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

<u>Contaminant</u>	<u>Site-Specific SCO's</u>
Lead	800 ppm
Mercury	1.5 ppm
Barium	600 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.

Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated and disposed off-Site is 2000 cubic yards.

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. Seven (7) 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 list SCO analytes, i.e. “lead, mercury, and barium” 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.

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. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

One blind duplicate sample for every 20 samples collected will be submitted to the approved laboratory for analysis of the same parameters. Trip blanks will be used whenever samples are transported to the laboratory for analysis of VOCs. One trip blank will be submitted to the laboratory with each shipment of soil samples. Trip blanks will not be used for samples to be analyzed for metals, SVOCs or pesticides.

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

Import and Reuse of Soils

Import of soils onto the property will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. Imported soil will meet the lower of:

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

The import of soil onto the site is not anticipated. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is less than 1 ton, based upon over excavating of structural elements. Due to the small amount of material that may be re-used at the site a map of soil backfill placement locations will be provided in the Remedial Closure Report..

4.3 ENGINEERING CONTROLS

Engineering Controls will be employed in the remedial action to address residual contamination remaining at the site. The Site has three primary Engineering Control Systems. These are:

- composite cover system consisting of asphalt covered roads, concrete covered sidewalks, and concrete building slabs;
- soil vapor barrier;
- passive SSDS

Composite Cover System

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of a concrete foundation that is to be approved by NYCDOB prior to permits being issued and will encompass the buildings slab; sub-grade foundation walls and constructed with rebar. The construction is anticipated to occupy the entire footprint of the property.

Figure 5 shows the typical design for each remedial cover type used on this Site. Figure 4 shows the location of each cover type built at the Site.

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

Vapor Barrier

Migration of soil vapor will be mitigated with a combination of building slab and vapor barrier. As part of new development, a Vaporblock Plus VBP 20-mil vapor barrier, manufactured by Raven Industries, will be installed beneath the structure's slab and along foundation sidewalls. Installation details (penetrations, joints, etc.) with respect to the proposed building foundation, footings, slab, and sidewalls product specification sheets are provided in Appendix 6.

The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The RAR will include photographs (maximum of two photos per page) of the installation process, professional engineer (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.

SUB-SLAB DEPRESSURIZATION SYSTEM

Migration of soil vapor into the building will be mitigated with the construction of a passive Sub-Slab Depressurization System (SSDS). The SSDS will consist of two closed loops of horizontal pipe set in the middle of a gas permeable layer immediately beneath the building slab and vapor barrier system. Each loop will consist of fabric wrapped 4-inch schedule 40 HDPE slotted pipe connected to a 3-inch ductile iron, or PVC riser pipe that will penetrate the concrete slab and travel through the building to the roof.

The SSDS is 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. Maintenance of this SSDS will be described in the Site Management Plan in the Remedial Action Report. The location and layout of the SSDS is shown in Figure 7. A typical section of the system is shown in Figure 7.

4.4 INSTITUTIONAL CONTROLS

Track 1 remedial actions do not require Engineering Controls. If Track 1 SCOs are not achieved, Institutional Controls (IC) will be utilized in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below. Long-term employment of EC/ICs will be established in a Declaration of Covenant and Restrictions (DCR) assigned to the property by the title holder and will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR. The property will continue to be registered with an E-Designation by the NYC Buildings Department.

Institutional Controls for this remedial action are:

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

shall be submitted at a frequency to be 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 commercial use and will not be used for a higher level of use without prior approval by OER.

4.5 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

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

Site management activities, reporting, and EC/IC certification will be scheduled by OER on a periodic basis to be established in the SMP and will be subject to review and modification by

OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by March 31 of the year following the reporting period.

4.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

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

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

Known and Potential Sources

- Several metals in shallow soil samples were detected including lead (max. concentration of 215 ppm), and zinc (max. concentration of 328 ppm) exceeded their respective Unrestricted Use SCOs;
- The metal barium exceeded the Restricted-Commercial SCO of 400 ppm in SB-3 (0-2);
- In the deeper soil samples, three metals including lead (max. concentration of 313 ppm), mercury (max. concentration of 0.291 ppm), and zinc (max. concentration of 380 ppm) exceeded their respective Unrestricted Use SCOs;
- Manganese exceeded the Restricted-Residential SCO of 2,000 ppm in SB-2 (5-7);
- Metals including magnesium (max. concentration of 47.0 ppm), manganese (max. concentration of 0.347 ppm), and sodium (max. concentration of 64.8 ppm) were detected at concentrations exceeding their GQS.

- Soil vapor samples with the highest total concentration of BTEX was at 139.5 $\mu\text{g}/\text{m}^3$;
- Acetone was detected in six of the seven soil vapor samples collected, with a maximum concentration of 477 ug/m^3 ;
- Chloroform was detected in six of the seven soil vapor samples collected, with a maximum concentration of 109 ug/m^3 ; and
- Chlorinated VOCs were detected at elevated concentrations including Tetrachloroethylene detected in six of the seven samples ranging from 4.58 ug/m^3 to 14.2 ug/m^3 and Trichlorofluoromethane detected in all seven soil vapor samples ranging from 2.51 ug/m^3 to 1,050 ug/m^3 . Carbon tetrachloride was not detected. 1,1,1-Trichloroethane (max at 2.8 ug/m^3) and Trichloroethene (max at 1.72 ug/m^3) were detected below Vapor Intrusion Matrices established by the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006.

Nature, Extent, Fate and Transport of Contaminants

Metals are present in the shallow and deep soils exceeding Unrestricted Use SCOs and Restricted-Commercial Use SCOs. Dissolved metals including manganese, and sodium were detected above GQS. The chlorinated VOCs in soil vapor were not detected or were well below guidance issued by New York State DOH and were not found in any of the on-Site soil or groundwater samples collected.

Potential Routes of Exposure

The five elements of an exposure pathway are: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population.

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

- Ingestion of water, fill, or soil;
- Inhalation of vapors and particulates; and

Dermal contact with fill or soil.

Existence of Human Health Exposure

Existing – The Site is currently a vacant building. There is no exposure to surficial soil/fill material. Groundwater is not exposed at the Site, and because the Site is served by the public water supply, groundwater is not used at the Site. There is a small mechanical room where soil vapors may accumulate, however the building is unoccupied, and there is no long term human presence in the cellar.

Construction/ Remediation Activities – Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils as a result of on-Site construction/excavation activities. Similarly, off-Site receptors could be exposed to dust from onsite activities. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through dust controls, and through the implementation of the Community Air Monitoring Plan and a Construction Health and Safety Plan. Groundwater is not anticipated to be encountered, and there will be no structures on site where soil vapor could accumulate.

Proposed Future Conditions – Under future remediated conditions, all soils in excess of Track 4 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/SSDS) 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.

Receptor Populations

The immediate area is mixed use residential and commercial, and is anticipated to remain as such. The new building at the site will be utilized as a retail commercial facility. Potential receptor populations are as follows:

On-Site Receptors - The Site is currently vacant. Therefore, the only potential on-Site receptors are Site representatives, trespassers and visitors granted access to the property. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives, and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child residents.

Off-Site Receptors - Potential offsite receptors within a 0.25-mile radius of the Site include: adult and child residents, commercial, industrial and construction workers, pedestrians, trespassers, and cyclists, based on the following:

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

Overall Human Health Exposure Assessment

There are potential complete exposure pathways for the current site condition. There is a potential complete exposure pathway that requires mitigation during implementation of the remedy. There is no complete exposure pathway under future conditions after the site is developed. Based upon this analysis, complete on-site exposure pathways appear to be present only during the current unremediated phase and during the remedial construction phase. Under current conditions, on-Site exposure pathways are minimized by preventing access to the Site.

During the remedial action, on-site exposure pathways will be eliminated by preventing access to the Site, through implementation of soil/materials management, storm water pollution prevention, dust controls, employment of a community air monitoring plan, and implementation of a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/ fill, as all soil that exceeds Track 4 Site Specific SCOs will have been removed, and the vapor barrier and concrete building slab will interrupt potential for soil vapor intrusion and vapor build-up inside the building.

This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide impervious surface cover cap, and a subsurface vapor barrier system for the building. 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 Heather Sonnenberg., Project Manager. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are James R. Holzmacher P.E. and Heather Sonnenberg.

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

5.4 CONSTRUCTION HEALTH AND SAFETY PLAN

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

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

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field

personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

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

5.5 COMMUNITY AIR MONITORING PLAN

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

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

VOC Monitoring, Response Levels, and Actions

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

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

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring

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

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

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

5.6 AGENCY APPROVALS

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

5.7 SITE PREPARATION

Pre-Construction Meeting

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

Mobilization

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

Utility Marker Layouts, Easement Layouts

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

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

Dewatering

If dewatering is to be used, describe the method. Explain methods for pre-treatment and disposal of extracted groundwater, type of permit obtained for dewatering, the agency managing that permit, and location of discharge. Delete this section if dewatering is not proposed

Equipment and Material Staging

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

Stabilized Construction Entrance

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

Truck Inspection Station

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

Extreme Storm Preparedness and Response Contingency Plan

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

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and

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

Storm Response

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

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

Storm Response Reporting

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

5.8 TRAFFIC CONTROL

Drivers of trucks leaving the NYC VCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site will be planned by the construction manager for the Site and reported to OER.

5.9 DEMOBILIZATION

Demobilization will include:

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

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

5.10 REPORTING AND RECORD KEEPING

Daily Reports

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

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

- Photograph of notable Site conditions and activities.

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

An alpha-numeric site map will be used to identify locations described in reports submitted to OER and is shown in Figure 6.

Record Keeping and Photo-Documentation

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

5.11 COMPLAINT MANAGEMENT

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

5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

All changes to the RAWP will be reported to the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be

followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

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

5.13 DATA USABILITY SUMMARY REPORT

The primary objective of a Data Usability Summary Report (DUSR) is to determine whether or not data meets the site specific criteria for data quality and data use. The DUSR provides an evaluation of analytical data without third party data validation. The DUSR for post-remedial samples collected during implementation of this RAWP will be included in the Remedial Action Report (RAR).

6.0 REMEDIAL ACTION REPORT

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

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

- Continue registration of the property with an E-Designation by the NYC Department of Buildings.
- Reports and supporting material will be submitted in digital form.

Remedial Action Report Certification

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

I, James R. Holzmacher P.E., am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 510 East 185th Street, Site 16CVCP055X.

I, Heather Sonnenberg am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 510 East 185th Street, Site 16CVCP055X.

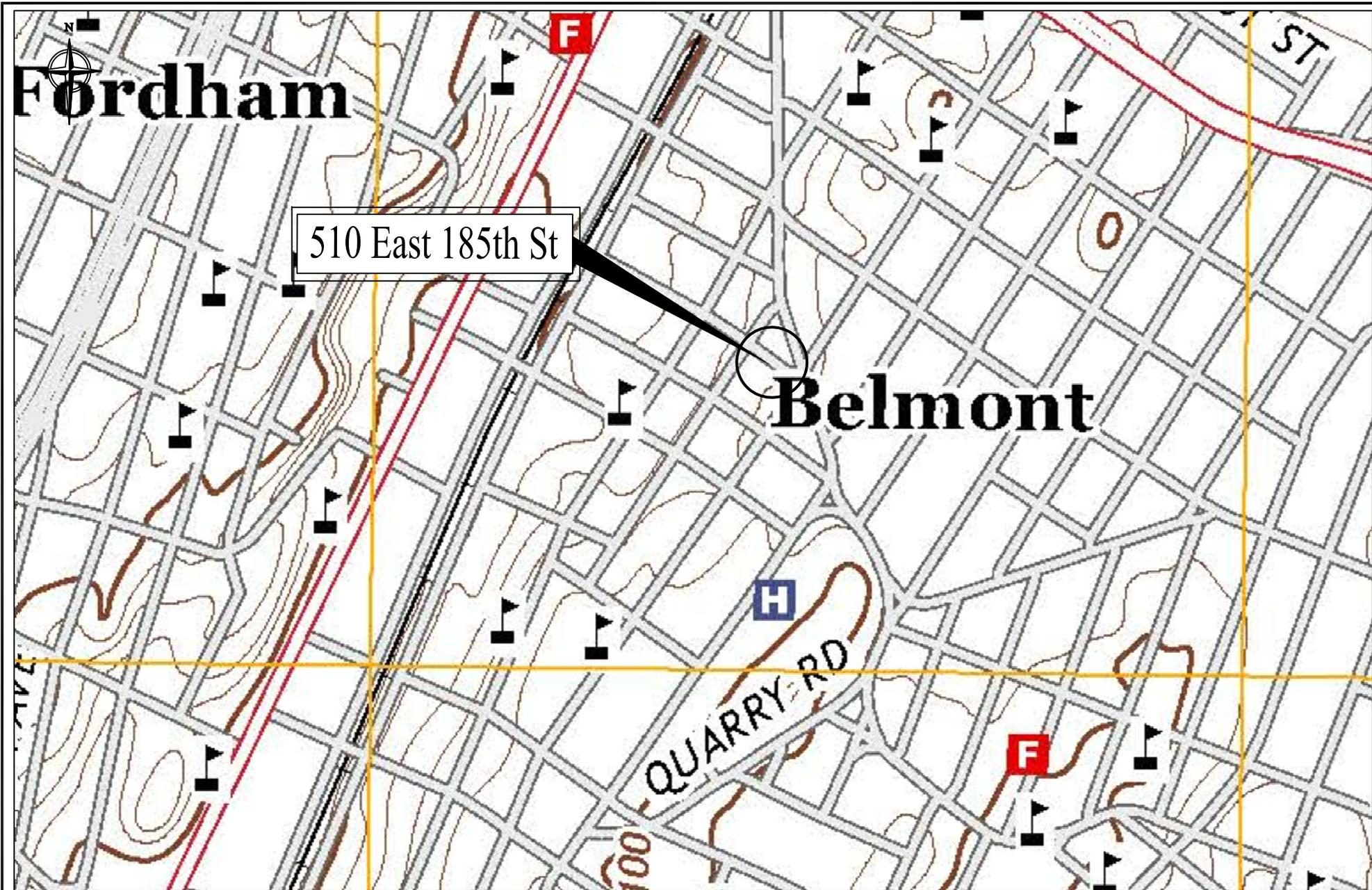
I certify that the OER-approved Remedial Action Work Plan dated month day year and Stipulations in a letter dated month day, year; if any were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material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

7.0 SCHEDULE

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

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	2	-
Fact Sheet 2 announcing start of remedy	1	-
Mobilization	1	1
Remedial Excavation	5	4
Demobilization	unknown	unknown
Record Declaration of Covenants and Restrictions	unknown	unknown
Submit Remedial Action Report	24	-

FIGURES



PREPARED BY:



J.R. HOLZMACHER P.E., LLC

*The Third Generation of Excellence
In Water Supply, Water Resources,
Civil and Environmental Engineering*

3555 VETERANS MEMORIAL HIGHWAY,
SUITE A, RONKONKOMA, NY 11779
PHONE # (631) 234-2220 FAX # (631) 234-2221
E-MAIL: info@holzmacher.com

TITLE:

Site Location Map

510 East 185th Street
Bronx, New York

DWN: LJF	SCALE: 1"=500'	DATE: 01/18/16	PROJECT NO.: RataR 15-01
CHKD: PJH	APPD: PJH	REV.: -	NOTES: -
FIGURE NO.:			1

FOR ANALYSIS
PURPOSES

PRELIMINARY DESIGN

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK

1st FLOOR PLAN

SEAL & SIGNATURE:

DATE: 10-26-15

PROJECT No: 201503

DRAWING BY: C Kuo

CHK BY: M Kang

DWG No:

A-002.00

PAGE No:

LEGEND

-  = ~10.70 below grade
-  = ~ 5.70 below grade
-  = ~ 0.78 below grade
-  = ~ 3.83 below grade
-  = ~ 3.43 below grade
-  = ~ 9.67 below grade



CELLAR FLOOR PLAN

FIGURE 3

ANTICIPATED EXCAVATION DEPTH MAP



E 185 STREET

BASSFORD AVENUE



BATHGATE AVENUE

E 184TH STREET

PREPARED BY:



J.R. HOLZMACHER P.E., LLC

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Civil and Environmental Engineering*

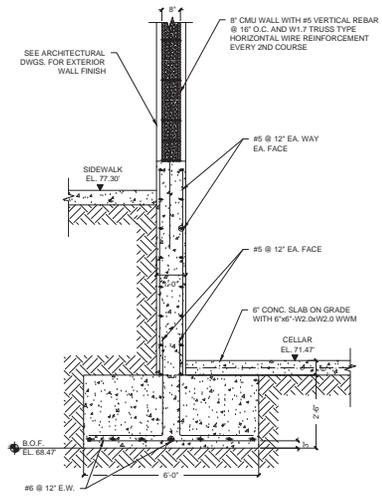
3555 VETERANS MEMORIAL HIGHWAY,
SUITE A, RONKONKOMA, NY 11779
PHONE # (631) 234-2220 FAX # (631) 234-2221
E-MAIL: info@holzmacher.com

TITLE:

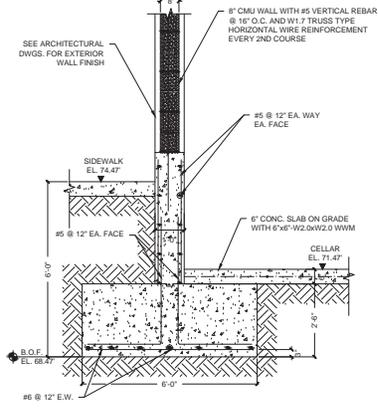
Location of Concrete Cover System

510 East 185th Street
Bronx, New York

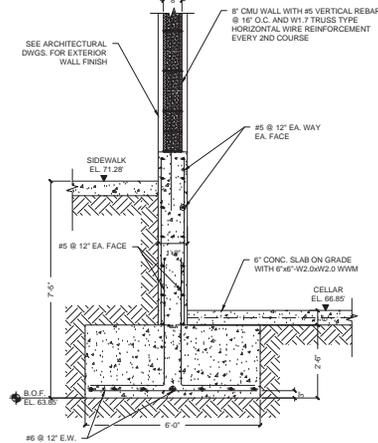
DWN: LJF	SCALE: N.T.S.	DATE: 01/27/16	PROJECT NO.: RataR 15-01
CHKD: PJH	APPD: PJH	REV.: -	NOTES: -
FIGURE NO.:		4	



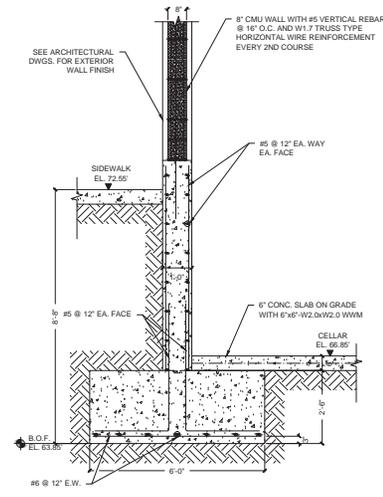
A SECTION
FO-107 SCALE: 3/32" = 1/2"



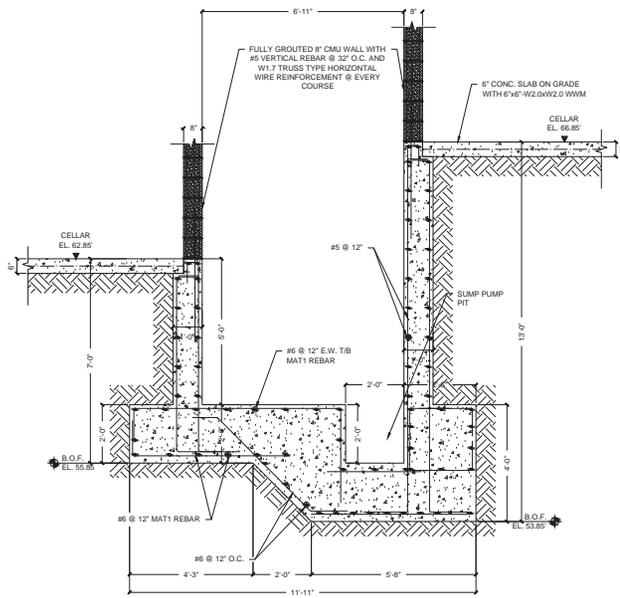
B SECTION
FO-107 SCALE: 3/32" = 1/2"



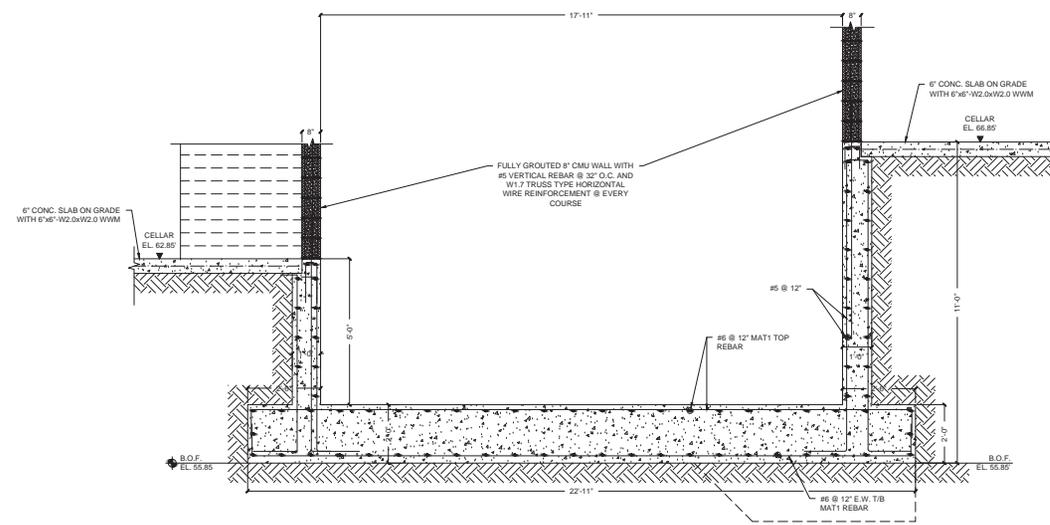
C SECTION
FO-107 SCALE: 3/32" = 1/2"



D SECTION
FO-107 SCALE: 3/32" = 1/2"



H SECTION
FO-107 SCALE: 3/32" = 1/2"

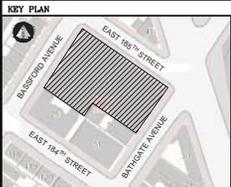


G SECTION
FO-107 SCALE: 3/32" = 1/2"

ENGINEER
LMW Engineering Group, LLC
Jieming Wang, P.E. 074354
125 Lexington Avenue
Linden, NJ, 07036
Tel: (908) 882-7600
Fax: (908) 882-8988

ARCHITECT
MKA
MICHAEL KANG
ARCHITECT, PLLC
Architectural, Interior Design, Planning & Building Code Compliance
3740 Main Street, Suite 408B, Flushing, NY 11354
mka@mkapl.com
Tel: (718) 351-2029
Fax: (718) 481-3439
MICHAEL KANG, RA

CLIENT:



THESE PLANS ARE AN INSTRUMENT OF SERVICE AND ARE THE PROPERTY OF LMW. IMPROVEMENT SHALL RESULT IN PROSECUTION.

No.	Revision Comment	Date

SCALE: AS SHOWN

PROJECT:
PROPOSED NINE (9) STORY BUILDING AT
510 EAST 185TH STREET, BRONX, NY 10458;
BLOCK: 3053; LOT: 28

DRAWING TITLE:
FOUNDATION SECTIONS

SEAL & SIGNATURE
DATE: 01/29/2016
PROJECT NO.: 174-2016
DESIGN BY: DWG BY: SG
CHK. BY: J.W.
DWG. NO.: **FO-101.00**
ASD FILE NO.: 4 OF 15

J.R. Holzmacher P.E., LLC
Figure 5 - Composite Cover Design
Provided By: LMW Engineering Group, LLC.
Jieming Wang, P.E.

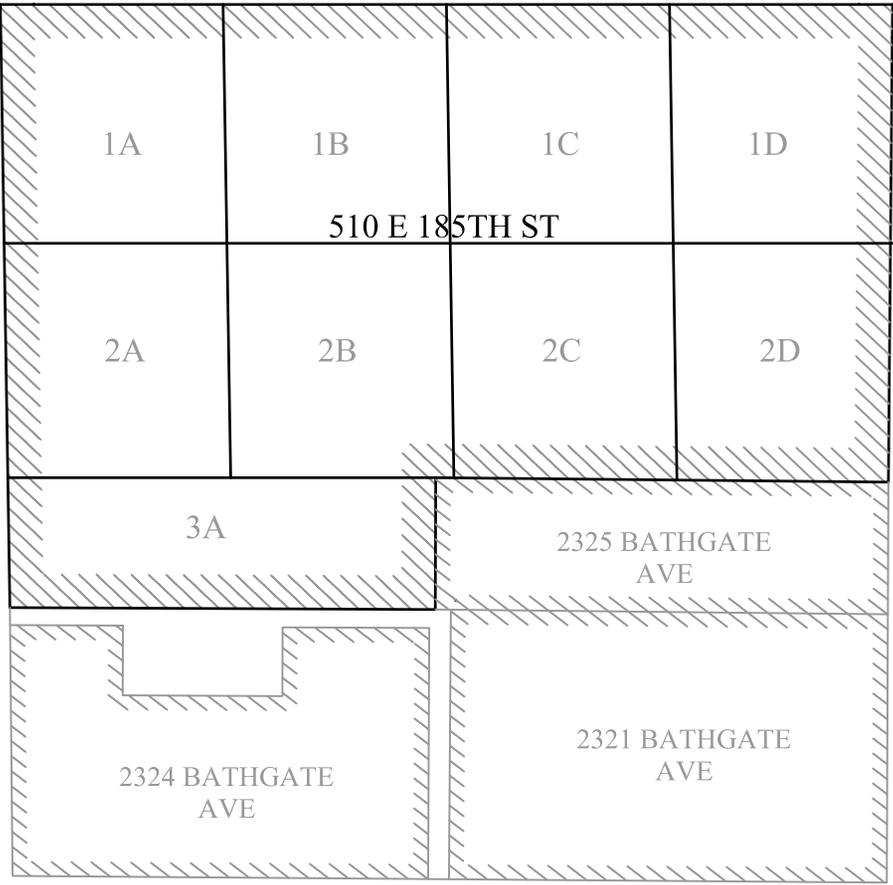


E 185 STREET

THIRD AVENUE

A B C D

1
2
3



E 184TH STREET

- 2327 BASSFORD AVE
- 2325 BASSFORD AVE
- 2323 BASSFORD AVE
- 2321 BASSFORD AVE
- 2319 BASSFORD AVE
- 2317 BASSFORD AVE
- 2315 BASSFORD AVE
- 471-499 E 184TH STREET

- 4563 3RD AVE
- 2328 BATHGATE AVE
- 2328 BATHGATE AVE
- 533 E 184TH ST

BASSFORD AVENUE

BATHGATE AVENUE



J.R. HOLZMACHER P.E., LLC
*The Third Generation of Excellence
 In Water Supply, Water Resources,
 Civil and Environmental Engineering*
 3555 VETERANS MEMORIAL HIGHWAY,
 SUITE A, RONKONKOMA, NY 11779
 PHONE # (631) 234-2220 FAX # (631) 234-2221
 E-MAIL: info@holzmacher.com

TITLE:
Site Grid Map
 510 East 185th Street
 Bronx, New York

DWN: LJF	SCALE: 1"=40'	DATE: 01/27/16	PROJECT NO.: RataR 15-01
CHKD: PJH	APPD: PJH	REV.: -	NOTES: -
FIGURE NO.:			6

TABLES

510 East 185th Street
Bronx, New York 10458
OER Project Number 16EHAZ194X
Unrestricted Residential SCOs

Table 1

	CasNo	Analyte	Units	Limits
VOC	630-20-6	1,1,1,2-Tetrachloroethane	PPB	NA
	71-55-6	1,1,1-Trichloroethane	PPB	680
	79-34-5	1,1,2,2-Tetrachloroethane	PPB	NA
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	PPB	NA
	79-00-5	1,1,2-Trichloroethane	PPB	NA
	75-34-3	1,1-Dichloroethane	PPB	270
	75-35-4	1,1-Dichloroethene	PPB	330
	563-58-6	1,1-Dichloropropene	PPB	NA
	87-61-6	1,2,3-Trichlorobenzene	PPB	NA
	96-18-4	1,2,3-Trichloropropane	PPB	NA
	95-93-2	1,2,4,5-Tetramethylbenzene	PPB	NA
	120-82-1	1,2,4-Trichlorobenzene	PPB	NA
	95-63-6	1,2,4-Trimethylbenzene	PPB	3600
	96-12-8	1,2-Dibromo-3-chloropropane	PPB	NA
	106-93-4	1,2-Dibromoethane	PPB	NA
	95-50-1	1,2-Dichlorobenzene	PPB	1100
	107-06-2	1,2-Dichloroethane	PPB	20
	78-87-5	1,2-Dichloropropane	PPB	NA
	108-67-8	1,3,5-Trimethylbenzene	PPB	8400
	541-73-1	1,3-Dichlorobenzene	PPB	2400
	142-28-9	1,3-dichloropropane	PPB	NA
	106-46-7	1,4-Dichlorobenzene	PPB	1800
	123-91-1	1,4-Dioxane	PPB	100
	594-20-7	2,2-Dichloropropane	PPB	NA
	78-93-3	2-Butanone	PPB	120
	110-75-8	2-Chloroethyl vinyl ether	PPB	NA
	95-49-8	2-Chlorotoluene	PPB	NA
	591-78-6	2-Hexanone	PPB	NA
	67-63-0	2-Propanol	PPB	NA
	106-43-4	4-Chlorotoluene	PPB	NA
	99-87-6	4-Isopropyltoluene	PPB	NA
	108-10-1	4-Methyl-2-pentanone	PPB	NA
	67-64-1	Acetone	PPB	50
	107-02-8	Acrolein	PPB	NA
	107-13-1	Acrylonitrile	PPB	NA
	71-43-2	Benzene	PPB	60
	108-86-1	Bromobenzene	PPB	NA
	74-97-5	Bromochloromethane	PPB	NA

510 East 185th Street
Bronx, New York 10458
OER Project Number 16EHAZ194X
Unrestricted Residential SCOs

Table 1

	CasNo	Analyte	Units	Limits
VOC	75-27-4	Bromodichloromethane	PPB	NA
	75-25-2	Bromoform	PPB	NA
	74-83-9	Bromomethane	PPB	NA
	75-15-0	Carbon disulfide	PPB	NA
	56-23-5	Carbon tetrachloride	PPB	760
	108-90-7	Chlorobenzene	PPB	1100
	75-45-6	Chlorodifluoromethane	PPB	NA
	75-00-3	Chloroethane	PPB	NA
	67-66-3	Chloroform	PPB	370
	74-87-3	Chloromethane	PPB	NA
	156-59-2	cis-1,2-Dichloroethene	PPB	250
	10061-01-5	cis-1,3-Dichloropropene	PPB	NA
	110-82-7	Cyclohexane	PPB	NA
	124-48-1	Dibromochloromethane	PPB	NA
	74-95-3	Dibromomethane	PPB	NA
	75-71-8	Dichlorodifluoromethane	PPB	NA
	108-20-3	Diisopropyl ether	PPB	NA
	64-17-5	Ethanol	PPB	NA
	100-41-4	Ethylbenzene	PPB	1000
	76-14-2	Freon-114	PPB	NA
	87-68-3	Hexachlorobutadiene	PPB	NA
	98-82-8	Isopropylbenzene	PPB	NA
	179601-23-1	m,p-Xylene	PPB	260
	79-20-9	Methyl Acetate	PPB	NA
	1634-04-4	Methyl tert-butyl ether	PPB	930
	75-09-2	Methylene chloride	PPB	50
	91-20-3	Naphthalene	PPB	NA
	104-51-8	n-Butylbenzene	PPB	12000
	103-65-1	n-Propylbenzene	PPB	3900
	95-47-6	o-Xylene	PPB	260
	105-05-5	p-Diethylbenzene	PPB	NA
	622-96-8	p-Ethyltoluene	PPB	NA
	135-98-8	sec-Butylbenzene	PPB	11000
	100-42-5	Styrene	PPB	NA
	75-65-0	t-Butyl alcohol	PPB	NA
	98-06-6	tert-Butylbenzene	PPB	5900
	127-18-4	Tetrachloroethene	PPB	1300
	108-88-3	Toluene	PPB	700

510 East 185th Street
Bronx, New York 10458
OER Project Number 16EHAZ194X
Unrestricted Residential SCOs

Table 1

	CasNo	Analyte	Units	Limits
VOC	156-60-5	trans-1,2-Dichloroethene	PPB	190
	10061-02-6	trans-1,3-Dichloropropene	PPB	NA
	79-01-6	Trichloroethene	PPB	470
	75-69-4	Trichlorofluoromethane	PPB	NA
	108-05-4	Vinyl acetate	PPB	NA
	75-01-4	Vinyl chloride	PPB	20

SVOC	120-82-1	1,2,4-Trichlorobenzene	PPB	NA
	95-50-1	1,2-Dichlorobenzene	PPB	1100
	541-73-1	1,3-Dichlorobenzene	PPB	2400
	106-46-7	1,4-Dichlorobenzene	PPB	1800
	95-95-4	2,4,5-Trichlorophenol	PPB	NA
	88-06-2	2,4,6-Trichlorophenol	PPB	NA
	120-83-2	2,4-Dichlorophenol	PPB	NA
	105-67-9	2,4-Dimethylphenol	PPB	NA
	51-28-5	2,4-Dinitrophenol	PPB	NA
	121-14-2	2,4-Dinitrotoluene	PPB	NA
	606-20-2	2,6-Dinitrotoluene	PPB	NA
	91-58-7	2-Chloronaphthalene	PPB	NA
	95-57-8	2-Chlorophenol	PPB	NA
	91-57-6	2-Methylnaphthalene	PPB	NA
	95-48-7	2-Methylphenol	PPB	330
	88-74-4	2-Nitroaniline	PPB	NA
	88-75-5	2-Nitrophenol	PPB	NA
	91-94-1	3,3'-Dichlorobenzidine	PPB	NA
	108-39-4/106-4	3+4-Methylphenol	PPB	330
	99-09-2	3-Nitroaniline	PPB	NA
	534-52-1	4,6-Dinitro-2-methylphenol	PPB	NA
	101-55-3	4-Bromophenyl phenyl ether	PPB	NA
	59-50-7	4-Chloro-3-methylphenol	PPB	NA
	106-47-8	4-Chloroaniline	PPB	NA
	7005-72-3	4-Chlorophenyl phenyl ether	PPB	NA
	100-01-6	4-Nitroaniline	PPB	NA
	100-02-7	4-Nitrophenol	PPB	NA
	83-32-9	Acenaphthene	PPB	20000
	208-96-8	Acenaphthylene	PPB	100000
	98-86-2	Acetophenone	PPB	NA
	62-53-3	Aniline	PPB	NA

