107-02 QUEENS BOULEVARD

QUEENS, NEW YORK

Remedial Action Work Plan

NYSDEC BCP Number: C241196

Prepared for:

RJ Capital Holdings LLC

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JUNE 2018

CERTIFICATION

I, Tarek Z. Khouri certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Report, Remedial Action Work Plan, was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

NYS Professional Engineer # 086611	6/27/2018	Signature
	Date	

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
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
PAH	Poly Aromatic Hydrocarbons
PCE	Tetrachloroethylene
PE	Professional Engineer
PGWSCOs	Protection of Groundwater Soil Cleanup Objectives
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
TCE	Trichloroethylene
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

Site Description/Physical Setting/Site History

RJ Capital Holdings, LLC and AVG Capital LLC and De Boulevard LLC filed an application to enter into the Brownfield Cleanup Program (BCP) Agreement with the New York State Department of Environmental Conservation (NYSDEC) as a Volunteer for a site located at 107-02 and 107-16 Queens Boulevard in Queens, New York (the "Site"). A Brownfield Cleanup Agreement (BCA) was executed between RJ Capital Holdings, LLC, AVG Capital LLC and De Boulevard LLC as Volunteers and NYSDEC on March 1, 2017. Site number C241196 was issued to this BCP Site.

The Site is 17,090 sq ft (0.39 acre) square feet in urban area and consists of a 1-story commercial building with a rear open parking area in the southern portion. The building at the Site has a full basement and consists of seven (7) tenant spaces identified as Café Biu Bela, Liz Cleaners, Twin Deli, Yury's Shoe Repair, D&L Skin Solution, Ship It Global, and Party World. A minor fire occurred in the ceiling of Café Biu Bella on May 24, 2017 and since then this tenant space has been vacant. Ship It Global has been vacant since August 2017.

The owner of Liz Cleaners shut down the operations of the dry cleaning machine, removed all visible piping on the machine and electric wiring on January 31, 2018 and filed with NYSDEC Division of Air Resources a Notice of Equipment Shutdown dated February 2, 2018. The dry-cleaning machine at Liz Cleaners was decommissioned by National Cleaners Associated on April 11, 2018 and was disposed of at a scrap metal recycler.

As of January 31, 2018, all of the tenant spaces have been vacated, with the exception of Yury's Shoe Repair and D&L Skin Solution. These two spaces were vacated on March 31, 2018. A temporary immediate exposure remedy system was installed in the basement of these two occupied tenants (Yury's Shoe Repair and D&L Skin Solution) as per the requirements of NYSDOH. This temporary exposure remedy system consisted of a ventilation system and an aeration system and was in operation on February 1, 2018.

Each system was equipped with a fan with a capacity of 1066 cubic feet per minute. Each fan was connected to 6-inch diameter flexible duct with fresh air withdrawn from the rear parking lot and the vented air exhausted on the roof via an abandoned boiler stack. Yury's Shoe Repair and D&L Skin Solution were vacated on March 31, 2018, and the entire building is now vacant.

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Summary of the Remedial Investigation

A remedial investigation was performed, and the results are documented in companion documents called "Phase II Environmental Site Assessment" (Phase II ESA) report dated April 2016 and a "Remedial Investigation Report" (RIR) dated February 2018. These remedial investigations focused on the following areas of concern for this Site:

1. The historical and most recent use of a tenant space at the Site identified a dry cleaner at 107-06 Queens Boulevard, which was operated by Double D Cleaners between 1983 and 1991 and by Liz Cleaners Corp. from 2005 until most recently.

1. Scope of Remedial Investigations

2. Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
3. Installation of fifteen (15) soil borings across the entire project Site and the collection of twenty (20) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installation of six (6) groundwater monitoring wells throughout the Site to establish groundwater flow and the collection of six (6) groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installation of twelve (12) sub-slab vapor points in the basement of the commercial building at the Site, two (2) soil vapor probes throughout rear parking area at the Site and the collection of fourteen (14) soil vapor samples, ten (10) indoor air samples and two (2) outdoor ambient air samples for chemical analysis;
6. Collection of one (1) sediment samples from a sewer pit located beneath the commercial building at the Site for chemical analysis to evaluate the sediment quality;

2. Findings of Remedial Investigations:

2. Elevation of the property is approximately 58 feet above mean sea level.
3. Depth to groundwater ranges from 38.10 to 40.42 feet below grade surface at the Site.
4. Groundwater flow is generally from southwest to northeast beneath the Site.
5. Bedrock was not encountered at the Site at the depth of 50 feet.
6. The stratigraphy of the site, from the ground surface down to approximately 8 feet, is classified as fill consisting of a mixture of fine- to coarse-grained sand with asphalt and bricks. The fill layer is underlain by fine-grained sand to the depth of 40 feet.
7. Soil/fill sample results were compared to NYSDEC Unrestricted Use Soil Cleanup objectives (UUSCOs) and Restricted Residential Soil Cleanup Objectives (RRSCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Analytical results of soil/fill samples reported PCE (6.3 mg/kg) , TCE (0.0094 mg/kg), cis-1,2-DCE (0.066 mg/kg) and vinyl chloride (0.025 mg/kg) occurred at 10 to 12 foot bgs in soil beneath the rear parking area (in SP-6) located the immediate southern vicinity of the drycleaners. Of these compounds, PCE and vinyl chloride were detected at concentrations exceeding their respective Track 1 Unrestricted Use Soil Cleanup Objective (UUSCO) but below their respective Restricted Residential Use SCO (RRSCO). In this specific area, no PCE or its derivative compounds were detected in the deeper soil sample collected above the soil-groundwater interface at 36 to 38 feet bgs (in SP-9). PCE (2.8 mg/kg) was also detected at a concentration exceeding its respective Track 1 UUSCO but below its respective RRSCO in the dry sediment sample collected from sewer pit located in the southwest corner of the basement beneath the drycleaners.

No other VOCs or SVOCs, total PCBs, herbicides or metals were detected in any soil samples at concentrations exceeding their respective Track 1 Unrestricted Use SCOs. Three pesticides, 4,4'-DDD (0.0077 mg/kg), 4,4'-DDE (0.0194 mg/kg) and 4,4'-DDT (1.97 mg/kg) were detected in a shallow soil sample at 0 to 2 feet bgs (in SP-14) and a deep soil sample at 26 to 28 feet bgs (in SP-15) collected beneath the northern and eastern portions of the basement of the building at concentrations exceeding their respective Track 1 UUSCOs but below their Restricted Residential use SCOs

8. Groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the 2017 RI showed PCE (maximum 8.3 ug/L) was detected in all groundwater samples collected from the monitoring wells installed at the Site and off-site. PCE concentration detected in the upgradient vicinity of the dry cleaner at the Site (in MW-5) exceeded its respective GQS. At this location, PCE was also detected in soil sample collected between 10 and 12 feet bgs at a concentration in exceedance of UUSCO. The plume of PCE extends in the downgradient off-site vicinity of the Site (in MW-3). The presence of elevated PCE levels in soil and in groundwater samples beneath the hydraulically upgradient portion of the Site may indicate a potential former PCE release.
   No other VOCs, SVOCs or dissolved metals were detected in any groundwater samples at concentrations exceeding their respective GQS. No PCBs, pesticides or herbicides were detected in any groundwater samples.

   Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) were detected in the groundwater beneath the Site at a maximum concentration of 47 ug/L.

9. Vapors associated with chlorinated solvents including PCE, TCE and chloroform were commonly detected in on-site soil/sub-slab vapor samples. PCE was the most abundant compound and was detected at a maximum concentration of 9000 µg/m^3 beneath the western portion of the basement of the building (in SB-5).

PCE concentrations gradually decreased, where a concentration of 1,680 µg/m^3 was detected beneath the central portion of the basement in the immediate eastern vicinity of the drycleaners (in SB-4), a concentration of 1,400 µg/m^3 was detected beneath the northwestern portion of the basement (in SB-6) and a concentration of 1,300 µg/m^3 was detected beneath the southern portion of the rear parking area yard (in SV-2). PCE concentrations ranging between 58 µg/m^3 and 680 µg/m^3 were detected in the eastern portion of the basement of the building at the Site (in SV-7 to SV-12). TCE, which is a degradation product of PCE, was detected at concentration ranging between 240 µg/m^3 in the western portion of the basement (in SB-5) to 5.4 µg/m^3 in the northeastern portion (in SB-9). Other chlorinated solvents of concern were detected in soil vapors in the western and southern portions of the Site including cis-1,2-DCE and carbon tetrachloride, which were detected at concentration of 120 and 44 µg/m^3 (in SB- and SV-2).

Chlorinated compounds PCE and TCE were also commonly detected in the indoor air sample evidenced by the results of IA-1 to IA-9 and IA-Ventilation. Indoor PCE concentrations ranged between 5.7 µg/m^3 and 472 µg/m^3 and indoor TCE concentrations ranged between 0.54 µg/m^3 and 85 µg/m^3. PCE and TCE were detected in IA-Ventilation at concentrations of 5,288 ug/m^3 and 42.27 ug/m^3, which could be possibly attributed to uncontrolled volatilization of PCE in ambient air from the then partially decommissioned dry-cleaning machine at the adjacent drycleaners. According to NYSDOH September 2013 PCE Fact sheet and NYSDOH August 2015 TCE Fact sheet, the levels of PCE and TCE detected in indoor air would require immediate and effective action to reduce exposure at this Site. The results of soil/sub-slab vapor samples and indoor air samples for VOCs were also compared to Matrices 1 and 2 in the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH Guidance), which address the compounds PCE and TCE reported in soil/sub-slab and indoor air data at this Site.

Based on the relationship between PCE and TCE concentrations detected in soil/sub-slab and indoor air, the NYSDOH recommends mitigation actions for this Site.

Qualitative Human Health Exposure Assessment

Human exposure to contaminants in Site soils may occur through direct contact or airborne transport. Construction and remedial workers are expected to be exposed to surface and subsurface soils and groundwater. Their greatest exposure to contaminated materials will be during excavation. Therefore, all construction activities related to excavation will be subject to strict health and safety and air monitoring procedures.

There will be no future human exposures to contaminated soils at the Site. All soils will be excavated to the depth of 19 feet across the entire Site, to 29 feet for the partial sub-basement beneath the western portion and to the depth of 35 feet for the elevator pit beneath the central portion and the to the depth of 24 feet for the elevator pit beneath the eastern portion. The soil excavation for the elevator pit will be above the water table. Therefore, potential exposure pathways are considered incomplete for future conditions.

As such, potential exposures would only occur during site remediation and construction but not under future use scenarios, thus not impacting future occupants of the Site.

The primary human health concern associated with groundwater contamination is the use of groundwater as a potable water supply. Human exposure to contaminated groundwater from the Site is not expected because the area is served by a public water supply..

Incidental exposure to contaminants in groundwater beneath the Site are not expected to occur during excavation and construction activities since the Site will be subject to strict health and safety and air monitoring procedures detailed in the site-specific Construction health and safety plan and the community air monitoring plan.

Construction workers could be exposed to airborne contamination (volatile organics or fugitive dust) during construction activities. To protect construction workers from ingestion and inhalation of dust or volatiles, dust monitoring and dust suppression measures will be implemented based on the procedures outlined in the Site Construction Health and Safety Plan (CHASP).

Under future conditions, there will be no potential exposures via transport of fugitive dust or vapors in ambient air because the Site will be covered by a building, pavement or clean fill.

Nearby residents (i.e., those living along adjoining sides of the site) may be exposed to either volatile or dust emissions during the construction activities via the inhalation exposure route. As such, continuous air monitoring will be conducted during construction. Measures to suppress either volatile or dust emissions will be also implemented based on the air monitoring data.

It should be noted that visitors to the Site could also be exposed to vapors or fugitive dust released during construction activities. However, their exposures would be occasional (during a visit) and for relatively short periods of time (e.g., one to two hours) so that the overall exposures would be less than the exposures to construction workers and nearby residents.

Summary of the Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and

- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

The remediation will include demolition of the existing building to accommodate excavation and off-site disposal of contaminant source areas, including but not limited to:

- Removal of an underground storage tank (UST), underground piping or other structures associated with the UST, any associated contaminated soil, or other contaminated soil found during the excavation. Confirmation samples will be taken will be taken within the tank excavation. The Site excavation confirmation samples need to achieve Unrestricted Use SCOs as well as GW protection SCOs; and
- The proposed excavation is anticipated to achieve a Track 1 unrestricted use cleanup. Removal of contaminated soil/fill material exceeding the Unrestricted

Use SCOs across the entire Site. Based on data gathered to date, this will include excavation of a minimum of approximately 15,074 cubic yards of contaminated soil/fill. Confirmation samples will be taken at the conclusion of soil excavation at depths consistent with the proposed soil cleanup. The Site excavation confirmation samples need to achieve Unrestricted Use SCOs as well as GW protection SCOs; and

- Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for Unrestricted Use SCOs will be brought in to fill in the Site excavation.

3. Backfill

Confirmation samples will be collected and analyzed to demonstrate achievement of unrestricted use soil cleanup objectives. Clean fill meeting the requirements of the 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 226 cubic yards. No soil/fill is expected to be reused/relocated on Site.

4. Vapor Intrusion Evaluation

As part of the Track 1 remedy, a soil vapor intrusion evaluation will be completed. The evaluation will include a provision for implementing actions recommended to address exposures related to soil vapor intrusion.

5. Local Institutional Controls

If no Environmental Easement (EE) or Site Management Plan (SMP) is needed to achieve soil, or soil vapor remedial action objectives, then the following local use restriction will be relied upon to prevent ingestion of groundwater: Article 141 of the NYCDOH code, which prohibits potable use of groundwater without prior approval.

6. Contingent Track 1 Elements

The intent of the remedy is to achieve a Track 1 unrestricted use, therefore, no environmental easement or site management plan is anticipated. If the soil vapor intrusion (SVI) evaluation is not completed prior to completion of the Final Engineering Report, then a Site Management Plan (SMP) and Environmental Easement (EE) will be required to address the SVI evaluation and implement actions as needed; if a mitigation or monitoring action is needed, a Track 1 cleanup can only be achieved if the mitigation system or other required action is no longer needed within 5 years of the date of the Certificate of Completion.

In the event that Track 1 unrestricted use is not achieved, including achievement of groundwater and soil vapor remedial objectives, the following contingent remedial elements will be required, and the remedy will achieve a Track 2 restricted residential cleanup.

A. Institutional Controls

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or NYCDOH; and
- require compliance with the Department approved Site Management Plan.

B. Site Management Plan

A Site Management Plan is required, which includes the following:

a. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

   Institutional Controls: The environmental easement discussed above.

This plan includes, but may not be limited to:

- An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- Descriptions of the provisions of the environmental easement including any land use, and/or groundwater use restrictions;
- Provisions for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion; and
- The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- Monitoring for vapor intrusion for any buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

RJ Capital Holdings, LLC and AVG Capital LLC and De Boulevard LLC entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in March 2017, to investigate and remediate a 0.39-acre property located at 107-02 to 107-16 Queens Boulevard in the Forest Hills section of Queens, New York. RJ Capital Holdings, LLC along with AVG Capital LLC and De Boulevard LLC are listed as a Volunteer in the Brownfield Cleanup Program. Mixed residential and commercial use is proposed for the property. When completed, the Site will contain a 10 story building with two sub-grade basement levels. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between March 10, 2016 and October 3, 2017. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site poses a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the County of Queens, New York and is identified as Block 3238 and Lot 44 on the New York City Tax Map. A United States Geological Survey (USGS) topographical quadrangle or other suitable type map (Figure 1) shows the Site location.

The Site is situated on an approximately 0.39-acre area bounded by MacDonald Park to the north, a 7--story residential building and a synagogue to the south, 5-story warehouse/commercial building to the east, and a US Post Office to the west (see Figure 2). A boundary map is attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The 0.39-acre property is fully described in Appendix 1 – Metes and Bounds.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated end use. The proposed redevelopment plan and end use is described here to provide the basis for this assessment. However, the Remedial Action contemplated under this RAWP may be implemented independent of the proposed redevelopment plan.

The proposed future use of the Site will consist of residential and commercial use. The Site is anticipated to be developed into of a 10-story building with a full sub-grade basement level covering the entire property perimeter site and a partial sub-basement level of approximately 5,750 square feet located in the western portion of the Site. The proposed building footprint will occupy 100% of the lot area. The sub-basement will be used for building mechanics. The basement will be used for a gym space and assembly space. The first floor will be used for as a commercial space and a residential lobby. The second floor will consist of a parking. Floors 3 to 10 will consist of 72 residential units. A layout of the proposed site development is presented in Figure 3. The current zoning designation is C4-5X commercial district. The proposed use is consistent with existing zoning for the property.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is located in the Forest Hills section of Queens, which consists of residential and commercial properties. A Receptor Survey was performed within a 1,000 radius of the Site. The Site is located along the northwestern front of New York City tax Block 3238 and is bounded by Queens Boulevard – East Bound Service Road to the north, 70th Avenue to the west and is bordered by a 7-story residential building and a synagogue to the south and a 5-story warehouse/commercial building to the east. A park (MacDonald Park) is located to the north of the Site. The results of the sensitive receptor database search indicate there is one sensitive receptors identified as Ivy Day School and located within 711 feet crossgradient to the northwest of the Site. Other potential sensitive receptors include residential facilities situated in the immediate southern and eastern vicinities of the Site. No other sensitive receptors including schools, day care, hospitals, rivers or streams were identified within the search distance of 1,000 feet from the Site.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation (RI) Work Plan dated July 24, 2017 and Remedial Investigation Work Plan Stipulation dated August 17, 2017. The investigation was conducted between March 2016 and February 2018. The RI was submitted to NYSDEC on April 6, 2018.

2.1 SUMMARY REMEDIAL INVESTIGATIONS PERFORMED

Table 1 provides the number, location and sampling criteria of soil probes;

Table 2 provides the number and location of the groundwater monitoring wells;

Table 3 provides the number, location and sampling criteria of soil vapor probes;

Table 4 provides the number, location and sampling criteria of sediment from sewer pit.

2.1.1 Borings and Wells

1. Installed fifteen (15) soil borings across the entire project Site;
2. Installed six (6) groundwater monitoring wells including five (5) on-site monitoring wells and one (1) off-site well to establish groundwater flow;
3. Installed of twelve (12) sub-slab vapor points in the basement of commercial building at the Site, two (2) soil vapor probes throughout rear parking area at the Site.

2.1.2 Samples Collected

1. Collected of twenty (20) soil samples for chemical analysis from the soil borings to evaluate soil quality;
2. Collected six (6) groundwater samples groundwater samples for chemical analysis to evaluate groundwater quality;
3. Collected sixteen fourteen (14) soil vapor samples, ten (10) indoor air samples and two (2) outdoor ambient air samples for chemical analysis;
4. Collected one (1) sediment samples from a sewer pit located beneath the commercial building at the Site for chemical analysis to evaluate the sediment quality.

Figure 4 provides a Sampling Map.

2.1.3 Chemical Analytical Work Performed

All twenty soil samples and the sediment sample were analyzed for volatile organic compounds (VOCs) via EPA Method 8260 and semi-volatile organic compounds (SVOCs) via EPA Method 8270. Twelve of the soil samples were also analyzed for Pesticides via EPA Method 8081, Herbicides via EPA Method 8151, Polychlorinated biphenyls via EPA Method 8082 and TAL Metals via EPA Method 6010 and EPA Method 7473 for Mercury and & Standard Methods (SM) 4500-CN for Cyanide.

All six groundwater samples collected on-Site were analyzed for VOCs via EPA Method 8260. Five of the groundwater samples were also analyzed for EPA Method 8270, Pesticides via EPA Method 8081, Herbicides via EPA Method 8151, Polychlorinated biphenyls via EPA Method 8082, total/dissolved TAL Metals via EPA Method 6010 and EPA Method 7473 for Mercury and Standard Methods (SM) 4500-CN for Cyanide, 1,4 Dioxane via EPA Method 8270D SIM instead of EPA Method 8260C SIM noted in the RAWP and also for PFOA and PFOS via modified EPA Method 537.

Sub-slab vapor samples, soil vapor samples and indoor/outdoor air samples were analyzed for VOCs via EPA TP-15.

2.1.4 Documentation

The investigation performed for Site environmental due diligence purposes was documented in a Phase II Environmental Site Assessment" (Phase II ESA) report dated April 2016. The BCP RI summarizing the work described in the RIWP dated July 2017 was submitted to NYSDEC on February 8, 2018.

2.1.5 SIGNIFICANT THREAT

The NYSDEC and NYSDOH have determined that this Site poses a significant threat to human health and the environment. Notice of that determination has been provided for public review. A copy of the notice is included in Appendix 2.

2.2 SITE HISTORY

This section should describe the following topics and others that are necessary or relevant.

2.2.1 Past Uses and Ownership

The Site was historically occupied by stables in northwestern portion around 1902, a 2-story dwelling in the western portion in 1914. The Site became vacant in 1932 and was then developed with the present commercial building with a rear parking in 1950. The commercial building at the Site housed 7 storefronts with shared basements.

Past uses of the commercial units included retail shops, restaurants, beauty salons, and drycleaners. The drycleaners at the Site has been located at 107-06 Queens Boulevard and was identified as Discount Cleaners in 1983, Double D Cleaners in 1991 and Liz Cleaners from 2005 to present. Two (2) 275-gallon aboveground number 2 fuel oil tanks feeding fuel oil heating systems are in the basement at 107-06 Queens Boulevard and one 5,000-gallon inactive number 4 fuel oil underground storage tank that is registered for 107-16 Queens Boulevard as active in the NYSDEC PBS # 2-306185. The 5,000 gallon is likely to be buried beneath the eastern portion of the parking area in the vicinity a fill port identified in that area. Currently the property is owned by De Boulevard LLC, who acquired its title on June 22, 2006. De Boulevard LLC is owned by RJ Capital Holdings LLC and AVG Capital LLC in equal shares.

2.2.2 Phase I and Phase II Reports

- Phase I Environmental Site Assessment Report, prepared by Hydro Tech Environmental, Corp. for the Volunteers, dated February 17, 2016.
- RIR, by Hydro Tech Environmental, Corp. for the Volunteers, dated February 5, 2018.

2.2.3 Sanborn Maps

All Sanborn Maps available for this Site were reviewed prior to preparation of the RAWP. The Site was utilized as stables in 1904, a residential facility in 1914 and a commercial facility since 1950 until most recently. The Sanborn Maps do not show any evidence of the registered 5,000 gallons UST and do not list the Site as a dry-cleaning facility.

2.3 GEOLOGICAL CONDITIONS

1. Elevation of the property is approximately 58 feet above mean sea level.
2. Depth to groundwater ranges from 38.10 to 40.42 feet at the Site.
3. Groundwater flow is generally from southwest to northeast beneath the Site.
4. Bedrock was not encountered at the Site at the depth of 50 feet.

5. The stratigraphy of the site, from the ground surface down to approximately 8 feet, is classified as fill consisting of a mixture of fine- to coarse-grained sand with asphalt and bricks. The fill layer is underlain by fine-grained sand to the depth of 40 feet.

A groundwater flow map is shown in Figure 5 for well monitoring performed during the RI. Groundwater monitoring and surveying data is provided in Table 5.

2.4 CONTAMINATION CONDITIONS

Five Areas of Concerns were identified based on the review of historical Site records, previous investigations and field observations. These AOCs included the following:

1. AOC-1: Presence of a UST in the eastern portion of rear parking area at the Site
2. AOC-2: Presence of chlorinated solvents in deep soil and dry sewer pit sediments
3. AOC-3: Presence of dissolved chlorinated solvents in groundwater
4. AOC 4: Presence of chlorinated solvents soil vapor at the Site

2.4.1 Conceptual Model of Site Contamination

The contamination present beneath the Site is associated with chlorinated hydrocarbons including PCE and its degradation products in soil, groundwater and in soil vapor beneath the property. The highest dissolved concentrations of PCE and its degradation products occurred in the upgradient southwestern portion of the Site. Three areas of concern are identified at the Site as follows:

1. AOC-2: Presence of chlorinated solvents in deep soil and dry sewer pit sediment
2. AOC-3: Presence of dissolved chlorinated solvents in groundwater on and off-site

3. AOC 4- : Presence of chlorinated solvents soil vapor at the Site

2.4.2 Description of Areas of Concern

1. AOC 1 – Presence of a UST

The 5,000-gallon number 2 fuel oil UST, which is currently registered at the Site as active is in fact out-of-service tank. The location of this tank was not identified on the Sanborn maps but was delineated via a parabolic anomaly with a GPR survey in the vicinity of a fill port situated in the eastern portion of the parking area. No evidence of release was identified in the soil or groundwater samples collected in the vicinity of the UST anomaly.

1. **AOC -2: Presence of chlorinated solvents in chlorinated solvents in deep soil and dry sewer pit sediment**

Investigations indicate PCE and vinyl chloride were detected at concentrations exceeding the Unrestricted Use SCOs but below the Restricted Residential Use SCOs in a deep soil; this deep soil is well above the interface with groundwater in southwestern portion of the parking area and in the immediate southern vicinity of the drycleaners at the Site. PCE was also detected at a concentration exceeding its respective Unrestricted Use SCOs but below the Restricted Residential Use SCOs in a dry sediment sample collected from sewer pit located in the southwestern corner of the basement of the drycleaners.

2. **AOC-3: Presence of chlorinated solvents in groundwater**

Dissolved PCE was detected at a trace concentrations marginally exceeding its respective GA Groundwater Standards is two groundwater samples collected on- site also off-site. PCE originates in the southwestern upgradient portion of the Site, where a highest concentration was detected. Dissolved PCE concentrations extends off-site downgradient to the northwest as evidenced by off-site monitoring well in this direction.

3. **AOC 4: Presence of Soil gas at the Site**

Analytical results of soil vapor indicate elevated levels of VOCs consisting of chlorinated solvents are present beneath Site. Soil vapor concentrations of chlorinated solvents were highest in the western and southeastern portions of the Site.

2.4.3 Identification of Standards, Criteria and Guidance

In accordance with DER-10 and ECL § 27-1415, the objectives of the remedial action are to: (1) reduce the concentrations of contaminants of concern at the Site to meet those levels that will protect public health and the environment, and (2) isolate the Site from migration of contaminated soil vapor from potential on-site sources. Where identifiable sources of contamination are found on the Site, the sources will be removed or eliminated to the greatest extent feasible, regardless of presumed risk or intended use of the Site. Also in accordance with DER-10, the Remedial Action Objectives (RAO) for this Site are defined as medium-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific standards, criteria, and guidance (SCGs). The SCGs for the Site include:

- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (2010);
- NYSDEC TAGM No. 4031– Fugitive Dust Suppression and Particulate Monitoring
- NYSDEC TOGS 1.1.1 – Ambient Water Quality Standards and Guidance Values and
- Groundwater Effluent Limitations (1998);
- NYSDOH – Guidance for Evaluating Soil Vapor Intrusions in the State of New York
- (2006);
- New York State Codes, Rules and Regulations (NYCRR) Title 6 Part 364 – Waste
- Transporter Permits;
- 6 NYCRR Part 370 – Hazardous Waste Management System;

- 6 NYCRR Part 375 – Environmental Remediation Program (December 2006);
- Code of Federal Regulations (CFR) Title 29 Part 1910.120 - Hazardous Waste Operations and Emergency Response Standard;
- CFR Title 29 Part 1926 – Safety and Health Regulations for Construction; and
- NYSDEC CP-51 – Soil Cleanup Guidance (2010).
- Permanent Closure of Petroleum Storage Tanks
- 6 NYCRR Part 612 - Registration of Petroleum Storage Facilities (February 1992)
- 6 NYCRR Part 613 - Handling and Storage of Petroleum (February 1992)

Site remediation will be achieved in compliance with the remedial goals to Track 1 Unrestricted Use cleanup levels. The proposed Site development will require excavation across the property to a minimum depth of 19 feet bgs and to a minimum depth of 29 feet beneath the western portion. The site excavation activities are anticipated to remove all contaminated soil/fill material exceeding the SCG. This excavation will not extend into the groundwater. The presence of PCE contamination in groundwater is minimal and is expected to remediate by natural attenuation. Potential health impacts associated with contaminated groundwater will be eliminated consistent with the RAOs established for the Site. Compliance with SCGs for soil vapor intrusion is expected following completion of the remedial action.

2.4.4 Soil/Fill Contamination

Soil characterization indicated soil beneath the Site consists of fine- to coarse-grained sand with fill material to approximately 8 feet bgs. The fill layer is underlain by fine-grained sand to the depth of 40 feet bgs.

2.4.4.1 Summary of Soil/Fill Data

PCE was detected in one location on-site at concentrations in exceedance of UUSCO. This location is SP-6 from 10 to 12 feet bgs (6.3 mg/kg). Vinyl chloride was also detected in SP-6 from 10 to 12 feet below bgs (0.025 mg/kg) at a concentration in exceedance of UUSCO.

PCE and vinyl chloride contamination does not extend to the soil and groundwater interface. Other chlorinated VOCs including trichloroethylene and cis-1,2-dichloroethylene (TCE) were also detected below UUSCOs in SP-6 from 10 to 12 feet bgs are present in on-site soil at concentrations below their UUSCOs. SVOCs, metals, total PCBs and Herbicides did not occur in any soil samples. Shallow soil in SP-14 and deep soil in in SP-15 exceeded UUSCO of 0.0033 mg/kg and for the pesticides, 4,4'-DDD (0.0776 mg/kg), 4,4'-DDE (0.194 mg/kg) and 4,4'-DDT (0.197 mg/kg).

2.4.4.2 Comparison of Soil/Fill with SCGs

Table 6 shows soil results compared to Unrestricted SCOs and Restricted Residential SCOs for all soil/fill at the Site. Figure 6 and Figure 7 are spider maps that show the location and summarize the exceedances from Track 1 Unrestricted SCOs for all soil/fill.

As this data indicates, the soil contamination at the Site in exceedance of Unrestricted SCOs is present in one hot spot at the Site. This hot spot is characterized at intermediate depth soil beneath rear parking area in the immediate southern vicinity of the drycleaners. This contamination does not extend to the depth of the soil and groundwater interface.

2.4.5 On-Site and Off-Site Groundwater Contamination

2.4.5.1 Summary of Groundwater Data

Groundwater investigations performed at the Site involved the sampling of one temporary monitoring well and a network of five monitoring wells currently present at the Site and in sidewalk located in the Site vicinity. These investigations identified PCE in all groundwater samples collected at the Site. The plume of PCE with concentrations exceeding its respective GA Groundwater Standards extends from MW-5 (8.3 ug/L) beneath the rear parking area in the immediate southern vicinity of the drycleaners to MW-3 (5.8 ug/L) in the northeast-adjacent sidewalk to the Site.

No other chlorinated VOCs detected at concentrations exceeding their respective GA standards.

2.4.5.2 Comparison of Groundwater with SCGs

Exceedances from GA groundwater standards in monitoring wells prior to the remedy are shown in Table 7. A spider map that indicates the locations of and summarizes exceedances from GA groundwater standards prior to the remedy is shown in Figure 8.

The plume of chlorinated solvents at concentrations exceeding their respective GA Standards is present beneath the southwestern upgradient portion of the Site and extends off-site into the northeast-adjacent sidewalk along the southwest Side of Queens Boulevard. The PCE concentrations within the plume range from 05 µg/L to 8.3 µg/L. The source of the plume was delineated the beneath the western portion of the rear parking area at the Site where PCE was also detected in dry soil samples at intermediate depth.

2.4.6 On-Site and Off-Site Soil Vapor Contamination

2.4.6.1 Summary of Soil Vapor Data

Chlorinated hydrocarbons including PCE, TCE and chloroform were commonly detected in on-site soil/sub-slab vapor samples collected throughout the property. PCE was the most abundant compound and was detected at a maximum concentration of 9000 µg/m^3 beneath the western portion of the basement of the building at the Site in the sub-slab vapor sample SB-5. PCE concentrations gradually decreased, where a concentration of 1,680 µg/m^3 was detected beneath the central portion of the basement in the immediate eastern vicinity of the drycleaners SB-4, a concentration of 1,400 µg/m^3 was detected beneath the northwestern portion of the basement in sub-slab vapor sample SB-6 and a concentration of 1,300 µg/m^3 was detected beneath the southern portion of the rear parking area yard in SV-2.

PCE concentrations ranging between 58 µg/m^3 and 680 µg/m^3 were detected in the eastern portion of the basement of the building at the Site as evidenced by the analytical results of SV-7 to SV-12. TCE, which is a degradation product of PCE, was detected at concentration ranging between 240 µg/m^3 in the western portion of the basement in SB-5 to 5.4 µg/m^3 in the northeastern portion in SB-9. Other chlorinated solvents of concern were detected in soil vapors in the western and southern portions of the Site including cis-1,2-DCE and carbon tetrachloride, which were detected at concentration of 120 and 44 µg/m^3 in SB-5 µg/m^3 and SV-2, respectively.

Chlorinated compounds PCE (maximum 472 µg/m^3) and TCE (maximum 85 µg/m^3) were also detected in the indoor air samples. PCE and TCE were detected at concentrations of 5,288 ug/m^3 and 42.27 ug/m^3 following the installation of the temporary immediate exposure remedy system in the basement of Yury's Shoe Repair and D&L Skin Solution. The detected high concentrations of PCE and TCE could be attributed to uncontrolled volatilization of PCE in ambient air from the then partially decommissioned dry-cleaning machine at the adjacent drycleaners. According to NYSDOH September 2013 PCE Fact sheet and NYSDOH August 2015 TCE Fact sheet, the levels of PCE and TCE detected in indoor air would require immediate and effective action to reduce exposure at this Site. Based on the relationship between PCE and TCE concentrations detected in soil/sub-slab and indoor air, the NYSDOH recommends mitigation actions for this Site.

2.4.6.2 Comparison of Soil Vapor with SCGs

A table of soil vapor data collected prior to the remedy is shown in Table 8. A spider map that indicates the location(s) of and summarizes soil vapor data prior to the remedy is shown in Figure 9.

Significant levels of PCE and its derivative compounds including were detected in on-site soil vapors. A variety of other VOCs including gasoline vapors and associated derivatives were detected in soil vapors at the Site. Gasoline compounds were identified in soil and in groundwater beneath the Site at concentrations below their respective standards.

2.4.7 On-Site Sediment Contamination

2.4.7.1 Summary of Sediment Data

PCE was detected in a sediment sample from a from sewer pit (2.8 mg/kg) located beneath the dry cleaners. No other VOCs including chlorinated hydrocarbons occurred in the sediment sample collected from the sewer pit located at the Site.

2.4.7.2 Comparison of Sediment Sample with SCGs

A table of sediment sample data collected prior to remedy is shown in Table 9.

2.5 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.5.1 Qualitative Human Health Exposure Assessment

Based on the results of the previous subsurface investigation reports including the RIR, potential human exposures to the exceedances of SCOs for PCE and its derivative compounds vinyl chloride in soil, to dissolved PCE in groundwater and PCE,and TCE in on-site vapors will be addressed in this section. Potential human exposures to these contaminants will be addressed in this RAWP as follows:

Nature, Extent, Fate and Transport of Contaminants

The presence of PCE and vinyl chloride, which were detected beneath the southwestern portion of the Site at depth interval between 10 and 12 feet bgs and well above the groundwater interface and the presence of PCE in dry sediment in a sewer pit beneath the drycleaners are likely to be indicative of a source of improper discharges of dry cleaning solvents by the historic or current drycleaners identified at the Site.

PCE was also identified in a dissolved phase in groundwater across the entire Site and off-site with maximum concentrations detected in the southwestern portion of the Site, where PCE was also detected in soil well above the soil-groundwater interface. PCE its derivative compounds including TCE, carbon tetrachloride and cis-1,2-DCE were also detected in on-site vapors and the distribution pattern of their concentrations is consistent with the presence of PCE in dry soil and in the groundwater.

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 documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

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

Existence of Human Health Exposure

Existing – The Site is entirely developed and is capped with a concrete basement slab beneath the 1-story commercial building and asphalt pavement in the rear parking area. Therefore, no exposure to surficial soil/fill material currently exist at the Site.

Groundwater is not exposed at the Site, and because the Site is served by the public water supply and groundwater use for potable supply is prohibited, groundwater is not used at the Site and there is no potential for exposure. The existing building structure is not airtight and there is potential for soil vapor accumulation.

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 to be encountered, and there will be no structures on site where soil vapor could accumulate.

Proposed Future Conditions – Once the remedial actions and redevelopment of the Site have been completed, there will be no potential onsite exposure pathways. All soils exceeding the Unrestricted Use SCOs will be removed as part of the remedy.

Receptor Populations

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

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

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

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

Overall Human Health Exposure Assessment

Based upon this analysis, complete on-site exposure pathways appear to be present only during the current unremediated phase and the remedial action phase. Under current conditions, preventing access to the Site could minimize on-Site exposure pathways. 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. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure. 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. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/ fill, as all soil that exceeds Unrestricted Use SCOs will have been removed, and the active SSDS and concrete building slab will interrupt potential for soil vapor intrusion.

2.5.2 Fish & Wildlife Remedial Impact Analysis

NYSDEC DER-10 requires an on-site and off-site Fish and Wildlife Resources Impact Analysis (FWRIA). However, based on the requirements stipulated in Section 3.10 -Appendix 3C of DER-10, there was no need to prepare an FWRIA for The Site. A completed form of DER-10 Appendix 3C is enclosed in this RAWP as Appendix 3.

2.6 REMEDIAL ACTION OBJECTIVES

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

2.7.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

RAOs for Environmental Protection

- Remove the source of ground water contamination.

2.7.2 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.7.3 Soil Vapor

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the Site.

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

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 remedial action objectives (RAOs) for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). A remedy is then developed based on the following ten criteria:

- Protection of human health and the environment;
- Compliance with standards, criteria, and guidelines (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; and
- Land use.

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

Alternative 1 (Track 1) involves:

- Establishment of Unrestricted Use Track 1 SCOs for the Site.

- Removal of all soil/ fill exceeding Unrestricted Use (Track 1) Soil Cleanup Objective (SCOs) throughout the Site to the depth of bedrock. This will include excavation of a minimum of approximately 2,311 cubic yards (or 3,005 tons) of contaminated soil/fill. It is expected that a Track 1 alternative will require excavation to a minimum depth of 6 feet below the basement slab in the hotspot pesticide area and to a minimum depth of 19 feet below grade surface in tetrachloroethene impacted soil behind and inside the rear portion of drycleaners.

- Collection and analysis of confirmation soil samples to confirm unrestricted use SOCs have been achieved - Over excavation would be required to meet the SCOs and accommodate development. For the development purposes, the site will be excavated to approximately thirty-five feet below grade on the central portion of the site for an elevator pit; approximately twenty-nine feet below grade on the western portion of the site for the partial sub-basement; approximately twenty-four feet below grade on the northeastern portion of the site for a second elevator pit and approximately nineteen feet below grade on the remainder of the site. Over excavation beyond that needed to achieve UUSCOs to accommodate development is not part of the selected remedy. Over excavation beyond that needed to achieve UUSCOs to accommodate development is not part of the selected remedy.

- Backfilling of excavated areas to development grade with certified-clean material (meeting Unrestricted Use SCOs), recycled concrete aggregate (RCA) or virgin, native crushed stone;

- Development and execution of plans for the protection of on-site workers, community, and environment during remediation and construction activities;

- Performance of a post-excavation soil vapor intrusion evaluation in order to confirm the Track 1 Remedial Action. The Site will not have EC or SMP under this remedial alternative

Alternative 2 (Track 2) involves:

- Establishment of site-specific Track 2 SCOs for the Site;

- Removal of all soil/ fill exceeding Track 2 Site-Specific SCOs. For development purposes, the site would be excavated to the depth of 19 feet across the entire Site, to the depth of 29 feet for the partial sub-basement beneath the western portion and to the depth of 35 feet for the elevator pit beneath the central portion. confirmation that the site-specific Track 2 SCOs have been achieved through post-excavation end point sampling;

- Performance of a post-excavation soil vapor intrusion evaluation. If the vapor intrusion evaluation determines that an active engineering control is needed to address soil vapor intrusion, installation of an active sub-slab depressurization system beneath the building slab to prevent soil vapor entering the new building; Such remedial action would require Site Management for the active SSD system Engineering Control.

- Establishment of institutional controls in the form of an environmental easement for use restrictions including prohibitions on the use of groundwater from the site and prohibitions on sensitive site uses, such as farming or vegetable gardening, to eliminate future exposure pathways; and prohibition of a higher level of land use;

- Establishment of a Site Management Plan to ensure long-term management of these engineering and institutional controls including the performance of periodic inspections and certification that the controls are performing as they were intended.

3.1.2 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 result in removal of all soil/fill with contaminant concentration above Track 1 SCOs. This alternative would be consistent with the RAOs and provide overall protection of public health and the environment in consideration of current and potential future land use by:

- Eliminating the potential for direct contact with contaminated on-site soils, and
- Eliminating potential on-site sources for production of soil vapors.
- Eliminating the risk of contamination leaching into groundwater.

Alternative 2 would achieve comparable protections of human health and the environment since all impacted soil/fill will be removed for purposes of construction and by ensuring that remaining soil/ fill on-Site meets residential SCOs as well as by placement of institutional and engineering controls, including an active SSDS system. Implementing institutional controls including a site management plan would ensure that the SSDS remains operational and protective. SSD system would protect new building from vapor intrusion.

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 and Materials Management Plan and Community Air Monitoring Plan (CAMP) would minimize potential exposure to contaminated soils during construction. Potential contact with contaminated groundwater would be prevented as City laws and regulations prohibit its use, and it is not anticipated to be encountered during construction. Potential future migration of off-Site soil vapors into the new building would be prevented by installing an active SSD system.

3.1.3 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, SCGs and RAOs for soil through removal to Track 1 Unrestricted Use SCOs and groundwater protection standards. Compliance with SCGs for soil vapor would also be achieved by installing of an active sub-slab depressurization system below the new building's basement slab. However, a Track 1 Remedial Action would not be achieved, pending completion of the removal action and additional sampling of the SSD system.

Alternative 2 would achieve compliance with the remedial goals, SCGs and RAOs for soil through removal to meet Track 2 Site Specific SCOs. Compliance with SCGs for soil vapor would also be achieved by installation of an active sub-slab depressurization system. A Site Management Plan would ensure that these controls remained protective for the long term.

Health and safety measures contained in the HASP and Community Air Monitoring Plan (CAMP) that comply with the applicable SCGs would 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 any Site-related concerns.

Short-term effectiveness and impacts

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

Both Alternatives 1 and 2 have similar-short term effectiveness during their respective implementations, as each requires excavation of historic fill material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short-term impacts would potentially be higher for Alternative 1 if excavation of greater amounts of historical fill material were encountered below the excavation depth of the proposed building. However, focused attention to means and methods during the remedial action during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact of these activities and any differences between these alternatives.

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Approximately 20, 20-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

Both alternatives would employ appropriate measures to prevent short-term impacts, including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Health and Safety Plan (CHASP) will be protected from on-Site contaminants (personal protective equipment would be worn consistent with the documented 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 by permanently removing all impacted soil/ fill material and enabling unrestricted usage of the property. The active SSD system employed and would be considered to be permanent controls for future off-site soil vapor management pending future vapor sampling.

Alternative 2 would provide long-term effectiveness by removing most on-site contamination and attaining Track 2 Site-Specific SCOs, establishing Engineering Controls including an active SSD system, establishing Institutional Controls to ensure long-term management including use restrictions, a Site Management Plan 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 use restrictions continue to be in place and are functioning as they were intended assuring that protections designed into the remedy will provide continued high level of protection in perpetuity.

Reduction of toxicity, mobility, or volume of contaminated material

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

Alternative 1 would achieve the greatest measure of long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill above Track 1 Unrestricted Use SCOs. Removal of on-Site contaminant sources will prevent future groundwater contamination. However, a Track 1 Remedial Action would not be achieved because the active SSD system Engineering Control would be required, pending completion of the removal action and additional sampling of the SSD system.

Alternative 2 would provide long-term effectiveness by permanently removing most on-Site contamination and attaining Track 2 Site-Specific SCOs; maintaining use restrictions, establishing an SMP to ensure long-term management of Institutional Controls (ICs), Engineering Controls (ECs).

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 will provide continued high level of protection in perpetuity. Alternative 1 would eliminate a greater total mass of contaminants form soil on Site.

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 or minimize any migration to groundwater. Potential sources of soil vapor and groundwater contamination will also be eliminated or minimized as part of the remedy.

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 remedial Alternatives 1 and 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. They use standard materials and services that are well established technology. The reliability of each remedy is also high. There are no special difficulties associated with any of the activities proposed.

Cost effectiveness

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

The costs associated with both Alternative 1 and Alternative 2 would likely be the comparable. Costs associated with Alternative 1 could potentially be higher than Alternative 2 if soil with analytes above Unrestricted Use SCOs is encountered below the excavation depth required for development. Additional costs would include disposal of additional soil, and import of clean soil for backfill. However, long-term costs for Alternative 2 are likely higher than Alternative 1 based on implementation of a Site Management Plan.

Community Acceptance

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

Based on the overall goals of the remedial program and the intended Site use, it is anticipated that Alternatives 1 and 2 for the Site would be acceptable to the community. This RAWP will be subject to public review and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedial action. This public comment will be considered by NYSDEC prior to approval of this plan. Observations here will be supplemented by public comment received on the RAWP.

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 proposed redevelopment of the Site is compatible with its current C4-5X commercial designation and is consistent with recent development patterns. Following remediation, the Site will meet either Track 1 Unrestricted Use or Track 2 Site-Specific SCOs, both of which are appropriate for its planned mixed residential and commercial use. Improvements in the current environmental condition of the property achieved by both alternatives are also consistent with the BCP goals for cleanup of contaminated land and bringing such properties into productive reuse. Both alternatives are equally protective of natural resources and cultural resources.

Applicable Regulations

- 6 NYCRR Part 375-6 Soil Cleanup Objectives

Based upon 6 NYCRR Part 375-6 Soil Cleanup Objectives for this project will be the Restricted Residential Use Soil Cleanup Objective (6 NYCRR Part 375-6.8):

- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation - May 2010;

- NYSDEC CP-51 – Soil Cleanup Guidance (2010).

This guidance will be followed during the remediation of the Site. This guidance will be further discussed in Section 5.2 of this report.

- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- Environmental Remediation Program (December 2006) – 6 NYCRR Part 375

This guidance will be followed during the remediation of the Site. This guidance will be further discussed in Section 5.2 of this report.

- Permanent Closure of Petroleum Storage Tanks
- 6 NYCRR Part 612 - Registration of Petroleum Storage Facilities (February 1992)
- 6 NYCRR Part 613 - Handling and Storage of Petroleum (February 1992)

This guidance will be followed during the closure and removal of USTs present at the Site.

- Fugitive Dust Suppression and Particulate Monitoring – NYSDEC TAGM No. 4031
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York

This guidance will be followed during the remediation of the Site and will be further discussed in Section 4.1.6 of this report.

- NYS Waste Transporter Permits – 6 NYCRR Part 364;

These permits will be held by haulers of the petroleum-contaminated soil/fill material. These permits will be provided in the Final Engineering Report.

- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364;
- Hazardous Waste Management System – 6 NYCRR Part 370;

- Hazardous Waste Operations and Emergency Response Standard – Code of Federal Regulations (CFR) Title 29 Part 1910.120;

Where applicable these regulations will be followed by the soil disposal facility.

3.2 SELECTION OF THE PREFERRED REMEDY

3.2.1 Zoning;

The new development at the Site will consist of a 10-story residential and commercial building. This development is in compliance with the NYC local zoning designation C4-5X provided in the NYC planning commission.

3.2.2 Applicable comprehensive community master plans or land use plans;

As discussed in the BCA, The Site remedial construction is an as-of right development that is consistent with local city resolutions and local community plans.

3.2.3 Surrounding property uses;

The remedial method selected for the Site will not impact upon surrounding property uses.

3.2.4 Citizen participation;

The citizens are likely to welcome the proposed remedial action because it will allow for the Site to be developed under track 1 guidelines.

3.2.5 Environmental justice concerns;

No Environmental justice concerns are currently foreseeable since the goal of the remediation is to prevent the soil vapor intrusion impact associated with chlorinated solvents from entering the new building in order to render the Site protective to public health and environmental.

3.2.6 Land use designations;

As previously discussed, the proposed remedial action will allow for the property to meet Track 1 Guidelines. Utilization of the Site for mixed residential and commercial use will meet the goals of the New York City Department of Planning.

3.2.7 Population growth patterns;

As previously discussed, utilization of the Site for mixed residential and commercial use will meet the goals of the New York City Department of Planning.

3.2.8 Accessibility to existing infrastructure;

The Site remedial construction will ultimately prevent impacts associated with soil vapor intrusion of chlorinated solvents.

3.2.9 Proximity to cultural resources;

Site remediation will protect future inhabitants from exposure to chlorinated compounds present in groundwater as a result of a regional impact and therefore, no impact to cultural resources present in the vicinity of the Site will occur.

3.2.10 Proximity to natural resources;

As discussed above, Site remediation will protect future inhabitants from exposure to potential impact from offsite sources. Impact to natural resources present in the vicinity of the Site will not occur.

3.2.11 Off-Site groundwater impacts;

The groundwater impact beneath the site is related to PCE that is present at relatively low concentrations along a transect oriented from southwest to northeast of the Site. Following site cleanup and removal of PCE present in the upper soil layer beneath the Site, and consistent with the mechanism of a natural attenuation, no off-Site groundwater impacts associated with the Site remediation will occur.

3.2.12 Proximity to floodplains;

The groundwater present beneath the Site is not impacting nor does it have the potential to impact upon any floodplains

3.2.13 Geography and geology of the Site; and

As part of Site remedial construction, the entire Site will be excavated to the depth 19 feet bgs beneath the area of the sub-grade basement level in the eastern and southern portions of the Site, to the depth of 29 feet bgs beneath the area of the partial sub-basement in the western portion and to the depth of 35 feet bgs beneath the area of the elevator bank in the central portion. The excavation is not expected to extend to the depth of the soil and groundwater interface. This new development will be in compliance with NYC building codes, and therefore Site remedial construction is not expected to undermine the geography and geology of the Site

3.2.14 Current Institutional Controls.

There are currently no institutional controls on the Site.

3.3 SUMMARY OF SELECTED REMEDIAL ACTIONS

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;

- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

The remediation will include demolition of the existing building to accommodate excavation and off-site disposal of contaminant source areas, including but not limited to:

- Removal of an underground storage tank (UST), underground piping or other structures associated with the UST, any associated contaminated soil, or other contaminated soil found during the excavation. Confirmation samples will be taken will be taken within the tank excavation. The Site excavation confirmation samples need to achieve Unrestricted Use SCOs as well as GW protection SCOs; and
- Removal of contaminated soil/fill material exceeding the Unrestricted Use SCOs across the entire Site. Based on data gathered to date, this will include excavation of a minimum of approximately 15,074 cubic yards of contaminated soil/fill. Confirmation samples will be taken at the conclusion of soil excavation at depths consistent with the proposed soil cleanup.

- The Site excavation confirmation samples need to achieve Unrestricted Use SCOs as well as GW protection SCOs; and
- Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for Unrestricted Use SCOs will be brought in to fill in the Site excavation.

3. Backfill

Confirmation samples will be collected and analyzed to demonstrate achievement of unrestricted use soil cleanup objectives. Clean fill meeting the requirements of the 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 226 cubic yards. No soil/fill is expected to be reused/relocated on Site.

4. Vapor Intrusion Evaluation

As part of the Track 1 remedy, a soil vapor intrusion evaluation will be completed. The evaluation will include a provision for implementing actions recommended to address exposures related to soil vapor intrusion.

5. Local Institutional Controls

If no Environmental Easement (EE) or Site Management Plan (SMP) is needed to achieve soil, or soil vapor remedial action objectives, then the following local use restriction will be relied upon to prevent ingestion of groundwater: Article 141 of the NYCDOH code, which prohibits potable use of groundwater without prior approval.

6. Contingent Track 1 Elements

The intent of the remedy is to achieve a Track 1 unrestricted use, therefore, no environmental easement or site management plan is anticipated. If the soil vapor intrusion (SVI) evaluation is not completed prior to completion of the Final Engineering Report, then a Site Management Plan (SMP) and Environmental Easement (EE) will be required to address the SVI evaluation and implement actions as needed; if a mitigation or monitoring action is needed, a Track 1 cleanup can only be achieved if the mitigation system or other required action is no longer needed within 5 years of the date of the Certificate of Completion.