510 East 185th Street
Bronx, New York 10458
OER Project Number 16EHAZ194X
Unrestricted Residential SCOs

Table 1

	CasNo	Analyte	Units	Limits
SVOC	120-12-7	Anthracene	PPB	100000
	1912-24-9	Atrazine	PPB	NA
	103-33-3	Azobenzene	PPB	NA
	100-52-7	Benzaldehyde	PPB	NA
	92-87-5	Benzidine	PPB	NA
	56-55-3	Benzo(a)anthracene	PPB	1000
	50-32-8	Benzo(a)pyrene	PPB	1000
	205-99-2	Benzo(b)fluoranthene	PPB	1000
	191-24-2	Benzo(g,h,i)perylene	PPB	100000
	207-08-9	Benzo(k)fluoranthene	PPB	800
	65-85-0	Benzoic acid	PPB	NA
	100-51-6	Benzyl alcohol	PPB	NA
	92-52-4	Biphenyl	PPB	NA
	111-91-1	Bis(2-chloroethoxy)methane	PPB	NA
	111-44-4	Bis(2-chloroethyl)ether	PPB	NA
	108-60-1	Bis(2-chloroisopropyl)ether	PPB	NA
		Bis(2-ethylhexyl)phthalate	PPB	NA
	85-68-7	Butyl benzyl phthalate	PPB	NA
	105-60-2	Caprolactam	PPB	NA
	86-74-8	Carbazole	PPB	NA
	218-01-9	Chrysene	PPB	1000
	53-70-3	Dibenzo(a,h)anthracene	PPB	330
	132-64-9	Dibenzofuran	PPB	7000
	84-66-2	Diethyl phthalate	PPB	NA
	131-11-3	Dimethyl phthalate	PPB	NA
	84-74-2	Di-n-butyl phthalate	PPB	NA
	117-84-0	Di-n-octyl phthalate	PPB	NA
	206-44-0	Fluoranthene	PPB	100000
	86-73-7	Fluorene	PPB	30000
	118-74-1	Hexachlorobenzene	PPB	330
	87-68-3	Hexachlorobutadiene	PPB	NA
	77-47-4	Hexachlorocyclopentadiene	PPB	NA
	67-72-1	Hexachloroethane	PPB	NA
	193-39-5	Indeno(1,2,3-c,d)pyrene	PPB	500
	78-59-1	Isophorone	PPB	NA
	91-20-3	Naphthalene	PPB	12000
	98-95-3	Nitrobenzene	PPB	NA
	62-75-9	N-Nitrosodimethylamine	PPB	NA

510 East 185th Street
Bronx, New York 10458
OER Project Number 16EHAZ194X
Unrestricted Residential SCOs

Table 1

	CasNo	Analyte	Units	Limits
SVOC	621-64-7	N-Nitrosodi-n-propylamine	PPB	NA
	86-30-6	N-Nitrosodiphenylamine	PPB	NA
	56-38-2	Parathion	PPB	NA
	87-86-5	Pentachlorophenol	PPB	800
	85-01-8	Phenanthrene	PPB	100000
	108-95-2	Phenol	PPB	330
	129-00-0	Pyrene	PPB	100000
	110-86-1	Pyridine	PPB	NA

PESTICIDES	72-54-8	4,4'-DDD	PPB	3.3
	72-55-9	4,4'-DDE	PPB	3.3
	50-29-3	4,4'-DDT	PPB	3.3
	309-00-2	Aldrin	PPB	5
	319-84-6	alpha-BHC	PPB	20
	5103-71-9	alpha-Chlordane	PPB	94
	319-85-7	beta-BHC	PPB	36
	510-15-6	Chlorobenzilate	PPB	NA
	96-12-8	DBCP	PPB	NA
	319-86-8	delta-BHC	PPB	40
	60-57-1	Dieldrin	PPB	5
	959-98-8	Endosulfan I	PPB	2400
	33213-65-9	Endosulfan II	PPB	2400
	1031-07-8	Endosulfan sulfate	PPB	2400
	72-20-8	Endrin	PPB	14
	7421-93-4	Endrin aldehyde	PPB	NA
	53494-70-5	Endrin ketone	PPB	NA
	58-89-9	gamma-BHC	PPB	100
	5566-34-7	gamma-Chlordane	PPB	NA
	76-44-8	Heptachlor	PPB	42
	1024-57-3	Heptachlor epoxide	PPB	NA
	118-74-1	Hexachlorobenzene	PPB	330
	77-47-4	Hexachlorocyclopentadiene	PPB	NA
	72-43-5	Methoxychlor	PPB	NA
	8001-35-2	Toxaphene	PPB	NA

PCBS	12674-11-2	Aroclor 1016	PPB	100
	11104-28-2	Aroclor 1221	PPB	100
	11141-16-5	Aroclor 1232	PPB	100

510 East 185th Street
Bronx, New York 10458
OER Project Number 16EHAZ194X
Unrestricted Residential SCOs

Table 1

	CasNo	Analyte	Units	Limits
PCBS	53469-21-9	Aroclor 1242	PPB	100
	12672-29-6	Aroclor 1248	PPB	100
	11097-69-1	Aroclor 1254	PPB	100
	11096-82-5	Aroclor 1260	PPB	100
	37324-23-5	Aroclor 1262	PPB	100
	11100-14-4	Aroclor 1268	PPB	100

METALS	7429-90-5	Aluminum	PPM	NA
	7440-36-0	Antimony	PPM	NA
	7440-38-2	Arsenic	PPM	13
	7440-39-3	Barium	PPM	350
	7440-41-7	Beryllium	PPM	7.2
	7440-43-9	Cadmium	PPM	2.5
	7440-70-2	Calcium	PPM	NA
	7440-47-3	Chromium	PPM	NA
	7440-48-4	Cobalt	PPM	NA
	7440-50-8	Copper	PPM	50
	7439-89-6	Iron	PPM	NA
	7439-92-1	Lead	PPM	63
	7439-95-4	Magnesium	PPM	NA
	7439-96-5	Manganese	PPM	1600
	7439-97-6	Mercury	PPM	0.18
	7440-02-0	Nickel	PPM	30
	7440-09-7	Potassium	PPM	NA
	7782-49-2	Selenium	PPM	3.9
	7440-22-4	Silver	PPM	2
	7440-23-5	Sodium	PPM	NA
	7440-28-0	Thallium	PPM	NA
	7440-62-2	Vanadium	PPM	NA
	7440-66-6	Zinc	PPM	109

NYSDEC 375 UNRES. Limits

Abbreviation:

NA = Not available, no value specified in NYSDEC 375 UNRES. Limits

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Table 2

	CasNo	Analyte	Units	Limits
VOC	630-20-6	1,1,1,2-Tetrachloroethane	PPB	NA
	71-55-6	1,1,1-Trichloroethane	PPB	100000
	79-34-5	1,1,2,2-Tetrachloroethane	PPB	NA
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	PPB	NA
	79-00-5	1,1,2-Trichloroethane	PPB	NA
	75-34-3	1,1-Dichloroethane	PPB	26000
	75-35-4	1,1-Dichloroethene	PPB	100000
	563-58-6	1,1-Dichloropropene	PPB	NA
	87-61-6	1,2,3-Trichlorobenzene	PPB	NA
	96-18-4	1,2,3-Trichloropropane	PPB	NA
	95-93-2	1,2,4,5-Tetramethylbenzene	PPB	NA
	120-82-1	1,2,4-Trichlorobenzene	PPB	NA
	95-63-6	1,2,4-Trimethylbenzene	PPB	52000
	96-12-8	1,2-Dibromo-3-chloropropane	PPB	NA
	106-93-4	1,2-Dibromoethane	PPB	NA
	95-50-1	1,2-Dichlorobenzene	PPB	100000
	107-06-2	1,2-Dichloroethane	PPB	3100
	78-87-5	1,2-Dichloropropane	PPB	NA
	108-67-8	1,3,5-Trimethylbenzene	PPB	52000
	541-73-1	1,3-Dichlorobenzene	PPB	49000
	142-28-9	1,3-dichloropropane	PPB	NA
	106-46-7	1,4-Dichlorobenzene	PPB	13000
	123-91-1	1,4-Dioxane	PPB	13000
	594-20-7	2,2-Dichloropropane	PPB	NA
	78-93-3	2-Butanone	PPB	100000
	110-75-8	2-Chloroethyl vinyl ether	PPB	NA
	95-49-8	2-Chlorotoluene	PPB	NA
	591-78-6	2-Hexanone	PPB	NA
	67-63-0	2-Propanol	PPB	NA
	106-43-4	4-Chlorotoluene	PPB	NA
	99-87-6	4-Isopropyltoluene	PPB	NA
	108-10-1	4-Methyl-2-pentanone	PPB	NA
	67-64-1	Acetone	PPB	100000
	107-02-8	Acrolein	PPB	NA
	107-13-1	Acrylonitrile	PPB	NA
	71-43-2	Benzene	PPB	4800
	108-86-1	Bromobenzene	PPB	NA
	74-97-5	Bromochloromethane	PPB	NA

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Table 2

	CasNo	Analyte	Units	Limits
VOC	75-27-4	Bromodichloromethane	PPB	NA
	75-25-2	Bromoform	PPB	NA
	74-83-9	Bromomethane	PPB	NA
	75-15-0	Carbon disulfide	PPB	NA
	56-23-5	Carbon tetrachloride	PPB	2400
	108-90-7	Chlorobenzene	PPB	100000
	75-45-6	Chlorodifluoromethane	PPB	NA
	75-00-3	Chloroethane	PPB	NA
	67-66-3	Chloroform	PPB	49000
	74-87-3	Chloromethane	PPB	NA
	156-59-2	cis-1,2-Dichloroethene	PPB	100000
	10061-01-5	cis-1,3-Dichloropropene	PPB	NA
	110-82-7	Cyclohexane	PPB	NA
	124-48-1	Dibromochloromethane	PPB	NA
	74-95-3	Dibromomethane	PPB	NA
	75-71-8	Dichlorodifluoromethane	PPB	NA
	108-20-3	Diisopropyl ether	PPB	NA
	64-17-5	Ethanol	PPB	NA
	100-41-4	Ethylbenzene	PPB	41000
	76-14-2	Freon-114	PPB	NA
	87-68-3	Hexachlorobutadiene	PPB	NA
	98-82-8	Isopropylbenzene	PPB	NA
	179601-23-1	m,p-Xylene	PPB	100000
	79-20-9	Methyl Acetate	PPB	NA
	1634-04-4	Methyl tert-butyl ether	PPB	100000
	75-09-2	Methylene chloride	PPB	100000
	91-20-3	Naphthalene	PPB	NA
	104-51-8	n-Butylbenzene	PPB	100000
	103-65-1	n-Propylbenzene	PPB	100000
	95-47-6	o-Xylene	PPB	100000
	105-05-5	p-Diethylbenzene	PPB	NA
	622-96-8	p-Ethyltoluene	PPB	NA
	135-98-8	sec-Butylbenzene	PPB	100000
	100-42-5	Styrene	PPB	NA
	75-65-0	t-Butyl alcohol	PPB	NA
	98-06-6	tert-Butylbenzene	PPB	100000
	127-18-4	Tetrachloroethene	PPB	19000
	108-88-3	Toluene	PPB	100000

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	CasNo	Analyte	Units	Limits
VOC	156-60-5	trans-1,2-Dichloroethene	PPB	100000
	10061-02-6	trans-1,3-Dichloropropene	PPB	NA
	79-01-6	Trichloroethene	PPB	21000
	75-69-4	Trichlorofluoromethane	PPB	NA
	108-05-4	Vinyl acetate	PPB	NA
	75-01-4	Vinyl chloride	PPB	900

SVOC	120-82-1	1,2,4-Trichlorobenzene	PPB	NA
	95-50-1	1,2-Dichlorobenzene	PPB	100000
	541-73-1	1,3-Dichlorobenzene	PPB	49000
	106-46-7	1,4-Dichlorobenzene	PPB	13000
	95-95-4	2,4,5-Trichlorophenol	PPB	NA
	88-06-2	2,4,6-Trichlorophenol	PPB	NA
	120-83-2	2,4-Dichlorophenol	PPB	NA
	105-67-9	2,4-Dimethylphenol	PPB	NA
	51-28-5	2,4-Dinitrophenol	PPB	NA
	121-14-2	2,4-Dinitrotoluene	PPB	NA
	606-20-2	2,6-Dinitrotoluene	PPB	NA
	91-58-7	2-Chloronaphthalene	PPB	NA
	95-57-8	2-Chlorophenol	PPB	NA
	91-57-6	2-Methylnaphthalene	PPB	NA
	95-48-7	2-Methylphenol	PPB	100000
	88-74-4	2-Nitroaniline	PPB	NA
	88-75-5	2-Nitrophenol	PPB	NA
	91-94-1	3,3'-Dichlorobenzidine	PPB	NA
	108-39-4/106-4	3+4-Methylphenol	PPB	100000
	99-09-2	3-Nitroaniline	PPB	NA
	534-52-1	4,6-Dinitro-2-methylphenol	PPB	NA
	101-55-3	4-Bromophenyl phenyl ether	PPB	NA
	59-50-7	4-Chloro-3-methylphenol	PPB	NA
	106-47-8	4-Chloroaniline	PPB	NA
	7005-72-3	4-Chlorophenyl phenyl ether	PPB	NA
	100-01-6	4-Nitroaniline	PPB	NA
	100-02-7	4-Nitrophenol	PPB	NA
	83-32-9	Acenaphthene	PPB	100000
	208-96-8	Acenaphthylene	PPB	100000
	98-86-2	Acetophenone	PPB	NA
	62-53-3	Aniline	PPB	NA

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Table 2

	CasNo	Analyte	Units	Limits
SVOC	120-12-7	Anthracene	PPB	100000
	1912-24-9	Atrazine	PPB	NA
	103-33-3	Azobenzene	PPB	NA
	100-52-7	Benzaldehyde	PPB	NA
	92-87-5	Benzidine	PPB	NA
	56-55-3	Benzo(a)anthracene	PPB	1000
	50-32-8	Benzo(a)pyrene	PPB	1000
	205-99-2	Benzo(b)fluoranthene	PPB	1000
	191-24-2	Benzo(g,h,i)perylene	PPB	100000
	207-08-9	Benzo(k)fluoranthene	PPB	3900
	65-85-0	Benzoic acid	PPB	NA
	100-51-6	Benzyl alcohol	PPB	NA
	92-52-4	Biphenyl	PPB	NA
	111-91-1	Bis(2-chloroethoxy)methane	PPB	NA
	111-44-4	Bis(2-chloroethyl)ether	PPB	NA
	108-60-1	Bis(2-chloroisopropyl)ether	PPB	NA
		Bis(2-ethylhexyl)phthalate	PPB	NA
	85-68-7	Butyl benzyl phthalate	PPB	NA
	105-60-2	Caprolactam	PPB	NA
	86-74-8	Carbazole	PPB	NA
	218-01-9	Chrysene	PPB	3900
	53-70-3	Dibenzo(a,h)anthracene	PPB	330
	132-64-9	Dibenzofuran	PPB	59000
	84-66-2	Diethyl phthalate	PPB	NA
	131-11-3	Dimethyl phthalate	PPB	NA
	84-74-2	Di-n-butyl phthalate	PPB	NA
	117-84-0	Di-n-octyl phthalate	PPB	NA
	206-44-0	Fluoranthene	PPB	100000
	86-73-7	Fluorene	PPB	100000
	118-74-1	Hexachlorobenzene	PPB	1200
	87-68-3	Hexachlorobutadiene	PPB	NA
	77-47-4	Hexachlorocyclopentadiene	PPB	NA
	67-72-1	Hexachloroethane	PPB	NA
	193-39-5	Indeno(1,2,3-c,d)pyrene	PPB	500
	78-59-1	Isophorone	PPB	NA
	91-20-3	Naphthalene	PPB	100000
	98-95-3	Nitrobenzene	PPB	NA
	62-75-9	N-Nitrosodimethylamine	PPB	NA

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Table 2

	CasNo	Analyte	Units	Limits
SVOC	621-64-7	N-Nitrosodi-n-propylamine	PPB	NA
	86-30-6	N-Nitrosodiphenylamine	PPB	NA
	56-38-2	Parathion	PPB	NA
	87-86-5	Pentachlorophenol	PPB	6700
	85-01-8	Phenanthrene	PPB	100000
	108-95-2	Phenol	PPB	100000
	129-00-0	Pyrene	PPB	100000
	110-86-1	Pyridine	PPB	NA

PESTICIDES	72-54-8	4,4'-DDD	PPB	13000
	72-55-9	4,4'-DDE	PPB	8900
	50-29-3	4,4'-DDT	PPB	7900
	309-00-2	Aldrin	PPB	97
	319-84-6	alpha-BHC	PPB	480
	5103-71-9	alpha-Chlordane	PPB	4200
	319-85-7	beta-BHC	PPB	360
	510-15-6	Chlorobenzilate	PPB	NA
	96-12-8	DBCP	PPB	NA
	319-86-8	delta-BHC	PPB	100000
	60-57-1	Dieldrin	PPB	200
	959-98-8	Endosulfan I	PPB	24000
	33213-65-9	Endosulfan II	PPB	24000
	1031-07-8	Endosulfan sulfate	PPB	24000
	72-20-8	Endrin	PPB	11000
	7421-93-4	Endrin aldehyde	PPB	NA
	53494-70-5	Endrin ketone	PPB	NA
	58-89-9	gamma-BHC	PPB	1300
	5566-34-7	gamma-Chlordane	PPB	NA
	76-44-8	Heptachlor	PPB	2100
	1024-57-3	Heptachlor epoxide	PPB	NA
	118-74-1	Hexachlorobenzene	PPB	1200
	77-47-4	Hexachlorocyclopentadiene	PPB	NA
	72-43-5	Methoxychlor	PPB	NA
	8001-35-2	Toxaphene	PPB	NA

PCBS	12674-11-2	Aroclor 1016	PPB	1000
	11104-28-2	Aroclor 1221	PPB	1000
	11141-16-5	Aroclor 1232	PPB	1000

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	CasNo	Analyte	Units	Limits
PCBS	53469-21-9	Aroclor 1242	PPB	1000
	12672-29-6	Aroclor 1248	PPB	1000
	11097-69-1	Aroclor 1254	PPB	1000
	11096-82-5	Aroclor 1260	PPB	1000
	37324-23-5	Aroclor 1262	PPB	1000
	11100-14-4	Aroclor 1268	PPB	1000

	CasNo	Analyte	Units	Limits
METALS	7429-90-5	Aluminum	PPM	NA
	7440-36-0	Antimony	PPM	NA
	7440-38-2	Arsenic	PPM	16
	7440-39-3	Barium	PPM	400
	7440-41-7	Beryllium	PPM	72
	7440-43-9	Cadmium	PPM	4.3
	7440-70-2	Calcium	PPM	NA
	7440-47-3	Chromium	PPM	180
	7440-48-4	Cobalt	PPM	NA
	7440-50-8	Copper	PPM	270
	7439-89-6	Iron	PPM	NA
	7439-92-1	Lead	PPM	400
	7439-95-4	Magnesium	PPM	NA
	7439-96-5	Manganese	PPM	2000
	7439-97-6	Mercury	PPM	0.81
	7440-02-0	Nickel	PPM	310
	7440-09-7	Potassium	PPM	NA
	7782-49-2	Selenium	PPM	180
	7440-22-4	Silver	PPM	180
	7440-23-5	Sodium	PPM	NA
	7440-28-0	Thallium	PPM	NA
	7440-62-2	Vanadium	PPM	NA
	7440-66-6	Zinc	PPM	10000

(16) NYSDEC 375 REST RES. Limits

Abbreviation:

NA = Not available, no value specified in NYSDEC 375 REST RES. Limits

Appendix 1 Citizen Participation Plan

The NYC Office of Environmental Remediation and Ratan Realty, 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, Ratan Realty, 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, William Wong, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841

Project Contact List. OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.

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

Belmont Library and Enrico Fermi Cultural Center

610 E. 186th Street, Bronx, NY, 10458

(718) 933-6410

Sun. Closed

Mon. 10:00am - 7:00pm

Tue. 10:00am - 7:00pm

Wed. 10:00am - 7:00pm

Thu. 10:00am - 7:00pm

Fri. 10:00am - 5:00pm

Sat. 10:00am - 5:00pm

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

Identify Issues of Public Concern. Ratan Realty, 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. This section should list any site-specific issues of public concern and the method that they will be used resolved them. If needed, contact OER for additional guidance on how to identify issues of public concern.

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

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

Citizen Participation Milestones. Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

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

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

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

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and

Engineering Controls implemented for to the Site and announcing the issuance of the
Notice of Completion.

Appendix 2 Sustainability statement

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

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.

Paperless Brownfield Cleanup Program. Ratan Realty, LLC is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program. Ratan Realty, 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.

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 RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

1.2 STOCKPILE METHODS

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

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

1.3 CHARACTERIZATION OF EXCAVATED MATERIALS

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

1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The PE/QEP overseeing the remedial action will:

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

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

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

1.5 OFF-SITE MATERIALS TRANSPORT

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

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

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

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

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

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

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

1.7 MATERIALS REUSE ON-SITE

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed in Table 1. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for

material reuse in this RAWP are followed. The expected location for placement of reused material is expected to be under the parking lot areas to account for the over excavation of historical fill.

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

1.8 DEMARCATION

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

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

1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The importation of material is not expected for this project.

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

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

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

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

Source Screening and Testing

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

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

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

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 FLUIDS MANAGEMENT

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

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

1.11 STORM-WATER POLLUTION PREVENTION

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

1.12 CONTINGENCY PLAN

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

1.13 ODOR, DUST AND NUISANCE CONTROL

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open

excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

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

Dust Control

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

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

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

Other Nuisances

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

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

Appendix 4

Health and Safety Plan

**Construction Health and Safety Plan
For
Property Located at
510 East 185th Street
Bronx, NY**

OER # 16EHAZ194X
December 2015

**Prepared by
J.R. Holzmacher P.E., LLC
Consulting Engineers
3555 Veterans memorial Highway, Suite A,
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1.0 INTRODUCTION

This section of the Health and Safety Plan (HASP) document defines general applicability and general responsibilities with respect to compliance with Health and Safety programs. This plan has been prepared for excavation/remediation activities to be conducted to determine if subsurface contamination is present. Soil sampling activities are estimated to occur during the excavation period for the proposed new building and sub-grade parking structures at the site.

1.1 Scope and Applicability of the Site Health and Safety Plan

The purpose of this HASP is to define the requirements and designate protocols to be followed during the excavation/remediation activities at the site. Applicability extends to all government employees, contractors, subcontractors, and visitors.

All personnel on site, contractors and subcontractors included, shall be informed of the site emergency response procedures and any potential fire, explosion, health, or safety hazards of the operation. This HASP summarizes those hazards in Table 3.1 and defines protective measures planned for the site.

This plan must be reviewed and an agreement to comply with the requirements must be signed by all personnel prior to entering the exclusion zone or contamination reduction zone.

During development of this plan, consideration was given to current safety standards as defined by the Environmental Protection Agency (EPA)/Occupational Health and Safety Administration (OSHA)/National Institute of Occupational Safety and Health (NIOSH), health effects and standards for known contaminants, and procedures designed to account for the potential for exposure to unknown substances. Specifically, the following reference sources have been consulted:

- OSHA 29 CFR 1910.120 and EPA 40 CFR 311
- USEPA, Office of Emergency and Remedial Response, Emergency Response Team, Standard Operating Safety Guides
- NIOSH/OSHA/USCG/EPA Occupational Health and Safety Guidelines
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values

1.2 Visitors

There will be no outside visitors allowed on the site during excavation/remediation activities. Outside visitors are defined as those not directly involved with construction and sampling activities.

2.0 KEY PERSONNEL/IDENTIFICATION OF HEALTH AND SAFETY

2.1 Key Personnel

The following personnel and organizations are critical to the excavation/remediation efforts at the site estimated to occur during the excavation activities identified in Figure 1.1 – Construction Activities Schedule. The organizational structure will be reviewed and updated periodically by the site supervisor.

Excavation/Construction Team Representatives:

1. J.R. Holzmacher P.E., LLC

TO BE DETERMINED

2.2 Site Specific Health and Safety Personnel

The Site Health and Safety Officer (SHSO) has responsibility for ensuring that the provisions of this HASP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection programs. The SHSO is also responsible for conducting site inspections on a regular basis in order to ensure the effectiveness of this plan.

The SHSO at the site with respect to Remedial activities is:

J.R. Holzmacher P.E., LLC
Philip Hoffken Jr.
Project Manager

Designated alternates include:

Lauren Fisher
J.R. Holzmacher P.E., LLC

2.3 Organizational Responsibility

1. The SHSO of the site will conduct site inspections throughout the project making sure the Health and Safety Plan is followed. His main concern is the personal protection of the workers.

3.0 TASK SAFETY AND HEALTH RISK ANALYSIS

3.1 Historical Overview of Site

The Site is located in the Belmont section of Bronx and is identified as Block 3053 and Lot 28. Currently, the Site is occupied by a vacant steel and masonry structure, 21 feet in height with a partial mezzanine used for additional storage, and a 10' x 20' cellar used as a meter and gas-fired boiler room. There is an interior loading dock located in the rear of the property along Bassford Avenue. The building comprises a total of 21,250 square feet of Lot 28. According to a 2009 Temporary Certificate of Occupancy occupants consisted of a Store, Eating and Drinking Establishment. In 2010, a Temporary Certificate of Occupancy identified occupants that included Retail Stores, Contractors Establishment, Warehouse and Loading, Storage and Shipping, Retail Stores, Eating and Drinking Establishment.

3.2 Task-by-Task Risk Analysis

The evaluation of hazards is based upon the knowledge of the site background presented in Section 3.1 above, and anticipated risks posed by the specific tasks to be performed.

The following subsections describe each task/operation in terms of the specific hazards associated with it. In addition, the protective measures to be implemented during completion of those tasks are also identified.

Table 3.1 provides a summary of task analysis and chemical hazards potentially encountered at the Site.

TABLE 3.1 TASK ANALYSIS POTENTIAL CHEMICAL HAZARDS OF CONCERN			
Contaminant	PEL/TLV	LEL (%)	IDLH
VOCs			
Benzene	1/0.5ppm	1.2	500 ppm
Toluene	200/50 ppm	1.1	500 ppm
Xylenes	100/100 ppm	~1	900 ppm
Ethyl benzene	100/100ppm	0.8	800 ppm
MTBE	NE/50ppm	NE	NE
Diesel Fuel	NE/100mg/m ³		Ca (exhaust)
Gasoline	NE/300	1.4	Ca

TABLE 3.1 TASK ANALYSIS POTENTIAL CHEMICAL HAZARDS OF CONCERN			
Contaminant	PEL/TLV	LEL (%)	IDLH
VOCs			
Lead	0.05/0.05 mg/m ³	NA	100 mg/m ³
PCBs	0.5-1 mg/m ³	NA	5 mg/m ³
PAHs	0.2 mg/m ³	NA	1750 mg/m ³
Pesticides	Variable	NA	NA
Arsenic	0.01 mg/m ³	NA	5 mg/m ³
Mercury	0.025 mg/m ³	NA	10 mg/m ³

NE – not established

Ca - Cancer

Notes:

1. TLV = Threshold Limit Value
2. IDLH = Immediately Dangerous to Life and Health

3.3 Physical Hazards -Soil Sampling and Excavation

3.3.1 Hazard Identification and Prevention

- Safety related work practices would be used to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts. Overhead power lines, buried cables and electrical equipment used on site all pose a danger of shock or electrocution if workers contact or sever them during field operations.
- New York State law requires that a utility mark out to be performed at a site at least 72 hours prior to starting any subsurface work. The tank removal contractor will contact New York City One Call (1-800-272-4480) to request a mark out of underground utilities in the proposed excavation and drilling areas. Work will not begin until the required utility clearances have been completed.
- Public utilities typically do not mark-out utility lines that are located on private property. Therefore, JRH will exercise due diligence and try to identify the location of any private utilities at the site. A private utility contractor will clear on-site subsurface disturbance locations for utilities prior to the commencement of any such work. JRH will also use as-built drawings for the area being investigated, perform a line locating survey, and identify a no-dig/drill zone and hand dig if there is insufficient data to determine the location of utility lines.

- Care must be taken to ensure loose clothing does not get tangled in any moving equipment while borings are being drilled.
- There may be slip or trip hazards associated with rough, slippery or elevated work surfaces at the site. The sampling sites could contain a number of slip, trip and fall hazards for site workers, such as: holes, pits, or ditches; excavation faces and slippery surfaces (steep grades, uneven grades, snow and ice and sharp objects).
- Drilling or excavating is dangerous during electrical storms. All field activity must terminate when thunderstorms are evident. Extreme heat and cold, ice and heavy rain can produce unsafe conditions for drilling work. Such conditions, when present, will be evaluated on a case-by-case basis to determine if work shall terminate.
- The use of an excavator and other equipment that are gasoline or fuel powered presents the possibility of encountering fire and explosion hazards.
- Plants and animals that are known to be hazardous to humans may affect work that takes place. Spiders, bees, wasps, hornets, ticks, poison oak and poison ivy are only some of the hazards that may be encountered. Individuals who may potentially be exposed to these hazards should be made aware of their existence and instructed in their identification. Emergencies resulting from contact with a natural hazard should be handled through the normal medical emergency channels. Individuals who are sensitive to these types of "natural" hazards should indicate their susceptibility to the SHSO.
- Work on-site will involve the use of heavy construction equipment such as an excavator. The unprotected exposure of site workers to this noise during field activities can result in noise induced hearing loss. The SHSO will monitor the noise exposure for the initial trip and determine whether noise protection is warranted for each of the team members. The SHSO will ensure that either ear muffs or disposable foam earplugs are made available to all personnel and are used by the personnel in the immediate vicinity of the field operation as required.

3.4 Chemical Hazards

3.4.1 General Description

There is low potential for VOC and SVOC contamination because the site has been either a vacant lot or utilized for parking cars on top of an asphalt layer.

Potential chemical hazards below the building slab are evaluated below. It is anticipated that petroleum compounds and dust could be of concern. The

potential for exposure to vapors, contaminated dusts, and contaminated soil/groundwater is of utmost concern.

3.4.2 Potential Chemical Health Hazards

Benzene

Exposure to benzene above the Permissible Exposure Limit (PEL) may produce skin irritation with potential for redness, blistering and burning. Overexposure may also result in irritation of the mucous membranes for the upper respiratory tract, nose and mouth causing difficulty breathing and possible pulmonary edema. Symptoms of exposure include headache, confusion, dizziness and tightening of the leg muscles. The OSHA PEL for benzene is 1 ppm. The American Conference of Governmental Industrial Hygienists recommends a Threshold Limit Value (TLV) of 0.5 ppm for benzene based on classification as a confirmed human carcinogen.

Toluene

Exposure to the vapors of toluene above the Permissible Exposure Limit (PEL) may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in depression of the central nervous system. Symptoms of such exposure include drowsiness, headache, fatigue and intoxicated behavior. The PEL for toluene is 200 ppm. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a Threshold Limit Value (TLV) of 50 ppm for toluene due to effects on the central nervous system.

Xylene

Xylene is a flammable, colorless liquid with an OSHA PEL of 100 ppm. Inhalation of xylene vapors above the PEL may result in motor activity changes, headaches, dizziness, drowsiness and intoxicated behavior. Inhalation can also cause nose, throat and respiratory tract irritation, causing difficulty in breathing and possible pulmonary edema on high exposure. Xylene vapors are also irritating to the eye and potential redness, blistering and serious burning of the skin. Xylene can pass through intact skin to cause systemic effects, including narcosis. The ACGIH recommends a TLV of 100 ppm for xylene due to irritant effects.

Methyl Tertiary-Butyl Ether (MTBE)

Methyl tertiary-butyl ether is a chemical compound that is manufactured by the chemical reaction of methanol and isobutylene. MTBE is almost exclusively used

as a fuel additive in motor gasoline. It is one of a group of chemicals commonly known as “oxygenates” because they raise the oxygen content of gasoline. At room temperature, MTBE is a volatile, flammable and colorless liquid that dissolves rather easily in water.

The majority of the human health-related research conducted to date on MTBE has focused on effects associated with the inhalation of the chemical. When research animals inhaled high concentrations of MTBE, some developed cancers or experienced other non-cancerous health effects. OSHA has not established a PEL or MTBE. The ACGIH has established a TLV of 50 ppm based on its effects on the kidney and reproductive system and gives it an A3 carcinogenicity rating. This means that it is a known animal carcinogen with unknown significance to humans.

Lead

The effects of lead exposure are long-term in nature. Early signs of lead poisoning include fatigue, headache, uneasy stomach, metallic taste and irritability. Later signs include memory loss, nausea, muscle/joint pains, stomachaches, weight loss and kidney problems.

Lead dust can be inhaled. Particles of lead can be swallowed if lead gets on clothing, hands or beard or into food or drinks. There will be no eating, drinking or smoking in the work area (the tunnels and access rooms). It will also be important to wash your hands and face before eating, drinking, or smoking outside of the work area.

PCBs

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor. Exposure to PCBs causes eye irritation, chloracne and liver toxicity. Aroclor 1254 is a known animal carcinogen that may or may not cause cancer in humans. PCBs are readily absorbed through the skin. The OSHA PEL ranges from 0.5-1 mg/m³. The ACGIH has also set TLVs between 0.5-1 mg/m³ based on its irritant effects and its ability to cause chloracne and liver damage.

Polycyclic Aromatic Hydrocarbons (PAHS or SVOCs)-

PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances such as tobacco or charbroiled meat. PAHs are regulated based on effects of

respiratory tract and skin irritation as well as eye irritation and nervous system disturbances. Acute exposures cause difficulty in breathing, skin/eye irritation and burns.