In the event that Track 1 unrestricted use is not achieved, including achievement of groundwater and soil vapor remedial objectives, the following contingent remedial elements will be required and the remedy will achieve a Track 2 restricted residential cleanup.

A. Institutional Controls

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or NYCDOH; and
- require compliance with the Department approved Site Management Plan.

B. Site Management Plan

A Site Management Plan is required, which includes the following:

a. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The environmental easement discussed above.

This plan includes, but may not be limited to:

- An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- Descriptions of the provisions of the environmental easement including any land use, and/or groundwater use restrictions;
- Provisions for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion; and
- The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- Monitoring for vapor intrusion for any buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

4.0 REMEDIAL ACTION PROGRAM

4.1 GOVERNING DOCUMENTS

4.1.1 Site Specific Health & Safety Plan (HASP)

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate Health and Safety Plan and for the appropriate performance of work according to that plan and applicable laws.

The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

The Site Safety Coordinator will be Paul I. Matli. A resume will be provided to NYSDEC prior to the start of remedial construction.

Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

4.1.2 Quality Assurance Project Plan (QAPP)

The QAPP is provided in Appendix 4.

4.1.3 Construction Quality Assurance Plan (CQAP)

The Construction Quality Assurance Plan (CQAP) will describe how the successful performance of the Remedial Action tasks will be assured through designed and documented QA/QC methodologies applied in the field and in the lab.

The CQAP will provide a detailed description of the observation and testing activities that will be used to monitor construction quality and confirm that remedy construction is in conformance with the remediation objectives and specifications. The CQAP should include:

- Responsibilities and authorities of the organizations and key personnel involved in the design and construction of the remedy.
- Qualifications of the quality assurance personnel that demonstrate that they possess the proper training and experience necessary to fulfill project-specific responsibilities.
- The observations and tests that will be used to monitor construction and the frequency of performance of such activities.
- The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for implementing corrective measures as addressed in the plans and specifications.
- Requirements for project coordination meetings between the Applicant and its representatives, the Construction Manager, Excavation Contractor, remedial or environmental subcontractors, and other involved parties.
- Description of the reporting requirements for quality assurance activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.
- Description of the final documentation retention provisions.

The CQAP will be provided by the Construction Manager and it will be submitted prior to the start of remedial construction.

4.1.4 Soil/Materials Management Plan (SoMP)

This document is included as Section 5.2 and includes detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage, transport and disposal. It also includes all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations.

4.1.5 Storm-Water Pollution Prevention Plan (SWPPP)

The erosion and sediment controls will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. A Storm Water Pollution Prevention Plan (SWPPP) is provided under Appendix 5.

4.1.6 Community Air Monitoring Plan (CAMP)

The Community Air Monitoring Plan (CAMP) is provided under Appendix 6.

4.1.7 Contractors Site Operations Plan (SOP);

The Remediation Engineer has reviewed all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirms that they are in compliance with this RAWP. The Remediation Engineer is responsible to ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

A detailed remedial construction design document will be submitted to NYSDEC for approval upon its completion.

4.1.8 Citizen Participation Plan

A certification of mailing will be sent by the Volunteer to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

The approved Citizen Participation Plan for this project is attached in Appendix 7.

Document repositories have been established at the following locations and contain all applicable project documents:

Queens Library - Forest Hills Branch

108-19 71 Avenue

Forest Hills, NY 11375

(718) 268-7934

Library hours:

Monday	9:00AM-8:00PM
Tuesday	1:00AM-6:00PM
Wednesday	10:00AM-6:00PM
Thursday	12:00AM-8:00PM
Friday	10:00AM-6:00PM
Saturday	10:00AM-5:00PM
Sunday	closed

4.2 GENERAL REMEDIAL CONSTRUCTION INFORMATION

4.2.1 Project Organization

The following individuals will be involved in the performance of the RAWP at the Site.

Individual Name	Title
Tarek Z. Khouri	Remedial Engineer
Mark Robbins	Project Director/Quality Assurance Officer
Paul Matli	Project Geologist/Health and Safety Officer
Komal Dixit	Project Geologist/Health and Safety Officer (Alternate)
Donald C. Anné	independent QAO generating data usability analysis

Resumes of key personnel involved in the Remedial Action are included in Appendix 8.

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Tarek Z. Khouri. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the 107-02 Queens Boulevard Site (NYSDEC BCA Index No. 241196-01-17 Site No. C241196). The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal. The Remedial Engineer will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this Remedial Action Work Plan and will certify compliance in the Final Remediation Report.

The Remedial Engineer will provide the certifications listed in Section 10.1 in the Final Engineering Report.

4.2.3 Remedial Action Construction Schedule

Currently, a 12-month remediation construction schedule is anticipated. Refer to Section 11.

4.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. DEC will be notified by the Applicant of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 Site Security

The Site will be secured at night in accordance with New York City Department of Building Construction Codes.

4.2.6 Traffic Control

Proper traffic control will be performed in accordance with New York City Department of Buildings Construction Codes.

4.2.7 Health and Safety Plan

The Construction Health and Safety Plan is provided under Appendix 9.

4.2.8 Worker Training and Monitoring

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. All workers will be trained in accordance with New York City Department of Building Construction Codes and in accordance with the Construction Health and Safety Plan provided under Appendix 9.

4.2.9 Agency Approvals

The Applicant has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is attached in Appendix 10. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the Final Remediation Report.

All planned remedial or construction work in regulated wetlands and adjacent areas will be specifically approved by the NYSDEC Division of Natural Resources to ensure that it meets the requirements for substantive compliance with those regulations prior to the start of construction. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

4.2.10 Pre-Construction Meeting with NYSDEC

This meeting must take place prior to the start of invasive construction activities. The meeting will be scheduled with the NYSDEC at least 5 days prior to its occurrence.

4.2.11 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in the HASP provided under Appendix 9. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.2.12 Remedial Action Costs

An itemized and detailed summary of estimated costs for all remedial activity is attached as Appendix 11. This will be revised based on actual costs and submitted as an Appendix to the Final Engineering Report.

4.3 SITE PREPARATION

4.3.1 Mobilization

All equipment will be brought to the Site. The equipment will be maintained on-site and will be checked out as operational prior to the mobilization.

4.3.2 Monitoring Wells Decommissioning

All groundwater monitoring wells installed on-site and off-site as part of the RI will be decommissioned prior to Site demolition activities in accordance with NYSDEC CP-43.

4.3.3 Erosion and Sedimentation Controls

The entire Site will be excavated for development during the remediation process. Any necessary Erosion and Sediment Controls are detailed in the Storm-Water Pollution Prevention Plan (SWPPP) provided in Appendix 5.

4.3.4 Stabilized Construction Entrance(s)

As indicated in the SWPPP a temporary gravel construction entrance will be installed on the west side of the property towards 70th Avenue. This will be done to reduce the amount of sediment transported onto roads by construction vehicles and run-off. The entrance will be graded so that runoff water will be directed to an inlet protection structure and away from the steep fill area.

4.3.5 Utility Marker and Easements Layout

The Applicant and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Applicant and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

4.3.6 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities include excavation is the sole responsibility of the Applicant and its contractors.

The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. The Applicant and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this Plan. Further, the Applicant and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

4.3.7 Equipment and Material Staging

All equipment and material will be staged onsite as per the New York City Department of Building Requirements.

4.3.8 Decontamination Area

A Decontamination Area will be staged at the Site.

4.3.9 Site Fencing

Following building demolition and prior to invasive remedial activities, a security fence is installed around the perimeter of the property in accordance with New York City Department of Building requirements

4.3.10 Demobilization

The Demobilization plan will be submitted and will include:

- Restoration of areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management area[s], and access area);
- Removal of temporary access areas (whether on-Site or off-Site) and restoration of disturbed access areas to pre-remediation conditions;
- Removal of sediment and erosion control measures and disposal of materials in accordance with acceptable rules and regulations;

- Equipment decontamination;
- General refuse disposal.

4.4 REPORTING

All daily and monthly Reports will be included in the Final Engineering Report.

4.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day following the reporting period and will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- References to alpha-numeric map for Site activities;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

Daily Reports will include a description of daily activities keyed to an alpha-numeric map for the Site that identifies work areas. These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

A Site map that shows a predefined alpha-numeric grid for use in identifying locations described in reports will be established in coordination with a disposal facility and will be submitted to NYSDEC prior to the start of invasive remedial activities. All disposal facility waste acceptance letters will also be provided to NYSDEC prior to the disposal of any material off-site.

The NYSDEC assigned project number will appear on all reports.

4.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers within one week following the end of the month of the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

4.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be submitted to NYSDEC on CD or other acceptable electronic media and will be sent to NYSDEC's Project Manager (2 copies) and to NYSDOH's Project Manager (1 copy).

CD's will have a label and a general file inventory structure that separates photos into directories and sub-directories according to logical Remedial Action components. A photo log keyed to photo file ID numbers will be prepared to provide explanation for all representative photos. For larger and longer projects, photos should be submitted on a monthly basis or another agreed upon time interval.

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-Site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

4.4.4 Complaint Management Plan

If public complaints are made, the public will be directed to the project manager whom will be on-site during construction. The project manager will be able to explain the results of the measurements and the actions taken if the measurements are elevated.

4.4.5 Deviations from the Remedial Action Work Plan

If conditions arise that require deviation from this Work Plan, the Remedial Engineer will contact NYSDEC immediately to notify for conditions requiring immediate action (i.e. conditions judged to be danger to the surrounding community) and what changes are required and request approval. All changes will be thoroughly documented in the Final Engineering Report and include a discussion of its effect on the remedy.

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

As part of the proposed remedial construction at the Site, demolition of the existing building will be necessary to accommodate for the excavation and off-site disposal of contaminant source areas. The footings for the new building will be installed at variable depths; at approximately 19 feet bgs beneath the sub-grade basement level in the eastern and southern portions of the Site, at approximately 29 feet bgs beneath the partial sub-basement in the western portion and at approximately 35 feet bgs beneath elevator bank in the central portion. No groundwater is expected to be encountered during Site invasive activities. A Qualified Environmental Professional (QEP) under the supervision of the Remedial Engineer will be on-site during all excavation activities to supervise the excavation, document the fieldwork and provide progress report(s) and to insure the proper implementation of a CAMP. All soil that is excavated will be visually examined by the QEP for the presence of visual/olfactory evidence of contamination. Additionally, select soil samples will be screened for the presence of organic vapors utilizing a Photoionization Detector (PID). A 19,596 tons (15,074 cubic yards) of soil/fill material will be excavated at the Site and disposed at permitted facilities in accordance with all Federal, State laws and regulations for handling, transport, and disposal. The soil is expected to be disposed as non-hazardous material. Final volumes for all waste(s) or soil that is disposed will be provided in the form of waste manifests. A maps of proposed soil excavation is shown in Figure 10.

5.1 SOIL CLEANUP OBJECTIVES

The Soil Cleanup Objectives for this Site are the Unrestricted Use SCOs listed in Table 10.

Soil and materials management on-Site and off-Site will be conducted in accordance with the Soil Management Plan as described below.

Table 6 summarizes all soil samples that exceed the SCOs proposed for this Remedial Action. A spider map that shows all soil samples that exceed the SCOs proposed for this Remedial Action is shown in Figure 6 and Figure 7.

UST closures will, at a minimum, conform to criteria defined in DER-10.

5.2 REMEDIAL PERFORMANCE EVALUATION (POST EXCAVATION END-POINT SAMPLING)

Tank closure and soil removal actions under this plan will be performed in conjunction with confirmation post-excavation end point soil sampling from the bottom following Site excavation and also from the bottom of the tank excavation. Confirmation samples and testing will be performed promptly following materials removal and completed prior to import of backfill material. End point samples will be collected in accordance with NYSDEC Bureau of Spill Prevention & Response Sampling Guidelines and Protocols, March 1991, NYSDEC CP-51/Soil Cleanup Guidance (October 2010) and NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, May 2010.

5.2.1 End-Point Sampling Frequency

General requirements of the NYSDEC DER-10 mandate sampling for every 30 linear feet of each sidewall and bottom sampling for every 900 square feet of bottom of excavation pit for excavations with up to 300 feet of perimeter sidewall. A reduction of sampling frequency is allowed for excavations exceeding 300 feet of perimeter sidewall. Pursuant to projected track cleanup objective, the soil environmental quality beneath the Site was characterized in the RIR at every 2-foot intervals from grade surface to the groundwater interface, which is encountered at between from 38.1 and 40.42 feet bgs. Based on the former soil characterization and consistent with the proposed remedial excavation, a modified end point sampling plan is then proposed as part of Site remedy and will consist of eleven (11) endpoint samples that shall be collected from the excavation floor of the two hot spot excavations. Prior to sample collection, all visual contamination at the Site will be over excavated to ensure a complete remediation. Soil end point samples results will be compared to the Track 1 Unrestricted Use SCOs. If the analytical results identify soil concentrations at the Site still exceeds the Track 1 SCOs, further horizontal and/or vertical excavation will take place and additional samples will be collected. The approximate collection location of the endpoint soil samples is shown on Figure 11.

5.2.2 Methodology

Soil end point samples will be collected by hand directly from undisturbed soil at bottom of of excavation. Per DER-10, grab VOC samples will be collected from zero to 6 inches at the excavation floor within 24 hours of completing the excavation, or from 6 to 12 inches if collected over 24 hours after completing the excavation. The 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.

Each grab end point sample will be placed into appropriately labeled laboratory containers. New York State ELAP certified labs will be used for all end-point sample analyses. End point samples will be analyzed for the USEPA target compound list/target analyte list (TCL/TAL) following methodology:

Soil analytical methods will include:

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

5.2.3 Reporting of Results

A summary of end point samples results will be provided in a tabular format and compared to Track 1 Unrestricted Use SCOs. All results will also be provided to NYSDEC in the appropriate electronic data deliverable (EDD) format.

5.2.4 QA/QC

All field sampling will be performed in accordance with the QAPP provided in Appendix 4**.** Samples will be properly handled and placed into the appropriate labeled containers. The samples will be placed in a cooler filled with ice and maintained at a maximum 4 degrees Celsius. All samples will be transmitted under proper chain of custody procedures to a State-certified (ELAP) laboratory for confirmatory laboratory analyses. All holding times for each matrix and analysis will be met.

Additionally, trip blanks will be provided with all laboratory transmittals. Field blanks will be prepared associated with all field samples. Matrix Spike and Matrix Spike Duplicate samples will be obtained throughout the sampling at a rate of 1 per 20 samples for each group of analytes.

5.2.5 DUSR

The final FER will provide a Data Usability Summary Report (DUSR). The DUSR will compare all sampling results to the QAPP provided under Appendix 4.

5.2.6 Reporting of End-Point Data in FER

Chemical labs used for all end point sample results and contingency sampling will be NYSDOH ELAP certified.

End point sampling, including bottom sampling, will be performed in accordance with DER-10 sample frequency requirements. Bottom samples will be collected at a rate of one for every 900 square feet. Endpoint samples will be collected from bottom soils beneath the removed UST. The FER will provide a tabular and map summary of all end-point sample results and exceedances of SCOs.

5.3 Estimated Material Removal Quantities

The estimated quantity of soil/fill to be removed from the Site is 19,596 tons (15,074 cubic yards). The estimated quantity of soil to be imported into the Site for backfill and cover soil is 294 tons (226 cubic yards). No soil/fill is expected to be reused/relocated on Site.

Where necessary, concrete footings associated with existing building will be removed and disposed as concrete and demolition materials (C&D) at a permitted and registered recycling facility.

5.4 Soil/Materials Management Plan

During site construction activities, an excavator will remove contaminated soil under the direction of a QEP, who will work under the supervision of the Remedial Engineer. The soil will be "live loaded" onto appropriate trucks and transported directly to an approved disposal facility. Waste characterization samples will be obtained and analyzed prior to excavation activities. Final volumes for all waste(s) or soil that is disposed will be provided in the form of waste manifests.

5.4.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the Final Engineering Report.

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

5.4.2 Stockpile Methods

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced.

Soil stockpiles will be continuously encircled with silt fences. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

A dedicated water truck equipped with a water cannon will be available on-Site for dust control.

5.4.3 Materials Excavation and Load Out

The Remediation Engineer or a qualified environmental professional under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-Site. The Remediation Engineer will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the remedial construction is complete.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking.

The Remediation Engineer will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site -derived materials.

The Applicant and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Plan.

Each hotspot and structure to be remediated (USTs, vaults and associated piping, transformers, etc.) will be removed and end-point remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be reported in the Final Engineering Report.

5.4.4 Materials Transport Off-Site

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Truck transport routes are provided in Figure 12. All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.

The in-bound and out-bound truck routes to the Site will be defined prior to Site mobilization. The truck transport routes identified in Figure 12 are the most appropriate routes and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting 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.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-Site in an appropriate manner.

5.4.5 Materials Disposal Off-Site

Disposal location(s) established later will be reported to the NYSDEC Project Manager. The total quantity of material expected to be disposed off-Site is approximately 19,596 tons (15,074 cubic yards) of contaminated soil will be removed from the site. None of this quantity is expected to be disposed as hazardous waste material.

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC's Project Manager. Unregulated off-Site management of materials from this Site is prohibited without formal NYSDEC approval.

Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Applicant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2

Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Solid & Hazardous Materials (DSHM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DSHM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

The Final Engineering Report will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the Final Engineering Report.

Hazardous wastes derived from on-Site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations.

Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with all applicable local, State and Federal regulations.

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER.

All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

5.4.6 Materials Reuse On-Site

No on-Site reuse of soil fill material is planned as part of Site remedial activities.

Concrete crushing or processing on-Site is prohibited.

Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-Site.

Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. This will be expressed in the final Site Management Plan.

5.4.7 Fluids Management

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site.

Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream or river) is prohibited without a SPDES permit.

5.4.8 Demarcation

After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. The survey will define the top elevation of residual contaminated soils.

A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the Site Management Plan. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the 'Residuals Management Zone' in the Site Management Plan. A map showing the survey results will be included in the Final Remediation Report and the Site Management Plan.

5.4.9 Backfill from Off-Site Sources

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that all import of soils from off-Site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan".

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are listed in Table 10. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this Remedial Action Work Plan should be construed as an approval for this purpose.

Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

5.4.10 Stormwater Pollution Prevention

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the RAWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters

Silt fencing or hay bales will be installed around the entire perimeter of the remedial construction area.

5.4.11 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs). These analyses will not be limited to STARS parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will be also included in daily and periodic electronic media reports.

5.4.12 Community Air Monitoring Plan

The CAMP has been prepared to monitor air quality during ground intrusive activities at the Site, which include but not limited to soil excavation, lagging and installation of concrete foundations. Air quality monitoring will include monitoring the air Volatile Organic Compounds (VOCs) using a PID and the presence of elevated levels of dust using Particulate Dust Track Real-time Particle Counter. Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report.

5.4.13 Odor, Dust and Nuisance Control Plan

The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan."

5.4.13.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site and on-Site. Specific odor control methods to be used on a routine basis will include spraying of an odor-suppressing agent, such as brand name Biosolve®.

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. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Applicant's Remediation Engineer, who is responsible for certifying the Final Engineering Report.

All necessary means will be employed to prevent on- and off-Site 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) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

5.4.13.2 Dust Control Plan

A dust suppression plan that addresses dust management during invasive on-Site work, will include, at a minimum, the items listed below:

- Dust suppression will be achieved though the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.

- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

5.4.13.3 Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to NYCDEP noise control standards.

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

All soil/fill at the Site will be excavated and removed to the extent possible in order to ensure attainment of Track 1 Unrestricted Use SCOs. No Engineering and Institutional Controls (ECs and ICs) will be required if the Site remedy achieves Track 1 SCOs or Track 2 Residential remedy. A soil vapor intrusion evaluation will be performed at the conclusion of site remedial excavation.

Under the Track 2 Restricted Residential contingency cleanup, Institutional Controls and (ICs) will be maintained as additional measures in order to protect human health and the environment. These ICs are described hereafter. Long-term management of ICs will be executed under a Site specific Site Management Plan (SMP) that will be developed and included in the FER.

The FER will report residual contamination on the Site in tabular and map form. This will include presentation of exceedances of both Track 1 and Track 2 sites.

7.0 ENGINEERING CONTROLS:

7.1 Sub-Slab Depressurization System

No Engineering Controls are required under both the Track 1 remedial actions and Track 2 contingency remedy.

8.0 INSTITUTIONAL CONTROLS

No Institutional Controls are required if Track 1 SCOs remedy were achieved. However, the ICs will be required if the Track 2 Restricted Residential remedy is achieved after the remedy is complete. The Site might be subject to potential soil vapor intrusion following completion of the remedy that will be verified by a post-excavation soil vapor intrusion evaluation. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a Site Management Plan. These elements are described in this Section. A Site -specific Environmental Easement will be recorded with Queens County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

8.1 Environmental Easement

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. If the Site will have residual contamination after completion of all Remedial Actions than an Environmental Easement is required. As part of this remedy, an Environmental Easement approved by NYSDEC will be filed and recorded with the Queens County Clerk. The Environmental Easement will be submitted as part of the Final Remediation Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the Queens County Clerk before the Certificate of Completion can be issued by NYSDEC.

A series of Institutional Controls are required under this remedy to implement, maintain and monitor these Engineering Control systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to restricted residential use only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan, which provides all of the methods and procedures to be followed to comply with this remedy.

Adherence to these Institutional Controls for the Site is mandated by the Environmental Easement and will be implemented under the Site Management Plan (discussed in the next section). The Controlled Property (Site) will also have a series of Institutional Controls in the form of Site restrictions and requirements. The Site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming on the Controlled Property are prohibited;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the Site Management Plan;
- The Controlled Property may be used for residential, restricted residential, commercial, or industrial~~of industrial~~ use, provided the long-term Engineering and Institutional Controls included in the Site Management Plan are employed;
- The Controlled Property may not be used for a higher level of use, such as unrestricted use in the case of a Track 2 cleanup, without an amendment or extinguishment of this Environmental Easement;

- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; 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. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

8.2 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the Certificate of Completion (COC) for the Remedial Action. The Site Management Plan is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be established after the first Periodic Review. The Site Management Plan will be based on a calendar year and will be due for submission to NYSDEC by March 1 of the year following the reporting period.

The Site Management Plan in the Final Remediation Report will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site -wide performance of the remedy.

No exclusions for handling of residual contaminated soils will be provided in the Site Management Plan (SMP). All handling of residual contaminated material will be subject to provisions contained in the SMP.

9.0 FINAL ENGINEERING REPORT

A Final Engineering Report (FER) and Certificate Of Completion (COC) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The Final Engineering Report will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete Site Management Plan (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10. The required certifications in the FER are listed in the Checklist for the Final Engineering Report Approval in Appendix 12.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Environmental Easement. This determination will be made by NYSDEC in the context of the Final Engineering Report review.

The Final Remediation Report will include written and photographic documentation of all remedial work performed under this remedy.

The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

The FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-6.

A table that shows exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

The FER will provide a thorough summary of all residual contamination that exceeds the SCOs defined for the Site in the RAWP and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the FER.

The Final Engineering Report will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

9.1 Certifications

The following certification will appear in front of the Executive Summary of the Final Engineering Report. The certification will be signed by the Remedial Engineer Tarek Z. Khouri who is a Professional Engineer registered in New York State This certification will be appropriately signed and stamped. The certification will include the following statements:

I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Work Plan (or Remedial Design or Plans and Specifications) was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Work Plan (or Remedial Design or Plans and Specifications).

If the Remedial Action Work Plan (or Remedial Design or Plans and Specifications) identifies time frames to be achieved by the remedial program, the certification must include: The data submitted to DER demonstrates that the remediation requirements set forth in the Remedial Work Plan (or Remedial Design or Plans and Specifications) and all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in the work plan (or Remedial Design or Plans and Specifications).

If the remedial program requires ICs or ECs, the certification must include: *All use restrictions, institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.*

If the remedial program requires applicable SMP, the certification must include: A*A Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER.*

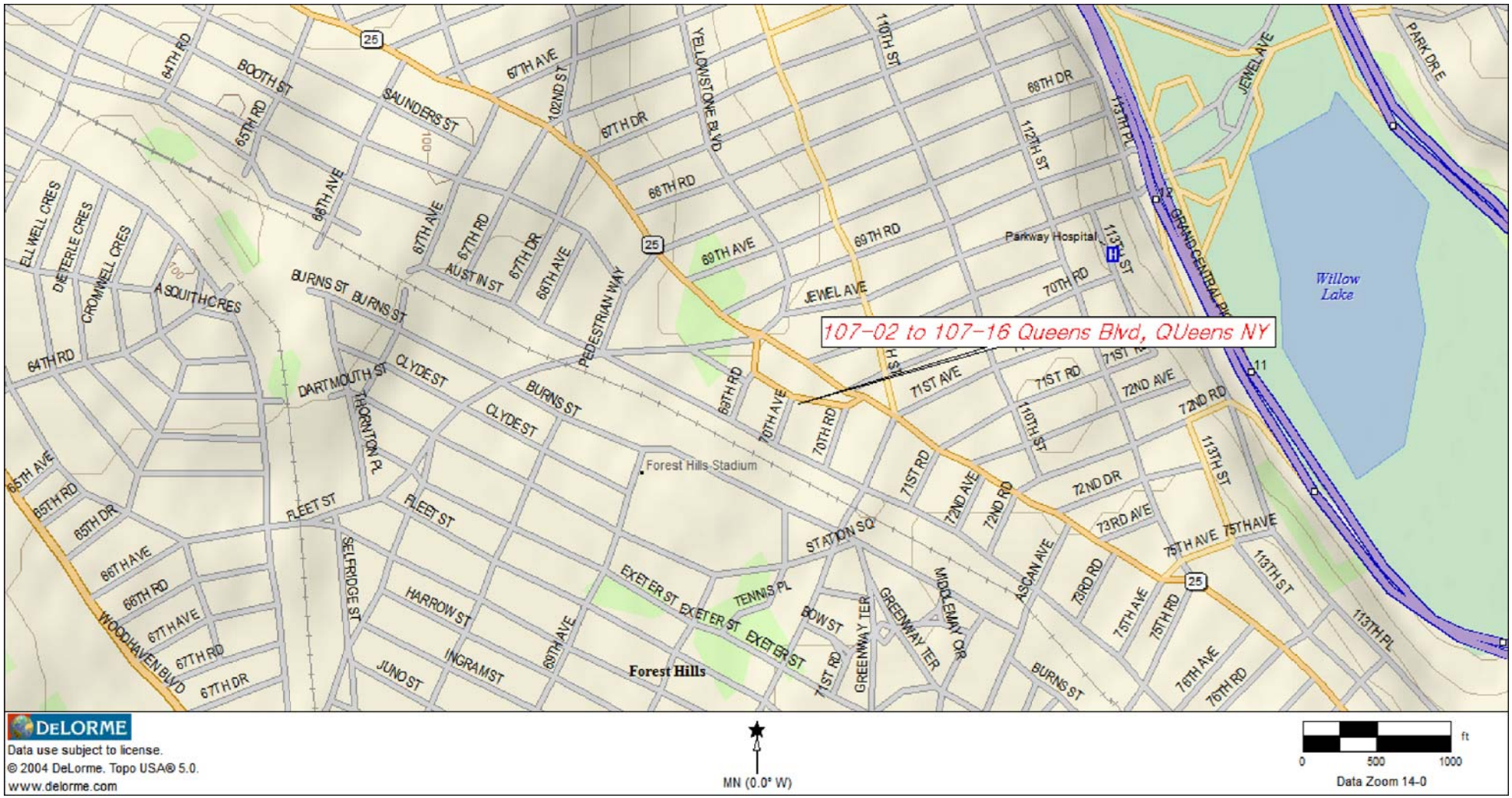
If the remedial program requires financial assurance, the certification must include: *Any financial assurance mechanisms required by DEC pursuant to Environmental Conservation Law have been executed.*

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

10.0 SCHEDULE

Implementation of the Track 2 remedial activities are anticipated to take approximately 12 months. Within 8 months of completion of all remedial activities at the Site, a Final Engineering Report (FER) will be submitted to NYSDEC as detailed in Section 5.2. The FER will include a Site Management Plan (SMP), which will be implemented following the issuance of a Certificate of Completion. A chart showing a detailed project schedule is included in Appendix 13.

FIGURES



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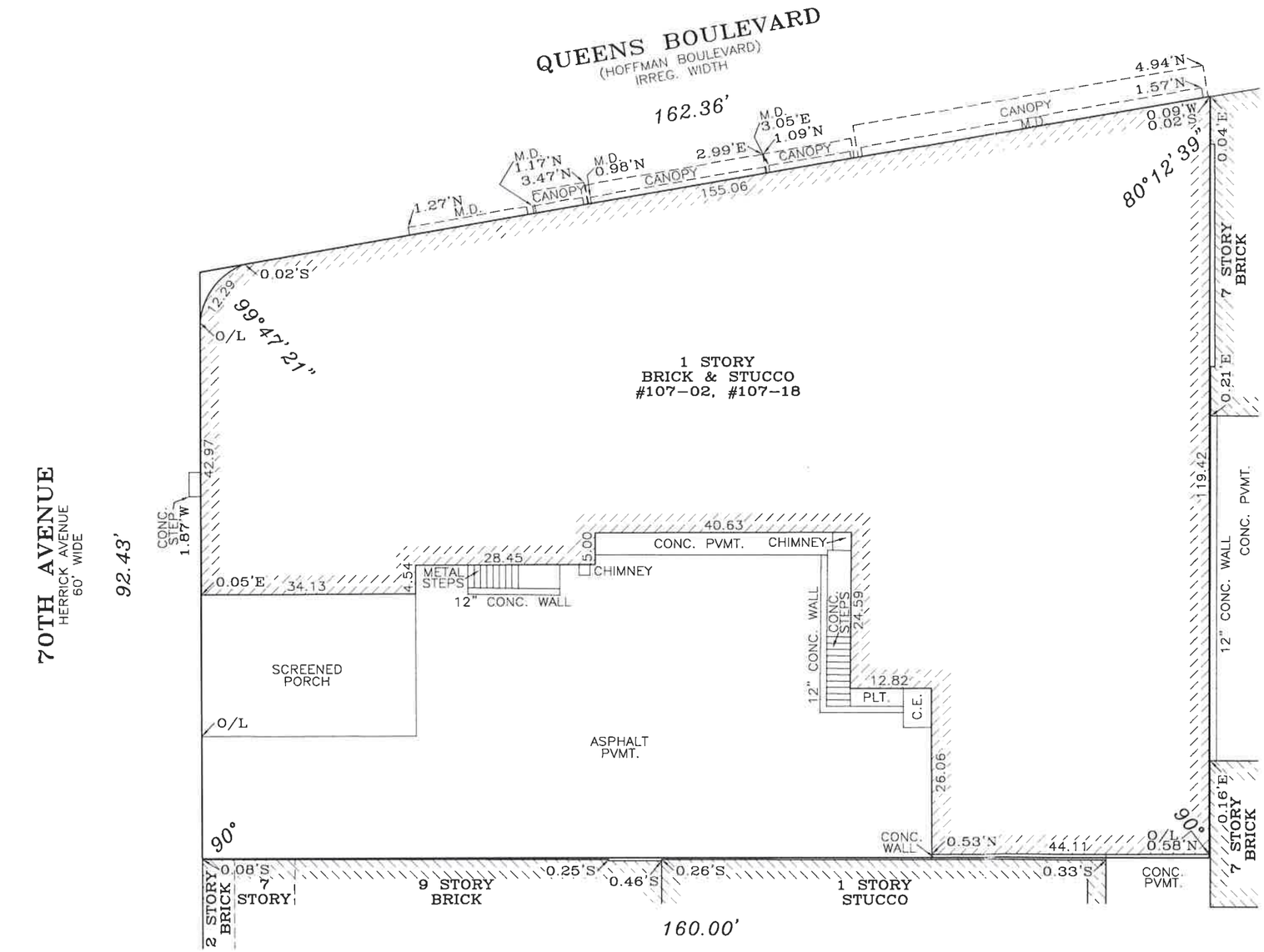
Scale: AS NOTED

TITLE:

FIGURE 1: SITE LOCATION MAP

FIGURE 2 – Site Boundary Map



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STATE OF NEW YORK
CHRISTOPHER M. BUCKLEY
050357
LICENSED LAND SURVEYOR
2/9/16

LEGEND:

CONCRETE — CONC.
PAVEMENT — PVMT.
METAL DOOR — M.D.
CELLAR ENTRANCE — C.E.

UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW.
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Ph. ◦ (718)472-1571 ◦ (516)488-1608
CHRISTOPHER M. BUCKLEY
PROFESSIONAL LAND SURVEYOR

SURVEY OF: Described Property

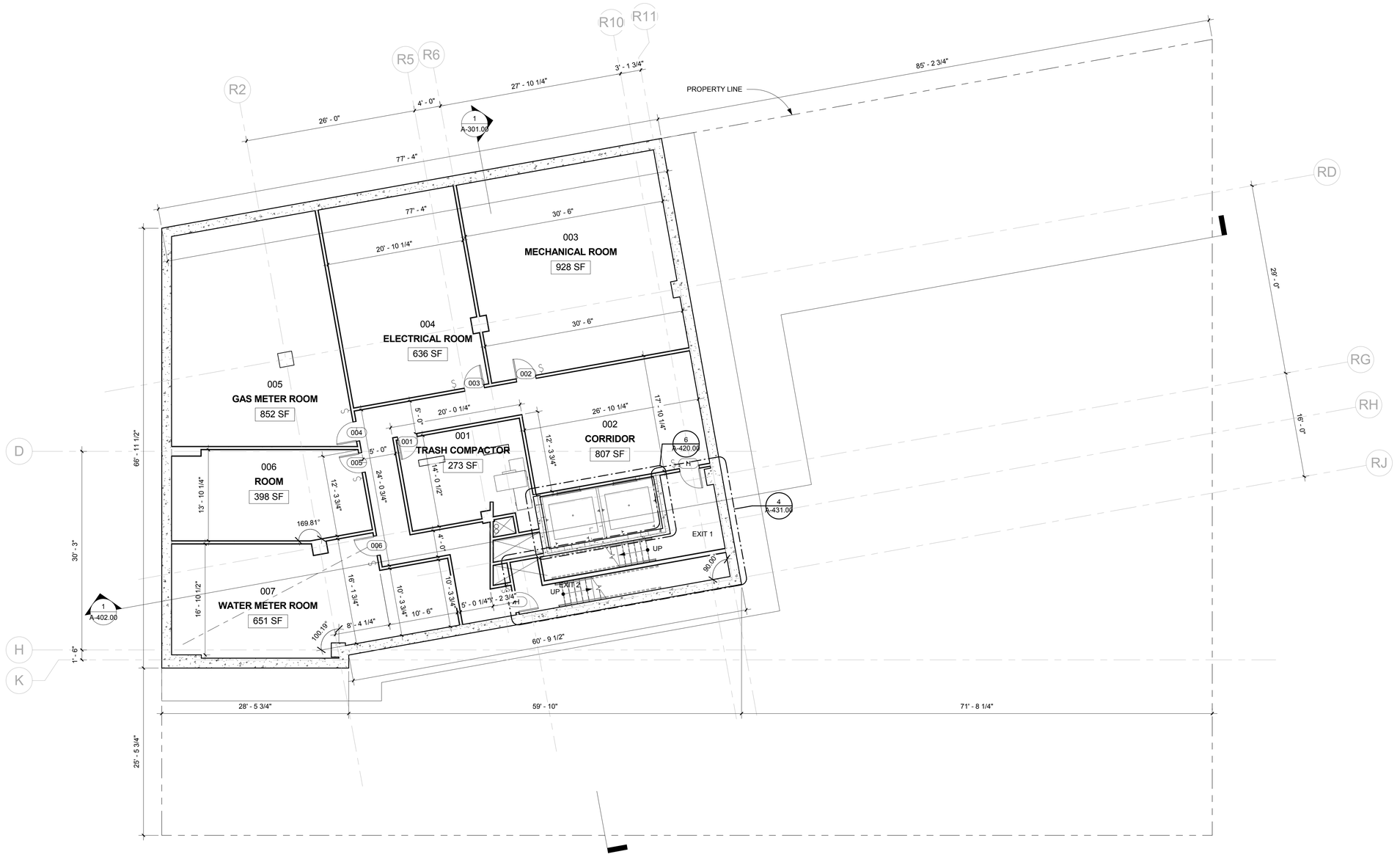
LOCATED AT:
107-02, 107-16 Queens Boulevard,
Forest Hills
Borough and County of Queens
City and State of New York

TAX DESIG: Block 3238, Lot 44

CERTIFIED TO:
Northeastern Metro Abstract Corp.
Old Republic Title Insurance Company
de Boulevard LLC

TITLE No.: 16254
DATE: February 9, 2016
SCALE: 1"=20'
Job No. 37287
Drawn By: MK

FIGURE 3 – Proposed Development



1 SUB-CELLAR
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VT LIC 88498

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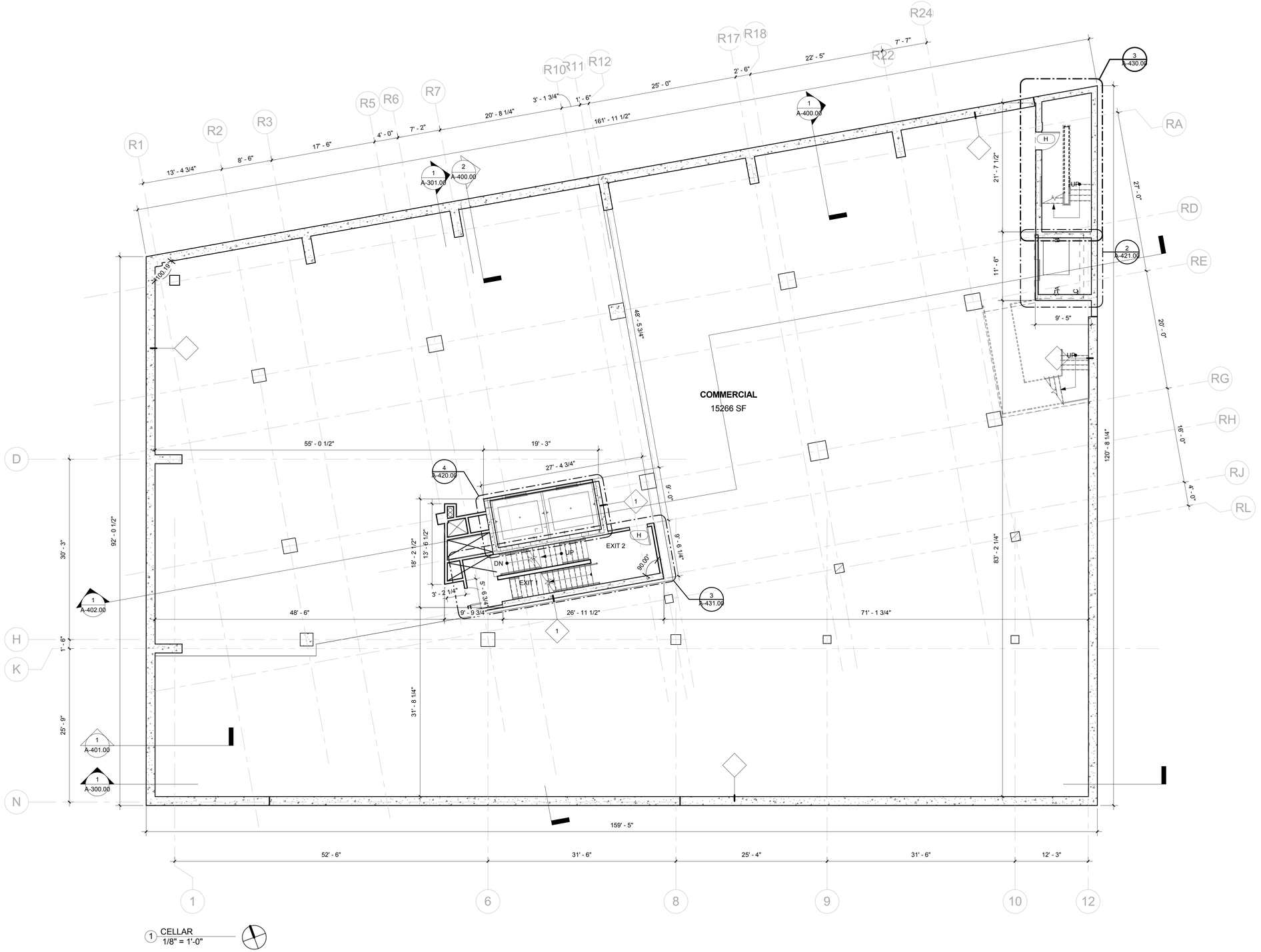

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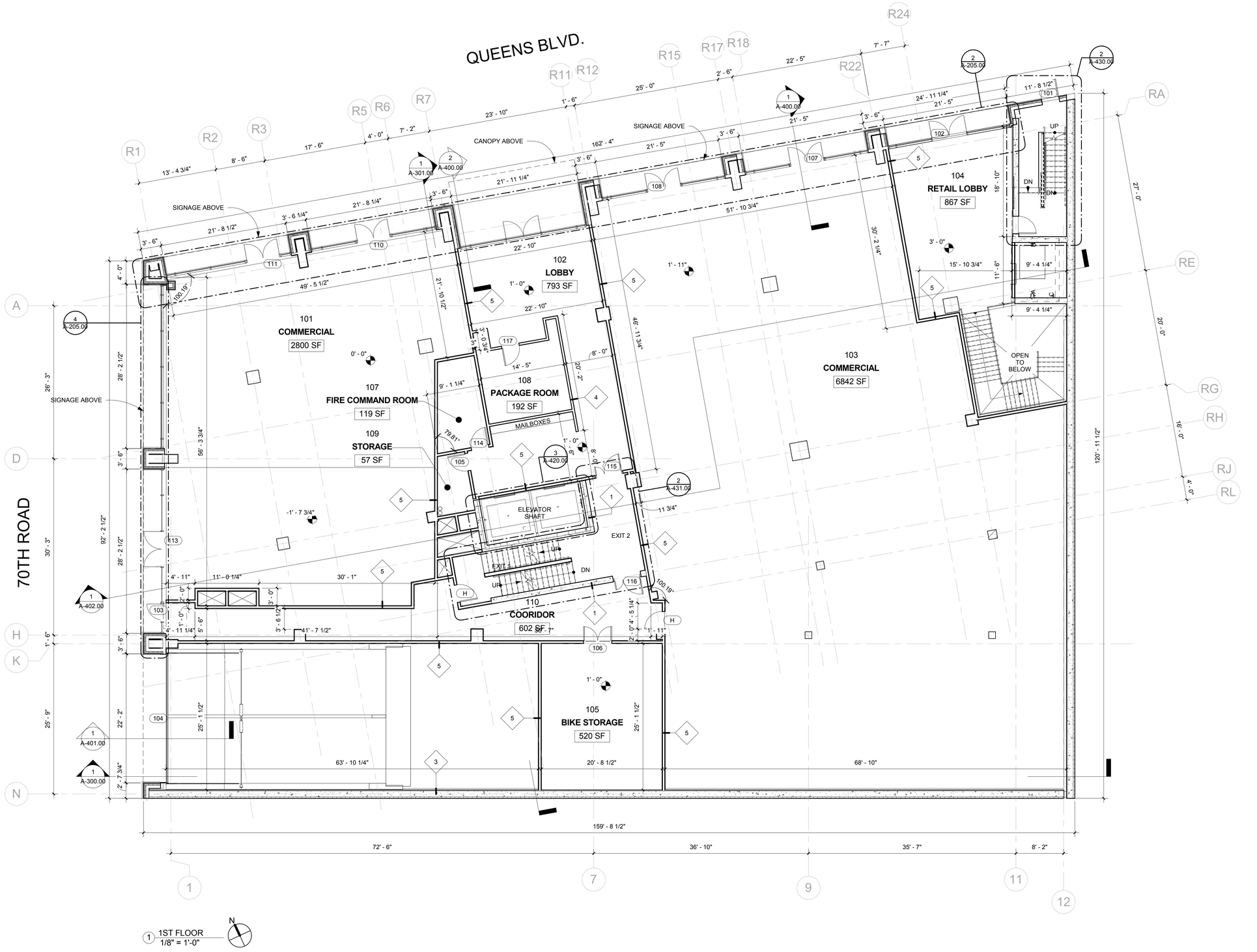

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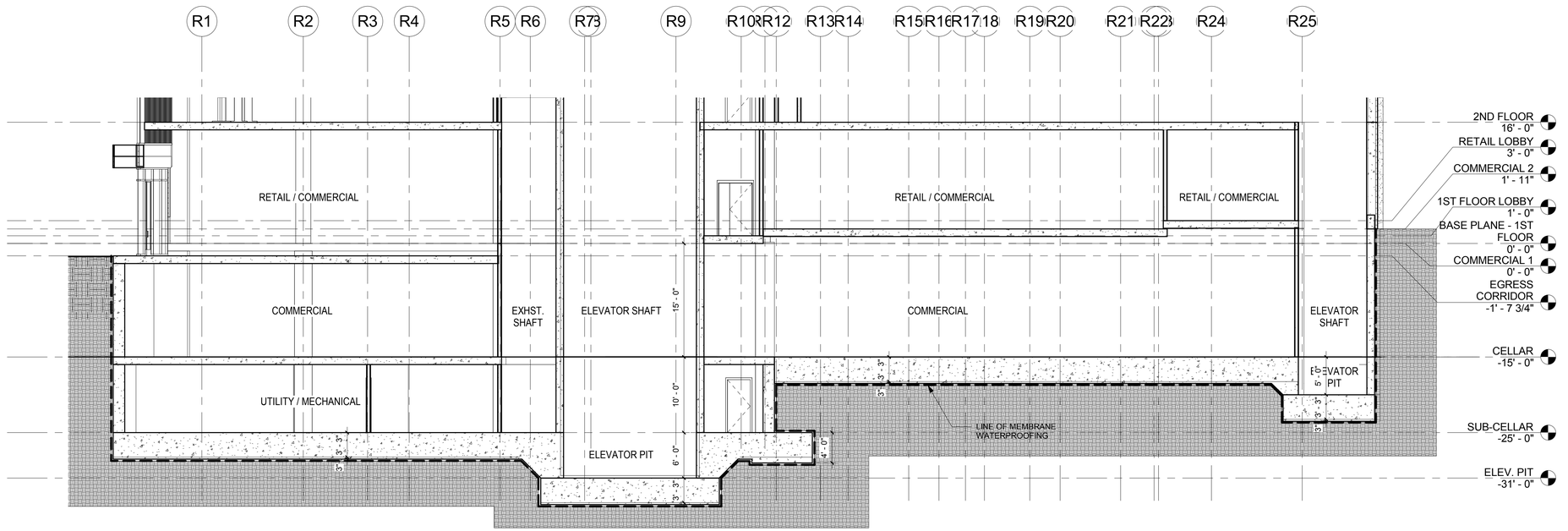

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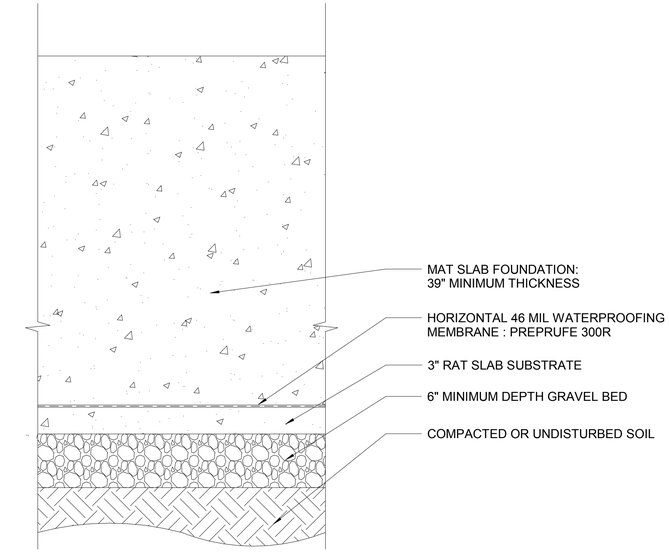

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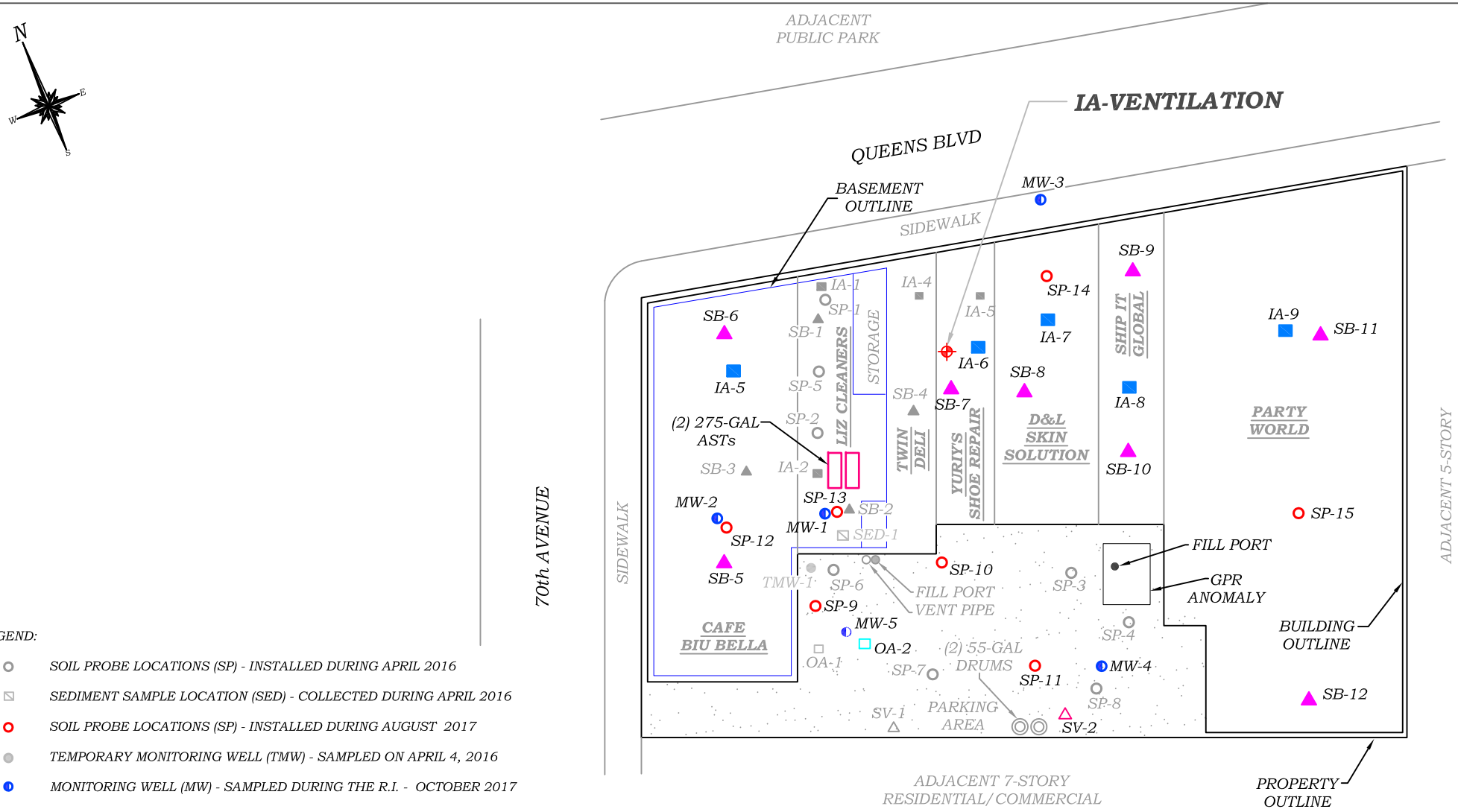

LEGEND:

- SOIL PROBE LOCATIONS (SP) - INSTALLED DURING APRIL 2016
- SEDIMENT SAMPLE LOCATION (SED) - COLLECTED DURING APRIL 2016
- SOIL PROBE LOCATIONS (SP) - INSTALLED DURING AUGUST 2017
- TEMPORARY MONITORING WELL (TMW) - SAMPLED ON APRIL 4, 2016
- MONITORING WELL (MW) - SAMPLED DURING THE R.I. - OCTOBER 2017
- SUB SLAB SOIL VAPOR PROBE LOCATIONS (SB) - SAMPLED MARCH 11TH AND APRIL 12TH, 2016
- SOIL VAPOR PROBE LOCATIONS (SV) - SAMPLED ON MARCH 11, 2016
- OUTDOOR AIR SAMPLING LOCATIONS (OA) - SAMPLED ON MARCH 11, 2016
- INDOOR AIR SAMPLING LOCATIONS (IA) - SAMPLED ON MARCH 11, 2016
- SUB SLAB SOIL VAPOR PROBE LOCATIONS (SB) - COLLECTED DURING THE R.I. - OCTOBER 3, 2017
- SOIL VAPOR PROBE LOCATIONS (SV) - COLLECTED DURING THE R.I. - OCTOBER 3, 2017
- OUTDOOR AIR SAMPLING LOCATION (OA) - COLLECTED DURING THE R.I. - SAMPLED ON OCTOBER 3, 2017
- INDOOR AIR SAMPLING LOCATIONS (IA) - COLLECTED DURING THE R.I. - SAMPLED ON OCTOBER 3, 2017
- INDOOR AIR SAMPLING LOCATION (IA) FOLLOWING INSTALLATION OF TEMPORARY IMMEDIATE EXPOSURE REMEDY SYSTEM ON FEBRUARY 1ST, 2018

0' 20' 40'

SCALE IN FEET (FT.)