The Occupational Safety and Health Administration (OSHA) have set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m³). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m³ averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m³ for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Pesticides

A pesticide is a substance or mixture of substances intended to prevent, destroy, repel or mitigate any pest. The health effects of pesticides depend on the type of pesticide. Some such as organophosphates and carbamates, affect the nervous system. Others may irritate the skin or eyes. Other may affect the hormone or endocrine system in the body. EPA human health risk assessments for many pesticides are available at <http://cfpub.epa.gov/oppref/rereg/status.cfm>.

Arsenic

Arsenic is a naturally occurring element combined with oxygen, chlorine and sulfur to form inorganic arsenic compounds. Overexposure to arsenic may cause vomiting, ulceration of the nasal septum, hoarse voice, sore throat, numbness in extremities, respiratory irritation, and skin/eye irritation. The EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or cancelled many of the uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration (OSHA) have set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter of workplace air (10 µg/m³) for 8 hour shifts and 40 hour work weeks.

Mercury

Mercury occurs naturally in the environment and exists in several forms. Overexposure may cause headache, drowsiness or insomnia, weakness, and pink skin on hands and feet. OSHA regulates levels of mercury in the workplace. It has set limits of 0.1 milligrams of mercury per cubic meter of air (mg/m³) for organic mercury and 0.05 mg/m³ for metallic mercury vapor in workplace air to protect workers during an 8-hour shift and a 40-hour workweek. NIOSH

recommends that the amount of metallic mercury vapor in workplace air be limited to an average level of 0.05 mg/m³ during a 10-hour work shift.

3.4.3 First Aid

If soil comes in contact with the eyes immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Contact lenses should not be worn but can be protected by safety glasses/goggles. If lead contaminated soil comes in contact with the skin, wash the skin with soap and water prior to leaving the site. If a person breathes in large amounts of dust, move the exposed person to fresh air at once. If contaminated soil has been swallowed, get medical attention immediately (NIOSH, 1987).

4.0 PERSONNEL TRAINING REQUIREMENTS

Consistent with OSHA 29 CFR 1910.120 regulation covering Hazardous Waste Operations and Emergency Response, all site personnel are required to be trained in accordance with the standard. At a minimum, all personnel are required to be trained to recognize the hazards on-site, the provisions of this HASP, and the responsible personnel. The SHSO at the site pre-entry briefing(s) or periodic site briefings will discuss this plan.

5.0 PERSONNEL PROTECTIVE EQUIPMENT TO BE USED

This section describes the general requirements of the EPA designated Levels of Protection (A through D), and the specific levels of protection required for each task at the Site.

5.1 Levels of Protection

Personnel will wear the appropriate protective equipment when response activities involve known or suspected atmospheric contamination, vapors, gases, or particulates may be generated by site activities, or when direct contact with skin-affecting substances may occur. Full facepiece respirators protect lungs, gastrointestinal tract, and eyes against airborne toxicants. Chemical-resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals.

The specific levels of protection and necessary components for each have been divided into four categories according to the degrees of protection afforded:

- Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.
- Level B: Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B is the primary level of choice when encountering unknown environments.
- Level C: Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.
- Level D: Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.

Modifications of these levels are permitted, and routinely employed during site work activities to maximize efficiency. For example, Level C respiratory protection and Level D skin protection may be required for a given task. Likewise the type of chemical protective ensemble (i.e., material, format) will depend upon contaminants and degrees of contact.

The Level of Protection selected is based upon the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, liquids, or other direct contact with material due to work being done.
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgment until the hazards can be better identified.

5.2 Level D Personnel Protective Equipment:

- Disposable Tyvek^R coveralls (as needed)
- Disposable Nitrile Exam gloves (as needed)
- Disposable Tyvek^R booties (as needed)
- Steel-tipped work boots
- Safety glasses
- Hard hat
- 3M N95 Dust Masks with Exhalation Valves (if needed)

5.3 Reassessment of Protection Program

The Level of Protection provided by PPE selection shall be upgraded or downgraded based upon changes in site conditions or investigation findings. When a significant change occurs, the hazards should be reassessed. Some indicators of the need for reassessment are:

- Commencement of a new work phase.
- Change in job tasks during a work phase.
- Change of season/weather
- When temperature extremes or individual medical considerations limit the effectiveness of PPE.
- Change in work scope, which affects the degree of contact with contaminants.

5.4 Work Mission Duration

Before the workers actually begin work in their PPE ensembles, the anticipated duration of the work mission will be established. Several factors limit mission length, including:

- Air supply consumption (SCBA use)-**Not Applicable.**
- Suit/Ensemble permeation and penetration rates for chemicals-**Not Applicable.**
- Ambient temperature and weather conditions (heat stress/cold stress).
- Capacity of personnel to work in PPE.

5.5 Personal Protective Equipment Recommended for Site

The following specific clothing materials are recommended for the site:

A. Soil Sampling – Level D

Site activities will require PPE as follows: hardhat, disposable Tyvek^R coveralls (if needed), disposable Tyvek^R booties (if needed), safety glasses and chemical resistant gloves. Particulate respirator-3M N95 Dust Masks with exhalation valves will be available.

5.6 SOP for Personal Protective Equipment

Proper inspection of PPE features several sequences of inspection depending upon specific articles of PPE and it's frequency of use. The different levels of inspection are as follows:

- Inspection and operation testing of equipment received from the factory or distributor.
- Inspection of equipment as it is issued to workers.
- Inspection after use or training and prior to maintenance.
- Periodic inspection of stored equipment.
- Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.
- The primary inspection of the PPE in use for activities at the Site will occur prior to immediate use and will be conducted by the user. This ensures that the specific device or article has been checked-out by the user and that the user is familiar with its use.

TABLE 5.1
SAMPLE PPE INSPECTION CHECKLIST

CLOTHING

Before use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
 - Imperfect seams
 - Non-uniform coatings
 - Tears
 - Malfunctioning closures
- Hold up to light and check for pinholes.
- Flex product:
 - Observe for cracks
 - Observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical attack:
 - Discoloration
 - Swelling

- Stiffness

During the work task:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
- Closure failure.
- Tears.
- Punctures.
- Seam Discontinuities.

GLOVES

Before use:

- Visually inspect for:
 - Imperfect seams
 - Tears
 - Non-uniform coating
 - Pressurize glove with air; listen for pinhole leaks.

5.7 Specific Levels of Protection Planned for the Site

The following levels of protection will be utilized during activities at the Site:

- Level D

6.0 FREQUENCY AND TYPES OF AIR MONITORING/SAMPLING

This section explains the general concepts of an air-monitoring program and specifies the surveillance activities that will take place during project completion at the Site.

The purpose of air monitoring is to identify and quantify airborne contaminants in order to verify and determine the level of worker protection needed. Initial screening for identification is often qualitative, i.e., the contaminant, or the class to which it belongs, is demonstrated to be present, but the determination of its concentration (quantification) must await subsequent testing. Two principal approaches are available for identifying and/or quantifying airborne contaminants:

- The on-site use of direct-reading instruments.
- Laboratory analysis of air samples obtained by a gas-sampling bag, collection media (i.e., filter, sorbent) and/or wet-contaminant collection methods.

6.1 Direct-Reading Monitoring Instruments

Unlike air sampling devices, which are used to collect samples for subsequent analysis in a laboratory, direct-reading instruments provide information at the time of sampling, enabling rapid decision-making. Data obtained from the real-time monitors are used to assure proper selection of personnel protection equipment, engineering controls, and work practices. Overall, the instruments provide the user the capability to determine if site personnel are being exposed to concentrations that exceed exposure limits or action levels for specific hazardous materials.

Of significant importance, especially during initial entries, is the potential for IDLH conditions or oxygen deficient atmospheres. Real-time monitors can be useful in identifying any IDLH conditions, toxic levels of airborne contaminants, flammable atmospheres, or radioactive hazards. Periodic monitoring of conditions is critical, especially, as exposures may have increased since initial monitoring or if new site activities have commenced.

6.2 Site Air Monitoring and Sampling Program

A. Air Monitoring Instruments

• Organic Vapor Monitoring

Instrument :Photoionization Detector (PID) with for use during all intrusive activities (10.6 Ev lamp).

Instrument: Detector Tubes – for measuring benzene and vinyl chloride concentrations.

Monitoring for organic vapors will be conducted in the breathing zone of employees using a PID during intrusive activities. Refer to Table 6.1 for total volatile organic vapor and benzene action levels.

• **Combustible Gas Monitoring**

Instrument: Combustible Gas Indicator (CGI)/ Oxygen Meter

Continuous air monitoring with a CGI/Oxygen meter will be conducted in areas where flammable vapors or gases are suspected. All work activities must stop where the monitor indicates the concentration of flammable vapors exceeds ten percent of the lower flammable limit (LEL) at a location with a potential ignition source. The area must be ventilated to reduce the concentration to below ten percent of the LEL.

• **Dust Monitoring**

Instrument: TSI DustTrak Model 8520 (or equivalent)

Continuous dust monitoring during all site activities will be conducted. Dust mitigation must be employed should readings exceed 10 mg/m³.

• **Calibration and Record keeping**

Equipment used will be calibrated in accordance with the manufacturers' specifications. The PID and CGI will be calibration checked before and after use under approximately the same conditions at which the instrument will be used. Calibration information will be kept in the field notebook or instrument log. The date, time, location, instrument serial number, calibration gas and concentration, will be noted.

B. Action Levels

TABLE 6.1		
SITE AIR MONITORING AND SAMPLING PROGRAM SUMMARY		
Instrument	Action Level	Action
PID (10.6 ev)	<u>Continuous</u> readings to 9ppm	Remain in level D PPE.
PID	<u>Continuous</u> reading of 10 to 100 ppm above background	Level D PPE but screen with Drager detection tube for benzene. If benzene detected >1 ppm upgrade to Level C and wear an organic vapor (OV) cartridge/air-purifying respirator (APR). Investigate source.
PID	<u>Continuous</u> reading over 100 ppm background	<u>Stop Work.</u> Reevaluate work conditions and procedures, Contact SHSO prior to continuing for authorization.

TABLE 6.1		
SITE AIR MONITORING AND SAMPLING PROGRAM SUMMARY		
Instrument	Action Level	Action
Drager Tubes: Benzene	1- 10 ppm	Upgrade PPE to level C with OV/APR.
Drager Tubes: Benzene	>10 ppm	<u>Stop Work</u> . Reevaluate work conditions and procedures. Contact SHSO prior to continuing for authorization.
Combustible Gas Indicator	<u>Continuous reading</u> of 0% to 1% lower explosive level (LEL).	Remain in level D PPE. If no benzene present, assume source is methane. Continuously monitoring LEL.
Combustible Gas Indicator	<u>Continuous</u> reading of 1% to 10% LEL	Level D unless benzene is present. Investigate source and ventilate, if possible. SHSO may require upgrade to Level C PPE.
Combustible Gas Indicator	<u>Continuous</u> reading > 10% LEL	<u>Stop Work</u> . Evacuate work area and ventilate source of combustible gas, if possible, Contact SHSO prior to continuing for authorization.
Dust Monitor	<u>Continuous</u> reading >10.0 mg/m ³	Suppress by spraying the dusty area with water.

Notes: PEL = Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit
 REL = National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limit
 TLV = American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value

C. Reporting Format

- Air Monitoring Log

6.3 Site Ambient Air Sampling

A. Sampling Criteria

A site ambient air sampling program will be considered if the following criteria are met:

1. Meteorological conditions
2. Health and safety observations
3. Particulate levels are two to three times above background.
4. Site specific activities
5. Site activity increases airborne contaminant(s) exposure potential.

7.0 SITE CONTROL MEASURES

The following section defines measures and procedures for maintaining site control. Site control is an essential component in the implementation of the site health and safety program.

7.1 Buddy System

During all Level B, C or D activities or when some conditions present a risk to personnel, the implementation of a buddy system is recommended if not mandatory. A buddy system requires at least two (2) people to work as a team, each looking out for each other. Table 8.1 lists those tasks, which require a buddy system and any additional site control requirements.

TABLE 7.1	
PERSONNEL REQUIREMENTS	
Task	Control Measures
Soil Sampling	Line of sight, buddy system

7.2 Site Communications Plan

Successful communications between field teams and personnel in the support zone is essential. The following communications systems will be available during activities at the Site.

- Hand Signals
- Direct Vocal Communication
- For hand signal communications, the following definitions will apply during activities at the Site:

TABLE 7.2	
HAND SIGNAL DEFINITIONS	
Signal	Definition
Hands clutching throat	Out of air/cannot breath
Hands on top of head	Need assistance
Thumbs up	OK/I am all right/I understand
Thumbs down	No/Negative
Arms waving upright	Send backup support
Grip partners wrist	Exit area immediately

7.3 Work Zone Definition

The three general work zones established at the Site are the Exclusion Zone, Contamination Reduction Zone, and Support Zone. One of the basic elements of effective site soil remediation activities is the delineation of work zones. The purpose of establishing work zones is to:

- Reduce the accidental spread of hazardous substances by workers or equipment from the contaminated areas to the clean areas;
- Confine work activities to the appropriate areas, thereby minimizing the likelihood of accidental exposures;
- Facilitate the location and evacuation of personnel in case of an emergency; and
- Prevent unauthorized personnel from entering controlled areas.

Although a site may be divided into as many zones as necessary to ensure minimal employee exposure to hazardous substances, this plan uses the three most frequently identified zones in similar projects. These zones are the Exclusion Zone, the Decontamination Zone, and the Support Zone (sometimes referred to by others as the “clean zone”). Movement of personnel and equipment between these zones should be minimized and restricted to specific access control points to minimize the spreading of contamination, if encountered.

7.3.1 Exclusion Zone

The Exclusion Zone is the area where contamination is either known or expected to occur and where the greatest potential for exposure exists. No contamination is actually known to exist on this site. Therefore, the following protective measures will be taken in the Exclusion Zone.

Unprotected onlookers will be restricted from suspicious pre-screened soils requiring sampling such that they are 25 feet upwind or 50 feet downwind of excavation or drilling activities.

Those conducting activities and sampling in the Exclusion Zone will wear the applicable Personal Protective Equipment (PPE). The actions to be taken and PPE to be worn in the Exclusion Zone if VOCs are determined with the PID to be above background are described in Section 6 and Table 6.1.

7.3.2 Decontamination Zone

A Decontamination Zone will be established between the Exclusion Zone and the Support Zone, and will include the personnel, equipment and supplies that are needed to decontaminate equipment and personnel. The size will be selected by the SHSO to be sufficient to conduct the necessary decontamination activities. Personnel and equipment in the Exclusion Zone must pass through this zone before leaving or entering the Support Zone. This zone should always be established and maintained upwind of the Exclusion Zone.

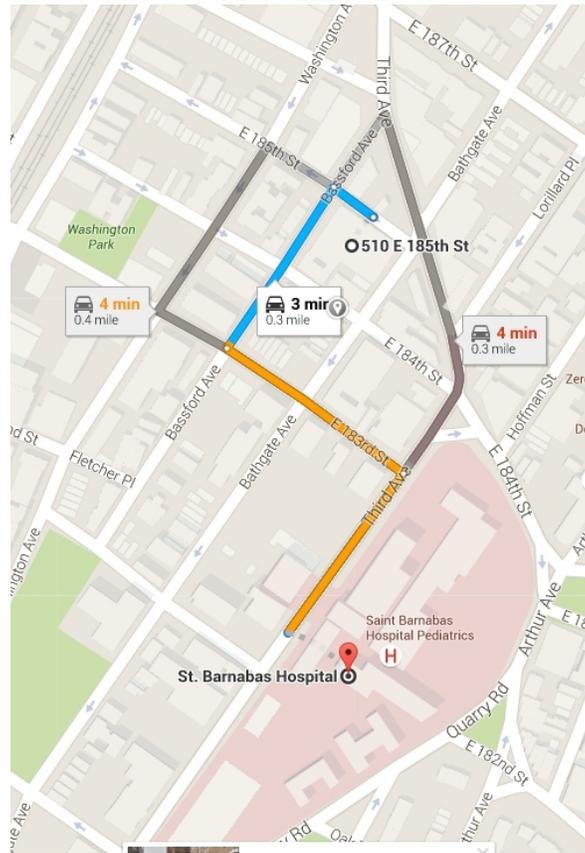
7.3.3 Support Zone

The Support Zone will surround the Decontamination Zone and the Exclusion Zone. Break areas, operational direction and support facilities will be located in this area. Eating, smoking and drinking will be allowed only in this area.

7.4 Nearest Medical Assistance

Figure 7.1 shows a map of the route to the Flushing Hospital Medical Center (718-670-5000), which is the nearest hospital that can provide emergency care for individuals who may experience an injury or exposure on site. The route to the hospital will be verified by the SHSO, and will be familiar to all site personnel.

FIGURE 7.1



Directions	Distance
510 E 185th St Bronx, NY 10458	
Head northwest on E 185th St toward Bassford Ave	128 ft
Turn left at the 1st cross street onto Bassford Ave	495 ft
Turn left at the 2nd cross street onto E 183rd St	0.1 mi
Turn right onto Third Ave	0.1 mi
Destination will be on the left	
St. Barnabas Hospital 4422 Third Avenue, Bronx, NY 10457	

7.5 Safe Work Practices

Table 7.3 provides a list of standing orders for the Exclusion Zone.

Table 7.4 provides a list of standing orders for the Decontamination Zone.

7.6 Emergency Alarm Procedures

The warning signals described in Section 9.4 “Evacuation Routes and Procedures,” will be deployed in the event of an emergency. Communication signals will also be used according to Section 7.2.

**TABLE 7.3
STANDING ORDERS FOR EXCLUSION ZONE**

- No smoking, eating, or drinking in this zone.
- No horseplay.
- No matches or lighters in this zone.
- Check-in on entrance to this zone.
- Check-out on exit from this zone.
- Implement the communications system.
- Line of sight must be in position.
- Wear the appropriate level of protection as defined in the HASP.

**TABLE 7.4
STANDING ORDERS FOR CONTAMINATION REDUCTION ZONE**

- No smoking, eating, or drinking in this zone.
- No horseplay.
- No matches or lighters in this zone.
- Wear the appropriate level of protection.

8.0 DECONTAMINATION PLAN

Consistent with the levels of protection required, the decontamination table(s) provides a step-by-step representation of the personnel decontamination process. These procedures should be modified to suit site conditions and protective ensembles in use.

8.1 Standard Operating Procedures

Decontamination involves the orderly controlled removal of contaminants. Standard decontamination sequences are presented in Table 8.1. All site personnel should minimize contact with contaminants in order to minimize the need for extensive decontamination. Personnel shall clean on-site as much gross contamination from clothing and equipment, as possible.

8.2 Levels of Decontamination Protection Required for Personnel

The levels of protection required for personnel assisting with decontamination will be Level D. The SHSO is responsible for monitoring decontamination procedures and determining their effectiveness.

8.3 Equipment Decontamination

Sampling equipment will be dedicated to each sample as practicable. Appendix A is the decontamination protocol for equipment. After on-site decontamination, non-disposable materials, such as gloves and booties, will be placed in plastic bags and for proper disposal off site.

8.4 Disposition of Decontamination Wastes

Contaminated disposable materials will be left in a secured condition on-site.

TABLE 8.1	
LEVEL D DECONTAMINATION STEPS	
Step 1	Remove outer garments (i.e., coveralls) and boots
Step 2	Remove gloves
Step 3	Wash hands and face

9.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

This section describes contingencies and emergency planning procedures to be implemented at the Site. This plan is compatible with local, state and federal disaster and emergency management plans, as appropriate.

9.1 Pre-Emergency Planning

During the site briefing held periodically/daily, all employees will be trained in and reminded of provisions of the emergency response plan, communication systems, and evacuation routes. Table 9.1 identifies potential hazards associated with site activities, along with the available emergency prevention/control equipment and its location. The plan will be reviewed and revised, if necessary, on a regular basis by the SHSO. This will ensure that the plan is adequate and consistent with prevailing site conditions.

TABLE 9.1		
EMERGENCY RECOGNITION/CONTROL MEASURES		
HAZARD	PREVENTION/CONTROL	LOCATION
Fire/Explosion	Fire Extinguisher	Site Trailer and Heavy Equip. mounted
Spill	Sorbent Materials	Not Applicable
Air Release	Evacuation Routes	Not Applicable

9.2 Personnel Roles and Lines of Authority

The Site Supervisor has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site area, and evacuation of adjacent residents. He/she is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified and follow-up reports completed. The SHSO may be called upon to act on the behalf of the site supervisor, and will direct responses to any medical emergency. The individual contractor organizations are responsible for assisting the project manager in his/her mission within the parameters of their scope of work.

The Site Supervisor is: Philip Hoffken Jr. of JRH.

9.3 Emergency Recognition/Prevention

Table 3.1 provides a listing of chemical and physical hazards on-site. Additional potential hazards associated with site activities are listed in Table 9.1, along with the available emergency prevention/control equipment and its location. Personnel will be familiar with

techniques of hazard recognition from preassignment training and site-specific briefings. The SHSO is responsible for ensuring that prevention devices and equipment are available to personnel.

9.4 Evacuation Routes/Procedures

In the event of an emergency which necessitates an evacuation of the site, the following alarm procedures will be implemented:

- Insure that a predetermined location is identified off-site in case of an emergency, so that all personnel can be accounted for.
- Personnel will be expected to proceed to the closest site exit with their buddy, and mobilize to the safe distance area associated with the evacuation route. Personnel will remain at that area until the re-entry alarm is sounded or an authorized individual provides further instructions.

9.5 Emergency Contact/Notification System

The following list provides names and telephone numbers for emergency contact personnel. In the event of a medical emergency, personnel will take direction from the SHSO and notify the appropriate emergency organization(s). In the event of a fire or spill, the site supervisor will notify the appropriate local, state and federal agencies.

TABLE 9.2		
List of Emergency Contacts		
Organization	Contact	Telephone
Police	NYCPD	911
Fire	NYCFD	911
Hospital	St. Barnabas Hospital 4422 Third Avenue, Bronx, NY 10457	718-960-9000
EPA Emergency Response Team		800-424-8802
NYSDEC	Spill Hotline	800-457-7362
National Response Center		800-424-8802
Center for Disease Control		404-488-4100
Chemtrec		800-424-9555

9.6 Emergency Medical Treatment Procedures

Any person who becomes ill or injured in the Exclusion Zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's

condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket.) First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the Site Supervisor.

Any person being transported to a clinic or hospital for treatment should take with them information on the chemical(s) they have been exposed to at the site. This information is included in Table 3.1.

Any vehicle used to transport contaminated personnel will be treated and cleaned as necessary.

9.7 Fires or Explosion

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the project manager or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on site.

If it is safe to do so, site personnel may:

- Use fire fighting equipment available on site to control or extinguish the fire; and,
- Remove or isolate flammable or other hazardous materials, which may contribute to the fire.

9.8 Spill or Leaks

In the event of a spill or a leak from excavation or drilling equipment, including containers, site personnel will:

- Inform their supervisor immediately;
- Locate the source of the spillage and stop the flow if it can be done safely; and,
- Begin containment and recovery of the spilled materials.

9.9 Emergency Equipment/Facilities

The following emergency equipment/facilities will be utilized on-site.

TABLE 9.3	
LIST OF EMERGENCY EQUIPMENT/FACILITIES	
List of Emergency Equipment/Facilities	Storage Location
First Aid Kit	Support Zone
Fire Extinguisher	Support Zone
Spill Kits	Support Zone
Berm Materials	Support Zone
Eye Wash	Support Zone

*510 East 185th Street
Bronx, NY
Queens, NY 11417
OER # 16EHAZ194X*

Real Time Air Equipment	Exclusion Zone
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10.0 REFERENCES

1. *Aldrich Chemical Book*, RTECS
2. *American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values*
3. *Chemical Protective Clothing Performance Index Book*, Forsburg
4. *Dangerous Properties of Industrial Materials*, SAX and Lewis
5. *Emergency Response Guide Book*, DOT P 5800.5, 1990
6. *EPA 40 CFR 311 Health and Safety Regulations*
7. *EPA/Office of Emergency and Remedial Response/Environmental Response Team Standard Operating Safety Guide*
8. *Extremely Hazardous Substances*, EPA, Noyes
9. *Guide to Occupational Exposure Values – 1992*
10. *Guidelines for the Selection of Chemical Protective Clothing*, Little
11. *Handbook of Toxic and Hazardous Chemicals and Carcinogens*, Sittig, np (Noyes)
12. *Hazardous Chemicals Data Book*, G. Weiss, ndc (Noyes)
13. *Hazardous Chemicals Desk Reference*
14. *NIOSH/OSHA/USCG/EPA Occupational Health and Safety Guidelines*
15. *OHMTADS Database*
16. *OSHA 29 CFR 1910.120 Health and Safety Regulations*
17. *The Merck Index, an Encyclopedia of Chemicals, Drugs, and Biologicals*, Merck & Co., Inc.
18. *Threshold Limit Values and Biological Exposure Indices*, ACGIH, 1991-1992
19. *V.S.L.G. Chris Man*

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Queens, NY 11417
OER # 16EHAZ194X*

APPENDIX A

**EQUIPMENT CLEANING AND
DECONTAMINATION PROCEDURES**

APPENDIX A

STANDARD OPERATING PROCEDURES

EQUIPMENT CLEANING AND DECONTAMINATION PROCEDURES

Summary

Equipment, tools, materials, etc. used in the excavation/remediation and collection of samples at the site must be properly prepared and cleaned/decontaminated during and after each sampling event. The degree of cleaning/decontamination will be dependent upon site conditions and the nature and type of contamination, if present, the intent and goal(s) of the remediation, and data quality objectives, as well as other site-specific requirements. The importance of this action must be impressed upon the sampling team and those assisting the team, such as a backhoe or drill rig operator.

Procedure

1. Heavy Equipment Decontamination

All equipment, tools and materials associated with sampling events must be cleaned or decontaminated prior to usage. Items such as drill rigs, auger flights, trackhoes, and backhoes all present potential sources of contamination to environmental samples. Therefore, all heavy equipment utilized at a site must undergo the following decontamination procedures:

- the equipment will first be high pressure, hot washed or steam-cleaned with potable water; and,
- the equipment will be rinsed thoroughly with potable water.

Contain, collect and dispose of all decontamination fluids in accordance with site/project-specific requirements. The bucket of trackhoes and backhoes may be cleaned over the excavation allowing high pressure decontamination washwater to return to the excavation.

2. Cleaning of Field Sampling Equipment

All equipment and tools used to collect samples for chemical analyses, including spatulas, spoons, scoops, trowels, split-spoons, augers, etc. will be decontaminated using the following procedures:

- non-phosphate detergent wash;
- potable water or distilled/deionized water rinse; and
- air or oven-dry.

If the equipment, listed above, is to be stored for future use, allow to dry and then wrap in aluminum foil (shiny-side out) or seal in plastic bags. Collect or dispose of all decontamination fluids in accordance with site/project-specific requirements.

3. Personal Clothing Decontamination

All footwear worn in and around a contamination area will be washed down using soap and water to remove any soil or oily residue remnants. If disposable gloves, booties or suits (such as Tyvek® suits) are worn, these suits or booties are to be removed and disposed of in a designated 55-gallon drum on site for future disposal. Any other clothing that comes in contact with contaminated soil should not be worn more than 24-hours and should be washed prior to wearing again.

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APPENDIX B

MSDSs



MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

<u>TRADE NAME (AS LABELED):</u>	MERCURY
<u>CHEMICAL NAME/CLASS:</u>	Mercury; Element
<u>SYNONYMS:</u>	Colloidal Mercury, Quick Silver; Liquid Silver; NCI-C60399; Hydrargyrum
<u>PRODUCT USE:</u>	Variety of industrial, analytical, and research applications.
<u>SUPPLIER/MANUFACTURER'S NAME:</u>	BETHLEHEM APPARATUS COMPANY
<u>ADDRESS:</u>	890 Front Street Hellertown, PA 18055
<u>EMERGENCY PHONE:</u>	610-838-7034
<u>BUSINESS PHONE:</u>	610-838-7034
<u>DATE OF PREPARATION:</u>	May 20, 1997
<u>DATE OF REVISION:</u>	May 2, 2000

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	%w/w	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL		IDLH mg/m ³	OTHER mg/m ³
			TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³		
Mercury Exposure limits are for Mercury, Inorganic Compounds	7439-97-6	100	0.025, (skin) A4 (Not Classifiable as a Human Carcinogen)	NE	Mercury Vapor: 0.5, Skin; (Vacated 1989 PEL)	0.1 (ceiling) Non-alkyl Mercury Compounds: 0.1 Ceiling, skin (Vacated 1989 PEL)	10	NIOSH REL: STEL = 0.1 (ceiling, skin) DFG MAKs: TWA = 0.1 PEAK = 10•MAK 30 min., momentary value Carcinogen: EPA-D; IARC-3, TLV-A4

NE = Not Established.

See Section 16 for Definitions of Terms Used.

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Mercury is a silver-white, odorless, heavy liquid. Mercury is highly toxic, irritating, and causes sensitization and neurological symptoms. The primary health hazard associated with overexposure to this product is the potential for irritation of skin, eyes, or other contaminated tissues. Mercury causes severe, adverse health effects after chronic exposure to low vapor levels; emergency response efforts must be directed to removal of all traces of this product. Mercury is not flammable, and is relatively stable (though it can react with many metals to form amalgams). Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational over-exposure are inhalation and contact with skin and eyes. The symptoms of over-exposure to Mercury, via route of exposure, are as follows:

INHALATION: Long-term exposures to Mercury vapors present a severe health hazard. When inhaled, Mercury will be rapidly distributed throughout the body. During this time, Mercury will cross the blood-brain barrier, and become oxidized to the Hg(II) oxidation state. The oxidized species of Mercury cannot cross the blood-brain barrier and thus accumulates in the brain. Mercury in other organs is removed slowly from the body via the kidneys. The average half-time for clearance of Mercury for different parts of the human body is as follows: lung: 1.7 days; head: 21 days; kidney region: 64 days; chest: 43 days; whole body: 58 days.

Long-term inhalation over-exposures can lead to the development of a wide variety of symptoms, including the following: excessive salivation, gingivitis, anorexia, chills, fever, cardiac abnormalities, anemia, digestive problems, abdominal pains, frequent urination, an inability to urinate, diarrhea, peripheral neuropathy (numbness, weakness, or burning sensations in the hands or feet), tremors (especially in the hands, fingers, eyelids, lips, cheeks, tongue, or legs), alteration of tendon reflexes, slurred speech, visual disturbances, and deafness. Allergic reactions (i.e. breathing difficulty) may also occur in sensitive individuals.

The principal target organ associated with chronic Mercury exposures via inhalation is the central nervous system. Such exposures lead to the development of "Erethism". This syndrome consists of subtle or dramatic changes in behavior and personality: depression, fearfulness, restlessness, irritability, timidity, and indecision. These psychic and behavioral characteristics are often accompanied by insomnia, drowsiness, headache, and fatigue. In advanced cases, memory loss, hallucinations, and mental deterioration may occur.

Another, less common, syndrome associated with Mercury over-exposure is "Acrodynia". Symptoms of this syndrome include a pink color to the extremities, apathy, fever, kidney problems, sensitivity to light, generalized edema, and a painful scaling of the skin of the hands and feet. Other symptoms of chronic over-exposure to Mercury can include loosening of the teeth, inflammation of the mucous membranes, a dark blue line appearing along gingival margins, abnormal blushing, excessive sweating, and rashes. Reproductive effects, sexual disorders, and impotence may also develop in the event of Mercury over-exposure.

Short-term over-exposures to high concentrations of mercury vapors can lead to breathing difficulty, coughing, acute, chemical pneumonia, and pulmonary edema (a potentially fatal accumulation of fluid in the lungs). Depending on the concentration of over-exposure, cardiac abnormalities, damage to the kidney, liver or nerves and effects on the brain may occur.

If this product is heated, and exposure to Mercury fumes occurs, "Metal Fume Fever" may develop. This syndrome is a flu-like illness which occurs when metal oxides below 1.5 microns in size are inhaled. Symptoms of this syndrome may develop 4-12 hours after exposure and begin with the onset of thirst, metallic taste in the mouth, and symptoms of Mercury poisoning as described above. All symptoms generally subside within 24-36 hours after the over-exposure ends.

CONTACT WITH SKIN or EYES: Mercury can be irritating to contaminated skin and eyes. Symptoms of skin exposure can include redness, dry skin, and pain. Prolonged contact may lead to ulceration of the skin. Allergic reactions (i.e. rashes, welts) may occur in sensitive individuals. Dermatitis (redness and inflammation of the skin) may occur after repeated skin exposures. Symptoms of eye exposure can include redness, pain, and watery eyes. A symptom of Mercury exposure is discoloration of the lens of the eyes.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH	(BLUE)	3
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FLAMMABILITY	(RED)	0
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REACTIVITY	(YELLOW)	0
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PROTECTIVE EQUIPMENT | X

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For a variety of applications involving elemental Mercury.

See Section 16 for Definition of Ratings

5. HAZARD IDENTIFICATION (continued)

SKIN ABSORPTION: Skin absorption is a significant route of potential over-exposure to Mercury. Currently, no quantitative estimates of the rate of penetration are available. Symptoms of such over-exposure would include redness and irritation of the contaminated area, as well as the development of symptoms described for "Inhalation".

INGESTION: Ingestion is not anticipated to be a significant route of occupational over-exposure. If Mercury is swallowed, symptoms of such over-exposure can include metallic taste in mouth, nausea, vomiting, central nervous system effects, and damage to the kidneys. Metallic mercury is not usually absorbed sufficiently from the gastrointestinal tract to induce an acute, toxic response. Damage to the tissues of the mouth, throat, esophagus, and other tissues of the digestive system may occur. Ingestion may be fatal, due to effects on gastrointestinal system and kidneys.

INJECTION: Injection is not anticipated to be a significant route of over-exposure for this product. If Mercury is injected (i.e. through abrasions and lacerations of the skin), local redness and pain will occur. Other symptoms of such exposure can include the development of embolisms (Mercury blocking a vein or artery), malaise, chest pain, and difficulty in breathing.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. The most severe health effects associated with Mercury exposure are related to long-term exposures to vapors. In the event of over-exposure, the following symptoms may be observed:

ACUTE: Mercury can be irritating to contaminated skin and eyes. Short-term over-exposures to high concentrations of mercury vapors can lead to breathing difficulty, coughing, acute, and potentially fatal lung disorders. Depending on the concentration of inhalation over-exposure, heart problems, damage to the kidney, liver or nerves and effects on the brain may occur.