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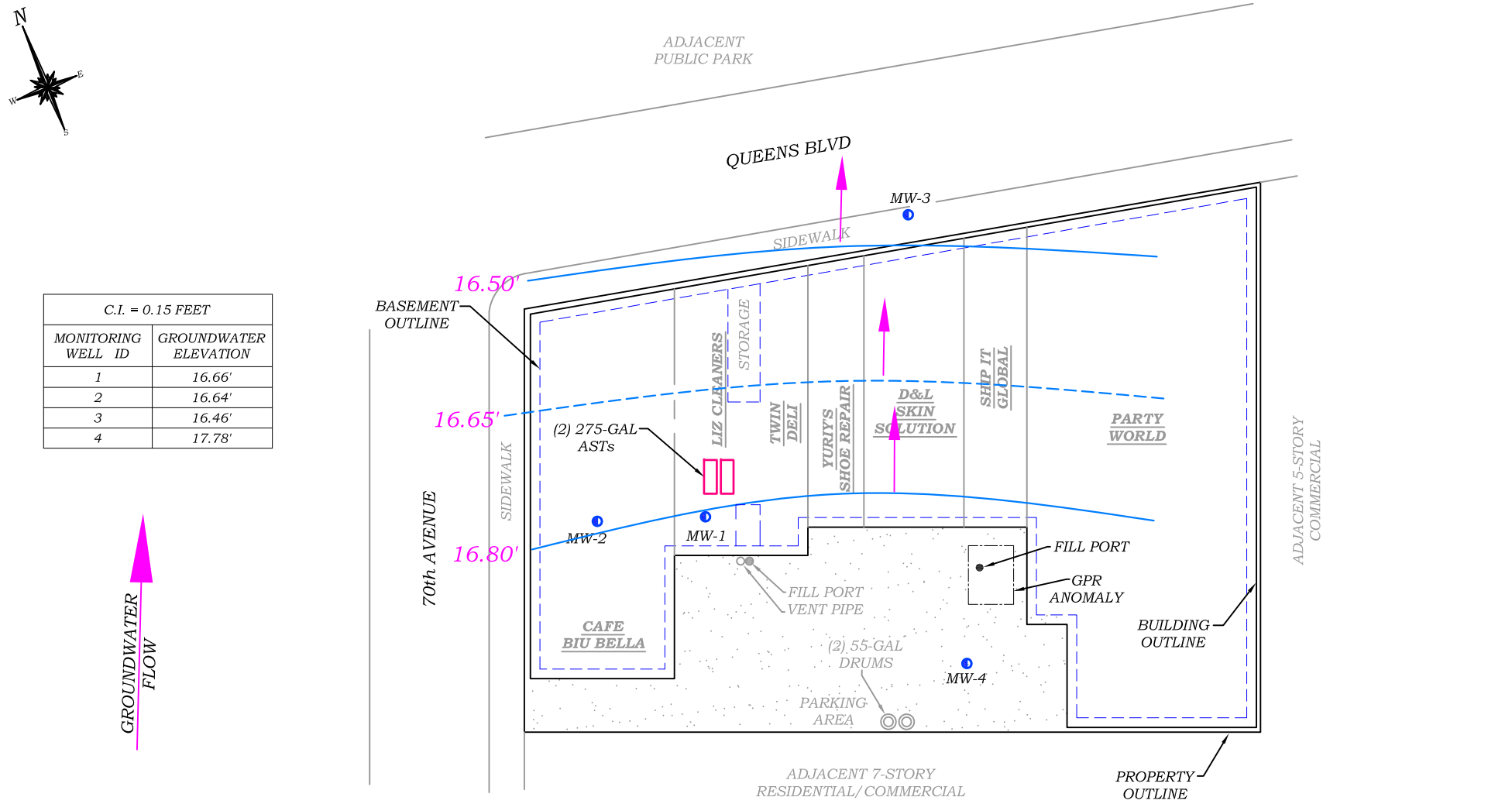
FIGURE 4: SAMPLING LOCATIONS MAP



C.I. = 0.15 FEET	
MONITORING WELL ID	GROUNDWATER ELEVATION
1	16.66'
2	16.64'
3	16.46'
4	17.78'

LEGEND:

- MONITORING WELL LOCATIONS (MW)
- GROUNDWATER CONTOUR LINE
- INFERRED CONTOUR LINE
- C.I. CONTOUR INTERVAL
- DIRECTION OF GROUNDWATER FLOW

0' 20' 40'

SCALE IN FEET (FT.)

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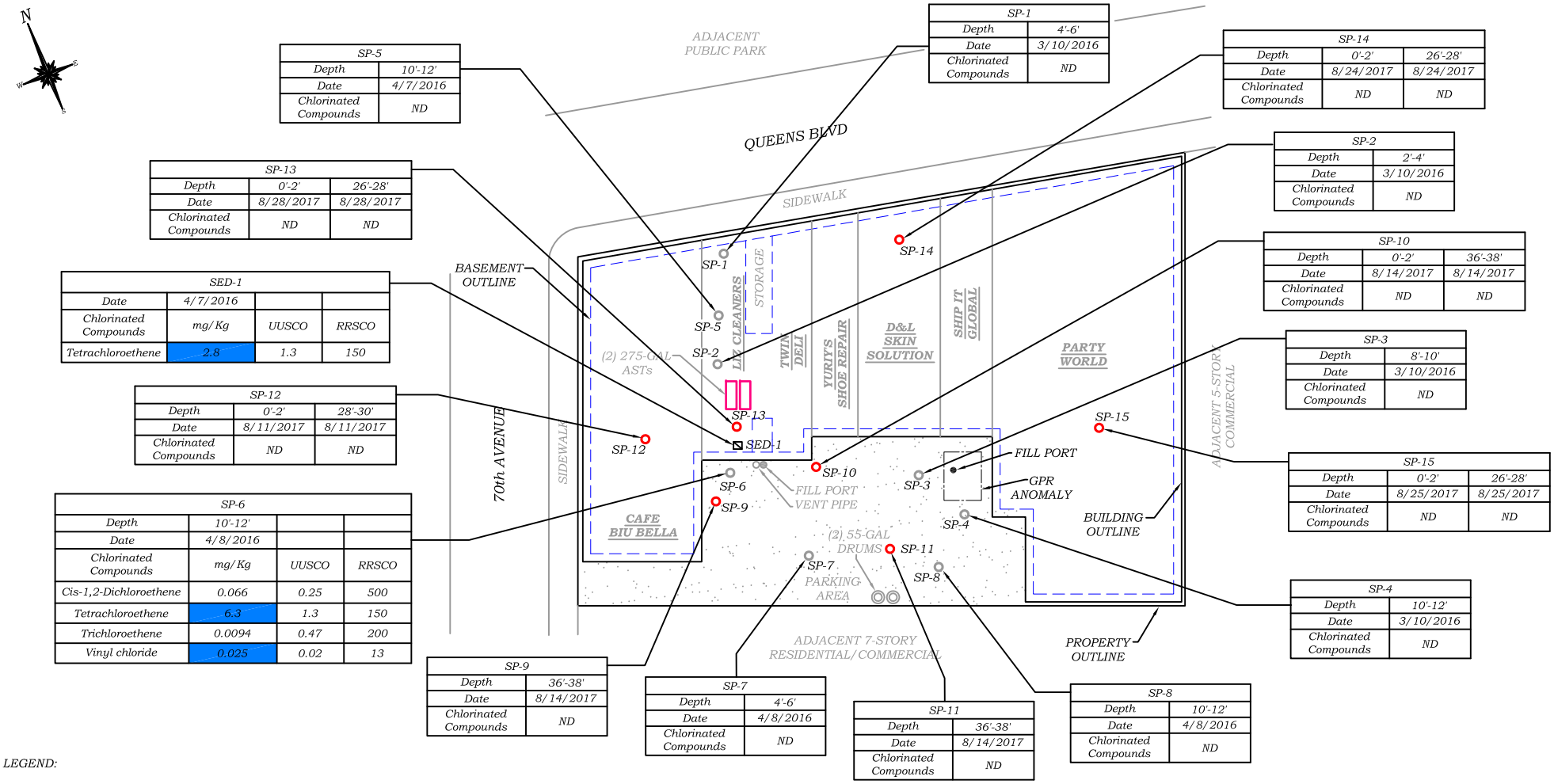
FIGURE 5: GROUNDWATER FLOW DIAGRAM- OCTOBER 2017



SP-5	
Depth	10'-12'
Date	4/7/2016
Chlorinated Compounds	ND

SP-1	
Depth	4'-6'
Date	3/10/2016
Chlorinated Compounds	ND

SP-14		
Depth	0'-2'	26'-28'
Date	8/24/2017	8/24/2017
Chlorinated Compounds	ND	ND

SP-13		
Depth	0'-2'	26'-28'
Date	8/28/2017	8/28/2017
Chlorinated Compounds	ND	ND

SP-2	
Depth	2'-4'
Date	3/10/2016
Chlorinated Compounds	ND

SED-1			
Date	4/7/2016		
Chlorinated Compounds	mg/Kg	UUSCO	RRSCO
Tetrachloroethene	2.8	1.3	150

SP-10		
Depth	0'-2'	36'-38'
Date	8/14/2017	8/14/2017
Chlorinated Compounds	ND	ND

SP-3	
Depth	8'-10'
Date	3/10/2016
Chlorinated Compounds	ND

SP-12		
Depth	0'-2'	28'-30'
Date	8/11/2017	8/11/2017
Chlorinated Compounds	ND	ND

SP-15		
Depth	0'-2'	26'-28'
Date	8/25/2017	8/25/2017
Chlorinated Compounds	ND	ND

SP-6			
Depth	10'-12'		
Date	4/8/2016		
Chlorinated Compounds	mg/Kg	UUSCO	RRSCO
Cis-1,2-Dichloroethene	0.066	0.25	500
Tetrachloroethene	6.3	1.3	150
Trichloroethene	0.0094	0.47	200
Vinyl chloride	0.025	0.02	13

SP-4	
Depth	10'-12'
Date	3/10/2016
Chlorinated Compounds	ND

SP-9	
Depth	36'-38'
Date	8/14/2017
Chlorinated Compounds	ND

SP-7	
Depth	4'-6'
Date	4/8/2016
Chlorinated Compounds	ND

SP-11	
Depth	36'-38'
Date	8/14/2017
Chlorinated Compounds	ND

SP-8	
Depth	10'-12'
Date	4/8/2016
Chlorinated Compounds	ND

LEGEND:

- SOIL PROBE LOCATIONS (SP) - INSTALLED BY HYDROTECH DURING APRIL 2016
- SEDIMENT SAMPLE LOCATION (SED) - COLLECTED BY HYDROTECH DURING APRIL 2016
- SOIL PROBE LOCATIONS (SP)

mg/Kg MILLIGRAMS PER KILOGRAM

NAS NONE ABOVE STANDARDS

ND NONE DETECTED

UUSCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVES

RRSCO RESTRICTED USE SOIL CLEANUP OBJECTIVES - RESIDENTIAL

BLUE SHADED VALUES EXCEED UUSCO

0' 20' 40'
SCALE IN FEET (FT.)

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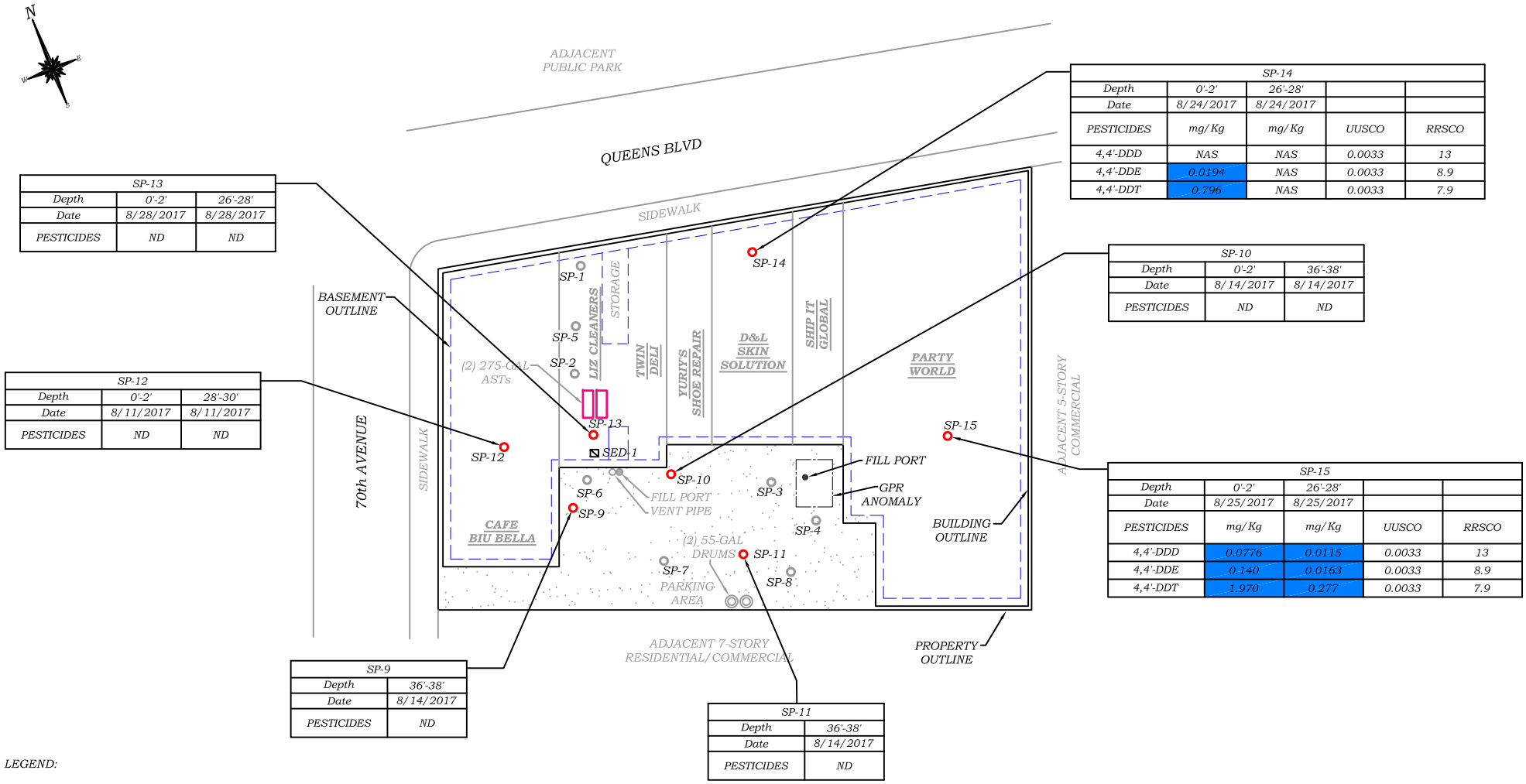
FIGURE 6: MAP OF CHLORINATED VOCs IN SOIL SAMPLES



SP-13		
Depth	0'-2'	26'-28'
Date	8/28/2017	8/28/2017
PESTICIDES	ND	ND

SP-12		
Depth	0'-2'	28'-30'
Date	8/11/2017	8/11/2017
PESTICIDES	ND	ND

SP-9	
Depth	36'-38'
Date	8/14/2017
PESTICIDES	ND

SP-11	
Depth	36'-38'
Date	8/14/2017
PESTICIDES	ND

SP-14				
Depth	0'-2'	26'-28'		
Date	8/24/2017	8/24/2017		
PESTICIDES	mg/Kg	mg/Kg	UUSCO	RRSCO
4,4'-DDD	NAS	NAS	0.0033	13
4,4'-DDE	0.0194	NAS	0.0033	8.9
4,4'-DDT	0.796	NAS	0.0033	7.9

SP-10		
Depth	0'-2'	36'-38'
Date	8/14/2017	8/14/2017
PESTICIDES	ND	ND

SP-15				
Depth	0'-2'	26'-28'		
Date	8/25/2017	8/25/2017		
PESTICIDES	mg/Kg	mg/Kg	UUSCO	RRSCO
4,4'-DDD	0.0776	0.0115	0.0033	13
4,4'-DDE	0.140	0.0163	0.0033	8.9
4,4'-DDT	1.970	0.277	0.0033	7.9

LEGEND:

- SOIL PROBE LOCATIONS (SP) - INSTALLED BY HYDROTECH DURING APRIL 2016
- SEDIMENT SAMPLE LOCATION (SED) - COLLECTED BY HYDROTECH DURING APRIL 2016
- SOIL PROBE LOCATIONS (SP)
- mg/Kg — MILLIGRAMS PER KILOGRAM
- NAS — NONE ABOVE STANDARDS
- ND — NONE DETECTED
- UUSCO — UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
- RRSCO — RESTRICTED USE SOIL CLEANUP OBJECTIVES - RESIDENTIAL
- BLUE SHADED VALUES EXCEED UUSCO

0' 20' 40'
SCALE IN FEET (FT.)

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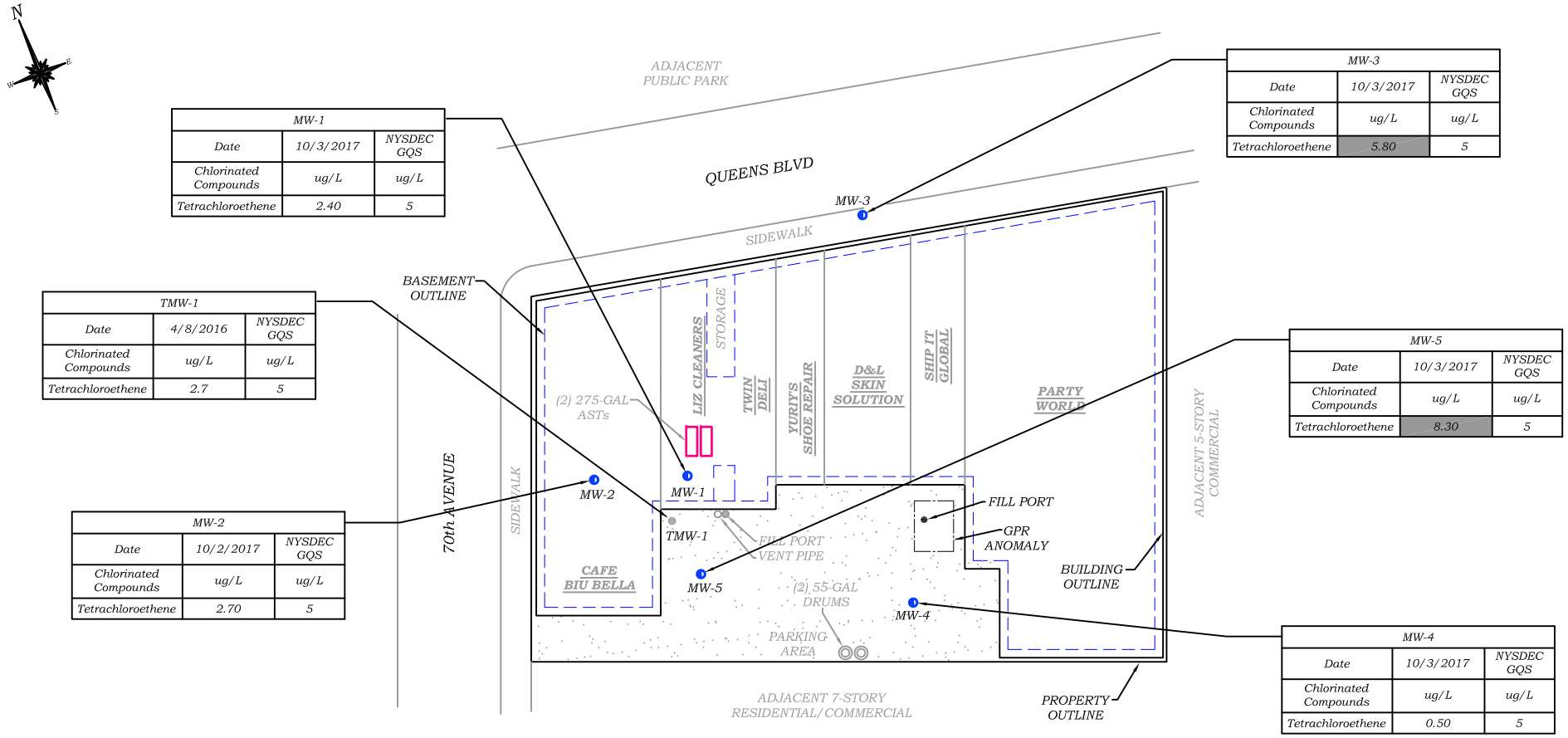
107-02 to 107-16
Queens Blvd
Queens, NY.
HTE Job # 170317

Drawn By: P.M.
Reviewed By: P.M.
Approved By: M.R.
Date: 1/15/18
Scale: AS NOTED

TITLE:

FIGURE 7: MAP OF PESTICIDES IN SOIL SAMPLES



MW-1		
Date	10/3/2017	NYSDEC GQS
Chlorinated Compounds	ug/L	ug/L
Tetrachloroethene	2.40	5

MW-3		
Date	10/3/2017	NYSDEC GQS
Chlorinated Compounds	ug/L	ug/L
Tetrachloroethene	5.80	5

TMW-1		
Date	4/8/2016	NYSDEC GQS
Chlorinated Compounds	ug/L	ug/L
Tetrachloroethene	2.7	5

MW-5		
Date	10/3/2017	NYSDEC GQS
Chlorinated Compounds	ug/L	ug/L
Tetrachloroethene	8.30	5

MW-2		
Date	10/2/2017	NYSDEC GQS
Chlorinated Compounds	ug/L	ug/L
Tetrachloroethene	2.70	5

MW-4		
Date	10/3/2017	NYSDEC GQS
Chlorinated Compounds	ug/L	ug/L
Tetrachloroethene	0.50	5

LEGEND:

- TEMPORARY MONITORING WELL (TMW)
- MONITORING WELL LOCATIONS (MW)
- ug/L MICROGRAMS PER LITER
- NAS NONE ABOVE STANDARDS
- ND NONE DETECTED
- NYSDEC NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION
- GQS GROUNDWATER QUALITY STANDARDS
- GRAY SHADED VALUES EXCEED NYSDEC GQS

0' 20' 40'
SCALE IN FEET (FT.)

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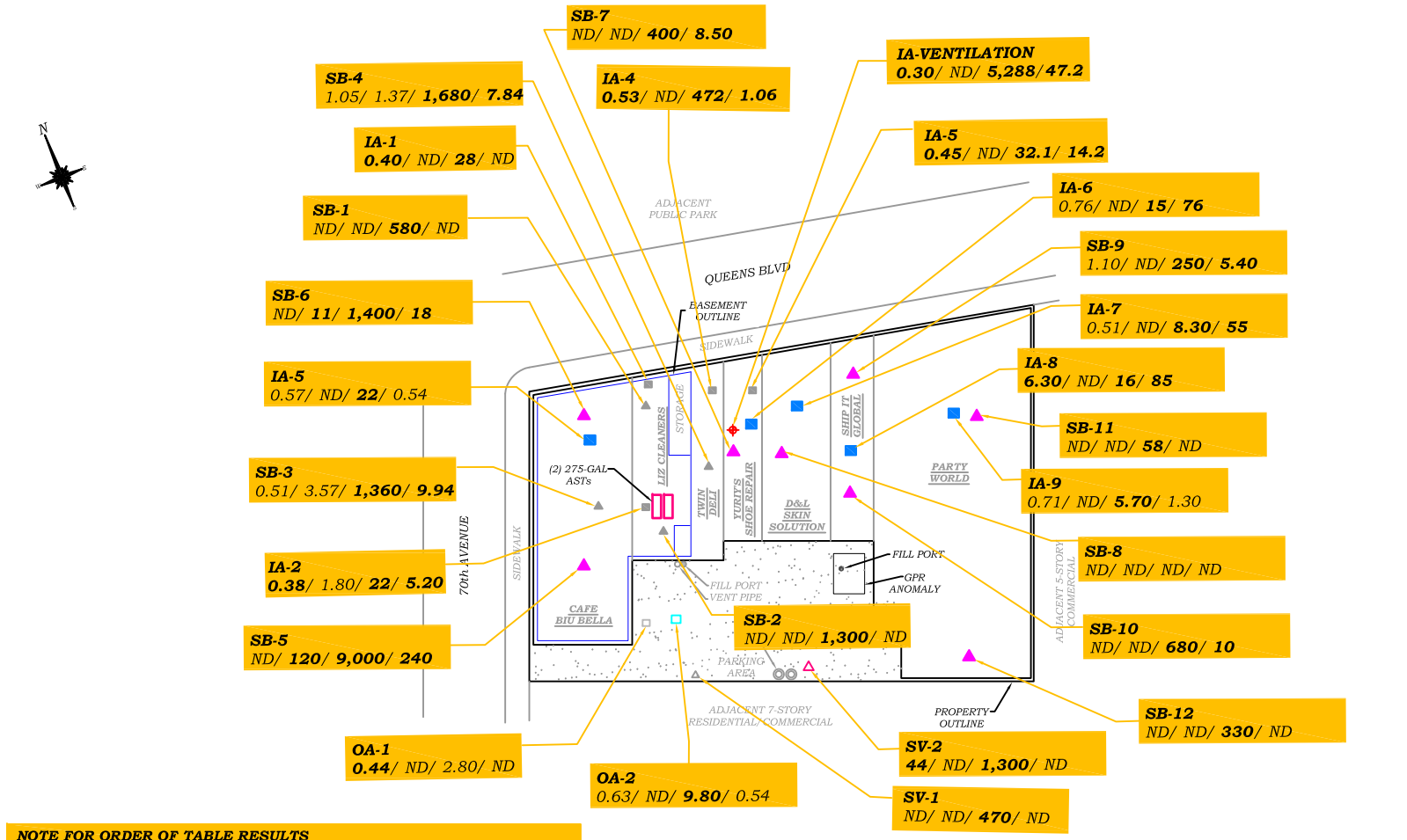
Reviewed By: P.M.
Approved By: M.R.
Date: 1/15/18
Scale: AS NOTED

TITLE:

FIGURE 8: MAP OF CHLORINATED VOCs IN GROUNDWATER SAMPLES



NOTE FOR ORDER OF TABLE RESULTS

Carbon Tetrachloride/ Cis-1,2-Dichloroethene/ Tetrachloroethene/ Trichloroethene

LEGEND:

- *SUB SLAB SOIL VAPOR PROBE LOCATIONS (SB) - INSTALLED BY HYDRO TECH ON MARCH 10TH AND APRIL 10TH, 2016 AND SAMPLED MARCH 11TH AND APRIL 12TH, 2016 USING 6-L SUMMA CANISTER FOR 4 HOURS*
- *SOIL VAPOR PROBE LOCATIONS (SV) - INSTALLED BY HYDRO TECH ON MARCH 10TH, 2016 AND SAMPLED MARCH 11TH, 2016 USING 6-L SUMMA CANISTER FOR 4 HOURS*
- *OUTDOOR AIR SAMPLING LOCATION (OA)*
- *INDOOR AIR SAMPLING LOCATIONS (IA)*
- *SUB SLAB SOIL VAPOR PROBE LOCATIONS (SB) - INSTALLED BY HYDRO TECH ON OCTOBER 3, 2017 USING 6-L SUMMA CANISTER FOR MIN. 6 HOURS*
- *SOIL VAPOR PROBE LOCATIONS (SV) - INSTALLED BY HYDRO TECH ON OCTOBER 3, 2017 USING 6-L SUMMA CANISTER FOR MIN. 6 HOURS*
- *OUTDOOR AIR SAMPLING LOCATION (OA)*
- *INDOOR AIR SAMPLING LOCATIONS (IA)*
- *ND — NONE DETECTED*
- *ug/m³ — MICROGRAM PER CUBIC METER*
- *INDOOR AIR SAMPLING LOCATION (IA) FOLLOWING INSTALLATION OF TEMPORARY IMMEDIATE EXPOSURE REMEDY SYSTEM ON FEBRUARY 1ST, 2018*

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HTE Job # 170317

Drawn By: B.R.
Reviewed By: P.M.
Approved By: P.M.
Date: 03/30/2018
Scale: AS NOTED

TITLE:

FIGURE 9: MAP OF CHLORINATED VOCs IN SOIL/SUB-SLAB VAPOR SAMPLES

LEGEND:

- *EXCAVATION TO 35' BGS (Elevator Bank Pit)*
- *EXCAVATION TO 24' BGS (Elevator Pit)*
- *EXCAVATION TO 29' BGS (Sub-basement)*
- *EXCAVATION TO 19' BGS (Basement)*

0' *20'* *40'*

SCALE IN FEET (FT.)