CHRONIC: Long-term over-exposure can lead to a wide range of adverse health effects. Anyone using Mercury must pay attention to personality changes, weight loss, skin or gum discolorations, stomach pains, and other signs of Mercury over-exposure. Gradually developing syndromes ("Erethism" and "Acrodynia") are indicative of potentially severe health problems. Mercury can cause the development of allergic reactions (i.e. dermatitis, rashes, breathing difficulty) upon prolonged or repeated exposures. Refer to Section 11 (Toxicology Information) for additional data.

TARGET ORGANS: ACUTE: Skin, eyes, respiratory system, central nervous system, brain. CHRONIC: Skin, respiratory system, central nervous system, brain, blood system, kidneys, and reproductive system.

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

Contaminated individuals must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to health professional with victim.

SKIN EXPOSURE: If Mercury contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. The contaminated individual must seek immediate medical attention.

EYE EXPOSURE: If Mercury contaminates the eyes, open the victim's eyes while under gently running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. Minimum flushing is for 15 minutes. The contaminated individual must seek immediate medical attention.

INHALATION: If Mercury vapors are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers. The contaminated individual must seek immediate medical attention.

INGESTION: If Mercury is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, induce vomiting. Have victim rinse mouth with water, or drink several cupfuls of water, if conscious. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Preexisting respiratory problems, dermatitis, central nervous system disorders, kidney problems, and liver dysfunctions can be aggravated by exposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treatment for Mercury over-exposure must be given. The following treatment protocol for ingestion of Mercury is from Clinical Toxicology of Commercial Products (5th Edition, 1984).

1. As soon as possible, have patient drink milk or slurry of activated charcoal to help precipitate mercury in the stomach.
2. Gastric lavage with tap water, milk, or 2-5% solution of sodium bicarbonate, unless spontaneous vomiting is intense and productive,
3. Administer through the lavage tube 0.5-1.0 oz. of sodium or magnesium sulfate in 6-8 oz. of water (unless spontaneous purging has already begun) and a slurry of activated charcoal.
4. Administer BAL (Dimercaprol; 3 mg/kg or 0.3 mL/10 kg) intramuscularly as a 10% solution in oil. If given within three hours after ingestion, severe renal damage may be prevented. Collect urine before and after BAL therapy for mercury analysis.
5. Demulcents (i.e. milk of magnesia, starch, bismuth subcarbonate) and analgesic drugs may be useful and necessary.

7. FIRST AID MEASURES (continued)

RECOMMENDATIONS TO PHYSICIANS (continued):

6. Because the BAL-Mercury Complex excreted in bile may be partly resorbed in the bowel, it is probably useful to administer activated charcoal every few hours, starting as soon as vomiting subsides.
7. Treat shock by correcting dehydration and electrolyte imbalances. If renal insufficiency develops, treat for acute renal failure.
8. The maintenance of an adequate nutritional status may be troublesome if gastrointestinal disorders becomes severe or persistent.
9. If toxic signs or symptoms recur after an apparent recovery, another course of chelation therapy is warranted. BAL is still appropriate, but a trial with D-Penicillamine or N-acetyl-D,L-penicillamine may be preferable. Either penicillamine compound is given by mouth, usually on an empty stomach, in a dose of 250 mg (4 times daily for adults; 3 times daily in children; 5-10 days). Penicillamine should be withheld until mercury is cleared out of the bowels. A chelating agent should be used until the urine-mercury level falls below 50µg/24 hours.

Laboratory Analysis: Determination of β 2-Microglobulins has been recommended as a useful test for renal function. Electroencephalographic changes may be correlated closely with the clinical state. Analysis of the blood, hair, urine, or feces can be done to determine the level of Mercury exposure. Mercury deposits in the body can be observed in X-Rays.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES

Carbon Dioxide: YES

Foam: YES

Dry Chemical: YES

Halon: YES

Other: Any "ABC" Class.

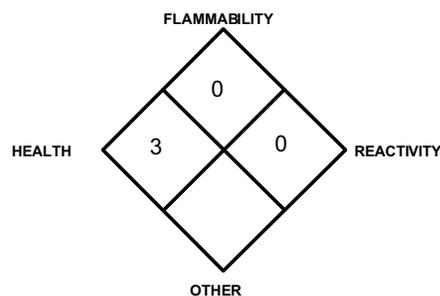
UNUSUAL FIRE AND EXPLOSION HAZARDS: Mercury vapors and mercury oxides generated during fires involving this product are toxic; additionally, this element can be irritating to contaminated tissue. Therefore, this product presents a severe health hazard to firefighters. Mercury is not flammable, and is relatively stable (though it can react with many metals to form amalgams).

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move fire-exposed containers if it can be done without risk to firefighters. Apply cooling water to sides of containers that are exposed to flame until well after fire is out. Decontaminate all equipment thoroughly after the conclusion of fire-fighting activities. If possible, prevent run-off water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING



**See Section 16 for
Definition of Ratings**

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a Mercury release, clear the affected area, protect people, and respond with trained personnel. In the event of a release under 1 pound of Mercury, the minimum Personal Protective Equipment should be **Level C: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard-hat, and Air-Purifying Respirator with cartridge appropriate for Mercury. Level B, which includes Self-Contained Breathing Apparatus, must be worn if the amount of Mercury released is over 1 pound or when the concentration of oxygen in atmospheres is less than 19.5% or unknown.** If necessary, dike area of release with suitable absorbent materials. There are a variety of methods which can be used to clean-up Mercury spills. Use a commercially-available Mercury Spill Kit for small spills. A suction pump with aspirator can also be used during clean-up operations. For larger releases, a Mercury vacuum can be used. Calcium polysulfide or excess sulfur can also be used for clean-up. Mercury can migrate into cracks and other difficult-to-clean areas; calcium polysulfide and sulfur can be sprinkled effectively into these areas. Decontaminate the area thoroughly. The area should be inspected visually and with colorimetric tubes for Mercury to ensure all traces of Mercury have been removed prior to re-occupation by non-emergency personnel. Decontaminate all equipment used in response thoroughly. If such equipment cannot be adequately decontaminated, it must be discarded with other spill residue. Place all spill residue in an appropriate container, seal immediately, and label appropriately. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations and regulations of Canada and its Provinces. (see Section 13, Disposal Considerations).

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting Mercury ON YOU or IN YOU. Wash thoroughly after handling this product. Avoid breathing vapors or spays of this product. Do not eat or drink while handling this product. Remove contaminated clothing immediately. Report all Mercury releases promptly. Clean-up all releases of this product immediately. Supervisors and other responsible personnel must be aware of personality changes, weight loss, or other signs of Mercury over-exposure in employees using this product; these symptoms can develop gradually and are indicative of potentially severe health effects related to Mercury contamination.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Use in a well-ventilated location. Open containers slowly on a stable surface. Drums, flask, and bottles of this product must be properly labeled. Empty containers may contain residual amounts of Mercury; therefore, empty containers should be handled with care. Store drums, flasks, and bottles in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers or in a diked area, as appropriate. Keep drums, flasks, and bottles tightly closed when not in use. Storage areas should be made of fire-resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment thoroughly before maintenance begins.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients), if applicable. Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients), if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent U.S. State standards, and Canadian CSA Standard Z94.4-93. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). The following respirator selection guidelines from NIOSH are provided for additional information:

RECOMMENDATIONS FOR MERCURY COMPOUNDS [except (organo) alkyls] (as Hg) CONCENTRATIONS IN AIR:

- Up to 0.5 mg/m³: Chemical cartridge respirator with cartridge(s) to protect against mercury compounds (an End-of-Service Life Indicator is required); or Supplied-Air Respirator (SAR).
- Up to 1.25 mg/m³: SAR operated in a continuous-flow mode; or powered air-purifying respirator with cartridge(s) to protect against mercury compounds (canister) (an End-of-Service Life Indicator is required.)
- Up to 2.5 mg/m³: Full-facepiece chemical cartridge respirator with cartridge(s) to protect against mercury compounds; or gas mask with canister to protect against mercury compounds; or SAR with a tight-fitting facepiece operated in a continuous-flow mode; or powered air-purifying respirator with a tight-fitting facepiece and cartridge(s) to protect against mercury compounds (canister) (an End-of-Service Life Indicator is required); or full-facepiece Self-Contained Breathing Apparatus (SCBA); or full-facepiece SAR.
- Up to 10 mg/m³: Positive pressure SAR.
- Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.
- Escape: Gas mask with canister to protect against mercury compounds; or escape-type SCBA.

EYE PROTECTION: Splash goggles or safety glasses. For operations involving the use of more than 1 pound of Mercury, or if the operation may generate a spray of Mercury, the use of a faceshield is recommended.

HAND PROTECTION: Wear neoprene gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task (i.e. lab coat, coveralls, Tyvek suit).

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): 6.9
determined.

EVAPORATION RATE (n-BuAc = 1): Not

SPECIFIC GRAVITY (water = 1): 13.5939

MELTING/FREEZING POINT: -38.87°C (-37.97°F)

SOLUBILITY IN WATER: Insoluble.

BOILING POINT: 356.72°C (674.1°F)

VAPOR PRESSURE, mm Hg @ 25°C: 0.002

pH: Not applicable.

ODOR THRESHOLD: Not applicable.

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.

APPEARANCE, ODOR AND COLOR: Mercury is a silver-white, heavy liquid which is odorless.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance of this product is a distinguishing characteristic.

10. STABILITY and REACTIVITY

STABILITY: Stable

DECOMPOSITION PRODUCTS: If this product is exposed to extremely high temperatures in the presence of oxygen or air, toxic vapors of mercury and mercury oxides will be generated.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Mercury is incompatible with acetylene and acetylene derivatives, amines, ammonia, 3-bromopropyne, boron diiodophosphide, methyl azide, sodium carbide, heated sulfuric acid, methylsilane/oxygen mixtures; nitric acid/alcohol mixtures, tetracarbonylnickel/oxygen mixtures, alkyne/silver perchlorate mixtures, halogens (i.e. chlorine, bromine) and strong oxidizers (i.e. chlorine dioxide, perchlorates). Mercury can attack copper and copper alloys. Additionally, mercury can react with many metals (i.e. calcium, lithium, potassium, sodium, rubidium, aluminum) to form amalgams.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure or contact to extreme temperatures, incompatible chemicals

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The specific toxicology data available for Mercury are as follows.

TDLo (Subcutaneous-Man) 254 mg/kg: Skin and Appendages: dermatitis, other (after systemic exposure)

TDLo (Oral-Man) 43 mg/kg: Behavioral: tremor; Liver: jaundice, other or unclassified, other changes

TDLo (Skin-Man) 129 mg/kg/5 hours-continuous: Sense Organs and Special Senses (Ear): tinnitus; Behavioral: headache; Skin and Appendages: dermatitis, allergic (after systemic exposure)

TDLo (Intravenous-Man) 571 µL/kg: Peripheral Nerve and Sensation: paresthesia; Lungs, Thorax, or Respiration: dyspnea; Skin and Appendages: sweating

TDLo (Intraperitoneal-Rat) 400 mg/kg/14 days-intermittent: Tumorigenic: equivocal tumorigenic agent by RTECS criteria, tumors at site of application

TCLo (Inhalation-Woman) 150 µg/m³/46 days: Behavioral: wakefulness, anorexia (human); Gastrointestinal: hypermotility, diarrhea

TCLo (Inhalation-Man) 44300 µg/m³/8 hours: Behavioral: muscle weakness; Liver: other changes; Nutritional and Gross Metabolic: body temperature increase

TCLo (Inhalation-Rat) 4 mg/m³/2 hours/11 days-intermittent: Brain and Coverings: other degenerative changes; Kidney, Ureter, Bladder: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other Enzymes

TCLo (Inhalation-Rat) 1 mg/m³/24 hours/5 weeks-continuous: Kidney, Ureter, Bladder: proteinuria

TCLo (Inhalation-Rat) 8 µg/m³/6.5 hours/41 weeks-intermittent: Behavioral: alteration of classical conditioning

TCLo (Inhalation-Rat) 17 mg/m³/2 hours/30 days-continuous: Brain and Coverings: other degenerative changes; Behavioral: alteration of classical conditioning, alteration of operant conditioning

TCLo (Inhalation-Rat) 890 ng/m³/24 hours: male 16 week(s) pre-mating: Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count)

TCLo (Inhalation-Rat) 7440 ng/m³/24 hours: male 16 week(s) pre-mating: Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)

TCLo (Inhalation-Rat) 1 mg/m³/24 hours: female 1-20 day(s) after conception: Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus)

TCLo (Inhalation-Rat) 300 µg/m³/4 hours: female 7-21 day(s) after conception: Reproductive: Specific Developmental Abnormalities: Central Nervous System

LCLo (Inhalation-Rabbit) 29 mg/m³/30 hours Cytogenetic Analysis (Unreported-Man) 150 µg/m³

SUSPECTED CANCER AGENT: Mercury is listed as follows by agencies tracking carcinogenic potential:

ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen: Agents which cause concern that they could be carcinogenic for humans, but which cannot be assessed conclusively because of a lack of data); EPA- D (Not Classifiable as to Human Carcinogenicity-Inadequate human and animal evidence of carcinogenicity or no data are available); IARC-3 (Possibly Carcinogenic to Humans)

Mercury is not found on the following lists: FEDERAL OSHA Z LIST, NTP, or CAL/OSHA and therefore is not considered to be, nor suspected to be, a cancer-causing agent by these agencies.

11. TOXICOLOGICAL INFORMATION (CONTINUED)

IRRITANCY OF PRODUCT: Mercury can be irritating to skin, eyes, or other contaminated tissue.

SENSITIZATION TO THE PRODUCT: Mercury is a sensitizer capable of causing allergic reactions (i.e. breathing difficulty, dermatitis, rashes) after prolonged or repeated over-exposures.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Mercury on the human reproductive system.

Mutagenicity: Human mutation data are available for Mercury; these data were obtained during clinical studies on specific human tissues exposed to high doses of this element.

Embryotoxicity: This product may cause embryotoxic effects in humans. Refer to the paragraph on "Teratogenicity" for additional information.

Teratogenicity: This product may cause teratogenic effects in humans. Intrauterine exposure may result in tremors and involuntary movements in the fetus. Mercury has also been reported to produce teratogenic effects in test animals.

Reproductive Toxicity: This product is reported to cause reproductive effects in humans. Impotence has been reported in over-exposed males. Women occupationally exposed have reported menstrual disturbances, reduced ovulation, and spontaneous abortions. Mercury is excreted in breast milk. Mercury has also been reported to produce adverse reproductive effects in test animals.

*A **mutagen** is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An **embryotoxin** is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance which interferes in any way with the reproductive process.*

BIOLOGICAL EXPOSURE INDICES: The following Biological Exposure Indices (BEIs) have been determined for Mercury.

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
MERCURY • Total inorganic mercury in urine • Total inorganic mercury in blood	• Preshift • End of shift at end of workweek	• 35 µg/g creatinine • 15 µg/L

Note: Women of child-bearing potential, whose blood Pb exceeds 10 µg/dl, are at risk of delivering a child with a blood Pb over the current Center for Disease Control Guideline of 10 µg/dl. If the blood Pb of such children remains elevated, they may be at increased risk of cognitive deficits. The blood Pb of these children should be closely monitored and appropriate steps should be taken to minimize the child's exposure to environmental lead.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: Mercury is stable, and persists for long periods in ambient environmental conditions. The following environmental data are available for this element:

The biological half-life of mercury in fish is approximately 2 to 3 years. Mercury bioaccumulates and concentrates in the food chain. Concentration may be as much as 10,000 times that of water. Mercury is concentrated by animals, plants and fishes. Chinook salmon fed contaminated fingerlings concentrated Mercury in the liver and kidneys. Methyl mercury is formed naturally in aquatic and terrestrial environments from elemental mercury. Methylation is likely to occur in upper sedimentary layers of sea or lake bottoms.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Mercury can be harmful or fatal to contaminated plant or animal life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Mercury can be harmful or fatal to contaminated aquatic plant or animal life in contaminated bodies of water. The following aquatic toxicity data are available for Mercury:

MERCURY:

LC₅₀ (Catfish) = 0.35 mg/L / 96 hours (conditions of bioassay not specified)

LC₅₀ (*Modiolus carvalhoi*) (mollusk) = 0.5 ppm / 48 hours; 0.19 ppm - 96 hours (conditions of bioassay not specified)

LC₅₀ (*Rana hexadactyla*) (tadpoles) = 0.051 ppm / 96 hours (conditions of bioassay not specified)

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, should be recycled. If altered by use, recycling may be possible. Consult Bethlehem Apparatus Company for information. If Mercury must be disposed of as hazardous waste, it must be handled at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: Depending on the nature of the waste, one of the following RCRA codes will be applicable: U151 (Toxic Commercial Chemical Products/Mercury); D009 (Characteristic; Toxicity Characteristic Leaching Procedure; Regulated Level: 0.2 mg/L).

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Mercury
HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive Material)
UN IDENTIFICATION NUMBER: UN 2809
PACKING GROUP: PG III
DOT LABEL(S) REQUIRED: Corrosive

NOTE: For transport by aircraft, Mercury must be packaged in packagings which meet the requirements of Packing Group I Performance Level. For transportation by other modes, Mercury must be packaged in packagings which meet the requirements of Packing Group III Performance Level or in non-specification reusable metal packagings. Refer to 49 CFR 173.164 for specific packaging requirements.

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MARINE POLLUTANT: Mercury is not listed as a Marine Pollutant, per Appendix B to 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This material is considered as dangerous goods, per regulations of Transport Canada. Use the above U.S. DOT information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: Mercury is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Mercury	No	YES	YES

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for Mercury. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. TSCA INVENTORY STATUS: Mercury is listed on the TSCA Inventory.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Mercury = 1 lb (0.454 kg)

OTHER U.S. FEDERAL REGULATIONS: Mercury is regulated as follows (other regulations may be applicable):

EPA: Mercury is listed as a Hazardous Air Pollutant (HAP) generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Mercury is included on this list.

FDA: The action level of 1.0 ppm total mercury in fish has been revised on September 12, 1984 by FDA to apply only to methyl mercury.

FIFRA: All uses of mercury are cancelled except the following: 1) as a fungicide in the treatment of textiles and fabrics intended for continuous outdoor use; 2) as a fungicide to control brown mold on freshly sawn lumber; 3) as a fungicide treatment to control Dutch elm disease; 4) as an in-can preservative in water based paints and coatings; 5) as a fungicide in water-based paints and coatings used for exterior application; 6) as a fungicide to control "winter turf diseases" such as Sclerotinia boreales, and gray and pink snow mold subject to the following: a. the use of these products shall be prohibited within 25 feet of any water body where fish are taken for human consumption. b. these products can be applied only by or under the direct supervision of golf course superintendents. These types of Mercury-containing products will be classified as restricted use pesticides when they are reregistered and classified in accordance with Section 4(C) of FEPCA.

U.S. STATE REGULATORY INFORMATION: Mercury is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Mercury.
California - Permissible Exposure Limits for Chemical Contaminants: Mercury.
Florida - Substance List: Mercury.
Illinois - Toxic Substance List: Mercury.
Kansas - Section 302/313 List: Mercury.
Massachusetts - Substance List: Mercury.
Michigan - Critical Materials Register: Mercury.

Minnesota - List of Hazardous Substances: Mercury.
Missouri - Employer Information/Toxic Substance List: Mercury.
New Jersey - Right to Know Hazardous Substance List: Mercury.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: Mercury.

Pennsylvania - Hazardous Substance List: Mercury.
Rhode Island - Hazardous Substance List: Mercury.
Texas - Hazardous Substance List: Mercury.
West Virginia - Hazardous Substance List: Mercury.
Wisconsin - Toxic and Hazardous Substances: Mercury.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL U.S. REGULATIONS (continued):

CALIFORNIA PROPOSITION 65: Mercury is on the California Proposition 65 lists. **WARNING**: Contains a chemical known to the State of California to cause birth defects or other reproductive harm.

LABELING (Precautionary Statements) ANSI LABELING (Z129.1): **DANGER!** HIGHLY TOXIC AFTER LONG-TERM EXPOSURE. DANGER OF CUMULATIVE EFFECTS. MAY CAUSE DAMAGE TO THE NERVOUS SYSTEM, BLOOD SYSTEM, KIDNEYS, LIVER. REPRODUCTIVE HAZARD. HARMFUL OR FATAL IF INHALED OR SWALLOWED. MAY CAUSE ALLERGIC SKIN AND RESPIRATORY REACTION. CAUSES SKIN AND EYE IRRITATION. Do not get on skin, in eyes, or on clothing. Avoid prolonged contact with the skin. Avoid breathing vapors and fumes. Do not take internally. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, face-shield, body protection, and NIOSH-approved respiratory protection, as appropriate. **FIRST-AID**: In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, induce vomiting. Get medical attention immediately. **IN CASE OF FIRE**: Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL**: Vacuum released material, or use a Mercury Spill Kit. Containerize residue immediately, and label appropriately. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

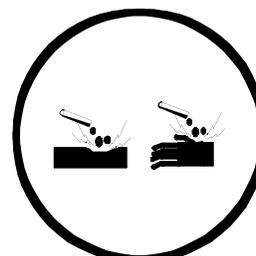
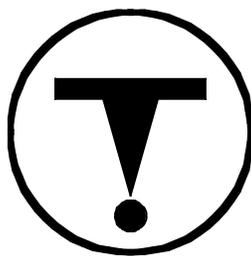
CANADIAN DSL/NDL INVENTORY STATUS: Mercury is listed on the DSL Inventory.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: Mercury is not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS SYMBOLS:

D1B:	Materials Causing Immediate and Serious Toxic Effects/Toxic Material
D2A:	Materials Causing Other Toxic Effects/Very Toxic Material
D2B:	Materials Causing Other Toxic Effects/Toxic Material
E:	Corrosive Material



16. OTHER INFORMATION

PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
(858) 565 - 0302

DATE OF PRINTING:

May 1, 2000

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Bethlehem Apparatus Company responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Bethlehem Apparatus Company for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order. **IDLH** - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. **Ecological Information:** **EC** is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **U.S.:** **EPA** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA:** **CEPA** is the Canadian Environmental Protection Act. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDSL** are the Canadian Domestic/Non-Domestic Substances Lists. **The CPR is the Canadian Product Regulations.** This section also includes information on the precautionary warnings which appear on the materials package label.



Material Safety Data Sheet

1. Product and Company Identification

Product name : **Benzene**

Chemical formula : C₆H₆

Synonyms : Benzol, Cyclohexatriene, Benzole, Phene, Pyrobenzol, Pyrobenzole, Carbon Oil, Coal Tar Naphtha, Phenyl Hydride, Benzolene, Bicarburet of Hydrogen, Coal Naphtha, Motor Benzol, Annulene, (6) Annulene, UN 1114

Company : Specialty Gases of America, Inc
6055 Brent Dr.
Toledo, OH 43611

Telephone : 419-729-7732

Emergency : 800-424-9300

2. Composition/Information on Ingredients

Components	CAS Number	% Volume
Benzene	71-43-2	99+%
Thiophene	110-02-1	0.00010

3. Hazards Identification

Emergency Overview

Flammable liquid and vapor. Vapor may cause flash fire.

May cause respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, cancer hazard (in humans).

Potential Health Effects

Inhalation : Irritation, ringing in the ears, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, symptoms of drunkenness, disorientation, blurred vision, lung congestion, blood disorders, paralysis, convulsion, coma. May cause hearing loss, visual disturbances, reproductive effects, brain damage, cancer in long term exposure.

Eye contact : Irritation.

Skin contact : Irritation, blisters. May cause tingling sensation in long term exposure.

Ingestion : Nausea, vomiting, chest pain, headache, drowsiness, symptoms of drunkenness, disorientation, visual disturbances, lung congestion, paralysis, convulsion, coma. May cause impotence, cancer in long term exposure.

Chronic Health Hazard : Not applicable.

4. First Aid Measures

General advice : None.

Eye contact : Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

- Skin contact : Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.
- Ingestion : Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.
- Inhalation : If adverse effects occur, remove to contaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

5. Fire-Fighting Measures

- Suitable extinguishing media : Regular dry chemical carbon dioxide water regular foam.
Large fires: Use regular foam or flood with fine water spray.
- Specific hazards : Severe fire hazard. Moderate explosion hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.
- Fire fighting : Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles well after fire is out. If this is impossible, take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

6. Accidental Release Measures

- Air release : Reduce vapors with water spray. Stay upwind and keep out of low areas.
- Soil release : Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.
- Water release : Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers. Cover with absorbent sheets, spill-control pads or pillows. Apply detergents, soaps, alcohols or another surface active agent. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment.
- Occupational release : Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Committee for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800) 424-8802 (USA) or (202) 426-2675 (USA).

7. Handling and Storage

Handling

Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

Storage

Store in accordance with all current regulations and standards. Subject to storage regulation: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Keep separated from incompatible substances.

8. Exposure Controls / Personal Protection

Exposure limits

ACGIH	:	0.5 ppm TWA 2.5 ppm STEL Skin – potential significant contribution to overall exposure by the cutaneous route
OSHA (final)	:	5 ppm STEL (see 29 CFR 1910.1028) 10 ppm TWA applies to industry segments except from the benzene standard at 29 CFR 1910.1028; 1 ppm TWA 25 ppm Ceiling
OSHA (vacated)	:	50 ppm STEL unless specified in 1910.1028 10 minute 10 ppm TWA unless specified in 1910.1028 25 ppm Ceiling unless specified in 1910.1028
NIOSH	:	1 ppm STEL 0.1 ppm TWA

Ventilation

Provide local exhaust or process enclosure ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

Personal protective equipment

Respiratory protection	:	The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. OSHA Standard: Respirator selection should comply with 29 CFR 1910.134, 29 CFR 1910.1028 and the final rule published in the Federal Register on August 24, 2006. NIOSH Recommendations: At any detectable concentration – Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator with full facepiece and operated in pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in positive-demand or other positive-pressure mode. Escape – Any air-purifying respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister. Any escape-type, self-contained breathing apparatus.
Hand protection	:	Wear appropriate chemical resistant gloves. OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1028.
Eye protection	:	Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.
Skin and body protection	:	Wear appropriate chemical resistant clothing.

9. Physical and Chemical Properties

Form	:	Liquid.
Color	:	Colorless to yellow.

Odor	: Distinct odor.
Molecular weight	: 78.11
Vapor pressure	: 75 mmHg @ 20°C
Vapor density	: 2.8 (air = 1)
Specific gravity	: 0.8765 @ 20°C (water = 1)
Boiling point	: 176°F (80°C)
Melting point	: 43°F (6°C)
Water solubility	: 0.18% @ 25°C
Solvent solubility	: Soluble: acetone, alcohol, carbon disulfide, acetic acid, carbon tetrachloride, chloroform, ether, oils.
Evaporation rate	: 5.1 (butyl acetate = 1)

10. Stability and Reactivity

Stability	: Stable under normal conditions.
Conditions to avoid	: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.
Materials to avoid	: Acids, bases, halogens, oxidizing materials, metal salts.
Hazardous decomposition products	: Thermal decomposition products: oxides of carbon.

11. Toxicological Information

The components of this material have been reviewed in various sources and the following selected endpoints are published:

BENZENE (71-43-2)	: Inhalation LC50 Rat: 13050-14380 ppm/4H; Oral LD50 Rat: 1800 mg/kg
THIOPHENE (110-02-1)	: Oral LD50 Rat: 1400 mg/kg

Acute Toxicity Level

BENZENE (71-43-2)	: Highly toxic: dermal absorption. Moderately toxic: ingestion. Slightly toxic: inhalation.
THIOPHENE (110-02-1)	: Toxic: inhalation. Moderately toxic: ingestion.

Component Carcinogenicity

BENZENE (71-43-2)	: ACGIH: A1 – Confirmed Human Carcinogen IARC: Supplement 7 [1987]; Monograph 29 [1982] (Group 1 (carcinogenic to humans)) DFG: Category 1 (causes cancer in man) Present Known Human Carcinogen
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Local Effects

BENZENE (71-43-2)	: Irritant: inhalation, skin, eye.
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Target Organs

BENZENE (71-43-2)	: Immune system (blood), central nervous system.
THIOPHENE (110-02-1)	: Central nervous system.

Medical Conditions Aggravated by Exposure

Blood system disorders, immune system disorders or allergies.

Additional Data

May cross the placenta. Alcohol may enhance the toxic effects. Interactions with drugs may occur.

12. Ecological Information

Ecotoxicity Data

BENZENE (71-43-2) : Fish:
96 Hr LC50 Pimephales promelas: 10.7 – 14.7 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 5.3 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 22.49 mg/L [static]; 96 Hr LC50 Poecilia reticulata: 28.6 mg/L [static]; 96 Hr LC50 Pimephales promelas: 22330 – 41160 µg/L [static]; 96 Hr LC50 Lepomis macrochirus: 70000 – 142000 µg/L [static]

Algae:

72 Hr EC50 Pseudokirchneriella subcapitata: 29 mg/L

Invertebrate:

48 Hr EC50 Daphnia magna: 8.76 – 15.6 mg/L [static]; 48 Hr EC50 Daphnia magna: 10 mg/L

13. Disposal Considerations

Waste from residues / unused products : Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U019. Hazardous Waste Number(s): D018. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level – 0.5 mg/L. Dispose in accordance with all applicable regulations.

Contaminated packaging : Return cylinder to supplier.

Component Waste Numbers

BENZENE (71-43-2) : RCRA: waste_number U019 (Ignitable waste; Toxic waste)
0.5 mg/L regulatory level

14. Transport Information

DOT (US only)

Proper shipping name : Benzene
Class : 3, Packing Group II
UN/ID No. : UN1114
Labeling : Flammable Liquid

Further information

Cylinders should be transported in a secure upright position in a well ventilated truck.

15. Regulatory Information

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

BENZENE (71-43-2) – 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 1989 final rule)

BENZENE (71-43-2) – SARA 313: 0.1% de minimis concentration
CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 1989 final rule)

SARA 311/312

Acute: Yes
Chronic: Yes
Fire: Yes
Reactive: No
Pressure: No

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
BENZENE	71-43-2	Yes	Yes	Yes	Yes	Yes	Yes
THIOPHENE	110-02-1	No	Yes	No	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enhancement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

16. Other Information

Prepared by : Specialty Gases of America, Inc.

For additional information, please visit our website at www.americangasgroup.com.

Material Safety Data Sheet

Toluene

MSDS Number: M1003
Effective Date: 9/07/2004

Section 1 - Chemical Product and Company Identification

MSDS Name: Toluene

Synonyms: Methacide; Methylbenzene; Methylbenzol; Phenylmethane; Toluol

Company Identification:

VEE GEE Scientific, Inc.
13600 NE 126th PI Ste A
Kirkland, WA 98034

For information in North America, call: 425-823-4518

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
108-88-3	Toluene	>99	203-625-9

Hazard Symbols: XN F

Risk Phrases: 11 20

Section 3 - Hazards Identification

Emergency Overview

Appearance: Colorless. Flash Point: 40°F. **Warning!** Flammable liquid and vapor. May cause central nervous system depression. May cause liver and kidney damage. This substance has caused adverse reproductive and fetal effects in animals. Causes digestive and respiratory tract irritation. May cause skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. **Danger!** Harmful or fatal if swallowed. Causes eye irritation and possible transient injury. **Poison!** May be absorbed through intact skin. Vapor harmful. Call physician immediately.

Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye Contact: Causes eye irritation. May result in corneal injury. Vapors may cause eye irritation.

Skin Contact: Causes moderate skin irritation. May cause cyanosis of the extremities.

Ingestion: Aspiration hazard. May cause irritation of the digestive tract. May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Inhalation of vapor may cause respiratory tract irritation. May cause liver and kidney damage. Vapors may cause dizziness or suffocation. Overexposure may cause dizziness, tremors, restlessness, rapid heart beat, increased blood pressure, hallucinations, acidosis, kidney failure.

Chronic Exposure: Prolonged or repeated skin contact may cause dermatitis. May cause cardiac sensitization and severe heart abnormalities. May cause liver and kidney damage.

Section 4 - First Aid Measures

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

Skin Contact: Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.

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

Notes to Physician: Causes cardiac sensitization to endogenous catecholamines which may lead to cardiac arrhythmias. Do NOT use adrenergic agents such as epinephrine or pseudoepinephrine.

Section 5 - Fire Fighting Measures

General Information: Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Use water spray to keep fire-exposed containers cool. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated.

Fire Extinguishing Media: Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out. For large fires, use water spray, fog or regular foam.

Section 5 -

Fire Fighting Measures

Autoignition Temperature: 422°C (792°F)

Flash Point: 7°C (45°F)

Explosion Limits, lower: 1.2 vol%.

Explosion Limits, upper: 7.1 vol%

NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 -

Accidental Release Measures

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

Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as saw dust. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces.

Section 7 -

Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 -

Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs	OSHA - Vacated Pels
Toluene	50 ppm TWA	100 ppm TWA 375 mg/m ³ TWA 500 ppm IDLH	200 ppm TWA C 300 ppm	100 ppm TWA 375 mg/m ³ TWA 150 ppm STEL 560 mg/m ³ STEL

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Personal Protective Equipment

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

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 -

Physical and Chemical Properties

Physical State: Clear liquid

Appearance: Colorless

Odor: Sweet, pleasant

pH: Not available

Vapor Pressure: 36.7 mm Hg @ 30° C

Vapor Density: 3.1

Evaporation Rate: 2.4

Viscosity: 0.59 cP @ 20° C

Boiling Point: 232° F

Freezing/Melting Point: -139° F

Decomposition Temperature: Not available

Solubility: Insoluble

Specific Gravity/Density: 0.9

Molecular Formula: C₆H₅CH₃

Molecular Weight: 92.056

Section 10 -

Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Incompatible materials, ignition sources, excess heat.

Incompatibilities with Other Materials: Nitrogen tetroxide, nitric acid plus sulfuric acid, silver perchlorate, strong oxidizers, sodium difluoride.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 -

Toxicological Information

Carcinogenicity:

CAS# 108-88-3:

ACGIH: A4 - Not Classifiable as a Human Carcinogen

IARC: Group 3 carcinogen

Section 11 -

Toxicological Information (continued)

Epidemiology: No information available.

Teratogenicity: Specific developmental abnormalities included craniofacial effects involving the nose and tongue, musculoskeletal effects, urogenital and metabolic effects in studies on mice and rats by the inhalation and oral routes of exposure. Some evidence of fetotoxicity with reduced fetal weight and retarded skeletal development has been reported in mice and rats.

Reproductive Effects: Effects on fertility such as abortion were reported in rabbits by inhalation. Paternal effects were noted in rats by inhalation. These effects involved the testes, sperm duct and epididymis.

Neurotoxicity: No information available.

Mutagenicity: No information available.

Section 12 -

Ecological Information

Ecotoxicity: No data available. Bluegill LC50=17 mg/L/24H Shrimp LC50=4.3 ppm/96H Fathead minnow LC50=36.2 mg/L/96H Sunfish (fresh water) TLm=1180 mg/L/96H

Environmental: From soil, substance evaporates and is microbially biodegraded. In water, substance volatilizes and biodegrades.

Physical: Photochemically produced hydroxyl radicals degrade substance.

Other: None.

Section 13 -

Disposal Considerations

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

RCRA P-Series: None listed.

RCRA U-Series: CAS# 108-88-3: waste number U220.

Section 14 -

Transport Information

Shipping Name	US DOT	Canada TDG
	Toluene	Toluene
Hazard Class	3	3 (9.2)
UN Number	UN1294	UN1294
Packing Group	II	II
Other		FP 4C

Section 15 -

Regulatory Information

US Federal

TSCA: CAS# 108-88-3 is listed on the TSCA inventory.

Health & Safety Reporting List: None of the chemicals are on the Health & Safety Reporting List.

CAS# 108-88-3: Effective Date: October 4, 1982; Sunset Date: October 4, 1992

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

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

TSCA Significant New Use Rule: None of the chemicals in this material have a SNUR under TSCA.

SARA:

Section 302 (RQ): CAS# 108-88-3: final RQ = 1000 pounds (454 kg)

Section 302 (TPQ): None of the chemicals in this product have a TPQ.

SARA Codes: CAS # 108-88-3: acute, flammable.

Section 313: This material contains Toluene (CAS# 108-88-3, 99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act: CAS# 108-88-3 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act: CAS# 108-88-3 is listed as a Hazardous Substance under the CWA. CAS# 108-88-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 108-88-3 is listed as a Toxic Pollutant under the Clean Water Act.

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

STATE: CAS# 108-88-3 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

WARNING: This product contains Toluene, a chemical known to the state of California to cause birth defects or other reproductive harm. California No Significant Risk Level: CAS# 108-88-3: NOEL = 7000 ug/day

European/International Regulations**European Labeling in Accordance with EC Directives**

Hazard Symbols: XN F

Risk Phrases:

R 11 Highly flammable.

R 20 Harmful by inhalation

Section 15 -

Regulatory Information (continued)

Safety Phrases:

- S 16 Keep away from sources of ignition - No smoking.
- S 25 Avoid contact with eyes.
- S 29 Do not empty into drains.
- S 33 Take precautionary measures against static discharges.

WGK (Water Danger/Protection): CAS# 108-88-3: 2

Canada - DSL/NDSL: CAS# 108-88-3 is listed on Canada's DSL List.

Canada - WHMIS: This product has a WHMIS classification of B2, D2B.

Canadian Ingredient Disclosure List: CAS# 108-88-3 is listed on Canada's Ingredient Disclosure List.

Exposure Limits: CAS# 108-88-3: OEL-AUSTRALIA:TWA 100 ppm (375 mg/m3);STEL 150 ppm (560 mg/m3) OEL-BELGIUM:TWA 100 ppm (377 g/m3);STEL 150 ppm (565 mg/m3) OEL-CZECHOSLOVAKIA:TWA 200 mg/m3;STEL 1000 mg/m3 OEL-DENMARK:TWA 50 ppm (190 mg/m3);Skin OEL-FINLAND:TWA 100 ppm (375 mg/m3);STEL 150 ppm;Skin OEL-FRANCE:TWA 100 ppm (375 mg/m3);STEL 150 ppm (560 mg/m3) OEL-GERMANY:TWA 100 ppm (380 mg/m3) OEL-HUNGARY:TWA 100 mg/m3;STEL 300 mg/m3;Skin OEL-JAPAN:TWA 100 ppm (380 mg/m3) OEL-THE NETHERLANDS:TWA 100 ppm (375 mg/m3);Skin OEL-THE PHILIPPINES:TWA 100 ppm (375 mg/m3) OEL-POLAND:TWA 100 mg/m3 OEL-USSIA:TWA 100 ppm;STEL 50 mg/m3 OEL-SWEDEN:TWA 50 ppm (200 mg/m3);STEL 100 ppm (400 mg/m3);Skin OEL-SWITZERLAND:TWA 100 ppm (380 mg/m3);STEL 500 ppm OEL-THAILAND:TWA 200 ppm;STEL 300 ppm OEL-TURKEY:TWA 200 ppm (750 mg/m3) OEL-UNITED KINGDOM :TWA 100 ppm (375 mg/m3);STEL 150 ppm;Skin OEL IN BULGARIA, COLOMBIA,JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 -

Additional Information

MSDS Creation Date: 09/07/2004

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

MATERIAL SAFETY DATA SHEET

Xylenes (Xylol)

SECTION 1 . Product and Company Identification

Product Name and Synonym: Xylenes (Xylol)
Product Code: 280-20
Material Uses:
Manufacturer: OFI Testing Equipment Inc.
1006 W. 34th Street
Houston, TX 77018
(877) 880-9885
Entry Date : 5/12/2010
Print Date: 9/13/2010
24 Hour Emergency Assistance : Chemtrec 800-424-9300
Canutec 613-996-6666

Health:	2			
Flammability:	3			
Reactivity:	0			
Hazard Rating:				
Least	Slight	Moderate	High	Extreme
0	1	2	3	4
NA = Not Applicable		NE = Not Established		

SECTION 2 HAZARD IDENTIFICATION

Keep away from heat and ignition sources. May be harmful if swallowed. Avoid breathing vapor or dust. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

Emergency Overview: Danger! Harmful Or Fatal If Swallowed. Vapor Harmful. Affects Central Nervous System. Causes Severe Eye Irritation. Causes Irritation To Skin And Respiratory Tract. Chronic Exposure Can Cause Adverse Liver, Kidney, And Blood Effects. Flammable Liquid And Vapor.

Inhalation: Inhalation of Vapors May be Irritating To The Nose And Throat. Inhalation Of High Concentrations May Result In Nausea, Vomiting, Headache, Ringing In The Ears, And Severe Breathing Difficulties Which May Be Delayed In Onset. Substernal Pain, Cough, And Hoarseness Are Also Reported. High Vapor Concentrations Are Anesthetic And Central Nervous System Depressants.

Ingestion: Ingestion Causes Burning Sensation in Mouth and Stomach, Nausea, Vomiting and Salvation. Minute Amounts Aspirated into the Lungs can Produce a Severe Hemorrhagic Pneumonitis with Severe Pulmonary Injury or Death.

Skin: Skin Contact Results in Loss of Natural Oils and Often Results in Characteristic Dermatitis. May be Absorbed Through the Skin.

Eye Contact: Vapors Cause Eye Irritation. Splashes Cause Severe Irritation, Possible Corneal Burns and Eye Damage.

Chronic Exposure: Chronic Inhalation Can Cause Headache, Loss of Appetite, Nervousness and Pale Skin. Repeated or Prolonged Skin Contact may Cause a Skin Rash. Repeated Exposure of the Eyes to High Concentrations of Vapor may Cause Reversible Eye Damage. Repeated Exposure can Damage Bone Marrow, Causing Low Blood Cell Count. May Damage Liver and Kidneys.

Aggravated by Exposure: Persons with Pre-Existing Skin Disorders or Eye Problems or Impaired Respiratory Function, or Impaired Liver or Kidney Function may be more Susceptible to the Effects of the Substance.

SECTION 3 MIXTURE COMPONENTS

Xylenes (Xylol)

SARA 313	Component	CAS Number	Percent Comp.	Dimension	Exposure Limits
<input checked="" type="checkbox"/>	Xylenes (Xylol)	CAS# 1330-20-7	100	V/V	OSHA TWA 100 ppm (435 mg/m ³)

SECTION 4 FIRST AID MEASURES

Keep away from heat and ignition sources. May be harmful if swallowed. Avoid breathing vapor or dust. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.

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

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

INGESTION: Give several glasses of milk or water. Vomiting may occur spontaneously, but DO NOT INDUCE! Never give anything by mouth to an unconscious person.

SECTION 5 FIRE FIGHTING MEASURES

Fire Extinguisher Type: Water spray, dry chemical, carbon dioxide, alcohol foam

Fire / Explosion Hazards: Vapor may travel considerable distance to source of ignition and flash back.

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

SECTION 6 ACCIDENTAL RELEASE MEASURES

Remove all sources of ignition. Ventilate area of leak or spill. Wear protective equipment. Clean up in a manner that doesn't disperse dust.

Ventilate area or Leak or Spill. Remove all Sources of Ignition. Wear Appropriate Personal Protective Equipment as Specified in Section 8. Isolate Hazard Area. Keep Unnecessary and Unprotected Personnel from Entering. Contain and Recover Liquid when Possible. Use Non-Sparking Tools and Equipment. Collect Liquid in an Appropriate Container or Absorb with an Inert Material (e.g., Vermiculite, Dry Sand, Earth), and Place in a Chemical Waste Container. Do Not Use Combustible Materials, such as Saw Dust. Do Not Flush to Sewer! US Regulations (CERCLA) Require Reporting Spills and Releases to Soil, Water and Air in Excess of Reportable Quantities.

SECTION 7 HANDLING AND STORAGE

Keep away from heat and flame. Do not get in eyes, on skin, on clothing. Use with adequate ventilation.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection: NIOSH/MSHA-approved respirator

Ventilation: Local Exhaust

Xylenes (Xylol)

Mechanical

Protective Gloves: Gloves to prevent skin exposure as rubber or vinyl

Eye Protection: Goggles and Face Shield

Other Protective Equipment: Wear appropriate clothing to prevent skin exposure

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Melting Point:	12.2° C	Percent Volatile by Volume:	> 99%
Boiling Point:	138° C	Evaporation Rate	Information not available
Vapor Pressure:	6.72	Evaporation Standard	
Vapor Density:	3.66	Auto Ignition Temp	Information not available
Solubility in Water:	Negligible	Lower Flamm. Limit in Air	1.0
Appearance /Odors:	Red liquid, solvent odor	Upper Flamm. Limit in Air	6.0
Flash Point:	17.0° C		
Specific Gravity:	0.864		

SECTION 10 STABILITY AND REACTIVITY INFORMATION

Stability: Stable

Conditions to Avoid: Avoid contact with heat, sparks, flames, or other sources of ignition.

Materials to Avoid: Oxidizing materials

Hazardous Decomposition Products: Oxides of carbon, acrid fumes

Hazardous polymerization: Will Not Occur

Conditions to Avoid: None known

SECTION 11 Toxicological Information

Carcinogenic References: NTP Carcinogen - Known: No, IARC Category- 3

SECTION 12 Ecological Information

Environmental Toxicity: When Released to the Soil and Water, this Material may Evaporate to Moderate Extent.

Environmental Toxicity: This material may be toxic to aquatic life. The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l.

SECTION 13 Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

SECTION 14 Transport Information

Xylenes (Xylol)

DOT Classification: Xylenes, 3, UN1307, PG III

DOT Regulations may change from time to time. Please consult the most recent D.O.T. regulations.

SECTION 15 Regulatory Information

Chemical Inventory Status –

Part 1:Ingredient

p-Xylene (106-42-3)

TSCA Yes

EC Yes

Japan YES

Australia Yes

Chemical Inventory Status –

Part 2:Ingredient

p-Xylene (106-42-3)

Korea Yes

DSL Yes

NDSL No

Phil. Yes

Federal, State & International Regulations –

Part 1: Ingredient.

p-Xylene (106-42-3)

RQ No

TPQ No

List YES

Chemical Catg No

Federal, State &
International Regulations –

Part 2:Ingredient

p-Xylene (106-42-3)

CERCLA 100

261.33 No

8(d) YES

Chemical Weapons Convention: No

TSCA 12 (b):YES

CDTA:NO PURE/LIQUID

SARA 311/312: Acute:YES

Chronic: YES

Fire: YES

Pressure: No

Reactivity: No

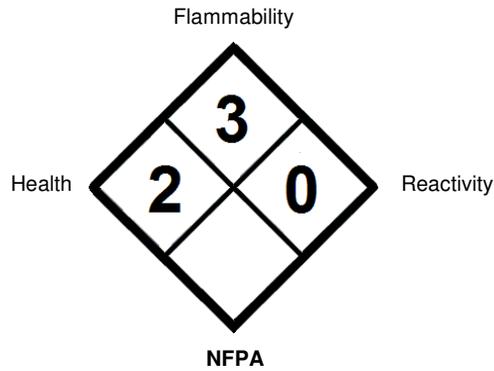
Australian Hazchem Code: 3Y

Poison Schedule:S6

SECTION 16 Additional Information

Effects of overexposure, Acute and Chronic: Irritation of eyes, nose and throat. Reversible eye damage, dermatitis, chemical pneumonia, central nervous system depression. Conditions aggravated: Persons with pre-existing eye, skin or respiratory conditions may be more susceptible. Target organs: Liver and kidneys.

Xylenes (Xylol)



Revisions

6/22/2010	0.1	updated msds to 16 section from 10 section msds. STN
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The information herein is believed to be accurate and is offered in good faith for the user's consideration and investigation. No warranty either expressed or implied is made for the completeness or accuracy of the information whether originating from the above mentioned company or not. Users of this material should satisfy themselves by independent investigation of current scientific and medical knowledge that the material can be used safely.

MATERIAL SAFETY DATA SHEET

SECTION 1 ♦ PRODUCT AND COMPANY IDENTIFICATION

Explorer Pipeline Company
6846 South Canton
P.O. Box 2650
Tulsa, Oklahoma 74101

FOR EMERGENCY SOURCE INFORMATION CONTACT:

- (918) 493 - 5100
- CHEMTREC: (800) 424-9300 (24 hour contact)
- CANUTEC: (613) 996-6666
- SETIQ: 91-800-00214

TRADE NAMES/SYNONYMS:

Methyl Tertiary Butyl Ether, Methyl Ether, Butyl Ether, or MTBE

CHEMICAL FAMILY: Alkyl Ethyl

EPL Code: 17

This material safety data sheet represents the composite characteristics and properties of fungible petroleum hydrocarbons and other related substances transported by explorer pipeline company. The information presented was compiled from one or more product shipper sources and is intended to provide health and safety guidance for these fungible products. Individual shipper and manufacturer MSDSs are available at Explorer Pipeline Company's, Tulsa, Oklahoma, offices.

SECTION 2 * HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER! EXTREMELY FLAMMABLE LIQUID

- Clear, colorless liquid with ether-like odor;
- Eye and mucous membrane irritant - effects central Nervous system - harmful or fatal if swallowed - aspiration hazard;
- High fire hazard. Keep away from heat, spark, open flame, and other ignition sources;
- Contact may cause eye, skin and mucous membrane irritation. Avoid prolonged breathing of vapors or mists;
- Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects;
- If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs); and
- Obtain prompt medical attention. Keep Out of Reach of Children!

SECTION 3 ▼ COMPOSITION/INFORMATION OF INGREDIENTS

INGREDIENT	CAS NUMBER	PERCENTAGE (%)
Methyl Tertiary Butyl Ether	1634-04-4	97+%

ACUTE

GETTING IT IN YOUR EYE...

- May cause minor eye irritation.

GETTING IT ON YOUR SKIN...

- No significant signs or symptoms indicative of any health hazard are expected to occur as a result of skin absorption exposure.
- May produce skin irritation.

SWALLOWING IT...

- The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

BREATHING IT...

- Excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

CHRONIC

➤ Medical information regarding special health effects is not conclusive.

CANCER, REPRODUCTIVE AND GENETIC EFFECTS

➤ This product has produced cancer, developmental and systemic toxicity in laboratory animals following repeated exposure. The significance of these results to human exposures has not been determined.

See Toxicological Information (Section 11) For More Information

SECTION 4 ☒ FIRST AID MEASURES

EYES: In case of eye contact, immediately rinse with clean water for 20-30 minutes. Retract eyelids often. Obtain emergency medical attention if pain, blinking, tears or redness persist.

SKIN: Immediately remove contaminated clothing. Wash skin thoroughly with mild soap/water. Flush with lukewarm water for 15 minutes. If sticky, use waterless cleaner first.

INGESTION: If large quantity swallowed, give lukewarm water (pint) if victim completely conscious/alert. Do not induce vomiting/risk of damage to lungs exceeds poisoning risk. Obtain emergency medical attention.

INHALATION: If overcome by exposure, remove victim to fresh air immediately. Give oxygen or artificial respiration as needed. Obtain emergency medical attention. Prompt action is essential.

NOTE TO PHYSICIAN: TREAT SYMPTOMATICALLY AND SUPPORTIVELY

SECTION 5 ☒ FIRE FIGHTING MEASURES

Releases flammable vapors below normal ambient temperatures. When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Flammable vapors may be heavier than air. May travel long distances along ground before igniting/flashing back to vapor source.

FLASH POINT:(Method Used) -30°F

FLAMMABLE LIMITS:

LEL: 1.0%

UEL: 8.0%

AUTOIGNITION TEMPERATURE: 797°F

EXTINGUISHING MEDIA: Dry Chemical, CO₂, Foam for Alcohols, Water spray, and fog to cool exposures

HAZARDOUS REACTIONS/DECOMPOSITION: Combustion may produce carbon monoxide, carbon dioxide, and acrid fumes. Incomplete combustion generates highly poisonous carbon monoxide and perhaps other toxic gases.

SPECIAL INSTRUCTIONS: Do not enter fire area without proper protection. Decomposition products possible. Fight fires from safe distance/protected location. Heat may build pressure/rupture closed containers, spreading fire, increasing risk of burns/injuries. Water may be ineffective due to low flash point. Even if material is water soluble, may not be practicable to extinguish fire by water dilution. Apply water spray/fog for cooling. Notify authorities if liquid enters sewer/public waters.

SECTION 6 ❖ ACCIDENTAL RELEASE MEASURES

➤ Flammable liquid. Release can cause fire/explosion. Liquids/vapors may ignite. Evacuate/limit access. Equip responders with proper protection. Kill all ignition sources. Stop release. Prevent flow to sewers/public waters. Notify fire/environmental authorities. Blanket with firefighting foam. Restrict water use for cleanup. Impound/recover large land spill. Soak up small spill with inert solids. Use suitable disposal containers. On water material partially soluble/may float or sink. Contain/minimize dispersion/collect. Disperse residue to reduce aquatic harm.

SECTION 7 ☒ HANDLING AND STORAGE

Prior to working with this product workers should be trained on its proper handling and storage

➤ Store in tightly closed/properly vented containers away from heat/sparks/open flame/strong oxidizers. Use only non-sparking tools. Store drums with bung in up position. Carefully vent internal pressure before removing closure. Containers must be grounded before transfer. Electrical equipment should conform to National Electric Code. Handle used containers with care; residue may be flammable/explosive, unless blanketed with inert gas.

➤ Isolate, vent, drain, wash, and purge equipment before maintenance. Remove all ignition sources, check atmosphere for explosiveness and oxygen deficiencies. Use adequate personal protective equipment. Observe precautions pertaining to confined space entry.

SECTION 8 ⚠ EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: No special ventilation is usually required beyond that needed for normal comfort control.

OTHER HYGIENIC AND WORK PRACTICES: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing/wash thoroughly before reuse. Shower after work using plenty of soap and water.

EXPOSURE LIMITS

OSHA PEL

ACGIH TLV (2005)

METHYL TERT BUTYL ETHER

TWA	STEL	TWA	STEL
Not Applicable (N.A.)	N.A.	50 ppm	N.A.

PERSONAL PROTECTIVE EQUIPMENT

- **EYES:** Eye protection such as chemical splash goggles and/or face shield must be worn when possibility exists for eye contact due to splashing or spraying liquid, airborne particles, or vapor. Contact lenses should not be worn.
- **SKIN:** Depending on the conditions of use, protective gloves, apron, boots, head and face protection should be worn. This equipment should be cleaned thoroughly after each use.
- **RESPIRATORY PROTECTION:** No occupational exposure standards have been developed for this material. Where exposure through inhalation may occur from use, NIOSH/MSHA approved respiratory protection is recommended.

SECTION 9 ⚡ PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (760 MM HG): 131°F	PERCENT VOLATILE BY VOLUME: 100%
SPECIFIC GRAVITY (H₂O = 1): 0.74 @ 68°F	VISCOSITY UNITS, TEMP: No Data
FREEZING POINT: -164°F	VAPOR DENSITY (AIR = 1): 3.1
VAPOR PRESSURE AT 68°F: 75 mm Hg	SOLUBILITY IN WATER: Approximately 4% to 5%
APPEARANCE AND ODOR: Clear, colorless liquid with ether-like odor.	

SECTION 10 ⚡ STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable

CONDITIONS TO AVOID: High temperature, open flame or spark.

OTHER PHYSICAL AND CHEMICAL PROPERTIES: No Data

MATERIALS TO AVOID: Strong oxidizing agents, ungrounded electrical equipment, open flames and spark.

HAZARDOUS POLYMERIZATION: Not Expected to Occur

SECTION 11 ☠ TOXICOLOGICAL INFORMATION

METHYL TERT BUTYL ETHER (MTBE)

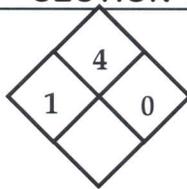
Acute symptoms associated with human exposure to MTBE appear to be mild and transient. Breathing small amounts of MTBE for short periods may cause nose and throat irritation. In laboratory studies, rodents exposed to high doses of MTBE exhibited blood chemistry changes and liver and kidney abnormalities.

TOXICITY

Type Of Dose	Specie	Result	Type Of Dose	Specie	Result	Type Of Dose	Specie	Result
LD _{50(oral)}	Mouse	3,500 mg/kg	LC _{50(inh)}	Mouse	35,000 ppm	LD _{LO(oral)}	Human	No Data Available

CARCINOGENICITY

IARC	Sufficient evidence in animals	Inadequate evidence in humans	Group 3: Possible human carcinogen
NTP	Not identified as a Know Carcinogen or Anticipated Human Carcinogen		

MATERIAL NAME: MTBE				MSDS # EPL-9	
California (Prop 65): Listed as carcinogen		NIOSH: Not Listed		ACGIH: A3 – Confirmed Animal	
OSHA: not classifiable as a human carcinogen					
MUTAGENICITY, TERATOGENICITY AND REPRODUCTIVE EFFECTS					
In laboratory studies, MTBE vapor exposure at the high dose concentration was associated with an increased incidence of liver tumors in female mice. Also, at high dose concentration exposures, MTBE was associated with an increased incidence of kidney and testicular (Leydig cell) tumors in male rats. There is no evidence that MTBE causes cancer in humans.					
SECTION 12 ✨ ECOLOGICAL INFORMATION					
ACUTE EFFECTS: MTBE is considered moderately toxicity to aquatic life. Insufficient data are available to evaluate or predict the short-term effects to birds or land animals.					
CHRONIC EFFECTS: MTBE is considered moderately toxicity to aquatic life. Insufficient data are available to evaluate or predict the long-term effects to birds or land animals.					
DISTRIBUTION AND PERSISTENCE IN THE ENVIRONMENT: MTBE evaporates when exposed to air. It dissolves when mixed with water. Most direct releases of MTBE to the environment are to air. MTBE also evaporates from water and soil exposed to air. Once in air, it is expected to break down to other chemicals. Because it is a liquid that does not bind well to soil, MTBE that makes its way into the ground can move through the ground and enter groundwater. Plants and animals are not likely to store methyl tertiary-butyl ether..					
SECTION 13 ✨ DISPOSAL CONSIDERATIONS					
Contaminated product/soil/water may be RCRA/OSHA hazardous waste due to low flash point. Use registered transporters. Dilute aqueous waste may biodegrade.					
SECTION 14 ★ TRANSPORTATION INFORMATION					
Not Meant To Be All Inclusive - Check Local, State, And Federal Laws And Regulations					
Agency	Shipping Name	Packing Group	Hazard Class	UN/NA #	
U.S. DOT	Methyl tert-butyl ether	II	Flammable Liquid	UN 2398	
SECTION 15 ☽ REGULATORY INFORMATION					
CERCLA RQ's (40 CFR Part 302)			MTBE - 1,000 pounds		
RCRA			Not Listed		
SARA (40 CFR Part 355) TPQ's			None of the ingredients are listed		
SARA Title III Section 313			All ingredients listed		
California's Prop 65			All ingredients listed		
OSHA			All ingredients are listed as hazardous under 29 CFR 1910.1200		
SECTION 16 ☼ OTHER INFORMATION					
NFPA 704 LABEL:			HMIS LABEL		
			1-4-0		
MSDS REVISIONS: Change in Format and update of Information					
MSDS CREATION DATE: July 1997			REVISION #1: <u>01/03/06</u>		

DISCLAIMER

The information in this MSDS was obtained from sources which we believe are reliable. **HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, REGARDING ITS ACCURACY.** Some conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. **FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.** All product measurements such as flash point, *etc.* are considered approximate values. All data provided by Explorer Pipeline Company.

This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, such as refined petroleum hydrocarbon mixtures, this MSDS information may not be applicable.

MSDS DEVELOPER: _____

A handwritten signature in black ink that reads "Cass Willard".

Cass Willard, CIH

DATE: 01/03/06

MATERIAL SAFETY DATA SHEET FOR LEAD

SECTION 1 – MATERIAL IDENTIFICATION

Material Name: Lead

Description: Bluish-Grey metal, apparently odorless

Other Designations: Soft lead, Hard Lead, Calcium lead.

Manufacturer: Mars Metal Company,
4130 Morris Drive,
Burlington, Ontario
L7L 5L6

Emergency Phone Number: (905) 637-3862

SECTION II – HAZARDOUS INGREDIENTS EXPOSURE GUIDELINES

Base Metal: Lead – C.A.S. #7439-9201/Exposure Limits: 1.05 Mg/M3 ACGIH TWA
Alloys: Sb, Sn, As, Cu, Ca – Antimony C.A.S. #7440-36-0/
Exposure Limits: 0.50 Mg/M3 ALGIH TWA

SECTION III – PHYSICAL DATA:

Boiling Point: 3164 degrees Fahrenheit
Melting Point: 622 degrees Fahrenheit
Specific Gravity: (H_o = 1) Approximately 10.3
Vapour Pressure: (MM HG) N.A.
Solubility in Water: Negligible

SECTION IV – FIRE AND EXPLOSION DATA

Hazards: Toxic fumes and vapours are produced by molten lead.
Dust explosion potential exists

Extinguishing Media: Dry chemical or carbon dioxide should be used on surrounding Area.

Firefighting Procedures: Full body protective clothing should be worn and positive pressure breathing apparatus used.

Flammability: Metal is not flammable, powders or dust may be flammable.

SECTION V – REACTIVITY DATA

Chemical Stability: Metal is stable.

Incompatibility: Strong oxidizers, Hydrogen Peroxide, Active metals.

Hazardous Decomposition Products: High temperature may produce hazardous fumes.

SECTION VI – HEALTH HAZARD DATA AND FIRST AID

Threshold Limit Value: Time weighed average exposure 0.15 MG/M3. Short term Exposure 0.30 MG/M3.

Routes of Exposure: Ingestion, Inhalation, and Eyes.

EFFECTS OF EXPOSURE:

Acute Overexposure: May cause weakness, vomiting, loss of appetite and Constipation.

Chronic Exposure: May cause weakness, Insomnia, Hypertension, Anemia, Neuromuscular dysfunction's and joint paint.

EMERGENCY AND FIRST AID PROCEDURES:

Ingestion: Rinse mouth, give plenty of water, get medical attention.

Inhalation: Remove from exposure to fresh air, get medical attention.

Eyes: Rinse thoroughly with water, get medical attention.

Skin: Remove contaminated clothing and wash effected area with water and soap.

SECTION VII – SPILL AND LEAK PROCEDURES:

Released or Spilled: Sweep up carefully using water (or other suitable wetting agent) to prevent emissions, place waste in sealable containers which are to be disposed of in accordance with local legislation.

Waste Disposal Method: Contact local authorities for instructions on proper disposal procedures in your area.

SECTION VIII – SPECIAL PROTECTION INFORMATION:

Respiratory: Use respirators as per the regulations respecting Lead.

Eye Protection: Face shield/approved safety glasses.

Hands: Protective gloves should be worn when handling Lead.

Other Protective Equipment: Clean overalls, safety boots, and helmets.

Local Exhaust: Adequate local and general ventilation must be provided.

SECTION IX – SPECIAL PRECAUTIONS:

Handling and Storage: Lead dust should be handled in sealed containers. Every effort should be made to prevent dusts from becoming airborne.

Other Precautions: Use wet methods for dust control whenever possible. Ensure that there is sufficient ventilation in areas of lead use.

January 2008



MATERIAL SAFETY DATA SHEET

(POLYCHLORINATED BIPHENYLS)

COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients Name: polychlorinated biphenyls (PCBs)

HAZARD IDENTIFICATION

Reports of Carcinogenicity: YES

HEALTH HAZARDS ACUTE AND CHRONIC

- **Eyes**: Moderately irritating to eye tissues.
- **Skin**: Can be absorbed through intact skin, may cause de-fatting, potential for chloracne.
- **Inhalation**: Possible liver injury.
- **Ingestion**: Slightly toxic; reasonably anticipated to be carcinogenic.

EFFECTS OF OVER-EXPOSURE

Can cause dermatological symptoms; however, these are reversible upon removal of exposure source.

FIRST AID MEASURES

- **Eyes**: Irrigate immediately with copious quantities of running water for at least 15 minutes if liquid or solid PCBs get into them.
- **Skin**: Contaminated clothing should be removed and the skin washed thoroughly with soap and water. Hot PCBs may cause thermal burns.
- **Inhalation**: Remove to fresh air; if skin rash or respiratory irritation persists, consult a physician (if electrical equipment arcs over, PCBs may decompose to produce hydrochloric acid).
- **Ingestion**: Consult a physician. Do not induce vomiting or give any oily laxatives. (If large amounts are ingested, gastric lavage is suggested).

FIRE FIGHTING MEASURES: Flash Point: >141 °C (285.8 °F)

EXTINGUISHING MEDIA: PCBs are fire-resistant compounds.

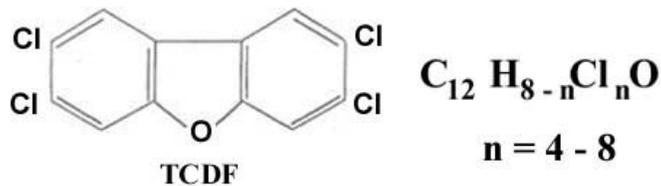
FIRE-FIGHTING PROCEDURES

Standard fire-fighting wearing apparel and self-contained breathing apparatus should be worn when fighting fires that involve possible exposure to chemical combustion products. Fire fighting equipment should be thoroughly cleaned and decontaminated after use.

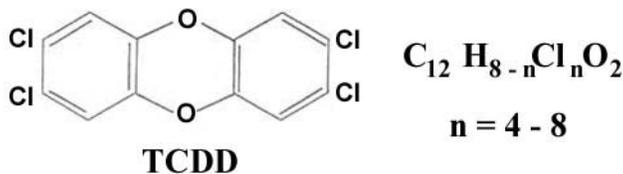
UNUSUAL FIRE/EXPLOSION HAZARD

If a PCB transformer is involved in a fire-related incident, the owner of the transformer is required to report the incident. Consult and follow appropriate federal, provincial and local regulations.

Note: When askarel liquid becomes involved in a fire, toxic by-products of combustion are typically produced including polychlorinated dibenzofurans and polychlorinated dibenzodioxins, both known carcinogens. The structures of these chemical species are as follows:



2,3,7,8-tetrachlorodibenzofuran



2,3,7,8-tetrachloro-dibenzo-p-dioxin

Note: 2,3,7,8-tetrachloro-dibenzo-p-dioxin is one of the most potent teratogenic, mutagenic and carcinogenic agents known to man.

SPILL RELEASE PROCEDURES

Cleanup & disposal of liquid PCBs are strictly regulated by the federal government. Ventilate area. Contain spill/leak. Remove spill by means of absorptive material. Spill clean-up personnel should use proper protective clothing. All wastes and residues containing PCBs should be collected, containerized, marked and disposed of in the manner prescribed by applicable federal, provincial and local laws.

HANDLING AND STORAGE PRECAUTIONS

Care should be taken to prevent entry into the environment through spills, leakage, use, vaporization, or disposal of liquid. Avoid prolonged breathing of vapours or mists. Avoid contact with eyes or prolonged contact with skin. Comply with all federal, provincial and local regulations.

OTHER PRECAUTIONS

Federal regulations require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be appropriately labelled.

RESPIRATORY PROTECTION

Use OSHA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended and, if used, replaces need for face shield and/or chemical splash goggles. The respirator use limitations specified by the manufacturer must be observed.

VENTILATION

Provide natural or mechanical ventilation to control exposure levels below airborne exposure levels.

PROTECTIVE GLOVES: Wear appropriate chemical resistant gloves to prevent skin contact.

EYE PROTECTION: Wear chemical splash goggles and have eye baths available.

OTHER PROTECTIVE EQUIPMENT

Wear appropriate protective clothing. Provide a safety shower at any location where skin contact can occur.

WORK HYGIENIC PRACTICES

Wash thoroughly after handling. Supplemental safety and health : none

PHYSICAL/CHEMICAL PROPERTIES

- **Vapour pressure:** (mm Hg @100 °F) 0.005 - 0.00006
- **Viscosity:** (CENTISTOKES) 3.6 - 540
- **Stability indicator/materials to avoid:** Yes
- **Stability Condition to Avoid:** PCBs are very stable, fire-resistant compounds.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide, hydrogen chloride, phenolics, aldehydes, furans, dioxins

WASTE DISPOSAL METHODS

Consult the applicable PCB regulations prior to any disposal of PCBs or PCB-contaminated items.