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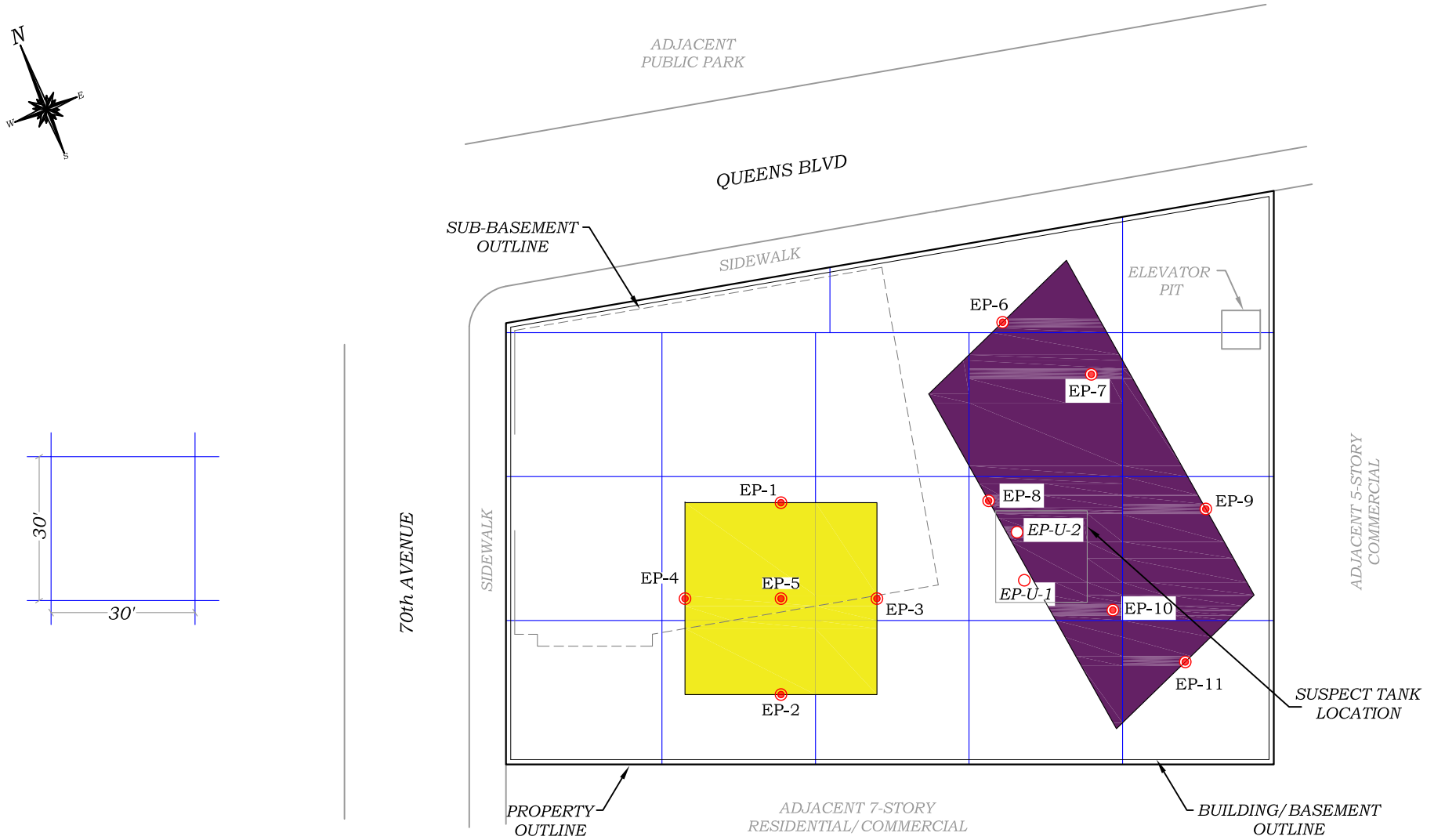
Reviewed By: P.M.
Approved By: M.R.
Date: 1/9/18
Scale: AS NOTED

TITLE:

FIGURE 10: MAP OF SITE EXCAVATIONS DEPTH



LEGEND:

- *BOTTOM POST SOIL EXAMINATION END POINT SAMPLES (EP)*
- *BOTTOM TANK EXCAVATION END POINT SAMPLES (EP-U)*
- *PCE HOT SPOT*
- *PESTICIDES HOT SPOT*

0' 20' 40'

SCALE IN FEET (FT.)

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HTE Job # 170317

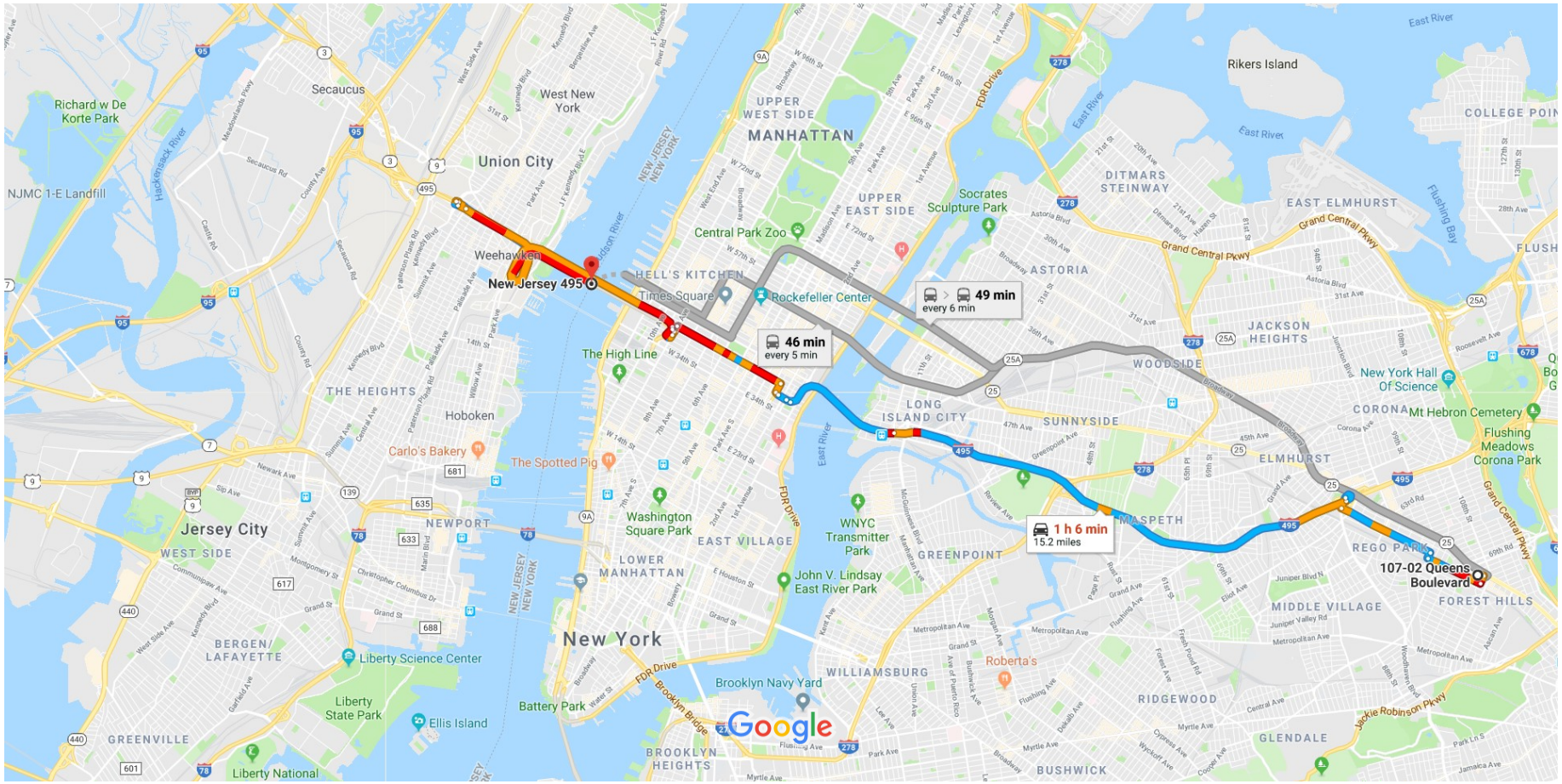
Drawn By: B.R.
Reviewed By: P.M.
Approved By: P.M.
Date: 04/29/2018
Scale: AS NOTED

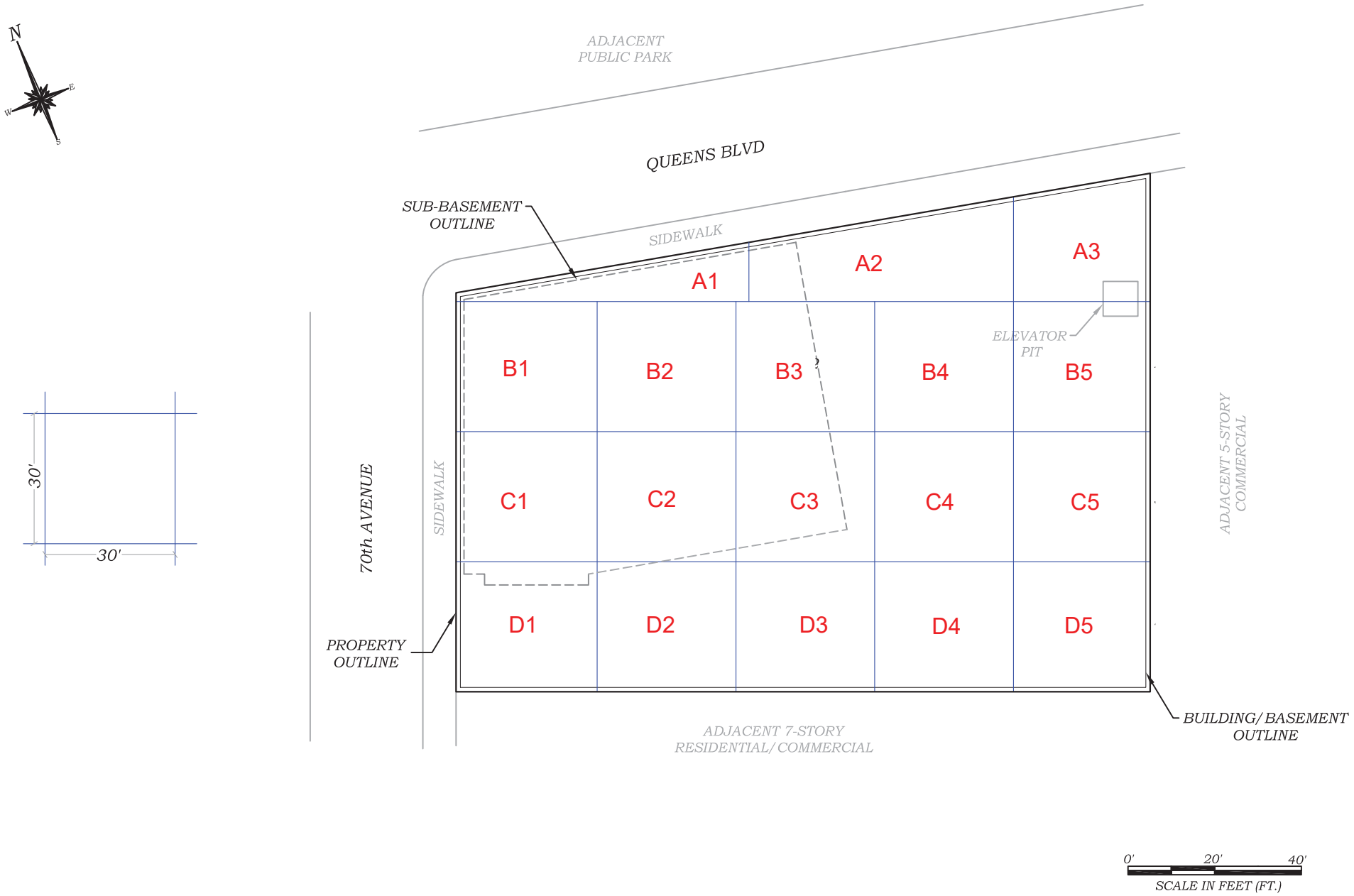
TITLE:

FIGURE 11: END POINT SAMPLING PLAN

Figure 12 - Truck Transport Routes

Google Maps 107-02 Queens Blvd, Flushing, NY 11375 to NJ-495, New Jersey Drive 15.2 miles, 1 h 6 min





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Reviewed By: P.M.
Approved By: P.M.
Date: 04/29/2018
Scale: AS NOTED

TITLE:

FIGURE 13: ALPHA NUMERICA SITE GRID MAP

TABLES

Table 1 - Summary of Soil Sampling Locations, Depth and Analyses

Soil Probe ID	Physical Location	Specific Location	Soil Characterization Depth (Feet)	Samples Chosen For Analysis (Feet)	Sample Selection Criteria	Analytical Methods
SP-1	Liz Cleaners basement	Northern portion	0-8 (bbs)	4-6 (bbs)	Visual observation	*TCL VOCs via EPA Method 8260 *TCL SVOCs via EPA Method 8270
SP-2	Liz Cleaners basement	Central portion	1-12 (bbs)	2-4 (bbs)	Visual observation	
SP-3	Rear parking area	Eastern vicnity of GPR anomaly	0-10 (bgs)	8-10 (bgs)	Visual observation	
SP-4		Southern vicnity of GPR anomaly	0-12 (bgs)	10-12 (bgs)	Visual observation	
SP-5	Liz Cleaners basement	Southern portion	0-12 (bbs)	10-12 (bbs)	Visual observation	
SP-6	Rear parking area	South of Liz Cleaners	0-16 (bgs)	10-12 (bgs)	Elevated PID	
SP-7		Celtral portion	0-16 (bgs)	4-6 (bgs)	Elevated PID	
SP-8		Vicinity of 55-gallon drums	0-16 (bgs)	10-12 (bgs)	Elevated PID	
SP-9	Rear parking area	Vinity of SP-6	12-40 (bgs)	36-38 (bgs)	Soil and groundwater interface	*TCL VOCs via EPA Method 8260 *TCL SVOCs via EPA Method 8270 * Pesticides via EPA Method 8081 * Herbicides via EPA Method 8151 * Polychlorinated biphenyls via EPA Method 8082 *TAL Metals via EPA Method 6010 & EPA Method 7473 for Mercury & Standard Methods (SM) 4500-CN for Cyanide
SP-10	Rear parking area	Northern portion	0-40 (bbs)	0-2 (bgs)	Shallow at surfgace	
				36-38 (bgs)	Soil and groundwater interface	
SP-11	Rear parking area	Vicinity of SP-8	12-40 (bgs)	36.38 (bgs)	Soil and groundwater interface	
SP-12	Café Biu Bella basement	West of sewer pit at Liz Cleaners	0-30 (bbs)	0-2(bbs)	Shallow at surfgace	
				28-30 (bbs)	Soil and groundwater interface	
SP-13	Liz Cleaners basement	Northern vicinity of sewer pit	0-30 (bbs)	0-2(bbs)	Shallow at surfgace	
				26-28 (bbs)	Soil and groundwater interface	
SP-14	D&L Solution basement	Northern portion	0-30 (bbs)	0-2(bbs)	Shallow at surfgace	
				26.28 (bbs)	Soil and groundwater interface	
SP-15	Party World basement	Central portion	0-30 (bbs)	0-2(bbs)	Shallow at surfgace	
				26.28 (bbs)	Soil and groundwater interface	

bbs=below basement slab elevation
bgs=below grade surface elevation
PID=Photoionization Detector
GPR=Ground Penetrating Radar

Table 2 - Summary of Groundwater Monitoring Well Sampling Locations and Analyses

Monitoring Well (MW) ID	Physical Location	Specific Location	Screen Depth Interval (Feet)	Analysis
TMW-1	Rear parking area	South of Liz Cleaners	33 to 48 feet bgs	*TCL VOCs via EPA Method 8260
MW-1	Liz Cleaners basement	North of sewer pit	25 to 40 feet bbs	*TCL VOCs via EPA Method 8260 and 1,4 Dioxane via EPA Method 8270D SIM *TCL SVOCs via EPA Method 8270 * Pesticides via EPA Method 8081 * Herbicides via EPA Method 8151 * Polychlorinated biphenyls via EPA Method 8082 *TAL Metals via EPA Method 6010 & & Standard Methods (SM) 4500-CN for Cyanide * PFOA and PFOS via modified EPA Method 537
MW-2	Café Biu Bella basement	West of sewer pit at Liz Cleaners	25 to 40 feet bbs	
MW-3	Northeast of Liz Cleaners	North-adjacent sidewalk	35 to 50 feet bgs	
MW-4	Rear parking area	Southeast of Liz Cleaners	23 to 38 feet bgs	
MW-5		South of Liz Cleaners	23 to 38 feet bgs	

bbs=below basement slab elevation
bgs=below grade surface elevation

Table 3 - Summary of Soil Vapor Sampling Locations and Analyses

Soil Vapor Point ID	Physical Location	Specific Location	Sample Collection Depth (Feet)	Analysis
SV-1	Rear parking area	Sounthern portion	6 feet bgs	* VOCs and via EPA Method TO-15
SV-2			8 geet bgs	
SB-1/IA-1	Liz Cleaners basement	Northern portion	Sub-slab	
SB-2/IA-2		Southern portion		
SB-3/IA-3	Café Biu Bella basement	Central portion		
SB-4/IA-4	Twin Deli basement			
IA-5	Yury's Show Repair - no basement	Central pottion	Breathing zone	
SB-5	Café Biu Bella basement	Southern portion	Sub-slab	
SB-6/IA-5		Northern portion		
SB-7/IA-6	Twin Deli basement	Central portion		
SB-8/IA-7	D&L Solution basement	Central portion		
SB-9	Ship It Global basement	Northern portion		
SB-10/IA-8		Southern portion		
SB-11/IA-9	Party World basement	Northern portion		
SB-12		Southern portion		
IA-Ventilation	D&L Solution basement	Central portion	Breathing zone	
OA-1	Rear parking area	Downwind	Breathing zone	
OA-2				

bgs=below grade surface elevation

Table 4 - Summary of Sediment Sampling Locations and Analyses

Sample ID	Physical Location	Specific Location	Analytical Methods
SED-1	Drycleaners basement	Sewer pit	*TCL VOCs via EPA Method 8260

Table 5
Groundwater Monitoring Results - October 2017
107-02 to 107-16 Queens Boulevard, Queens, NY

Well ID	Casing Elevation	DTP	DTW	Water Table Elevation
MW-1	46.76	ND	30.1	16.66
MW-2	46.02	ND	29.38	16.64
MW-3	56.88	ND	40.42	16.46
MW-4	56.58	ND	38.8	17.78
MW-5	54.65	ND	38.1	16.55

All values reported in feet.
Elevations detemined in reference to NAVD88
DTW…Depth to Water from top of casing
DTP…Depth to Product from top of casing
ND…None Detected
NM…Not Measured
NA…Not Available

Table 6
Soil Samples Analytical Results for VOC's
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	SP-1 (4-6)		SP2 (2-4)		SP3 (8-10)		SP4 (10-12)		SP-5 (10-12)		SP 6 (10-12)		SP 7 (4-6)		SP 8 (10-12)		SP-9 (36-38)		SP-10 (0-2)		SP-10 (36-38)		SP-11 (36-38)		SP-12 (0-2)		SP-12 (28-30)		SP-13 (0-2)		SP-13 (26-28)		SP-14 (0-2)		SP-14 (26-28)		SP-15 (0-2)		SP-15 (26-28)		UUSCOs	RRSCOs
Sampling Date	3/10/2016		3/10/2016		3/10/2016		3/10/2016		4/7/2016		4/8/2016		4/8/2016		4/8/2016		8/14/2017		8/14/2017		8/14/2017		8/14/2017		8/11/2017		8/11/2017		8/28/2017		8/28/2017		8/24/2017		8/24/2017		8/25/2017		8/25/2017			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
Compound	Result		Result		Result		Result	Q	Result		Result		Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Units	mg/Kg	Q	mg/Kg	Q	mg/Kg	Q	Result		mg/kg	Q	mg/kg	Q	mg/kg	Q	mg/kg	Q	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
1,1,1,2-Tetrachloroethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	~
1,1,1-Trichloroethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.68	100
1,1,2,2-Tetrachloroethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,1,2-Trichloro-1,2,2-trifluoroetha	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	NT		NT		NT		NT		0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,1,2-Trichloroethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,1-Dichloroethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.27	26
1,1-Dichloroethylene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.33	100
1,1-Dichloropropylene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,2,3-Trichlorobenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,2,3-Trichloropropane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,2,4-Trichlorobenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,2,4-Trimethylbenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	**0.00340**	J	0.00280	U	**0.00280**	J	**0.00230**	J	3.6	52
1,2-Dibromo-3-chloropropane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,2-Dibromoethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,2-Dichlorobenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	1.1	100
1,2-Dichloroethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.02	3.1
1,2-Dichloropropane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,3,5-Trimethylbenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	8.4	52
1,3-Dichlorobenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	2.4	49
1,3-Dichloropropane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
1,4-Dichlorobenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	1.8	13
1,4-Dioxane	NT		NT		NT		NT		NT		NT		NT		NT		0.0510	U	0.0560	U	0.0590	U	0.0530	U	0.0430	U	0.0540	U	0.0420	U	0.0510	U	0.0450	U	0.0560	U	0.0470	U	0.0450	U	0.1	13
2,2-Dichloropropane	<0.036	U	<0.067	U	<0.048	U	<0.043	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
2-Butanone	NT		NT		NT		NT		NT		NT		NT		NT		0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.12	100
2-Chlorotoluene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
4-Chlorotoluene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Acetone	**0.0045**	J	<0.0067	U	**0.0066**	J	**0.0066**	J	< 0.027	U	< 0.03	U	< 0.028	U	< 0.028	U	0.00510	U	0.00590	J	0.00590	U	**0.0100**	J	**0.0110**		**0.0450**		**0.0310**		**0.00540**	J	**0.0400**		**0.0270**		0.00470	U	**0.00730**	J	0.05	100
Benzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.06	4.8
Bromobenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Bromochloromethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Bromodichloromethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Bromoform	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Bromomethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Carbon tetrachloride	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.76	2.4
Chlorobenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	1.1	100
Chloroethane	NT		NT		NT		NT		< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Chloroform	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.37	49
Chloromethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
cis-1,2-Dichloroethylene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	**0.066**		< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.25	100
cis-1,3-Dichloropropylene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Dibromochloromethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Dibromomethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Dichlorodifluoromethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Ethyl Benzene	<0.0018	U	<0.0034	U	<0.0024	U	**0.020**		< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	1	41
Hexachlorobutadiene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Isopropylbenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Methyl tert-butyl ether (MTBE)	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.011	U	< 0.012	U	< 0.011	U	< 0.011	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.93	100
Methylene chloride	<0.0036	U	<0.0067	U	<0.0048	U	<0.0043	U	< 0.011	U	< 0.012	U	< 0.011	U	< 0.011	U	0.00510	U	0.00560	U	0.00590	U	0.00530	U	0.00430	U	0.00540	U	0.00420	U	0.00510	U	0.00450	U	0.00560	U	0.00470	U	0.00450	U	0.05	100
Naphthalene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	12	100
n-Butylbenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	12	100
n-Propylbenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	3.9	100
o-Xylene	<0.0036	U	<0.0067	U	<0.0048	U	**0.086**		< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.26	100
p- & m- Xylenes	<0.0018	U	<0.0034	U	<0.0024	U	**0.044**		< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00510	U	0.00560	U	0.00590	U	0.00530	U	0.00430	U	0.00540	U	0.00420	U	0.00510	U	0.00450	U	0.00560	U	0.00470	U	0.00450	U	0.26	100
Xylenes, Total	<0.0018	U	<0.0034	U	<0.0024	U	**0.130**		< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00770	U	0.00840	U	0.00880	U	0.00800	U	0.00650	U	0.00810	U	0.00630	U	0.00760	U	0.00680	U	0.00840	U	0.00710	U	0.00670	U	0.26	100
p-Isopropyltoluene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
sec-Butylbenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	11	100
Styrene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
tert-Butylbenzene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	5.9	100
Tetrachloroethylene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	6.3		< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	1.3	19
Toluene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.7	100
trans-1,2-Dichloroethylene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.19	100
trans-1,3-Dichloropropylene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Trichloroethylene	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	**0.0094**		< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.47	21
Trichlorofluoromethane	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	< 0.0059	U	< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Vinyl acetate	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	NT		NT		NT		NT		0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	NS	NS
Vinyl Chloride	<0.0018	U	<0.0034	U	<0.0024	U	<0.0022	U	< 0.0053	U	0.025		< 0.0056	U	< 0.0056	U	0.00260	U	0.00280	U	0.00290	U	0.00270	U	0.00220	U	0.00270	U	0.00210	U	0.00250	U	0.00230	U	0.00280	U	0.00240	U	0.00220	U	0.02	0.9