Material Safety Data Sheet

MSDS ID NO.: 0255MAR019
Revision date: 09/12/2005

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon 325 Extract
Synonyms: SB-AE Binder; 325 Aromatic Extract; Heavy Paraffinic Solvent Extract
Chemical Family: Aromatic Extract
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

325 Extract is a complex mixture of hydrocarbons obtained as the extract from a solvent extraction process. It consists predominantly of aromatic hydrocarbons having carbon numbers predominantly in the range of C20-C50. The CAS description of this stream states that it is likely to contain >5% 4 to 6-membered condensed ring polycyclic aromatic hydrocarbons.

This product was analyzed by MAP and found to contain <0.05% of the 22 3-7 ring polycyclic aromatic compounds identified as Persistent Bioaccumulative Toxic (PBT) Chemicals subject to reporting under EPA EPCRA Section 313 regulations.

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon 325 Extract	64742-04-7	100			

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Extracts, Petroleum Heavy Paraffinic Distillate Solvent	64742-04-7	100.0000			
Sulfur Compounds	Mixture	0.5-4			

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

THIS PRODUCT IS A BROWN TO BLACK VISCOUS COLORED LIQUID. CONTAINS POLYNUCLEAR AROMATIC HYDROCARBONS SOME OF WHICH HAVE PRODUCED CANCER IN LABORATORY ANIMALS AND HUMANS. REPEATED SKIN CONTACT TO SOME COMPONENTS OF THIS PRODUCT HAVE PRODUCED SYSTEMIC TOXICITY (INCLUDING LIVER DAMAGE) IN LABORATORY ANIMALS. VAPORS CAN PRODUCE EYE, SKIN, AND RESPIRATORY TRACT IRRITATION. THIS PRODUCT IS NOT A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD, BUT WILL IGNITE AND BURN AT TEMPERATURES EXCEEDING THE FLASH POINT.

OSHA WARNING LABEL:

DANGER!

**CONTAINS POLYNUCLEAR AROMATIC HYDROCARBONS SOME OF WHICH HAVE PRODUCED CANCER IN LABORATORY ANIMALS AND HUMANS.
REPEATED SKIN CONTACT TO SOME COMPONENTS IN THIS PRODUCT HAS PRODUCED SYSTEMIC TOXICITY (INCLUDING LIVER DAMAGE) IN LABORATORY ANIMALS.**

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

- Inhalation:** Exposure to vapor or mist may cause pulmonary irritation, dizziness, nausea and loss of consciousness.
- Ingestion:** Product is presumed to be slightly toxic (single dose). Significant ingestion could result in liver damage.
- Skin contact:** Prolonged and repeated liquid contact can cause dermatitis, folliculitis or oil acne. Components of this product may cause skin sensitization. Components of this product can cause liver damage if absorbed through the skin.
- Eye contact:** Liquid or vapor contact may result in slight eye irritation.

Carcinogenic Evaluation:

Product information

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon 325 Extract 64742-04-7	NE			

- Notes:** The International Agency for Research on Cancer (IARC) has determined that there is sufficient evidence for the carcinogenicity of untreated vacuum distillates, acid-treated oils, and aromatic oils, including extracts from solvent treatment of distillates and the high boiling fraction of catalytically cracked oils in animals.

Component Information

- Notes:** The International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP) have concluded that certain polycyclic aromatic hydrocarbons, i.e. (benzo(a)pyrene, benz(a)anthracene, benzo(a)phenanthrene, indeno(1,2,3-cd)pyrene, benzo(j)fluoranthene, benzo(j,k,fluorine, benzo(g,h,i)perylene, and 5-methylchrysene are probably carcinogenic to humans (Group 2A and B).

4. FIRST AID MEASURES

- Inhalation:** If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: Ingestion not likely. If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Preexisting skin conditions, respiratory disorders, and impaired liver function may be aggravated by exposure to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO₂, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product is not a combustible liquid per the OSHA Hazard Communication Standard, but will ignite and burn at temperatures exceeding the flash point.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Use water spray to cool exposed surfaces from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 435 F; 224 C (Min)

Autoignition temperature: No data available.

Flammable limits in air - lower (%): No data available.

Flammable limits in air - upper (%): No data available.

NFPA rating:

Health: 2	HMIS classification:
Flammability: 1	Health: 2
Reactivity: 1	Flammability: 1
Other: -	Reactivity: 1
	Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return product to source.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Avoid skin contact. Stay upwind and vent open hatches before unloading. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures:	Local or general exhaust required in an enclosed area or when there is inadequate ventilation.
Respiratory protection:	Not required under normal conditions and adequate ventilation. Use atmosphere supplying respirators in confined spaces or when vapors exceed permissible limits; otherwise, an organic vapor respirator with pre-filter for fumes can be used. Self-contained breathing apparatus should be used for fire fighting.
Skin and body protection:	Impermeable gloves (e.g., nitrile, viton, tyvek/saranex 23) to prevent skin contact. Chemical resistant apron or other protective clothing to avoid skin contact.
Eye protection:	Goggles and faceshield when handling hot material.
Hygiene measures:	Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Brown To Black Viscous Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Brown to Black
Odor:	Aromatic Sweet
Molecular weight:	Not determined.
pH:	Neutral
Boiling point/range (5-95%):	642-1017 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	1.0
Density:	8.3 lbs/gal
Bulk density:	No data available.
Vapor density:	No data available.
Vapor pressure:	Negligible
Evaporation rate:	No data available.
Solubility:	Not determined
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	453.4 cSt @ 40 C 16.4 cSt @ 100 C
Pour Point:	70 F

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.

Hazardous decomposition products:

Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.

Materials to avoid:

Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid:

Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:**Product information**

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon 325 Extract	64742-04-7	No data available	>2 mg/kg [Rabbit]	>5 gm/kg [Rat]

Lifetime skin painting studies with heavy distillate aromatic extracts (HDAE) have produced tumors following prolonged and repeated skin contact. HDAE was found to be positive in an Ames mutagenicity test. Repeated dermal application of HDAE (30 mg/kg/day for 13 weeks) resulted in anemia, liver degeneration and injury to bone marrow and lymphoid tissues. Treatment related mortality and body weight reduction was observed at 500 mg/kg. Repeated dermal application (125 mg/kg/day) of HDAE to pregnant rats during gestation produced maternal and fetal toxicity. Increased resorptions were observed at doses of 30 mg/kg/day and above.

Summary of health effect data on aromatic extracts:

This product contains >0.1% 3-7 ring polynuclear aromatic hydrocarbons (PAC's). Some 3-7 ring PACs have been shown to be carcinogenic in experiment animals. An increased risk of cancer has been observed in workers employed in the aluminum production, coal gasification, coal-tar pitch, coke production and iron and steel industries that had been occupationally exposed to polynuclear aromatic hydrocarbons (PAC). Since these kinds of PACs have been measured at high levels in air samples taken in these industries, IARC has concluded that these PACs are probably carcinogenic to humans.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects:

If spilled, hot product and/or the coating action of the oil components could harm plant life.

The 96 hour TLM for WAF (water accommodated fraction) of an aromatic extract is >1000 mg/l in fish or algae. 21 day exposures of 1000 mg/l WAF of an aromatic extract to Daphnia did not affect survival nor reproduction.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations:

This material as supplied and by itself, when discarded or disposed of, is not an EPA RCRA hazardous waste according to federal regulations. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:**Transport Information:**

This material when transported via US commerce is NOT REGULATED by DOT regulations.

DOT reportable quantity (lbs):

Not applicable.

TDG (Canada):

Regulated substances:

Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b):

This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard:

This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302:

This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Extracts, Petroleum Heavy Paraffinic Distillate Solvent	NA
Sulfur Compounds	NA

SARA Section 304:

This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Extracts, Petroleum Heavy Paraffinic Distillate Solvent	NA
Sulfur Compounds	NA

SARA Section 311/312:

The following EPA hazard categories apply to this product:

Acute Health Hazard
Chronic Health Hazard

SARA Section 313:

This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Extracts, Petroleum Heavy Paraffinic Distillate Solvent	None
Sulfur Compounds	None

State and Community Right-To-Know Regulations:

The following component(s) of this material are identified on the regulatory lists below:

Extracts, Petroleum Heavy Paraffinic Distillate Solvent

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed

Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
Sulfur Compounds	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology And Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

MATERIAL SAFETY DATA SHEET

MALATHION ULV® CONCENTRATE INSECTICIDE

FOR CHEMICAL EMERGENCY, SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CALL CHEMTREC - DAY OR NIGHT 1-800-424-9300

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

FORMULATED FOR:

Loveland Products, Inc.
P.O. Box 1286 • Greeley, CO 80632-1286

24-Hour Emergency Phone: 1-800-424-9300
Medical Emergencies: 1-800-301-7976
U.S. Coast Guard National Response Center: 1-800-424-8802

PRODUCT NAME: MALATHION ULV® CONCENTRATE INSECTICIDE
CHEMICAL NAME: Malathion; (0-0-Dimethyl phosphorodithioate of diethyl mercaptosuccinate)
CHEMICAL FAMILY: Organophosphate Insecticide
EPA REG. NO.: 34704-565
MSDS Number: 000565-04b-LPI

MSDS Revisions: See section 16

Date of Issue: 07/08/04

Supersedes: 01/08/04

2. HAZARDS IDENTIFICATION SUMMARY

KEEP OUT OF REACH OF CHILDREN – CAUTION – Harmful if swallowed, inhaled or absorbed through skin. Avoid breathing vapors or spray mist. Avoid contact with skin, eyes, or clothing. Do not contaminate feed or foodstuffs.

This product is clear yellow-amber colored liquid with a mild petroleum odor.

Warning Statements:

NOTE TO PHYSICIAN: This product is a cholinesterase inhibitor. Treat symptomatically. Atropine is an antidote. Symptoms of cholinesterase inhibition include salivation, gastrointestinal hypermotility, abdominal cramping, nausea, diarrhea, sweating, miosis, tearing, blurred vision, headache, dizziness, ataxia, bradycardia, dyspnea, cyanosis, and muscle twitching or tremors. In extreme cases, tetany, mental confusion, incontinence, weakness, collapse, paralysis, convulsive seizures, and even death, can occur.

3. COMPOSITION, INFORMATION ON INGREDIENTS

<u>Chemical Ingredients:</u>	<u>Percentage by Weight:</u>	<u>CAS No.</u>	<u>TLV (Units)</u>
Malathion	96.50	121-75-5	15 mg/m ³ (skin)
Inert Ingredients	3.50		

This product is hazardous according to the OSHA Hazard Communication Standard (29 CFR 1910.1200)

4. FIRST AID MEASURES

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

If in eyes: Hold eye open and rinse slowly and gently with water 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If on skin or clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for further treatment advice.

FOR A MEDICAL EMERGENCY INVOLVING THIS PRODUCT CALL: **1-800-301-7976**. Have the product label or container with you when calling a poison control center or doctor, or going for treatment.

5. FIRE FIGHTING MEASURES

FLASH POINT (°F/Test Method): 325.4°F/163°C (PMCC)

FLAMMABLE LIMITS (LFL & UFL): None established

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, foam, water spray or fog.

HAZARDOUS COMBUSTION PRODUCTS: Thermal decomposition products include dimethyl sulfide, sulfur dioxide, carbon monoxide, carbon dioxide, and phosphorus pentoxide.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus with full protective clothing. Fight fire from upwind and keep all non-essential personnel out of area. Avoid heavy hose streams.

UNUSUAL FIRE AND EXPLOSION HAZARDS: If water is used to fight fire or cool containers, contain runoff by diking to prevent contamination of water supplies. Containers in fire may burst or explode from excessive heat. Stay well back from fire area.

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

For small spills, absorb with an absorbent material such as pet litter. Sweep up and transfer to containers for possible land application according to label use or for proper disposal. Check local, state and federal regulations for proper disposal. Flush the area with water to remove any residue.

CAUTION: Keep spills and cleaning runoff out of municipal sewers and open bodies of water.

7. HANDLING AND STORAGE

HANDLING: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Remove PPE after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

MATERIAL SAFETY DATA SHEET

MALATHION ULV® CONCENTRATE INSECTICIDE

STORAGE: Store in a safe manner. Store in original container only. Keep container tightly closed when not in use. Store at temperatures not exceeding 77°F/25°C. Do not use or store near heat or open flame. Do not contaminate water, food or feed by storage or disposal.

Personal Protective Equipment: Applicators and other handlers must wear: long sleeved shirt and long pants, chemical-resistant gloves, such as barrier laminate, butyl rubber, nitrile rubber or Viton® and shoes plus socks. Follow manufacturer's instructions for cleaning and maintaining PPE. If no instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets with requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

RESPIRATORY PROTECTION: Not normally required, if vapors or mists exceed acceptable levels, wear a NIOSH approved pesticide respirator.

EYE PROTECTION: Chemical goggles or shielded safety glasses.

SKIN PROTECTION: Wear protective clothing: long-sleeved shirts and pants, shoes with socks. Wear chemical-resistant gloves.

	OSHA PEL 8 hr TWA	ACGIH TLV-TWA
Malathion	15 mg/m ³ (Skin)	1 mg/m ³ (Inhalable fraction of aerosol); BEI*

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Clear yellow-amber colored liquid with a mild petroleum odor.

SPECIFIC GRAVITY (Water = 1): 1.231 g/ml

VAPOR PRESSURE: 3.4 x 10⁻⁶ mm/Hg @ 25°C

PERCENT VOLATILE (by volume): Not established

Note: These physical data are typical values based on material tested but may vary from sample to sample.

Typical values should not be construed as a guaranteed analysis of any specific lot or as specification items.

BULK DENSITY: 10.27 lbs/gal.

BOILING POINT: >300°F/>148.9°C

EVAPORATION RATE: Not established

SOLUBILITY: Emulsifies

pH: 3.7-3.8 (50% solution)

10. STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID: Excessive heat.

INCOMPATIBILITY: Strong alkalis, amines, and strong oxidizing compounds. Can corrode iron, steel, tin plate, lead and copper. Rapidly hydrolyzed at pH >7.0 or <5.0.

HAZARDOUS DECOMPOSITION PRODUCTS: Dimethyl sulfide, sulfur dioxide, carbon monoxide, carbon dioxide, and phosphorus pentoxide.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Oral LD₅₀ (rat): 5500 mg/kg

Eye Irritation (rabbit): Slight irritation

Inhalation LC₅₀ (rat): >5.2 mg/L (4 hr)

Carcinogenic Potential: Not listed by NTP, ACGIH, OSHA, or NIOSH as a carcinogen.

Acute Dermal LD₅₀ (rabbit): > 2000 mg/kg

Skin Irritation (rabbit): Slight irritation

Skin Sensitization (Guinea Pig): Not a sensitizer

12. ECOLOGICAL INFORMATION

Malathion is toxic to fish, aquatic invertebrates, and aquatic life stages of amphibians. For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in areas near the application site. Do not contaminate water by cleaning equipment or disposal of wash waters. Highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

13. DISPOSAL CONSIDERATIONS

Do not reuse empty container. **Metal:** Triple rinse (or equivalent), then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by local, state and federal regulations. **Plastic:** Triple rinse (or equivalent), then offer for recycling at an ACRC site (go to <http://www.acrecycle.org/> for locations) or by reconditioning, or puncture and dispose of in a sanitary landfill, or, incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility. Do not contaminate water, food or feed by storage or disposal.

14. TRANSPORT INFORMATION

DOT Shipping Description: LESS THAN 10.2 GALLONS NOT REGULATED BY USDOT.

DOT Shipping Description: RQ ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., 9, UN3082, III (MALATHION) MARINE POLLUTANT ERG GUIDE 171

U.S. Surface Freight Classification: INSECTICIDES, INSECT REPELLENTS, NOI, OTHER THAN POISON (NMFC 102120, CLASS: 60)

Consult appropriate ICAO/IATA and IMDG regulations for shipment requirements in the Air and Maritime shipping modes.

15. REGULATORY INFORMATION

NFPA & HMIS Hazard Ratings:	NFPA		HMIS
	2 Health	0 Least	2 Health
	1 Flammability	1 Slight	1 Flammability
	0 Instability	2 Moderate	0 Reactivity
		3 High	H PPE
		4 Severe	

SARA Hazard Notification/Reporting
SARA Title III Hazard Category: Immediate Y Fire N Sudden Release of Pressure N
 Delayed Y Reactive N

Reportable Quantity (RQ) under U.S. CERCLA: Malathion (CAS: 121-75-5): 100 pounds
SARA, Title III, Section 313: Malathion (CAS: 121-75-5) 96.5%
RCRA Waste Code: Not listed
CA Proposition 65: Not listed

16. OTHER INFORMATION

MSDS STATUS: Format modified to address changes in ANSI Standard Z400.1-2004
PREPARED BY: Registrations and Regulatory Affairs **REVIEWED BY:** Environmental/ Regulatory Services

©Viton is a registered trademark of DUPONT DOW ELASTOMERS L.L.C.
 *ACGIH® has recommended a Biological Exposure Index for this substance: Acetylcholinesterase Inhibiting Pesticides
 ©ACGIH is a registered trademark of American Conference of Governmental Industrial Hygienists

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MATERIAL SAFETY DATA SHEET

UNITED MINERAL & CHEMICAL CORPORATION
1100 VALLEY BROOK AVENUE
LYNDHURST, NJ 07071
TEL: 201-507-3300 FAX: 201-507-1506

FOR EMERGENCY CALL:
C H E M T R E C
1-800-424-9300

SECTION A - PRODUCT INFORMATION

TRADE NAME : ARSENIC METAL;
MBE CHARGES, ARSENIC CHUNK & GRANULE
REVISION DATE : NOVEMBER 16, 2007
CAS NUMBER : 7440-38-2
SYNONYMS : METALLIC ARSENIC; GREY ARSENIC; ARSENIA
CHEMICAL FAMILY : METALS - GROUP 5a
FORMULA : As

SECTION B - HAZARDOUS COMPONENTS

COMPONENT	CAS NO.	%	PEL/TLV
ARSENIC METAL (As)	7440-38-2	100	0.01mg/m ³ ACGIH TWA AS As 0.01mg/m ³ OSHA TWA, INORGANIC COMPOUNDS AS AS (SEE 29 CFR 1910.1018) 0.5 mg/m ³ OSHA TWA, ORGANIC COMPOUNDS AS AS 0.002 mg/m ³ /15 min. CEILING-NIOSH, INORGANIC CMPD. 5 mg As/m ³ IDLH-CARCINOGEN, INORGANIC COMPOUNDS

TWA – Time Weighted Average over 8 hours
IDLH - Immediately dangerous to life & health

See the OSHA Inorganic Arsenic Standard at 29 CFR 1910.1018 before processing.

SECTION C - PHYSICAL PROPERTIES

BOILING POINT (°C) :	SUBLIMES @ 615	SPECIFIC GRAVITY :	5.72
MELTING POINT (°C) :	817 @ 3.6477 Mpa	FREEZING POINT (°) :	N/A
VAPOR PRESSURE (mm Hg) :	1mm @ 372°C	PERCENT VOLATILE (BY WT.) :	N/A
VAPOR DENSITY (AIR=1) :	N/A	EVAPORATION RATE :	N/A
SOLUBILITY IN WATER :	INSOLUBLE	pH (0 % IN WATER) :	NONE
ODOR THRESHOLD :	N/A		
APPEARANCE & ODOR :	SILVER GRAY CRYSTALLINE CHUNKS, RODS, OR GRANULES; NO ODOR AS METAL AS COMPOUND, AsH ₃ HAS GARLIC ODOR		

SECTION D - FIRE & EXPLOSION DATA

FLAMMABLE LIMITS :	FLASH POINT (°) : NONE	AUTO IGNITION TEMP (° F): (UNKNOWN)
EXTINGUISHING MEDIA :	LEL : (N/A) UEL : (N/A) WATER : () FOAM : (X)	CO₂ : (X) DRY CHEMICAL : (X)
SPECIAL FIRE FIGHTING PROCEDURES :	ARSENIC IN MASS FORM IS NON-FLAMMABLE. IN THE EVENT OF A FIRE, RESTRICT PERSONS NOT WEARING PROTECTIVE EQUIPMENT FROM AREA. TRY TO SNUFF FIRE WITH SAND, DRY MEDIA, FOAM OR CO ₂ . IF NO OTHER OPTIONS AVAILABLE, USE WATER & ALWAYS WEAR SELF CONTAINED BREATHING APPARATUS OR NIOSH TOXIC VAPOR RESPIRATOR. POISONOUS GASES ARE PRODUCED IN FIRE, INCLUDING ARSENIC OXIDES.	
UNUSUAL FIRE & EXPLOSION HAZARDS :	ARSENIC, WHEN HEATED OR IN CONTACT WITH ACID OR ACID FUMES, CAN PRODUCE HIGHLY TOXIC FUMES (SUCH AS ARSINE). ARSENIC REACTS VIGOROUSLY WITH OXIDIZING MATERIALS. ARSENIC IS FLAMMABLE IN THE FORM OF DUST WHEN EXPOSED TO HEAT OR FLAME OR BY CHEMICAL REACTION WITH POWERFUL OXIDIZERS (SEE SECTION E). SLIGHT EXPLOSION HAZARD EXISTS IN THE FORM OF DUST WHEN EXPOSED TO FLAME. IN THE EVENT OF A FIRE OR SPILL, CONTACT THE STATE DEPT. OF THE ENVIRONMENT & YOUR REGIONAL OFFICE OF THE FEDERAL ENVIRONMENTAL PROTECTION AGENCY.	

SECTION E - REACTIVITY DATA

STABILITY : STABLE
INCOMPATIBILITY : HYDROGEN GAS CAN REACT WITH INORGANIC ARSENIC TO FORM THE HIGHLY TOXIC GAS ARSINE. INCOMPATIBLE WITH BROMINE AZIDE, DIRUBIDIUM ACETYLIDE, HALOGENS, PALLADIUM ZINC, PLATINUM, NCl₃, AgNO₃, CrO₃, Na₂O₂, HEXAFLUOROISOPROPYLIDENEAMINO LITHIUM. CAN REACT WITH ACIDS OR ACID FUMES AND POWERFUL OXIDIZERS SUCH AS BROMATES, CHLORATES, IODATES, PEROXIDES, LITHIUM, NaCl₃, KNO₃, KMnO₃, Rb₂C₂, AgNO₄, NOCl, IF₅, CrO₃, ClF₃, ClO, BrF₃, BrF₅, BrN₃, RbC₃BCH, CsC₃BCH.
HAZARDOUS DECOMPOSITION PRODUCTS : ARSENIC FUMES, ARSINE, OTHER ARSENIC COMPOUNDS
HAZARDOUS POLYMERIZATION : WILL NOT OCCUR
CONDITIONS TO AVOID : AVOID OPEN CONTAINERS AND CONTACT WITH INCOMPATIBLE MATERIALS

SECTION F - PERSONAL PROTECTIVE EQUIPMENT INFO

RESPIRATORY EQUIPMENT : FOR HANDLING ELEMENTAL ARSENIC IN CHUNK, ROD, OR GRANULES USE NIOSH APPROVED, AIR PURIFYING, TOXIC VAPOR RESPIRATOR FOR PARTICULATE & FUME/ AIR LEVEL. IF PROCESSING MATERIAL INTO INORGANIC ARSENIC COMPOUNDS, CHOOSE PROPER RESPIRATORY PROTECTION IN ACCORDANCE WITH THE OSHA INORGANIC ARSENIC STANDARD AT 29 CFR 1910.1018 (h). FOR UNKNOWN CONCENTRATIONS OF INORGANIC ARSENIC OR UNDER FIRE-FIGHTING CONDITIONS USE FULL FACEPIECE SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE.

PROTECTIVE GLOVES : NEOPRENE OR PLASTIC

EYE PROTECTION : FACE SHIELD OR VENTED GOGGLES FOR WHEN DUST/ FUME OR INORGANIC COMPOUNDS ARE GENERATED.

VENTILATION : LOCAL EXHAUST/MECHANICAL(GENERAL) SCRUBBER OR TRAP IF POSSIBLE TO MAINTAIN EXPOSURE TO LESS THAN PERMISSIBLE LIMITS FOR ELEMENTAL ARSENIC AND ANY COMPOUNDS BEING GENERATED (SEE SECTION B)

OTHER PROTECTIVE EQUIPMENT : LAB COAT, COVERALLS, COVERLETS FOR SHOES, AND ACCESS TO EYEWASH FOUNTAIN FOR DUST OR INORGANIC COMPOUND GENERATION

SECTION G - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE : 0.01mg/m³ TWA ARSENIC, ELEMENTAL & INORGANIC COMPOUNDS(EXCEPT ARSINE), AS As

PRIMARY ROUTES OF EXPOSURE : INHALATION OF FUMES, DUST, REACTION GASES; INGESTION; SKIN CONTACT

ORAL LD₅₀ : 763 mg/m³ RAT; ORAL RAT TDLo 605 micrograms/kg – REPRODUCTIVE EFFECTS; ORAL-MAN TDLo 7857 mg/kg/55 year old – SKIN & GASTROINTESTINAL EFFECTS

DERMAL IRRITATION-RABBIT : UNKNOWN; SUBCUTANEOUS RABBIT LDLo: 300 mg/kg

EYE IRRITATION-RABBIT : UNKNOWN

OSHA PEL : 0.01mg/m³ TWA INORGANIC COMPOUNDS AS As; 0.5 mg/m³ TWA ORGANIC COMPOUNDS AS As.

ACGIH TLV : 0.01mg/m³ TWA ELEMENTAL ARSENIC & INORGANIC COMPOUNDS (EXCEPT ARSINE), AS As

EFFECTS OF OVEREXPOSURE : ARSENIC METAL IS NOT AS READILY AVAILABLE IN THE BODY AS ARSENIC IN THE FORM OF DUST OR VAPOR OR WHEN PROCESSED INTO ARSENIC COMPOUNDS (ARSENICALS). INORGANIC ARSENICALS ARE MORE TOXIC THAN ORGANIC ARSENICALS.

ACUTE EFFECTS: ARSENIC IS A POISON BY SUBCUTANEOUS, INTRAMUSCULAR, AND INTRAPERITONEAL ROUTES. ACUTE ARSENIC POISONING FROM INGESTION RESULTS IN BURNING LIPS, THROAT CONSTRICTION, ABDOMINAL PAIN, MARKED IRRITATION OF THE STOMACH AND INTESTINES WITH NAUSEA, VOMITING, AND DIARRHEA. IN SEVERE CASES THE STOOLS AND VOMIT ARE BLOODY AND THE PATIENT MAY GO INTO COLLAPSE AND SHOCK WITH WEAK, RAPID PULSE, COLD SWEATS, COMA, AND DEATH. INHALATION MAY CAUSE ULCERATION OF NASAL SEPTUM, RESPIRATORY IRRITATION (COUGH, SORE THROAT), SHORTNESS OF BREATH AND WEAKNESS. SKIN OR EYE CONTACT MAY CAUSE DERMATITIS, SKIN AND EYE IRRITATION. AFTER ABSORPTION, ARSENIC MAY CAUSE MULTI-ORGAN FAILURE AS DELAYED EFFECTS. ARSENIC IS AN EXPERIMENTAL TERATOGEN (MAY CAUSE DAMAGE TO THE DEVELOPING FETUS) AND MAY CAUSE SPONTANEOUS ABORTION OR STILLBIRTH WITH EITHER ACUTE OR CHRONIC POISONING.

CHRONIC EFFECTS: ARSENIC IS A CONFIRMED HUMAN CARCINOGEN AND HAS BEEN ASSOCIATED WITH LUNG, BLADDER, SKIN, AND OTHER CANCERS IN HUMANS. CHRONIC ARSENIC POISONING MAY INCLUDE ANY OR ALL OF THE FOLLOWING: DIGESTIVE SYSTEM DISTURBANCES, LOSS OF APPETITE, CRAMPS, NAUSEA, CONSTIPATION, DIARRHEA; LIVER DAMAGE WHICH MAY RESULT IN JAUNDICE; DISTURBANCES OF THE BLOOD, KIDNEYS AND NERVOUS SYSTEM; SKIN ABNORMALITIES INCLUDING ITCHING, PIGMENTATION, AND POSSIBLE CANCEROUS CHANGES. ARSENIC HAS INDUCED DNA DAMAGE IN HUMAN CELLS.

TARGET ORGANS (NIOSH) : (FOR INORGANIC COMPOUNDS AS As): LIVER, KIDNEYS, SKIN, LUNGS, LYMPHATIC SYSTEM

KNOWN EFFECTS ON OTHER ILLNESSES : EXPECTED TO AGGRAVATE PRE-EXISTING GASTROINTESTINAL, NERVOUS SYSTEM, SKIN, LIVER & KIDNEY PROBLEMS.

LISTED CARCINOGEN :	NONE ()	OSHA (YES)	NTP (YES)	IARC (YES)	OTHER (YES)
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SECTION H – EMERGENCY & FIRST AID DATA

SKIN : FLUSH WITH SOAP & WATER. AVOID RUBBING INTO THE SKIN. CONTACT PHYSICIAN IMMEDIATELY.

EYES : FLUSH WITH WATER FOR AT LEAST 15 MINUTES, LIFTING UPPER AND LOWER EYELIDS. CONTACT PHYSICIAN IMMEDIATELY.

INHALATION : REMOVE TO FRESH AIR. PROVIDE OXYGEN IF NECESSARY. CONTACT PHYSICIAN IMMEDIATELY.

INGESTION : IMMEDIATELY CALL POISON CONTROL OR A PHYSICIAN. DO NOT INDUCE VOMITING UNLESS DIRECTED TO DO SO BY POISON CONTROL OR EMERGENCY MEDICAL PERSONNEL. TAKE TO HOSPITAL IMMEDIATELY.

MEDICAL NOTE: AGGRESSIVE DECONTAMINATION WITH GASTRIC LAVAGE IS RECOMMENDED. IF AN X-RAY INDICATES THE PRESENCE OF ARSENIC IN THE LOWER GI TRACT, WHOLE BOWEL IRRIGATION SHOULD BE CONSIDERED. ACTIVATED CHARCOAL MAY NOT BIND SIGNIFICANT AMOUNTS BUT IS RECOMMENDED UNTIL DEFINITIVE QUANTITATIVE DATA IS AVAILABLE. FLUID REPLETION SHOULD BEGIN AS SOON AS POSSIBLE.

SECTION I - SPILL & DISPOSAL INFORMATION**STEPS TO BE TAKEN IN CASE OF SPILL OR LEAK:**

EVACUATE THE DANGER AREA. WEARING FULL PROTECTIVE EQUIPMENT (RESPIRATOR, GLOVES, GOGGLES, LAB COAT), GATHER UP CHUNKS, RODS, OR GRANULES WITH VACUUM OR UTENSILS RESERVED FOR POISONOUS SOLIDS AND PLACE IN SUITABLE CONTAINER AND SEAL. DO NOT RELEASE TO THE ENVIRONMENT. AVOID GENERATING DUST. VENTILATE THE AREA AFTER CLEANUP OF MATERIAL AND RESIDUE IS COMPLETE.

WASTE DISPOSAL INFORMATION:

SOLID WASTES SHOULD BE VITRIFIED, PLACED IN LABELED CONTAINER & BURIED IN AN EPA SUPERVISED FACILITY. ETCHING SOLUTIONS & CUTTING WASTES SHOULD BE PRECIPITATED, CEMENTED/VITRIFIED & PLACED IN METAL/PLASTIC LABELED CONTAINERS & BURIED IN EPA SUPERVISED FACILITY. PASS GAS THROUGH POTASSIUM PERMANGANATE, PRECIPITATE & TREAT AS ABOVE. WASTE MAY BE CONSIDERED HAZARDOUS DEPENDING ON LEVEL OF TOXICITY CHARACTERISTIC OF ARSENIC. SEE 40 CFR 261.24 FOR DETERMINATION.

RCRA HAZARDOUS WASTE : NO () YES (**X) **RCRA # :** (**D004)

** - IF TESTED POSITIVE AS CHARACTERISTIC OF TOXICITY FOR ARSENIC

CERCLA : NO () YES (X)

RQ (1 LB. RQ IS APPLICABLE ONLY IF THE DIAMETER OF THE PIECES OF THE SOLID METAL RELEASED IS LESS THAN 100 MICROMETERS OR 0.004 INCH. THIS PRODUCT FORM IS LARGER THAN 100 MICROMETERS AND HAS NO RQ IN ITS CURRENT FORM. IF AS HAZARDOUS WASTE CHARACTERISTIC OF ARSENIC, THEN RQ=1 LB.)

FOLLOW ALL LOCAL, STATE AND FEDERAL INFORMATION AND REGULATIONS

SECTION J - OTHER REGULATORY INFORMATION

TSCA: WE CERTIFY THAT ALL COMPONENTS OF THIS PRODUCT ARE REGISTERED UNDER THE REGULATIONS OF THE TOXIC SUBSTANCES CONTROL ACT.

SARA TITLE III, SECT. 313: LISTED (X) UNLISTED ()

DOT REGULATED: YES: (X) NO: () **RQ:** (N/A - PIECES ARE LARGER THAN 100 MICROMETERS IN DIAMETER)

IF REGULATED, PROPER SHIPPING NAME: ARSENIC

HAZARD CLASS: (6.1)

IDENTIFICATION NO.: (UN1558)

PACKING GROUP: (II)

LABEL REQUIRED: (POISON)

INLAND B/L: UN1558, ARSENIC, 6.1, PACKING GROUP II, POISON

EMERGENCY RESPONSE GUIDE NO.: (152)

SECTION K - SPECIAL PRECAUTIONS**FOR INDUSTRIAL USE ONLY****HANDLING & STORAGE INFORMATION:**

PRIOR TO WORKING WITH ARSENIC, PERSONNEL SHOULD BE TRAINED IN PROPER HANDLING & STORAGE. STORE IN ORIGINAL PACKAGING IN COOL DRY AREA. WHEN HANDLING, WEAR FULL PROTECTIVE EQUIPMENT (SEE SECTION F). PLACE INTO INERT ATMOSPHERE IMMEDIATELY. IF PROCESSING INTO INORGANIC ARSENIC COMPOUNDS, FOLLOW THE OSHA STANDARD AT 29 CFR 1910.1018. DO NOT INGEST. DO NOT INHALE DUST OR ANY PROCESSING FUMES. AVOID SKIN AND EYE CONTACT.

NOTE: MAINTENANCE PERSONNEL OF PROCESSING AND EXTRACT EQUIPMENT MUST ALSO WEAR FULL PROTECTIVE EQUIPMENT (SEE SECTION F) AND OBSERVE THE REQUIREMENTS OF THE OSHA INORGANIC ARSENIC STANDARD (29 CFR 1910.1018) AS RESIDUES MAY CONTAIN ARSENIC PARTICLES AND VARYING COMPOUNDS OF ARSENIC.

OTHER PRECAUTIONS :

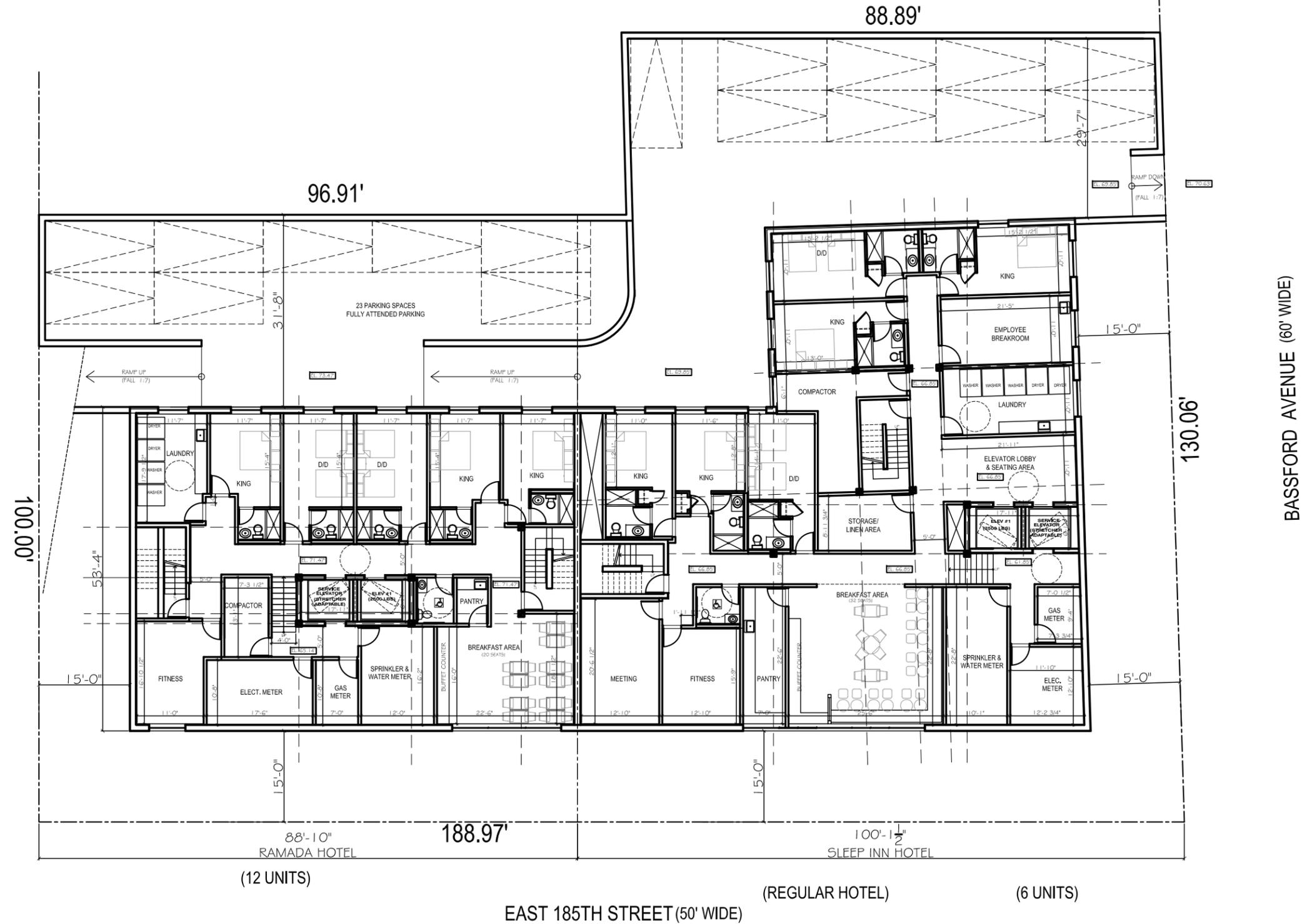
MINIMUM - HAVE QUARTERLY MEDICAL CHECKS INCLUDING URINE TESTS OF PERSONNEL WORKING WITH ARSENIC OR ARSENIC COMPOUNDS. DO NOT EAT, DRINK OR SMOKE IN THE WORK AREA.

IN ACCORDANCE WITH GOOD PRACTICES OF PERSONAL HYGIENE, HANDLE WITH DUE CARE AND AVOID ANY UNNECESSARY CONTACT WITH THIS PRODUCT. THIS INFORMATION IS BEING SUPPLIED TO YOU UNDER OSHA "RIGHT TO KNOW" REGULATION 29 CFR 1910.1200 AND IS OFFERED IN GOOD FAITH AS TYPICAL VALUES AND NOT AS PRODUCT SPECIFICATION. THE INFORMATION IS BELIEVED TO BE TRUE AND ACCURATE. NO WARRANTY, EXPRESSED OR IMPLIED, REGARDING THE ACCURACY OF THIS DATA, THE HAZARD CONNECTED WITH USE OF THE MATERIAL, OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF, IS MADE. UNITED MINERAL AND CHEMICAL CORPORATION AND ITS SUPPLIERS ASSUME NO RESPONSIBILITY FOR DAMAGE OR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.

UNITED MINERAL & CHEMICAL CORPORATION

APPENDIX 5

Proposed Development Plans



FOR ANALYSIS
PURPOSES
PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK
1st FLOOR PLAN

SEAL & SIGNATURE:	DATE: 10-26-15
	PROJECT No: 201503
	DRAWING BY: C Kuo
	CHK BY: M Kang
	DWG No:
	A-002.00
	PAGE No:



CELLAR FLOOR PLAN

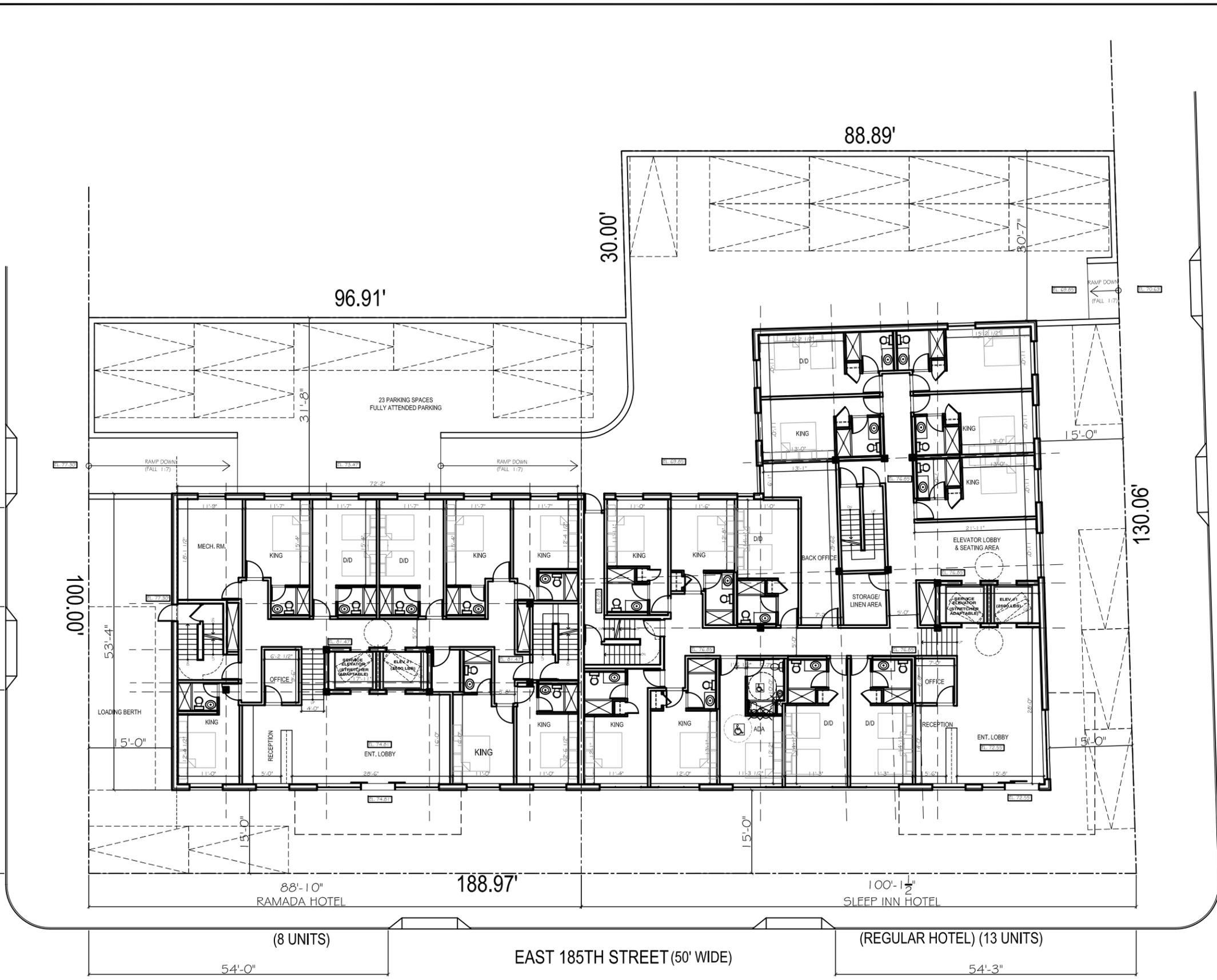
FOR ANALYSIS
PURPOSES
PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK

1st FLOOR PLAN

SEAL & SIGNATURE:	DATE: 10-26-15
	PROJECT No: 201503
	DRAWING BY: C Kuo
	CHK BY: M Kang
	DWG No:
	A-003.00
	PAGE No:



1st FLOOR PLAN

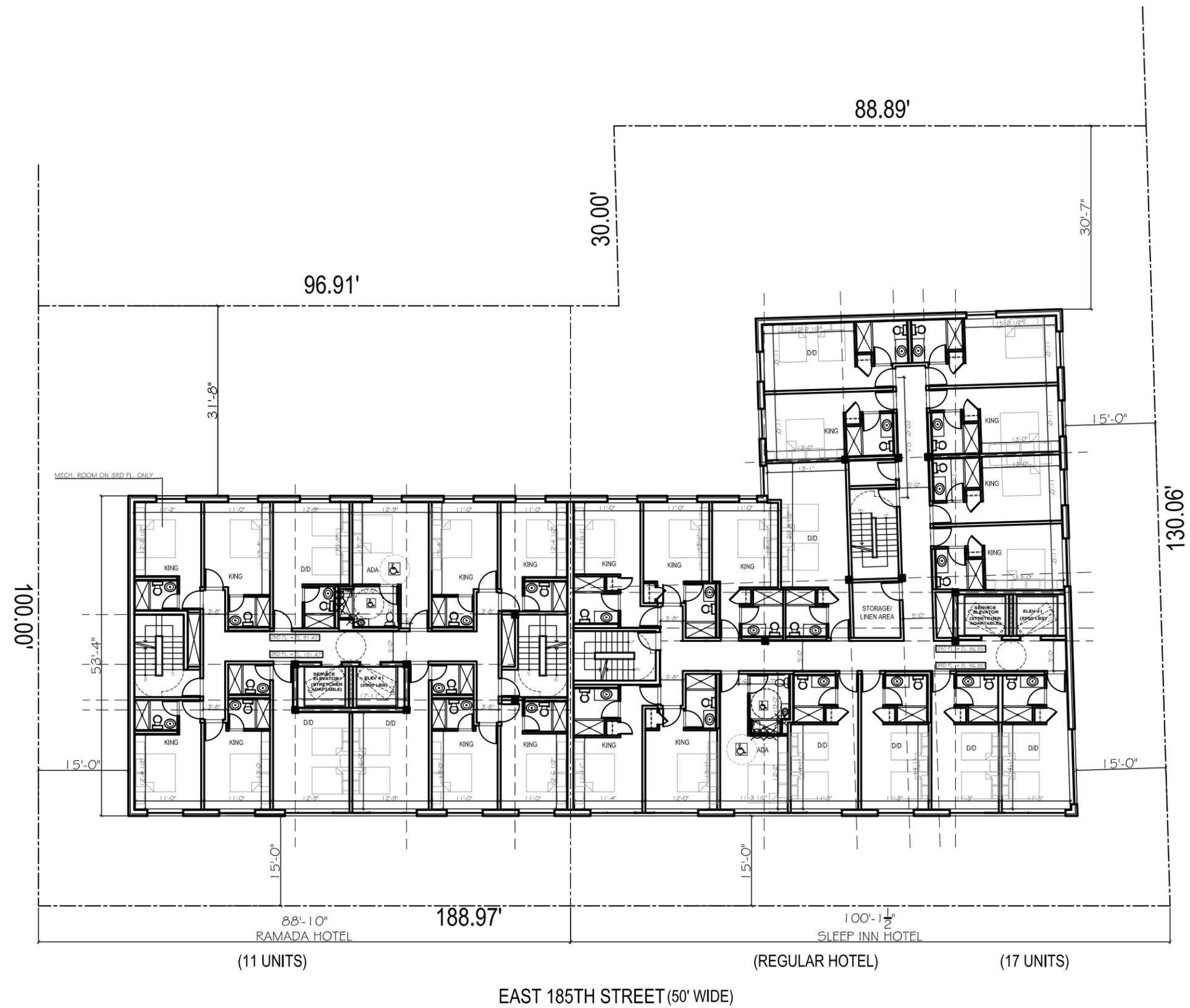


FOR ANALYSIS
PURPOSES
PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK
2nd, 3rd FLOOR PLAN

SEAL & SIGNATURE:	DATE: 10-26-15
	PROJECT No: 201503
	DRAWING BY: C Kuo
	CHK BY: M Kang
	DWG No:
	A-004.00
	PAGE No:



2nd, 3rd FLOOR PLAN

BATHGATE AVENUE (50' WIDE)

BASSFORD AVENUE (60' WIDE)

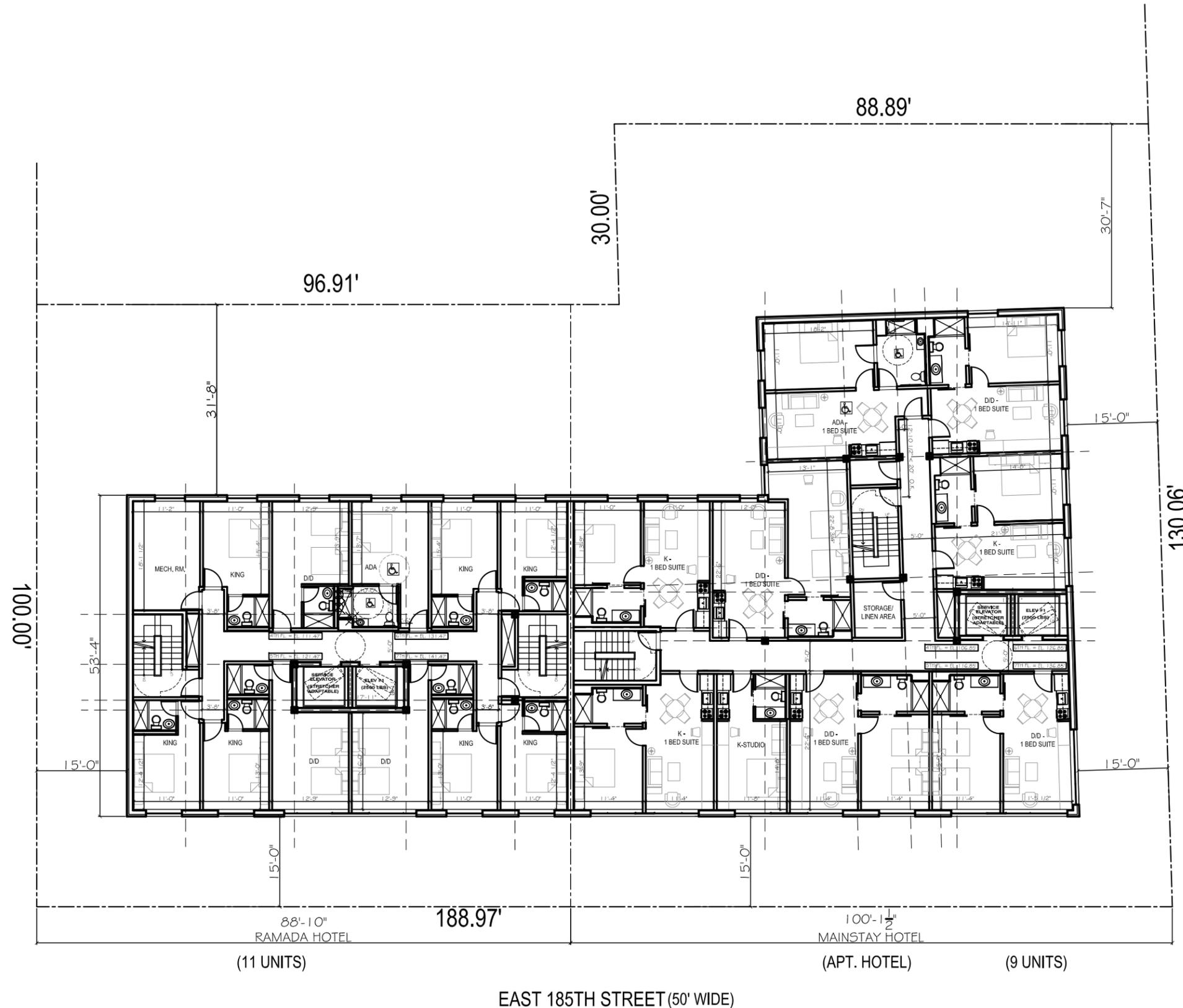
EAST 185TH STREET (50' WIDE)

(11 UNITS)

(REGULAR HOTEL)

(17 UNITS)

BATHGATE AVENUE (50' WIDE)



FOR ANALYSIS
PURPOSES
PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK
4th, 5th, 6th, 7th FLOOR PLAN

SEAL & SIGNATURE:	DATE: 10-26-15
	PROJECT No: 201503
	DRAWING BY: C Kuo
	CHK BY: M Kang
	DWG No:
	A-005.00
	PAGE No:



4th, 5th, 6th, 7th FLOOR PLAN

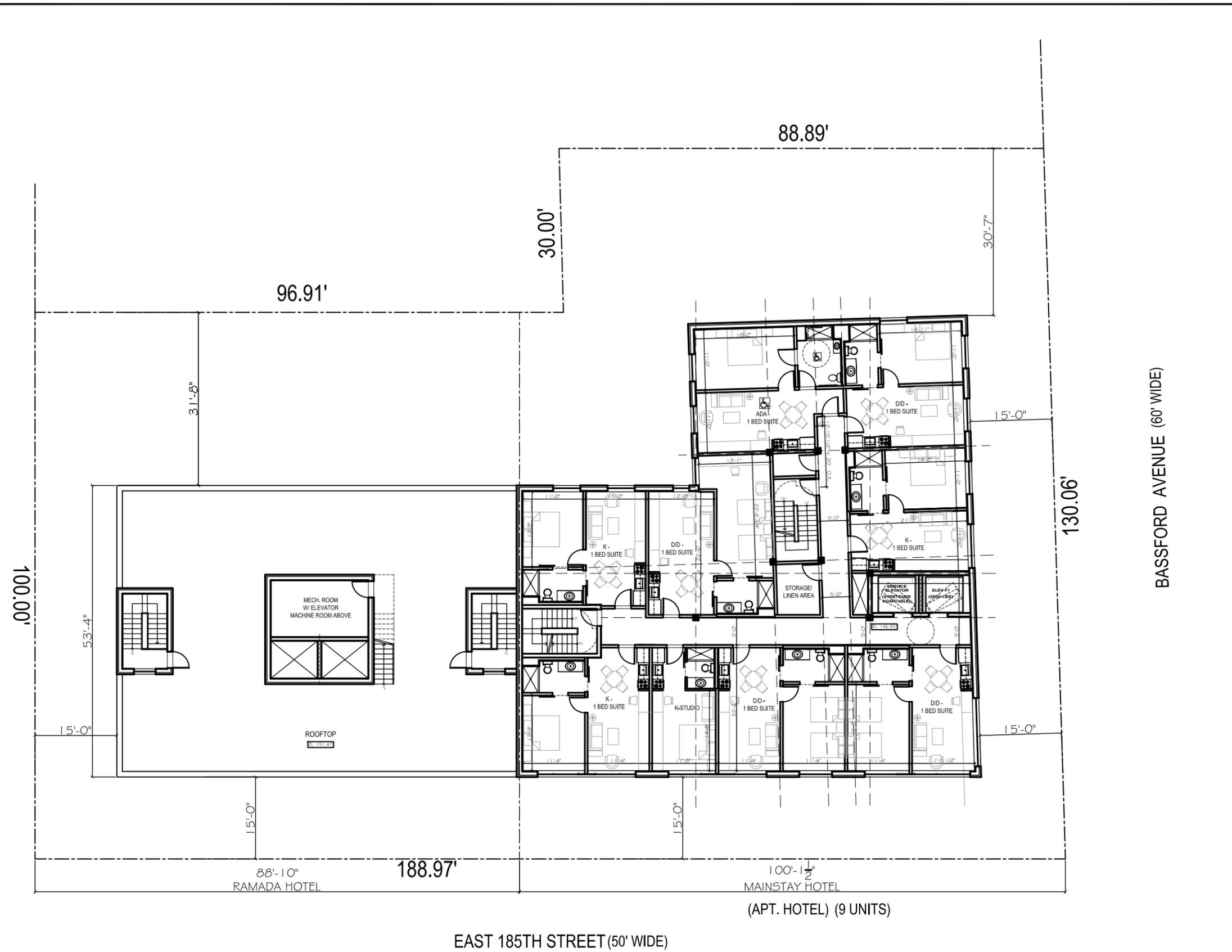
FOR ANALYSIS
PURPOSES
PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

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510 E. 185TH STREET
Bronx, NEW YORK

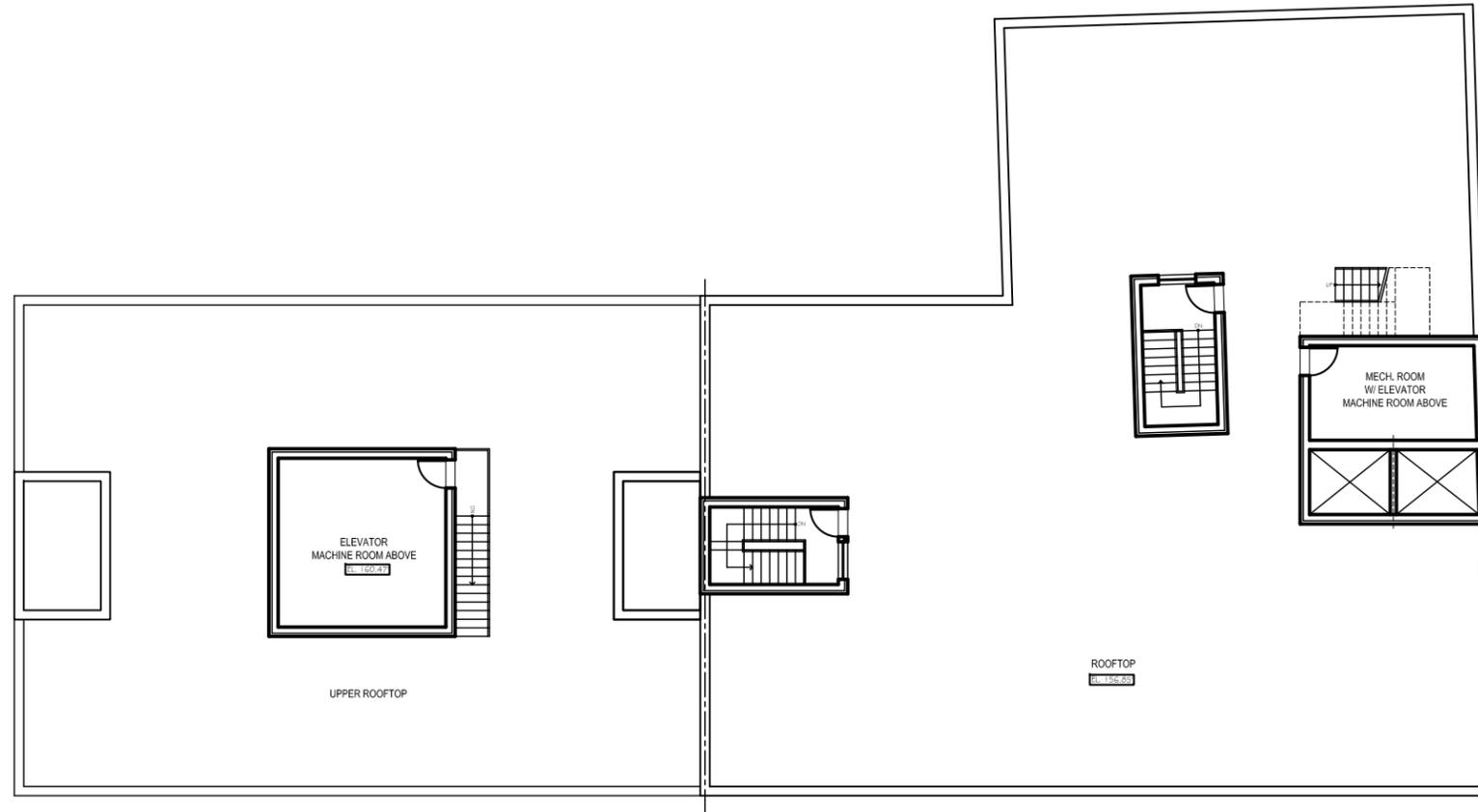
8th FLOOR PLAN

SEAL & SIGNATURE:	DATE:	10-26-15
	PROJECT No:	201503
	DRAWING BY:	C Kuo
	CHK BY:	M Kang
	DWG No:	A-006.00
	PAGE No:	



8th FLOOR PLAN





FOR ANALYSIS
 PURPOSES

PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

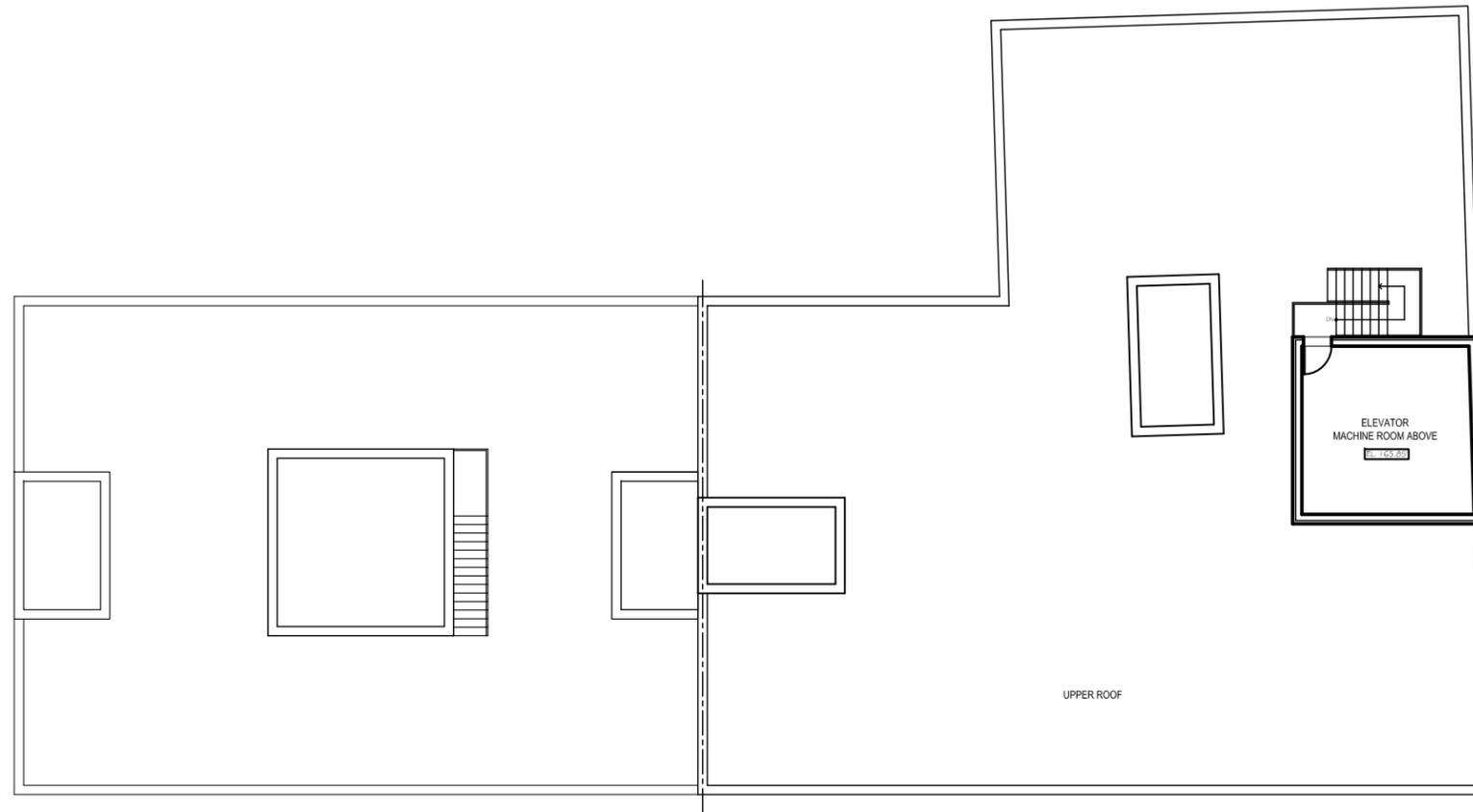
PROJECT
510 E. 185TH STREET
 Bronx, NEW YORK

ROOF PLAN

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	PROJECT No:	201503
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	CHK BY:	M Kang
	DWG No:	A-007.00
	PAGE No:	



ROOF PLAN



FOR ANALYSIS
 PURPOSES

PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

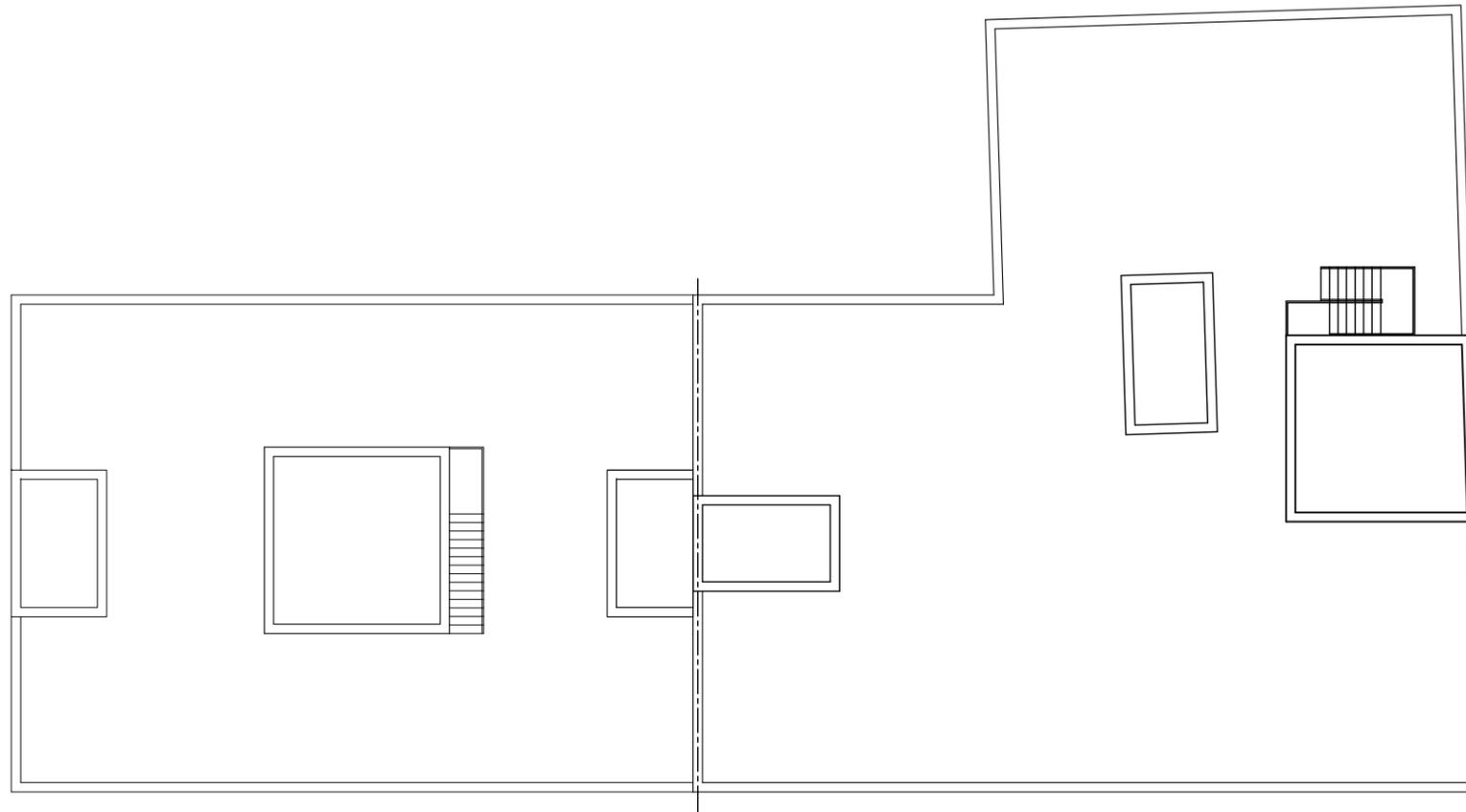
PROJECT
 510 E. 185TH STREET
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UPPER ROOF PLAN

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UPPER ROOF PLAN



BULKHEAD PLAN

**FOR ANALYSIS
 PURPOSES**

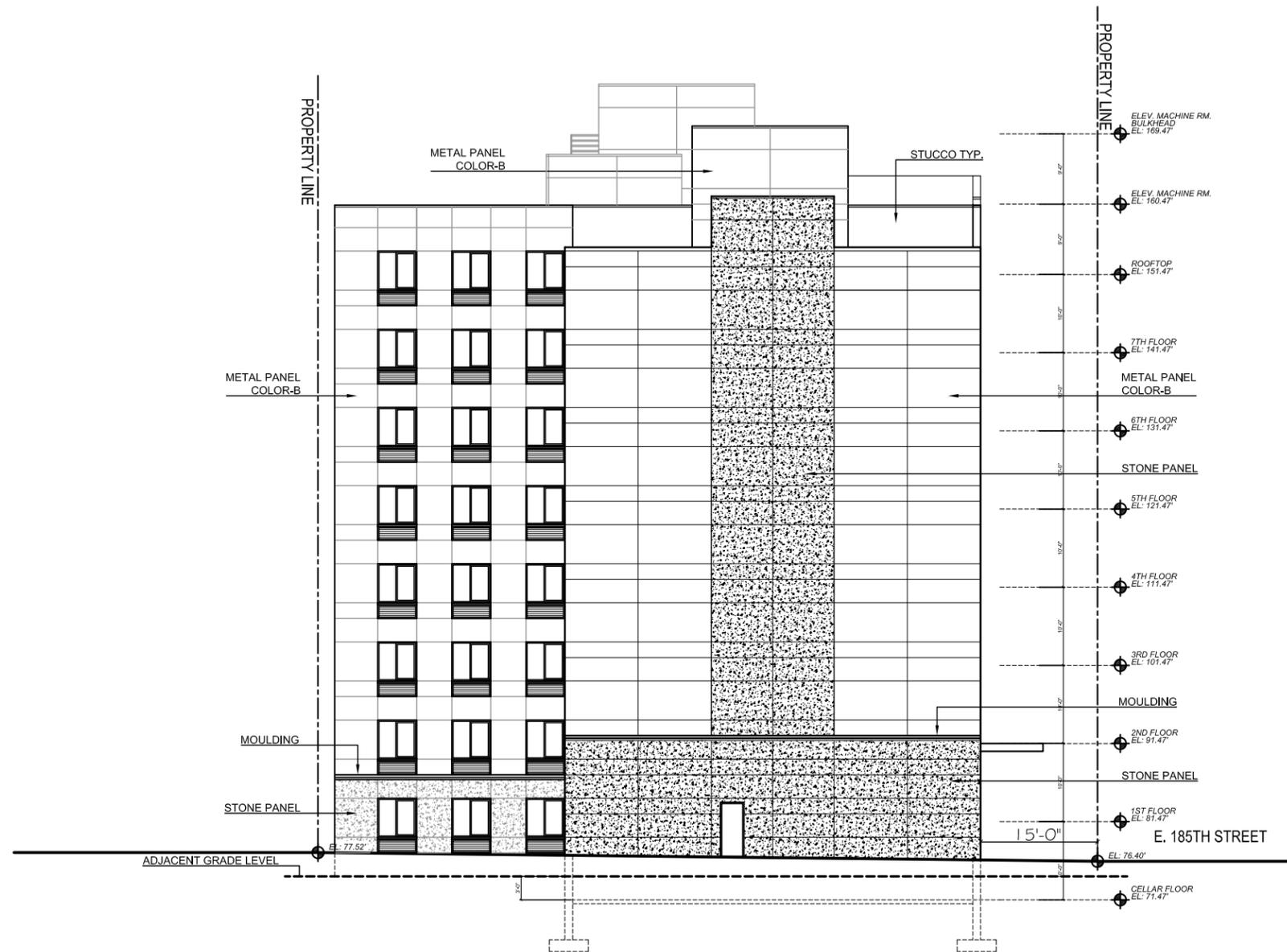
PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
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BULKHEAD PLAN

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	DRAWING BY: C Kuo
	CHK BY: M Kang
	DWG No:
	A-009.00
	PAGE No:



BATHGATE AVENUE ELEVATION

FOR ANALYSIS
PURPOSES

PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK
BATHGATE AVE. ELEVATION

SEAL & SIGNATURE:	DATE:	10-26-15
	PROJECT No:	201503
	DRAWING BY:	C Kuo
	CHK BY:	M Kang
	DWG No:	A-010.00
PAGE No:		



EAST 185TH STREET ELEVATION

**FOR ANALYSIS
PURPOSES**

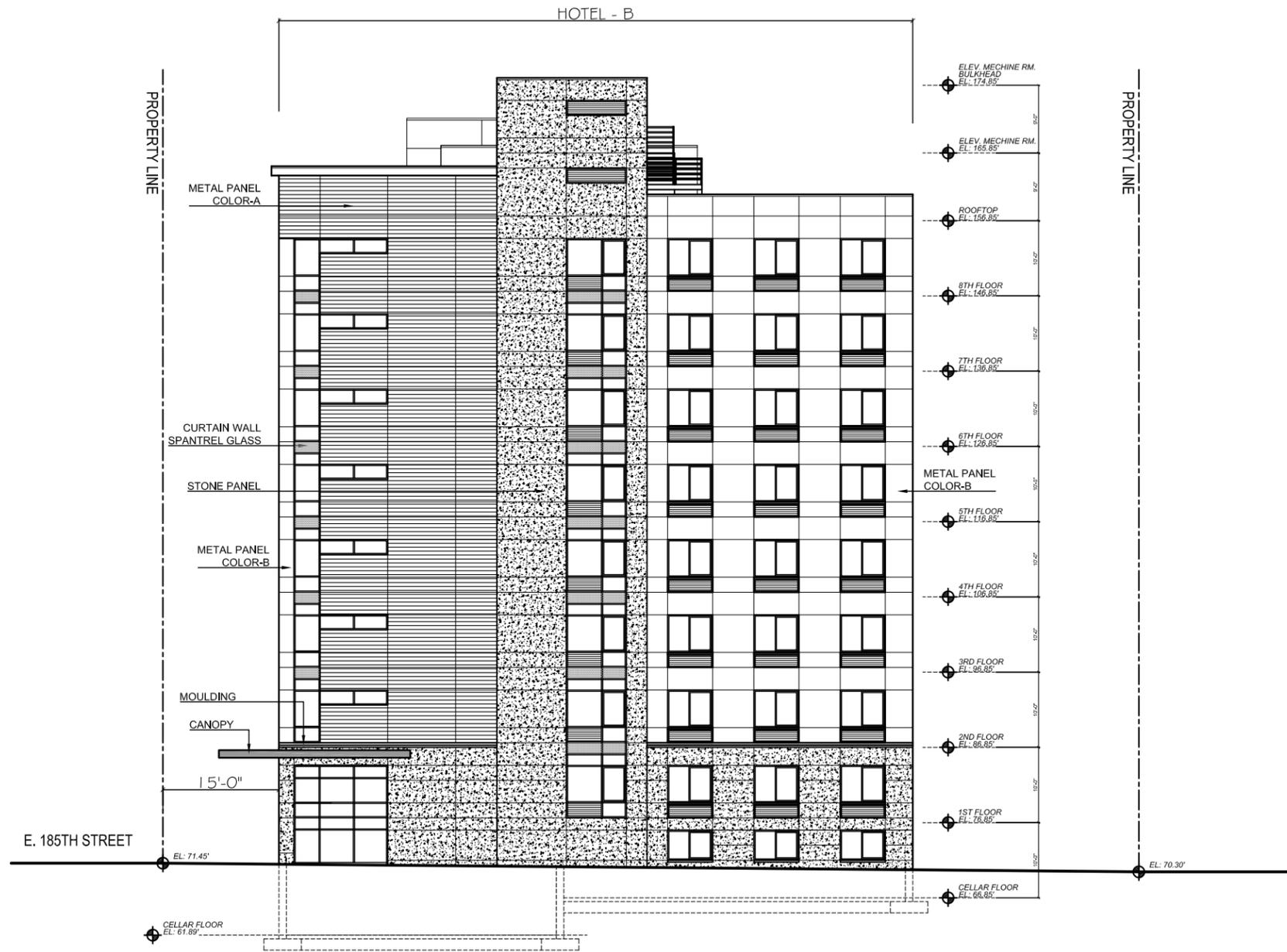
PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK

EAST 185TH ST. ELEVATION

SEAL & SIGNATURE:	DATE: 10-26-15
	PROJECT No: 201503
	DRAWING BY: C Kuo
	CHK BY: M Kang
	DWG No:
	A-011.00
	PAGE No:



BASSFORD AVENUE ELEVATION

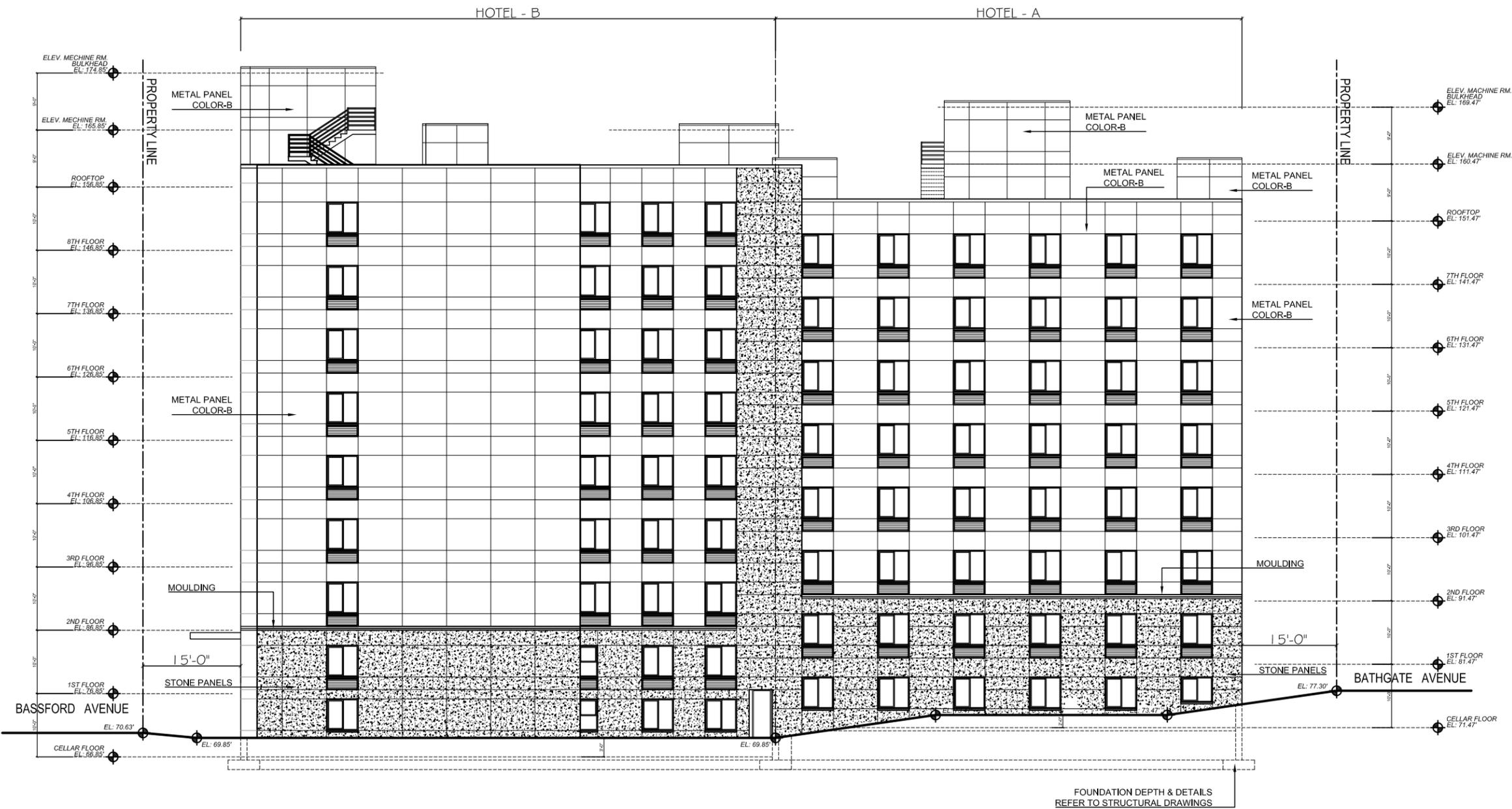
FOR ANALYSIS
PURPOSES

PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK
BASSFORD AVE. ELEVATION

SEAL & SIGNATURE:	DATE: 10-26-15
	PROJECT No: 201503
	DRAWING BY: C Kuo
	CHK BY: M Kang
	DWG No:
	A-012.00
	PAGE No:



SOUTH-WEST ELEVATION
(REAR PARKING LOT SIDE)

FOR ANALYSIS
PURPOSES
PRELIMINARY DESIGN

REV.#	DATE	DESCRIPTION

PROJECT
510 E. 185TH STREET
Bronx, NEW YORK
SOUTHWEST ELEVATION

SEAL & SIGNATURE:	DATE: 10-26-15
	PROJECT No: 201503
	DRAWING BY: C Kuo
	CHK BY: M Kang
	DWG No:
	A-013.00
	PAGE No:

Appendix 6
Raven Industries Cut-Sheets
of Vaporblock Plus VBP

VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier



Product Description

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

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

Product Use

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

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

Size & Packaging

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



Under-Slab Vapor/Gas Retarder

Product

Part

VaporBlock Plus 20 VBP20

APPLICATIONS

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



VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

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™
UNDERSLAB VAPOR RETARDER / GAS BARRIER

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.

App 6 - 3



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1/11 EFD 1125

VaporBlock® Plus™

UNDERSLAB VAPOR RETARDER / GAS BARRIER

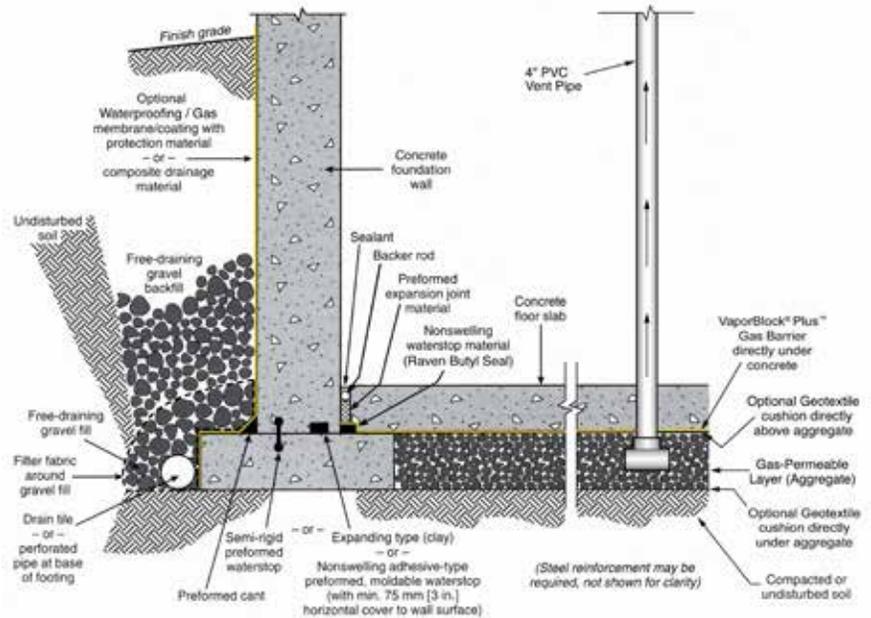
INSTALLATION GUIDELINES

Please Note: Read these instructions thoroughly before installation to ensure proper use of VaporBlock® Plus™. ASTM E 1465, ASTM E 2121 and, ASTM E 1643 also provide valuable information regarding the installation of vapor / gas barriers. When installing this product, contractors shall conform to all applicable local, state and federal regulations and laws pertaining to residential and commercial building construction.

- When VaporBlock Plus gas barrier is used as part of an active control system for radon or other gas, a ventilation system will be required.
- If designed as a passive system, it is recommended to install a ventilation system that could be converted to an active system if needed.

Materials List:

- VaporBlock® Plus™ Vapor / Gas Barrier
- VaporBond Plus 4" Foil Seaming Tape
- Butyl Seal 2-Sided Tape
- VaporBoot Plus Pipe Boots 12/Box (recommended)
- VaporBoot Tape (optional)



Elements of a moisture/gas-resistant floor system. General illustration only.
(Note: This example shows multiple options for waterstop placement.)

VAPORBLOCK® PLUS™ PLACEMENT

- 1.1. Level and tamp or roll granular base as specified. A base for a gas-reduction system may require a 4" to 6" gas permeable layer of clean coarse aggregate as specified by your architectural or structural drawings after installation of the recommended gas collection system. In this situation, a cushion layer consisting of a non-woven geotextile fabric placed directly under VaporBlock® Plus™ will help protect the barrier from damage due to possible sharp coarse aggregate.
- 1.2. Unroll VaporBlock Plus running the longest dimension parallel with the direction of the pour and pull open all folds to full width. (Fig. 1)
- 1.3. Lap VaporBlock Plus over the footings and seal with Raven Butyl Seal tape at the footing-wall connection. Prime concrete surfaces and assure they are dry and clean prior to applying Raven Butyl Seal Tape. Apply even and firm pressure with a rubber roller. Overlap joints a minimum of 6" and seal overlap with Raven VaporBond Tape. When used as a gas

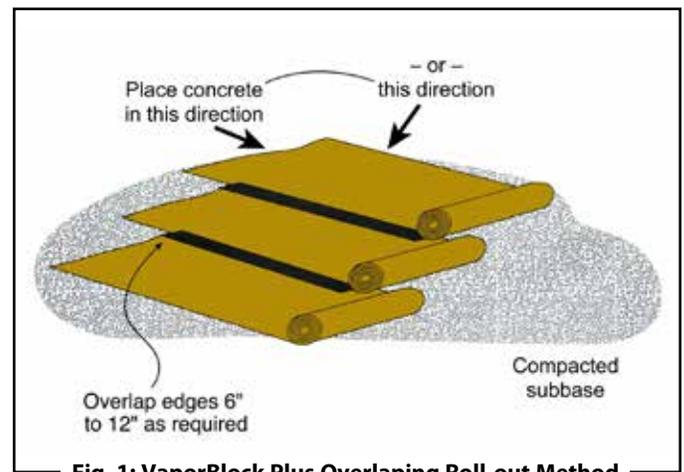


Fig. 1: VaporBlock Plus Overlapping Roll-out Method

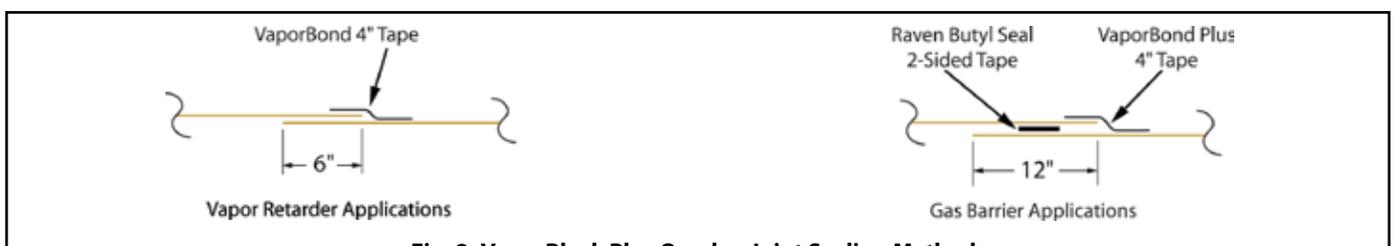


Fig. 2: VaporBlock Plus Overlap Joint Sealing Methods

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SINGLE PENETRATION PIPE BOOT INSTALLATION

barrier, overlap joints a minimum of 12" and seal in-between overlap with 2-sided Raven Butyl Seal Tape. Then seal with VaporBond Plus Tape centered on the overlap seam. (Fig. 2)

- 1.4. Seal around all plumbing, conduit, support columns or other penetrations that come through the **VaporBlock Plus** membrane. Pipes four inches or smaller can be sealed with Raven VaporBoot Plus preformed pipe boots. VaporBoot Plus preformed pipe boots are formed in steps for 1", 2", 3" and 4" PVC pipe or IPS size and are sold in units of 12 per box (Fig. 3 & 5).

Pipe boots may also be fabricated from excess **VaporBlock Plus** membrane (Fig. 4 & 6) and sealed with VaporBoot Tape or VaporBond Plus Tape (sold separately).

Reminder Note: All holes or penetrations through the membrane will need a patch cut to a minimum of 12" from the opening in all directions.

To fabricate pipe boots from **VaporBlock Plus** excess material (see Fig. 4 & 6 for A-F):

- A) Cut a square large enough to overlap 12" in all directions.
- B) Mark where to cut opening on the center of the square and cut four to eight slices about 3/8" less than the diameter of the pipe.
- C) Force the square over the pipe leaving the tightly stretched cut area around the bottom of the pipe with approximately a 1/2" of the boot material running vertically up the pipe. *(no more than a 1/2" of stretched boot material is recommended)*
- D) Once boot is positioned, seal the perimeter to the membrane by applying 2-sided Raven Butyl Seal Tape in between the two layers. Secure boot down firmly over the membrane taking care not to have any large folds or creases.
- E) Use VaporBoot Tape or VaporBond Plus Tape to secure the boot to the pipe.

VaporBoot Tape (option) – fold tape in half lengthwise, remove half of the release liner and wrap around the pipe allowing 1" extra for overlap sealing. Peel off the second half of the release liner and work the tape outward gradually forming a complete seal.

VaporBond Plus Tape (option) - Tape completely around pipe overlapping the to get a tight seal against the pipe.
- F) Complete the process by taping over the boot perimeter edge with VaporBond Plus Tape to create a monolithic membrane between the surface of the slab and gas/moisture sources below and at the slab perimeter. (Fig. 4 & 6)

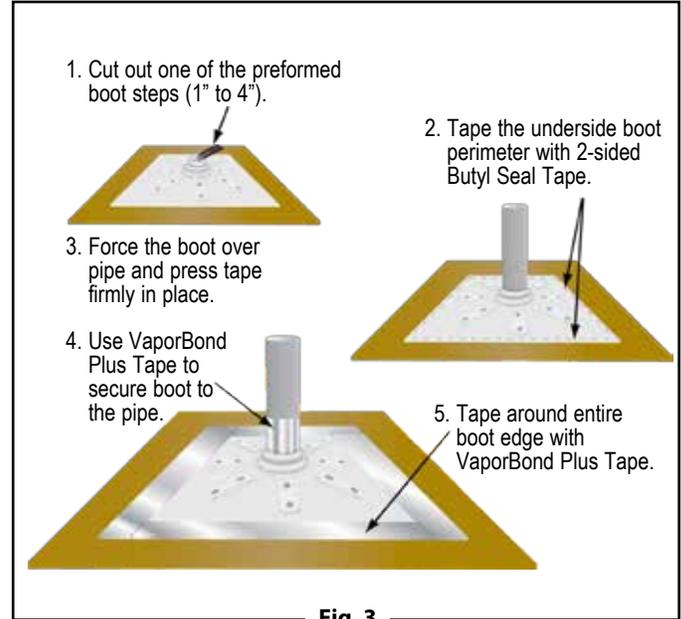


Fig. 3

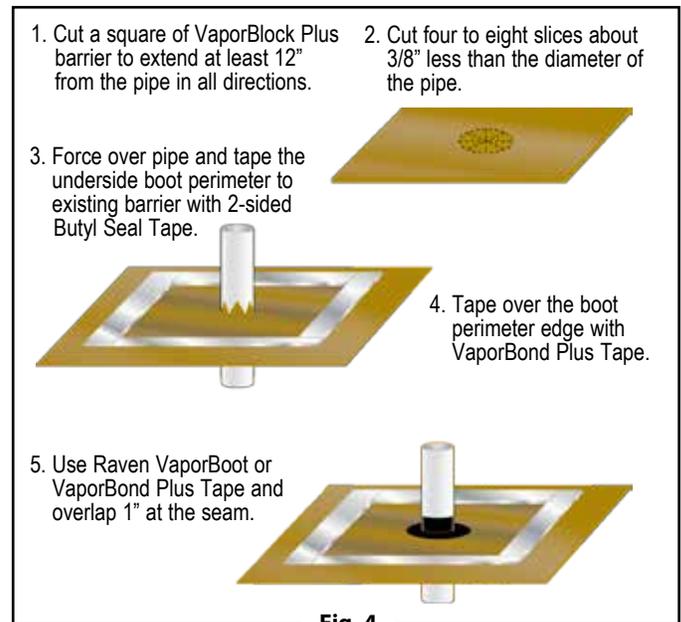


Fig. 4

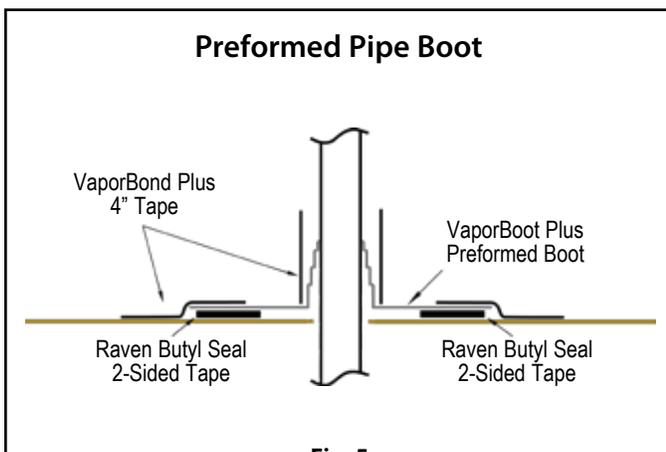


Fig. 5

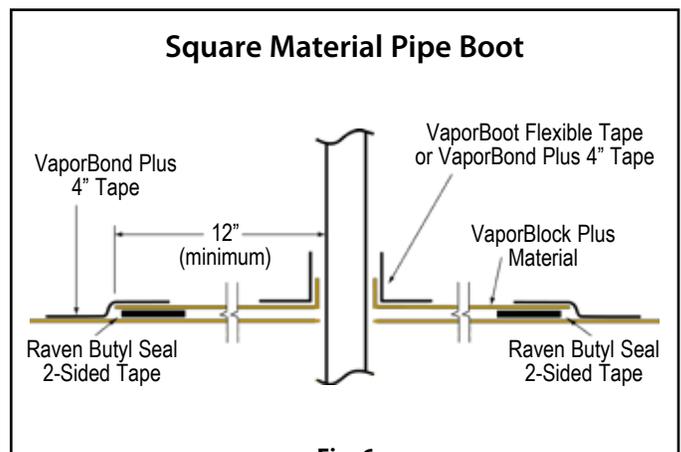


Fig. 6

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MULTIPLE PENETRATION PIPE BOOT INSTALLATION

1.5. For side-by-side multiple penetrations;

- A) Cut a patch large enough to overlap 12" in all directions (Fig. 7) of penetrations.
- B) Mark where to cut openings and cut four to eight slices about 3/8" less than the diameter of the penetration for each.
- C) Slide patch material over penetration to achieve a tight fit.
- D) Once patch is positioned, seal the perimeter to the membrane by applying 2-sided Raven Butyl Seal Tape in-between the two layers. (Fig. 8)
- E) After applying Raven Butyl Seal Tape between the patch and membrane, tape around each of the penetrations and the patch with VaporBond Plus 4" foil tape. (Fig. 9) For additional protection apply an acceptable polyurethane elastomeric sealant around the penetrations. (Fig. 10)

1.6. Holes or openings through **VaporBlock Plus** are to be repaired by cutting a piece of **VaporBlock Plus** 12" larger in all directions from the opening. Seal the patch to the barrier with 2-sided Raven Butyl Seal Tape and seal the edges of the patch with VaporBond Plus Tape.

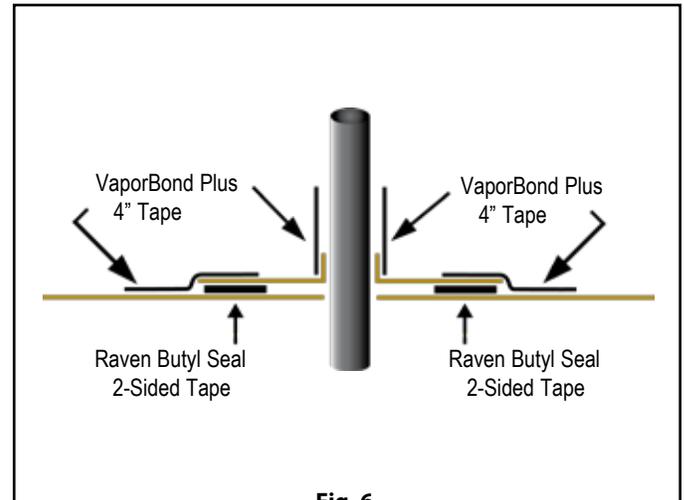


Fig. 6

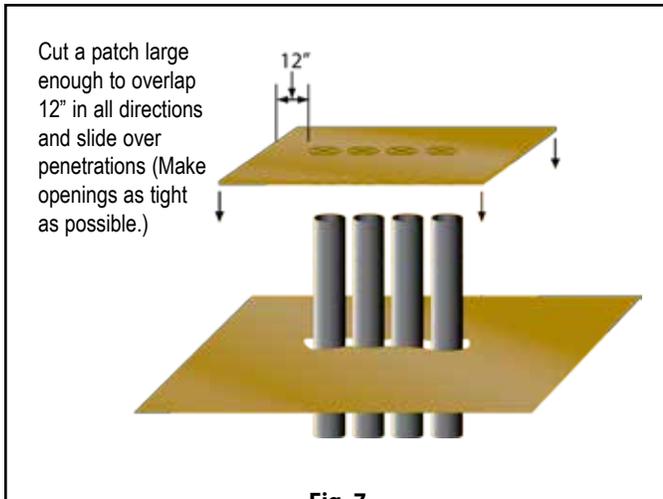


Fig. 7

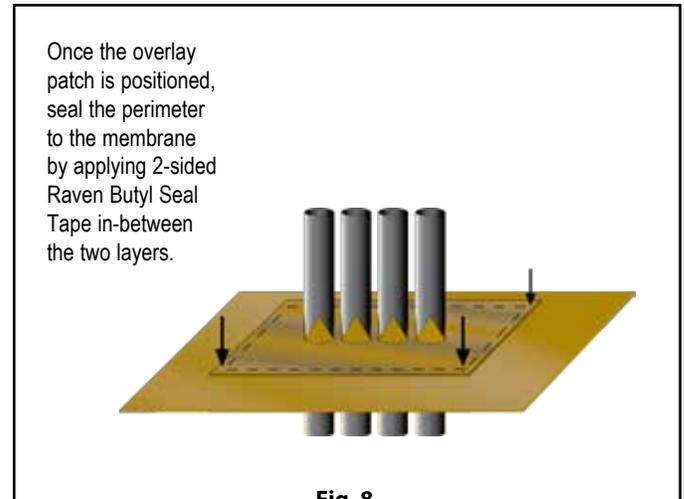


Fig. 8

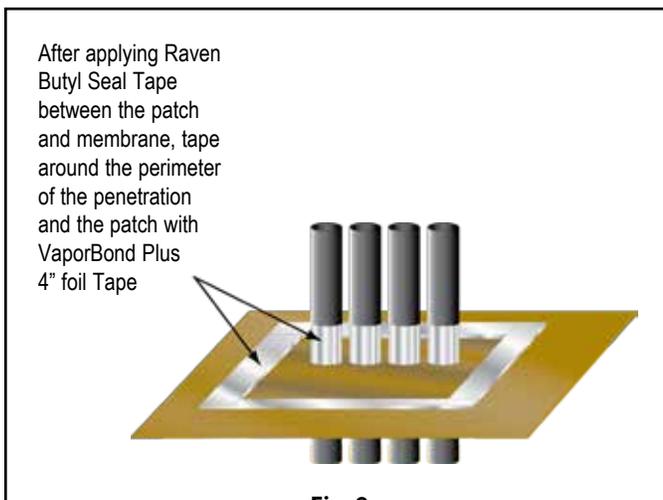


Fig. 9

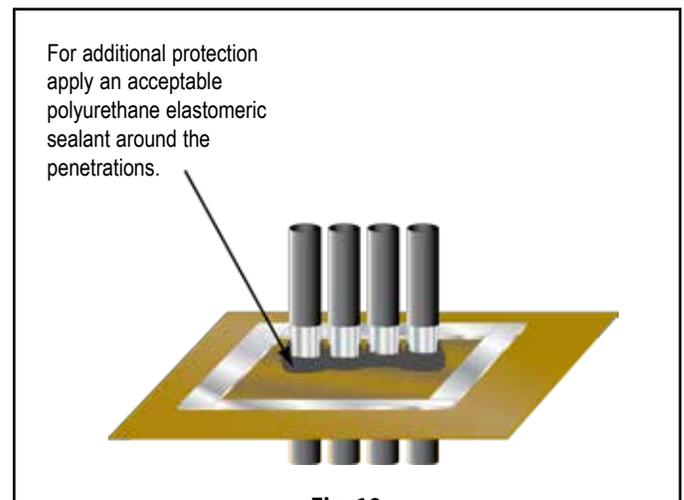


Fig. 10

VAPORBLOCK® PLUS™ PROTECTION

- 2.1. When installing reinforcing steel and utilities, in addition to the placement of concrete, take precaution to protect **VaporBlock Plus**. Carelessness during installation can damage the most puncture-resistant membrane. Sheets of plywood cushioned with geotextile fabric temporarily placed on **VaporBlock Plus** provide for additional protection in high traffic areas including concrete buggies.
- 2.2. Use only brick-type or chair-type reinforcing bar supports to protect **VaporBlock Plus** from puncture.
- 2.3. Avoid driving stakes through **VaporBlock Plus**. If this cannot be avoided, each individual hole must be repaired per section 1.6.
- 2.4. If a cushion or blotter layer is required in the design between **VaporBlock Plus** and the slab, additional care should be given if sharp crushed rock is used. Washed rock will provide less chance of damage during placement. Care must be taken to protect blotter layer from precipitation before concrete is placed.

VaporBlock® Plus™ Gas & Moisture Barrier can be identified on site as gold/white in color printed in black ink with the following logo and classification listing:



VaporBlock® Plus™
Gas & Moisture Barrier



Note: To the best of our knowledge, these are typical installation procedures and are intended as guidelines only. Architectural or structural drawings must be reviewed and followed as well as on a project basis. NO WARRANTIES ARE MADE AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS OR GUIDELINES REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and we disclaim all liability for resulting loss or damage.

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