NOTES:
Q is the Qualifier Column with definitions as follows:
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
NS=this indicates that no regulatory limit has been established for this analyte
sample exceeds NYSDEC Part 375 UUSCO

UUSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives

Table 6 (Cont.)
Soil Samples Analytical Results for SVOC's
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	SP-1 (4-6)		SP2 (2-4)		SP3 (8-10)		SP4 (10-12)		SP-5 (10-12)		SP 6 (10-12)		SP 7 (4-6)		SP 8 (10-12)		SP-9 (36-38)		SP-10 (0-2)		SP-10 (36-38)		SP-11 (36-38)		SP-12 (0-2)		SP-12 (28-30)		SP-13 (0-2)		SP-13 (26-28)		SP-14 (0-2)		SP-14 (26-28)		SP-15 (0-2)		SP-15 (26-28)		UUSCOs	RRSCOs
Sampling Date	3/10/2016		3/10/2016		3/10/2016		3/10/2016		4/7/2016		4/8/2016		4/8/2016		4/8/2016		8/14/2017		8/14/2017		8/14/2017		8/14/2017		8/11/2017		8/11/2017		8/28/2017		8/28/2017		8/24/2017		8/24/2017		8/25/2017		8/25/2017			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
Compound	Result		Result		Result		Result	Q	Result		Result		Result		Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Units	mg/Kg	Q	mg/Kg	Q	mg/Kg	Q	Result		mg/Kg	Q	mg/Kg	Q	mg/Kg	Q	mg/Kg	Q	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
1,2,4-Trichlorobenzene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
1,2-Dichlorobenzene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	1.1	100
1,3-Dichlorobenzene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	2.4	49
1,4-Dichlorobenzene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	1.8	13
2,4-Dinitrotoluene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
2,6-Dinitrotoluene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
2-Chloronaphthalene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
2-Chlorophenol	NT		NT		NT		NT		NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
2-Methylnaphthalene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
2-Nitroaniline	NT		NT		<0.0871	U	<0.0864	U	NT		NT		NT		NT		0.0858	U	0.0897	U	0.0846	U	0.0857	U	0.0842	U	0.0880	U	0.0850	U	0.0862	U	0.0835	U	0.0845	U	0.0836	U	0.0835	U	NS	NS
4-Bromophenyl phenyl ether	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
4-Chloroaniline	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
4-Chlorophenyl phenyl ether	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
4-Nitroaniline	NT		NT		<0.0871	U	<0.0864	U	NT		NT		NT		NT		0.0858	U	0.0897	U	0.0846	U	0.0857	U	0.0842	U	0.0880	U	0.0850	U	0.0862	U	0.0835	U	0.0845	U	0.0836	U	0.0835	U	NS	NS
Acenaphthene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	20	100
Acenaphthylene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	100	100
Aniline	NT		NT		<0.174	U	<0.173	U	NT		NT		NT		NT		0.172	U	0.180	U	0.169	U	0.172	U	0.169	U	0.176	U	0.170	U	0.173	U	0.167	U	0.169	U	0.167	U	0.167	U	NS	NS
Anthracene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	100	100
Benzo(a)anthracene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	1	1
Benzo(a)pyrene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	1	1
Benzo(b)fluoranthene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	1	1
Benzo(g,h,i)perylene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	100	100
Benzo(k)fluoranthene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	0.8	3.9
Benzyl butyl phthalate	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Bis(2-chloroethoxy)methane	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Bis(2-chloroethyl)ether	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Bis(2-chloroisopropyl)ether	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Bis(2-ethylhexyl)phthalate	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Chrysene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	1	3.9
Dibenzo(a,h)anthracene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	0.33	0.33
Dibenzofuran	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	7	59
Diethyl phthalate	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Dimethyl phthalate	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Di-n-butyl phthalate	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Di-n-octyl phthalate	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Fluoranthene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	100	100
Fluorene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	30	100
Hexachlorobenzene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	0.33	1.2
Hexachlorobutadiene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Hexachlorocyclopentadiene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Hexachloroethane	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Indeno(1,2,3-cd)pyrene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	0.5	0.5
Isophorone	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Naphthalene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	12	100
Nitrobenzene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
N-Nitrosodimethylamine	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
N-nitroso-di-n-propylamine	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
N-Nitrosodiphenylamine	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	NS	NS
Phenanthrene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	100	100
Pyrene	NT		NT		<0.0436	U	<0.0433	U	NT		NT		NT		NT		0.0430	U	0.0450	U	0.0424	U	0.0430	U	0.0422	U	0.0441	U	0.0426	U	0.0432	U	0.0419	U	0.0424	U	0.0419	U	0.0419	U	100	100
Pyridine	NT		NT		<0.174	U	<0.173	U	NT		NT		NT		NT		0.172	U	0.180	U	0.169	U	0.172	U	0.169	U	0.176	U	0.170	U	0.173	U	0.167	U	0.169	U	0.167	U	0.167	U	NS	NS

NOTES:

Q is the Qualifier Column with definitions as follows:

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated

NS=this indicates that no regulatory limit has been established for this analyte

UUSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives

RRSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives

Table 6 (Cont.)
Soil Samples Analytical Results for Pesticides, Herbicides & PCBs
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	SP-1 (4-6)		SP2 (2-4)		SP3 (8-10)		SP4 (10-12)		SP-5 (10-12)		SP 6 (10-12)		SP 7 (4-6)		SP 8 (10-12)		SP-9 (36-38)		SP-9 (36-38)		SP-10 (0-2)		SP-10 (36-38)		SP-11 (36-38)		SP-12 (0-2)		SP-12 (28-30)		SP-13 (0-2)		SP-13 (26-28)		SP-14 (0-2)		SP-14 (26-28)		SP-15 (0-2)		SP-15 (26-28)		UUSCOs	RRSCOs
Sampling Date	3/10/2016		3/10/2016		3/10/2016		3/10/2016		4/7/2016		4/8/2016		4/8/2016		4/8/2016		8/14/2017		8/14/2017		8/14/2017		8/14/2017		8/14/2017		8/11/2017		8/11/2017		8/28/2017		8/28/2017		8/24/2017		8/24/2017		8/25/2017		8/25/2017			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
Compound	Result		Result		Result		Result	Q	Result		Result		Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Units	mg/Kg	Q	mg/Kg	Q	mg/Kg	Q	Result		mg/kg	Q	mg/kg	Q	mg/kg	Q	mg/kg	Q	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
Pesticides																																											
4,4'-DDD	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	**0.0776**	D	**0.0115**	D	0.0033	13
4,4'-DDE	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	**0.0194**	D	0.00166	U	**0.140**	D	**0.0163**	D	0.0033	8.9
4,4'-DDT	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	**0.796**	D	**0.00231**	D	**1.970**	D	**0.277**	D	0.0033	7.9
Aldrin	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	0.005	0.097
alpha-BHC	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	0.02	0.48
alpha-Chlordane	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	**0.0107**	DP	0.00166	U	**0.0372**	DP	**0.00485**	D	0.094	4.2
beta-BHC	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	0.036	0.36
Chlordane, total	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0331	U	0.0352	U	0.0330	U	0.0334	U	0.0329	U	0.0348	U	0.0334	U	0.0337	U	**0.0587**	D	0.0333	U	0.288	U	**0.0362**	DP	NS	NS
delta-BHC	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	0.04	100
Dieldrin	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	0.005	0.2
Endosulfan I	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	2.4	24
Endosulfan II	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	2.4	24
Endosulfan sulfate	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	2.4	24
Endrin	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	0.014	11
Endrin aldehyde	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	NS	NS
Endrin ketone	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	NS	NS
gamma-BHC (Lindane)	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	0.1	1.3
gamma-Chlordane	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	**0.0129**	D	0.00166	U	**0.0529**	D	**0.00733**	D	NS	NS
Heptachlor	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	0.042	2.1
Heptachlor epoxide	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00166	U	0.00176	U	0.00165	U	0.00167	U	0.00164	U	0.00174	U	0.00167	U	0.00168	U	0.00165	U	0.00166	U	0.0144	U	0.00163	U	NS	NS
Methoxychlor	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.00828	U	0.00880	U	0.00826	U	0.00834	U	0.00822	U	0.00871	U	0.00835	U	0.00841	U	0.00823	U	0.00832	U	0.0719	U	0.00815	U	NS	NS
Toxaphene	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0838	U	0.0891	U	0.0836	U	0.0844	U	0.0832	U	0.0881	U	0.0846	U	0.0852	U	0.0833	U	0.0842	U	0.728	U	0.0825	U	NS	NS
Herbicides																																											
2,4,5-T	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0206	U	0.0209	U	0.0200	U	0.0203	U	0.0198	U	0.0206	U	0.0205	U	0.0207	U	0.0200	U	0.0203	U	0.0200	U	0.0200	U	NS	NS
2,4,5-TP (Silvex)	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0206	U	0.0209	U	0.0200	U	0.0203	U	0.0198	U	0.0206	U	0.0205	U	0.0207	U	0.0200	U	0.0203	U	0.0200	U	0.0200	U	3.8	100
2,4-D	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0206	U	0.0209	U	0.0200	U	0.0203	U	0.0198	U	0.0206	U	0.0205	U	0.0207	U	0.0200	U	0.0203	U	0.0200	U	0.0200	U	NS	NS
Polychlorinated Biphenyls (PCB)																																											
Aroclor 1016	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0167	U	0.0178	U	0.0167	U	0.0168	U	0.0166	U	0.0176	U	0.0169	U	0.0170	U	0.0166	U	0.0168	U	0.145	U	0.0165	U	NS	NS
Aroclor 1221	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0167	U	0.0178	U	0.0167	U	0.0168	U	0.0166	U	0.0176	U	0.0169	U	0.0170	U	0.0166	U	0.0168	U	0.145	U	0.0165	U	NS	NS
Aroclor 1232	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0167	U	0.0178	U	0.0167	U	0.0168	U	0.0166	U	0.0176	U	0.0169	U	0.0170	U	0.0166	U	0.0168	U	0.145	U	0.0165	U	NS	NS
Aroclor 1242	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0167	U	0.0178	U	0.0167	U	0.0168	U	0.0166	U	0.0176	U	0.0169	U	0.0170	U	0.0166	U	0.0168	U	0.145	U	0.0165	U	NS	NS
Aroclor 1248	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0167	U	0.0178	U	0.0167	U	0.0168	U	0.0166	U	0.0176	U	0.0169	U	0.0170	U	0.0166	U	0.0168	U	0.145	U	0.0165	U	NS	NS
Aroclor 1254	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0167	U	0.0178	U	0.0167	U	0.0168	U	0.0166	U	0.0176	U	0.0169	U	0.0170	U	0.0166	U	0.0168	U	0.145	U	0.0165	U	NS	NS
Aroclor 1260	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0167	U	0.0178	U	0.0167	U	0.0168	U	0.0166	U	0.0176	U	0.0169	U	0.0170	U	0.0166	U	0.0168	U	0.145	U	0.0165	U	NS	NS
Total PCBs	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.0167	U	0.0178	U	0.0167	U	0.0168	U	0.0166	U	0.0176	U	0.0169	U	0.0170	U	0.0166	U	0.0168	U	0.145	U	0.0165	U	0.1	1

NOTES:

Q is the Qualifier Column with definitions as follows:

U=analyte not detected at or above the level indicated

P=this flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis

D=result is from an analysis that required a dilution

NS=this indicates that no regulatory limit has been established for this analyte

sample exceeds NYSDEC Part 375 UUSCO

UUSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives

RRSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives

Table 6 (Cont.)
Soil Samples Analytical Results for Metals
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	SP-1 (4-6)		SP2 (2-4)		SP3 (8-10)		SP4 (10-12)		SP-5 (10-12)		SP 6 (10-12)		SP 7 (4-6)		SP 8 (10-12)		SP-9 (36-38)		SP-9 (36-38)		SP-10 (0-2)		SP-10 (36-38)		SP-11 (36-38)		SP-12 (0-2)		SP-12 (28-30)		SP-13 (0-2)		SP-13 (26-28)		SP-14 (0-2)		SP-14 (26-28)		SP-15 (0-2)		SP-15 (26-28)		UUSCOs	RRSCOs
Sampling Date	3/10/2016		3/10/2016		3/10/2016		3/10/2016		4/7/2016		4/8/2016		4/8/2016		4/8/2016		8/14/2017		8/14/2017		8/14/2017		8/14/2017		8/14/2017		8/11/2017		8/11/2017		8/28/2017		8/28/2017		8/24/2017		8/24/2017		8/25/2017		8/25/2017			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
Compound	Result		Result		Result		Result	Q	Result		Result		Result		Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Units	mg/Kg	Q	mg/Kg	Q	mg/Kg	Q	Result		mg/kg	Q	mg/kg	Q	mg/kg	Q	mg/kg	Q	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
Aluminum	NT		NT		NT		NT		NT		NT		NT		NT		NT		**1,990**		**3,930**		**2,410**		**2,410**		**3,300**		**2,240**		**2,470**		**1,380**		**2,210**		**2,150**		**2,190**		**2,180**		NS	NS
Antimony	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.52	U	**0.62**		0.51	U	0.51	U	**0.69**		0.64		0.51	U	0.52	U	0.50	U	0.51	U	0.50	U	0.50	U	NS	NS
Arsenic	NT		NT		NT		NT		NT		NT		NT		NT		NT		1.030	U	**1.650**		1.010	U	1.030	U	1.010	U	1.060	U	1.020	U	1.030	U	1	U	**1.350**		1	U	1	U	13	16
Barium	NT		NT		NT		NT		NT		NT		NT		NT		NT		**11.50**		**26.80**		**16.40**		**15.70**		**19.80**		**21.40**		**14.80**		**10**		**14.70**		**12**		**13.70**		**32.10**		350	400
Beryllium	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.10	U	0.11	U	0.10	U	0.10	U	0.10	U	0.11	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	7.2	72
Cadmium	NT		NT		NT		NT		NT		NT		NT		NT		NT		0.31	U	0.32	U	0.30	U	0.31	U	0.30	U	0.32	U	0.31	U	0.31	U	0.30	U	0.31	U	0.30	U	0.30	U	2.5	4.3
Calcium	NT		NT		NT		NT		NT		NT		NT		NT		**8,240**		**604**		**12,600**		**14,000**		**1,350**		**11,400**		**1,240**		**7,110**		**634**		**668**		**815**		**1,170**		NS	NS
Chromium, Hexavalent	NT		NT		NT		NT		NT		NT		NT		NT		0.515	U	0.538	U	0.507	U	0.514	U	0.505	U	0.528	U	0.511	U	0.517	U	0.501	U	0.508	U	0.501	U	0.501	U	1	110
Chromium, Trivalent	NT		NT		NT		NT		NT		NT		NT		NT		**5.64**		**11.20**		**4.76**		**9.17**		**11.20**		**5.59**		**10**		**3.43**		**8.32**		**9.38**		**6.95**		**10.20**		30	180
Cobalt	NT		NT		NT		NT		NT		NT		NT		NT		**2.88**		**4.93**		**3.43**		**4.63**		**5.42**		**2.69**		**3.90**		**2.17**		**4.39**		**3.31**		**3.50**		**5.97**		NS	NS
Copper	NT		NT		NT		NT		NT		NT		NT		NT		**6.75**		**9.53**		**8.27**		**10**		**10.40**		**7.74**		**6.76**		**5.23**		**8.20**		**6.03**		**6.93**		**8.20**		50	270
Cyanide, total	NT		NT		NT		NT		NT		NT		NT		NT		0.52	U	0.54	U	0.51	U	0.51	U	0.51	U	0.53	U	0.51	U	0.52	U	0.50	U	0.51	U	0.50	U	0.50	U	27	27
Iron	NT		NT		NT		NT		NT		NT		NT		NT		**5,790**		**11,700**		**5,470**		**9,550**		**14,000**		**5,430**		**9,820**	**B**	**3,400**	**B**	**15,600**	**B**	**8,670**	**B**	**9,290**	**B**	**14,800**	**B**	NS	NS
Lead	NT		NT		NT		NT		NT		NT		NT		NT		**1.32**		**8.53**		**1.35**		**1.90**		**3.33**		**1.33**		**3.24**		**1.10**		**4.85**		**1.44**		**1.95**		**1.94**		63	400
Magnesium	NT		NT		NT		NT		NT		NT		NT		NT		**5,010**		**1,330**		**7,690**		**8,590**		**1,250**		**5,830**		**1,150**		**4,100**		**793**		**912**		**940**		**895**		NS	NS
Manganese	NT		NT		NT		NT		NT		NT		NT		NT		**155**		**214**		**172**		**264**		**267**		**147**		**192**		**124**		**287**		**117**		**209**		**587**		1600	2000
Mercury	NT		NT		NT		NT		NT		NT		NT		NT		0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.18	0.81
Nickel	NT		NT		NT		NT		NT		NT		NT		NT		**5.87**		**8.87**		**6.60**		**8.94**		**9.23**		**5.54**		**7.76**		**4.54**		**7.58**		**7.04**		**6.83**		**8.28**		30	310
Potassium	NT		NT		NT		NT		NT		NT		NT		NT		**448**		**427**		**542**		**394**		**486**		**445**		**562**		**250**		**340**		**321**		**331**		**342**		NS	NS
Selenium	NT		NT		NT		NT		NT		NT		NT		NT		1.03	U	1.08	U	1.01	U	1.03	U	1.01	U	1.06	U	**1.23**		1.03	U	1.04		1.02	U	1.00	U	**1.95**		3.9	180
Silver	NT		NT		NT		NT		NT		NT		NT		NT		0.52	U	0.54	U	0.51	U	0.51	U	0.51	U	0.53	U	0.51	U	0.52	U	0.50	U	0.51	U	0.50	U	0.50	U	2	180
Sodium	NT		NT		NT		NT		NT		NT		NT		NT		**101**		**76.80**		**129**		**127**		**211**		**154**		**126**	B	**76.90**	B	**91.10**	B	**106**	B	**84**	B	**76.50**	B	NS	NS
Thallium	NT		NT		NT		NT		NT		NT		NT		NT		1.03	U	1.08	U	1.01	U	1.03	U	1.01	U	1.06	U	1.02	U	1.03	U	1	U	1.020	U	1	U	1	U	NS	NS
Vanadium	NT		NT		NT		NT		NT		NT		NT		NT		**10.80**		**18.50**		**8.36**		**20.90**		**18.30**		**8.16**		**15.60**		**5.62**		**16.30**		**9.86**		**9.87**		**12.20**		NS	NS
Zinc	NT		NT		NT		NT		NT		NT		NT		NT		**7.36**		**17**		**10.30**		**12**		**11.90**		**11**		**8.36**		**5.48**		**9.12**		**7.24**		**7.47**		**10.90**		109	10000

NOTES:
Q is the Qualifier Column with definitions as follows:
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
NS=this indicates that no regulatory limit has been established for this analyte
ND=analyte not detected at or above the level indicated

UUSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives

Table 7
Groundwater Samples Analytical Results for VOC's
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	TMW-1		MW-1		MW-2		MW-3		MW-4		MW-5		Field Blank		Field Blank		Field Blank 1		Field Blank 2		Field Blank 3		Field Blank		Field Blank		Trip Blank		Trip Blank		Trip Blank		Trip Blank		NYSDEC TOGS Standards and Guidance Values - GA
Sampling Date	4/8/2016		10/3/2017		10/2/2017		10/3/2017		10/3/2017		10/3/2017		8/11/2017		8/14/2017		8/24/2017		8/25/2017		8/28/2017		10/2/2017		10/3/2017		8/11/2017		8/25/2017		10/2/2017		10/3/2017		
Client Matrix	Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		
Compound	Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
Units	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
1,1,1,2-Tetrachloroethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,1,1-Trichloroethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,1,2,2-Tetrachloroethane	< 0.50	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,1,2-Trichloro-1,2,2-trifluoroethane	NT		0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,1,2-Trichloroethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	1
1,1-Dichloroethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,1-Dichloroethylene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,1-Dichloropropylene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,2,3-Trichlorobenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,2,3-Trichloropropane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	0.04
1,2,4-Trichlorobenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,2,4-Trimethylbenzene	< 1.0	U	**0.47**	J	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,2-Dibromo-3-chloropropane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	0.04
1,2-Dibromoethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	0.0006
1,2-Dichlorobenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	3
1,2-Dichloroethane	< 0.60	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	0.6
1,2-Dichloropropane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	1
1,3,5-Trimethylbenzene	< 1.0	U	0.200	U	**0.55**		0.200	U	0.200	U	0.470	J	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,3-Dichlorobenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	3
1,3-Dichloropropane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
1,4-Dichlorobenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	3
2,2-Dichloropropane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
2-Butanone	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	50
2-Chlorotoluene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
2-Hexanone	< 5.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	N		N		0.200	U	**0.30**	J	0.200	U	0.200	U	0.200	U	N		0.200	U	0.200	U	0.200	U	50
4-Chlorotoluene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
4-Methyl-2-pentanone	< 5.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	NT		NT		0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	NT		0.200	U	0.200	U	0.200	U	NS
Acetone	< 25	U	1	U	**1.10**	J	**1.20**	J	**1.10**	J	**1.40**	J	5	U	5	U	1	U	**1.20**	J	**2.50**		**5.50**		**5.50**		5	U	1	U	1	U	1	U	50
Benzene	< 0.70	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	1
Bromobenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Bromochloromethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Bromodichloromethane	< 0.50	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	**0.280**	J	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	50
Bromoform	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	50
Bromomethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Carbon disulfide	< 5.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	NT		NT		0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	NT		0.200	U	0.200	U	0.200	U	NS
Carbon tetrachloride	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Chlorobenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Chloroethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Chloroform	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	**0.26**	J	2.500	U	0.200	U	0.200	U	0.200	U	7
Chloromethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	**0.64**		2.500	U	0.200	U	0.200	U	0.200	U	5
cis-1,2-Dichloroethylene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
cis-1,3-Dichloropropylene	< 0.40	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	0.4
Dibromochloromethane	< 0.50	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	50
Dibromomethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	NS
Dichlorodifluoromethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Ethyl Benzene	< 1.0	U	0.220	J	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Hexachlorobutadiene	< 0.40	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	0.5
Isopropylbenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Methyl tert-butyl ether (MTBE)	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	10
Methylene chloride	< 1.0	U	1	U	1	U	1	U	1	U	1	U	2.500	U	2.500	U	1	U	1	U	1	U	1	U	1	U	2.500	U	1	U	1	U	1	U	5
Naphthalene	< 1.0	U	1	U	1	U	1	U	1	U	1	U	2.500	U	2.500	U	1	U	1	U	1	U	1	U	1	U	2.500	U	1	U	1	U	1	U	10
n-Butylbenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
n-Propylbenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
o-Xylene	< 1.0	U	**0.37**	J	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
p- & m- Xylenes	< 1.0	U	0.990	J	0.500	U	0.500	U	0.500	U	0.500	U	5	U	5	U	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U	5	U	0.500	U	0.500	U	0.500	U	5
p-Isopropyltoluene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
sec-Butylbenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Styrene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
tert-Butylbenzene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Tetrachloroethylene	**2.7**		**2.40**		**2.70**		**5.80**		**0.50**		**8.30**		2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Toluene	< 1.0	U	**0.68**		0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
trans-1,2-Dichloroethylene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
trans-1,3-Dichloropropylene	< 0.40	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	0.4
Trichloroethylene	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Trichlorofluoromethane	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	5
Vinyl Chloride	< 1.0	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	2.500	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	2.500	U	0.200	U	0.200	U	0.200	U	2

NOTES:

Q is the Qualifier Column with definitions as follows:

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated

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

NS=this indicates that no regulatory limit has been established for this analyte

sample exceeds NYSDEC TOGS Standards and Guidance Values - GA

Table 7 (Cont.)
Groundwater Samples Analytical Results for SVOC's
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	TMW-1		MW-1		MW-2		MW-3		MW-4		MW-5		Field Blank		Field Blank		Field Blank 1		Field Blank 2		Field Blank 3		Field Blank		Field Blank		Trip Blank		Trip Blank		Trip Blank		Trip Blank		
Sampling Date	4/8/2016		10/3/2017		10/2/2017		10/3/2017		10/3/2017		10/3/2017		8/11/2017		8/14/2017		8/24/2017		8/25/2017		8/28/2017		10/2/2017		10/3/2017		8/11/2017		8/25/2017		10/2/2017		10/3/2017		NYSDEC TOGS Standards and Guidance Values - GA
Client Matrix	Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		
Compound	Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
Units	ug/L	Q	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
1,2,4-Trichlorobenzene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
1,2-Dichlorobenzene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		3
1,3-Dichlorobenzene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		3
1,4-Dioxane	NT		0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		
1,4-Dichlorobenzene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		3
2,4,5-Trichlorophenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
2,4,6-Trichlorophenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
2,4-Dichlorophenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
2,4-Dimethylphenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50
2,4-Dinitrophenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		10
2,4-Dinitrotoluene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
2,6-Dinitrotoluene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
2-Chloronaphthalene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		10
2-Chlorophenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
2-Methylnaphthalene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		NS
2-Methylphenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
2-Nitroaniline	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
2-Nitrophenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
3- & 4-Methylphenols	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		NS
3,3-Dichlorobenzidine	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
3-Nitroaniline	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
4,6-Dinitro-2-methylphenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		NS
4-Bromophenyl phenyl ether	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		NS
4-Chloro-3-methylphenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
4-Chloroaniline	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
4-Chlorophenyl phenyl ether	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		NS
4-Nitroaniline	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
4-Nitrophenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
Acenaphthene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		20
Acenaphthylene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		NS
Aniline	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
Anthracene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		50
Benzo(a)anthracene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		0.002
Benzo(a)pyrene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		0.002
Benzo(b)fluoranthene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		0.002
Benzo(g,h,i)perylene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		NS
Benzo(k)fluoranthene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		0.002
Benzyl alcohol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		NS
Benzyl butyl phthalate	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50
Bis(2-chloroethoxy)methane	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
Bis(2-chloroethyl)ether	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
Bis(2-chloroisopropyl)ether	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
Bis(2-ethylhexyl)phthalate	NT		0.645	U	0.513	U	0.556	U	0.606	U	0.556	U	0.541	U	0.556	U	**1.23**		0.513	U	0.541	U	0.526	U	0.571	U	NT		NT		NT		NT		5
Chrysene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		0.002
Dibenzo(a,h)anthracene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		NS
Dibenzofuran	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		NS
Diethyl phthalate	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50
Dimethyl phthalate	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50
Di-n-butyl phthalate	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50
Di-n-octyl phthalate	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50
Fluoranthene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		50
Fluorene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		50
Hexachlorobenzene	NT		0.0258	U	0.0205	U	0.0222	U	0.0242	U	0.0222	U	0.0216	U	0.0222	U	0.0216	U	0.0205	U	0.0216	U	0.0211	U	0.0229	U	NT		NT		NT		NT		0.04
Hexachlorobutadiene	NT		0.645	U	0.513	U	0.556	U	0.606	U	0.556	U	0.541	U	0.556	U	0.541	U	0.513	U	0.541	U	0.526	U	0.571	U	NT		NT		NT		NT		0.5
Hexachlorocyclopentadiene	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		5
Hexachloroethane	NT		0.645	U	0.513	U	0.556	U	0.606	U	0.556	U	0.541	U	0.556	U	0.541	U	0.513	U	0.541	U	0.526	U	0.571	U	NT		NT		NT		NT		5
Indeno(1,2,3-cd)pyrene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		0.002
Isophorone	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50
Naphthalene	NT		**0.37**		0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		10
Nitrobenzene	NT		0.323	U	0.256	U	0.278	U	0.303	U	0.278	U	0.270	U	0.278	U	0.270	U	0.256	U	0.270	U	0.263	U	0.286	U	NT		NT		NT		NT		0.4
N-Nitrosodimethylamine	NT		0.645	U	0.513	U	0.556	U	0.606	U	0.556	U	0.541	U	0.556	U	0.541	U	0.513	U	0.541	U	0.526	U	0.571	U	NT		NT		NT		NT		NS
N-nitroso-di-n-propylamine	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		NS
N-Nitrosodiphenylamine	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50
Pentachlorophenol	NT		0.323	U	0.256	U	0.278	U	0.303	U	0.278	U	0.270	U	0.278	U	0.270	U	0.256	U	0.270	U	0.263	U	0.286	U	NT		NT		NT		NT		1
Phenanthrene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		50
Phenol	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		1
Pyrene	NT		0.0645	U	0.0513	U	0.0556	U	0.0606	U	0.0556	U	0.0541	U	0.0556	U	0.0541	U	0.0513	U	0.0541	U	0.0526	U	0.0571	U	NT		NT		NT		NT		50
Pyridine	NT		3.230	U	2.560	U	2.780	U	3.030	U	2.780	U	2.700	U	2.780	U	2.700	U	2.560	U	2.700	U	2.630	U	2.860	U	NT		NT		NT		NT		50

NOTES:
Q is the Qualifier Column with definitions as follows:
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
NT=this indicates the analyte was not a target for this sample
NS=this indicates that no regulatory limit has been established for this analyte

Table 7 (Cont.)
Groundwater Samples Analytical Results for Pesticides, Herbicides and PCBs
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	TMW-1		MW-1		MW-2		MW-3		MW-4		MW-5		Field Blank		Field Blank		Field Blank 1		Field Blank 2		Field Blank 3		Field Blank		Field Blank		Trip Blank		Trip Blank		Trip Blank		Trip Blank		NYSDEC TOGS Standards and Guidance Values - GA
Sampling Date	4/8/2016		10/3/2017		10/2/2017		10/3/2017		10/3/2017		10/3/2017		8/11/2017		8/14/2017		8/24/2017		8/25/2017		8/28/2017		10/2/2017		10/3/2017		8/11/2017		8/25/2017		10/2/2017		10/3/2017		
Client Matrix	Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		
Compound	Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
Units	ug/L	Q	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Pesticides, 8081 target list																																			
4,4'-DDD	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.3
4,4'-DDE	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	**0.0186**	P	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.2
4,4'-DDT	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	**0.111**		0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.2
Aldrin	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		NS
alpha-BHC	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.01
alpha-Chlordane	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		NS
beta-BHC	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.04
Chlordane, total	NT		0.0211	U	0.0205	U	0.0216	U	0.0216	U	0.0205	U	0.0211	U	0.0211	U	0.0229	U	0.0205	U	0.0211	U	0.0211	U	0.0211	U	NT		NT		NT		NT		0.05
delta-BHC	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.04
Dieldrin	NT		0.00211	U	0.00205	U	0.00216	U	0.00216	U	0.00205	U	0.00211	U	0.00211	U	0.00229	U	0.00205	U	0.00211	U	0.00211	U	0.00211	U	NT		NT		NT		NT		0.004
Endosulfan I	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	**0.0146**		0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		NS
Endosulfan II	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		NS
Endosulfan sulfate	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		NS
Endrin	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		NS
Endrin aldehyde	NT		0.0105	U	0.0103	U	0.0108	U	0.0108	U	0.0103	U	0.0105	U	0.0105	U	0.0114	U	0.0103	U	0.0105	U	0.0105	U	0.0105	U	NT		NT		NT		NT		5
Endrin ketone	NT		0.0105	U	0.0103	U	0.0108	U	0.0108	U	0.0103	U	0.0105	U	0.0105	U	0.0114	U	0.0103	U	0.0105	U	0.0105	U	0.0105	U	NT		NT		NT		NT		5
gamma-BHC (Lindane)	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.05
gamma-Chlordane	NT		0.0105	U	0.0103	U	0.0108	U	0.0108	U	0.0103	U	0.0105	U	0.0105	U	0.0114	U	**0.0172**		0.0105	U	0.0105	U	0.0105	U	NT		NT		NT		NT		NS
Heptachlor	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.04
Heptachlor epoxide	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		0.03
Methoxychlor	NT		0.00421	U	0.00410	U	0.00432	U	0.00432	U	0.00410	U	0.00421	U	0.00421	U	0.00457	U	0.00410	U	0.00421	U	0.00421	U	0.00421	U	NT		NT		NT		NT		35
Toxaphene	NT		0.105	U	0.103	U	0.108	U	0.108	U	0.103	U	0.105	U	0.105	U	0.114	U	0.103	U	0.105	U	0.105	U	0.105	U	NT		NT		NT		NT		0.06
Herbicides, Target List																																			
2,4,5-T	NT		5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	NT		NT		NT		NT		35
2,4,5-TP (Silvex)	NT		5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	NT		NT		NT		NT		0.26
2,4-D	NT		5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	NT		NT		NT		NT		50
Polychlorinated Biphenyls (PCB)																																			
Aroclor 1016	NT		0.0526	U	0.0513	U	0.0541	U	0.0541	U	0.0513	U	0.0526	U	0.0526	U	0.0571	U	0.0513	U	0.0526	U	0.0526	U	0.0526	U	NT		NT		NT		NT		NS
Aroclor 1221	NT		0.0526	U	0.0513	U	0.0541	U	0.0541	U	0.0513	U	0.0526	U	0.0526	U	0.0571	U	0.0513	U	0.0526	U	0.0526	U	0.0526	U	NT		NT		NT		NT		NS
Aroclor 1232	NT		0.0526	U	0.0513	U	0.0541	U	0.0541	U	0.0513	U	0.0526	U	0.0526	U	0.0571	U	0.0513	U	0.0526	U	0.0526	U	0.0526	U	NT		NT		NT		NT		NS
Aroclor 1242	NT		0.0526	U	0.0513	U	0.0541	U	0.0541	U	0.0513	U	0.0526	U	0.0526	U	0.0571	U	0.0513	U	0.0526	U	0.0526	U	0.0526	U	NT		NT		NT		NT		NS
Aroclor 1248	NT		0.0526	U	0.0513	U	0.0541	U	0.0541	U	0.0513	U	0.0526	U	0.0526	U	0.0571	U	0.0513	U	0.0526	U	0.0526	U	0.0526	U	NT		NT		NT		NT		NS
Aroclor 1254	NT		0.0526	U	0.0513	U	0.0541	U	0.0541	U	0.0513	U	0.0526	U	0.0526	U	0.0571	U	0.0513	U	0.0526	U	0.0526	U	0.0526	U	NT		NT		NT		NT		NS
Aroclor 1260	NT		0.0526	U	0.0513	U	0.0541	U	0.0541	U	0.0513	U	0.0526	U	0.0526	U	0.0571	U	0.0513	U	0.0526	U	0.0526	U	0.0526	U	NT		NT		NT		NT		NS
Total PCBs	NT		0.0526	U	0.0513	U	0.0541	U	0.0541	U	0.0513	U	0.0526	U	0.0526	U	0.0571	U	0.0513	U	0.0526	U	0.0526	U	0.0526	U	NT		NT		NT		NT		0.09

NOTES:
Q is the Qualifier Column with definitions as follows:
U=analyte not detected at or above the level indicated
P=this flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis
NT=this indicates the analyte was not a target for this sample
NS=this indicates that no regulatory limit has been established for this analyte
sample exceeds NYSDEC TOGS Standards and Guidance Values - GA

Table 7 (Cont.)
Groundwater Samples Analytical Results for Metals
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	TMW-1		MW-1		MW-2		MW-3		MW-4		MW-5		Field Blank		Field Blank		Field Blank 1		Field Blank 2		Field Blank 3		Field Blank		Field Blank		Trip Blank		Trip Blank		Trip Blank		Trip Blank		NYSDEC TOGS Standards and Guidance Values - GA
Sampling Date	4/8/2016		10/3/2017		10/2/2017		10/3/2017		10/3/2017		10/3/2017		8/11/2017		8/14/2017		8/24/2017		8/25/2017		8/28/2017		10/2/2017		10/3/2017		8/11/2017		8/25/2017		10/2/2017		10/3/2017		
Client Matrix	Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
Units	ug/L	Q	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Metals, Target Analyte, ICP																																		
Aluminum	NT		**87.80**		**2,300**		**6,790**		**74**		**7,590**		56	U	56	U	56	U	**317**		56	U	**203**		55.600	U	NT		NT		NT		NT		NS
Antimony	NT		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	6	U	6	U	6	U	6	U	6	U	1.110	U	1.110	U	NT		NT		NT		NT		3
Arsenic	NT		1.110	U	1.110	U	**1.890**		1.110	U	**2.550**		4	U	4	U	4	U	4	U	4	U	1.110	U	1.110	U	NT		NT		NT		NT		25
Barium	NT		**91.50**		**268**		**248**		**83**		**263**		11	U	11	U	11	U	11	U	11	U	11.100	U	11.100	U	NT		NT		NT		NT		1000
Beryllium	NT		0.333	U	0.333	U	**0.52**		0.333	U	**0.68**		1	U	1	U	1	U	1	U	1	U	0.333	U	0.333	U	NT		NT		NT		NT		3
Cadmium	NT		0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	3	U	3	U	3	U	3	U	3	U	0.556	U	0.556	U	NT		NT		NT		NT		5
Calcium	NT		**103,000**		**122,000**		**50,200**		**100,000**		**92,500**		**107**		**126**		56	U	**828**		**293**		**150**		55.600	U	NT		NT		NT		NT		NS
Chromium, Hexavalent	NT		10	U	10	U	10	U	10	U	**17**				6	U	6	U	6	U	6	U	10	U	10	U			NT		NT		NT		50
Chromium Trivalent	NT		5.560	U	**8.0**		**109**		5.560	U	**88**		6	U			6	U	6	U	6	U	5.560	U	5.560	U	NT		NT		NT		NT		50
Cyanide, total	NT		10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NT		NT		NT		NT		200
Copper	NT		22.200	U	**41.60**	B	**90.70**	B	22.200	U	**104**	B	**11**	J	11	J	**6**	J	**7**	B	**7**	B	22.200	U	22.200	U	NT		NT		NT		NT		200
Iron	NT		**416**		**6,590**		**22,400**		**213**		**34,200**		**24**		**52**		22	U	**592**		**343**		**399**		22.200	U	NT		NT		NT		NT		NS
Lead	NT		5.560	U	5.560	U	**23.10**		5.560	U	**41.80**		6	U	6	U	6	U	6	U	6	U	5.560	U	5.560	U	NT		NT		NT		NT		25
Magnesium	NT		**28,600**		**41,600**		**16,200**		**24,000**		**31,200**		56	U	56	U	56	U	**179**		56	U	**101**		55.600	U	NT		NT		NT		NT		35000
Manganese	NT		**75.10**		**832**		**4,390**		**48.50**		**3,870**		6	U	6	U	6	U	**88**		6	U	5.560	U	5.560	U	NT		NT		NT		NT		300
Mercury	NT		0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	NT		NT		NT		NT		0.7
Nickel	NT		5.560	U	**17.100**		**67**		5.560	U	**76.10**		6	U	6	U	6	U	6	U	6	U	5.560	U	5.560	U	NT		NT		NT		NT		100
Potassium	NT		**3,560**	B	**5,020**	B	**5,420**	B	**2,100**	B	**4,000**	B	**119**		**99**		56	U	**200**		**245**		**103**	B	**65.70**	B	NT		NT		NT		NT		NS
Selenium	NT		**5.97**		**6.910**		**7.84**		**6.80**		**10.60**		11	U	11	U	11	U	11	U	11	U	1.110	U	1.110	U	NT		NT		NT		NT		10
Silver	NT		5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	6	U	6	U	6	U	6	U	6	U	5.560	U	5.560	U	NT		NT		NT		NT		50
Sodium	NT		55,400	B	**85,400**	B	**7,130**	B	**71,700**	B	**40,500**	B	**252**		**185**		**142**	B	**319**	B	**324**	B	**1,890**	B	**1,840**	B	NT		NT		NT		NT		20000
Vanadium	NT		11.100	U	11.100	U	**12.50**		11.100	U	**25.20**		6	U	6	U	6	U	6	U	6	U	11.100	U	11.100	U	NT		NT		NT		NT		NS
Thallium	NT		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	11	U	11	U	11	U	11	U	11	U	1.110	U	1.110	U	NT		NT		NT		NT		NS
Zinc	NT		16.700	U	**45.80**		**67.40**		**18.90**		**98.30**		**19**		17	U	17	U	**23**		**34**		**21.20**		16.700	U	NT		NT		NT		NT		2000
Metals, Target Analyte, ICP Dissolved																																		
Aluminum	NT		55.600	U	55.600	U	55.600	U	55.600	U	55.600	U	NT		NT		NT		NT		NT		55.600	U	**92.70**		NT		NT		NT		NT		NS
Antimony	NT		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	NT		NT		NT		NT		NT		1.110	U	1.110	U	NT		NT		NT		NT		3
Arsenic	NT		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	NT		NT		NT		NT		NT		1.110	U	1.110	U	NT		NT		NT		NT		25
Barium	NT		**99.50**		**133**		**26.60**		**78.70**		**46.10**		NT		NT		NT		NT		NT		11.100	U	11.100	U	NT		NT		NT		NT		1000
Beryllium	NT		0.111	U	0.111	U	0.111	U	0.111	U	0.111	U	NT		NT		NT		NT		NT		0.111	U	0.111	U	NT		NT		NT		NT		3
Cadmium	NT		0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	NT		NT		NT		NT		NT		0.556	U	0.556	U	NT		NT		NT		NT		5
Calcium	NT		**117,000**	B	**114,000**	B	44,600	B	**104,000**	B	**78,900**	B	NT		NT		NT		NT		NT		**618**	B	55.600	U	NT		NT		NT		NT		NS
Chromium	NT		5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	NT		NT		NT		NT		NT		5.560	U	5.560	U	NT		NT		NT		NT		50
Copper	NT		**8.25**	B	**6.46**	B	5.560	U	**10.20**	B	**8.58**	B	NT		NT		NT		NT		NT		5.560	U	5.560	U	NT		NT		NT		NT		200
Iron	NT		**28.80**		**34.200**		22.200	U	22.200	U	22.200	U	NT		NT		NT		NT		NT		**76.10**		22.200	U	NT		NT		NT		NT		NS
Lead	NT		5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	NT		NT		NT		NT		NT		5.560	U	5.560	U	NT		NT		NT		NT		25
Magnesium	NT		**33,400**		**33,900**		**13,000**		**25,400**		**22,700**		NT		NT		NT		NT		NT		55.600	U	55.600	U	NT		NT		NT		NT		35000
Manganese	NT		**64.80**		5.560	U	**113**		29.500		**122**		NT		NT		NT		NT		NT		5.560	U	5.560	U	NT		NT		NT		NT		300
Mercury	NT		0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	NT		NT		NT		NT		NT		0.200	U	0.200	U	NT		NT		NT		NT		0.7
Nickel	NT		5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	NT		NT		NT		NT		NT		5.560	U	5.560	U	NT		NT		NT		NT		100
Potassium	NT		**4,290**	B	**5,770**	B	**4,560**	B	**2,340**	B	**3,320**	B	NT		NT		NT		NT		NT		**205**	B	**139**	B	NT		NT		NT		NT		NS
Silver	NT		5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	NT		NT		NT		NT		NT		5.560	U	5.560	U	NT		NT		NT		NT		50
Selenium	NT		**4.42**		**6.91**		1.110	U	**4.14**		**2.44**		NT		NT		NT		NT		NT		1.110	U	1.110	U	NT		NT		NT		NT		10
Sodium	NT		62,500	B	76,300	B	6,980	B	73,100	B	**42,800**	B	NT		NT		NT		NT		NT		**2,260**	B	**2,120**	B	NT		NT		NT		NT		20000
Thallium	NT		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	NT		NT		NT		NT		NT		1.110	U	1.110	U	NT		NT		NT		NT		NS
Vanadium	NT		11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	NT		NT		NT		NT		NT		11.100	U	11.100	U	NT		NT		NT		NT		NS

NOTES:
Q is the Qualifier Column with definitions as follows:
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
NT=this indicates the analyte was not a target for this sample
NS=this indicates that no regulatory limit has been established for this analyte
sample exceeds NYSDEC TOGS Standards and Guidance Values - GA

Table 7 (Cont.)
Groundwater Samples Analytical Results for PFOA/PFOS
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	TMW-1		MW-1		MW-2		MW-3		MW-4		MW-5		Field Blank		Field Blank		Field Blank 1		Field Blank 2		Field Blank 3		Field Blank		Field Blank		Trip Blank		Trip Blank		Trip Blank		Trip Blank		NYSDEC TOGS Standards and Guidance Values - GA
Sampling Date	4/8/2016		10/3/2017		10/2/2017		10/3/2017		10/3/2017		10/3/2017		8/11/2017		8/14/2017		8/24/2017		8/25/2017		8/28/2017		10/2/2017		10/3/2017		8/11/2017		8/25/2017		10/2/2017		10/3/2017		
Client Matrix	Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		Water		
Compound	Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
Units	ug/L	Q	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L
Perfluorobutanesulfonic acid (PFBS)	NT		**44**		20	ND	20	ND	<20	ND	**340**		NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorohexanoic acid (PFHxA)	NT		20	ND	20	ND	20	ND	<20	ND	**21**		NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluoroheptanoic acid (PFHpA)	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorohexanesulfonic acid (PFHxS)	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorooctanoic acid (PFOA)	NT		**21**		**27**		**27**		**38**		**47**		NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorooctanesulfonic acid (PFOS)	NT		**24**		20	ND	20	ND	<20	ND	**20**		NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorononanoic acid (PFNA)	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorodecanoic acid (PFDA)	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
NMeFOSAA	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluoroundecanoic acid (PFUnA)	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
NEtFOSAA	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorododecanoic acid (PFDoA)	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorotridecanoic acid (PFTrDA)	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS
Perfluorotetradecanoic acid (PFTA)	NT		20	U	20	ND	20	ND	<20	ND	20	ND	NT		NT		NT		NT		NT		20	ND	20	ND	NT		NT		NT		NT		NS

NOTES:
NS=analyte not detected at or above the level indicated
NT=this indicates the analyte was not a target for this sample
NS=this indicates that no regulatory limit has been established for this analyte

Table 8
Soil/Sub-slab Vapor Samples Analytical Results for VOCs
107-02 to 107-16 Queens Boulevard, Queens, NY

Sample ID	SB-1		SB-2		1A-1		1A-2		SB-3		1A-3		SB-4		1A-4		1A-5		SB-5		SB-6		1A-6		SB-7		1A-6		SB-8		1A-7		SB-9		SB-10		1A-8		SB-11		SB-12		1A-9		SV-1		SV-2		OA-1		OA-2		1A- Ventilation	
Sampling Date	3/11/2016		3/11/2016		3/11/2016		3/11/2016		4/12/2016		4/12/2016		4/12/2016		4/12/2016		4/12/2016		10/3/2017		10/3/2017		10/3/2017		10/3/2017		10/3/2017		10/2/2017		10/3/2017		10/3/2017		10/3/2017		10/3/2017		10/3/2017		10/3/2017		10/3/2017		3/11/2016		10/3/2017		3/11/2016		10/3/2017		2/15/2017	
Client Matrix	Sub Slab		Sub Slab		Indoor Ambient Air		Indoor Ambient Air		Sub Slab		Indoor Ambient Air		Sub Slab		Indoor Ambient Air		Indoor Ambient Air		Sub-slab Vapor		Sub-slab Vapor		Indoor Ambient Air		Sub-slab Vapor		Indoor Ambient Air		Sub-slab Vapor		Indoor Ambient Air		Sub-slab Vapor		Sub-slab Vapor		Indoor Ambient Air		Sub-slab Vapor		Sub-slab Vapor		Indoor Ambient Air		Soil Vapor		Soil Vapor		Outdoor Ambient Air		Outdoor Ambient Air		Indoor Ambient Air	
Compounds	Result		Result		Result		Result		Result		Result		Result		Result		Result		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Units	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3		ug/m3		ug/m3		ug/m3		ug/m3		ug/m2		ug/m3		ug/m3		ug/m3		ug/m3		ug/m3		ug/m3		ug/m3		ug/m3		ug/m3		ug/m3		ug/m3	
1,1,1,2-Tetrachloroethane	<16	U	<14	U	<0.72	U	<0.69	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	21	U	14	U	0.69	U	16	U	0.69	U	NO		0.790	U	1.100	U	11	U	0.690	U	13	U	16	U	0.700	U	<12	U	11	U	<0.69	U	0.69	U	0.36	U
1,1,1-Trichloroethane	<13	U	<11	U	<0.57	U	<0.55	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	17	U	11	U	0.55	U	12	U	0.55	U	NO		0.63	U	0.86	U	8.50	U	0.55	U	10	U	13	U	0.56	U	<9.2	U	8.90	U	<0.55	U	0.55	U	0.29	U
1,1,2,2-Tetrachloroethane	<16	U	<14	U	<0.72	U	<0.69	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	21	U	14	U	0.69	U	16	U	0.69	U	NO		0.79	U	1.10	U	11	U	0.69	U	13	U	16	U	0.70	U	<12	U	11	U	<0.69	U	0.69	U	0.36	U
1,1,2-Trichloro-1,2,2-trifluoroethane	<18	U	<15	U	<0.8	U	<0.77	U	NT		NT		NT		NT		NT		23	U	16	U	0.77	U	17	U	**1.60**		NO		0.88	U	1.20	U	12	U	**2.10**		14	U	18	U	0.780	U	<13	U	13	U	<0.77	U	**0.92**		0.41	U
1,1,2-Trichloroethane	<13	U	<11	U	<0.57	U	<0.55	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	17	U	11	U	0.55	U	12	U	0.55	U	NO		0.63	U	0.86	U	8.50	U	0.55	U	10	U	13	U	0.56	U	<9.2	U	8.90	U	<0.55	U	0.55	U	0.29	U
1,1-Dichloroethane	<9.4	U	<8.1	U	<0.42	U	<0.4	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	12	U	8.30	U	0.40	U	9.20	U	0.40	U	NO		0.47	U	0.64	U	6.30	U	0.40	U	7.50	U	9.40	U	0.41	U	<6.8	U	6.60	U	<0.4	U	0.40	U	0.21	U
1,1-Dichloroethylene	<9.2	U	<7.9	U	<0.42	U	<0.4	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	12	U	8.10	U	0.40	U	9	U	0.40	U	NO		0.46	U	0.63	U	6.20	U	0.40	U	7.30	U	9.20	U	0.40	U	<6.7	U	6.50	U	<0.4	U	0.40	U	0.05	U
1,2,4-Trichlorobenzene	<17	U	<15	U	<0.78	U	<0.74	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	23	U	15	U	0.74	U	17	U	0.74	U	NO		0.86	U	1.20	U	12	U	0.74	U	14	U	17	U	0.76	U	<13	U	12	U	<0.74	U	0.74	U	**3.41**	D
1,2,4-Trimethylbenzene	**64**	**D**	**140**	**D**	**0.52**	**D**	<0.49	U	**9.78**		< 1.00	U	**8.75**		< 1.00	U	**1.48**		15	U	10	U	**1.90**		11	U	**0.79**		NO		**0.79**	D	**1.90**	D	7.700	U	**1.50**		9.100	U	11	U	**1.80**	D	**31**	**D**	8.100	U	<0.49	U	0.49	U	**1.77**	D
1,2-Dibromoethane	<18	U	<15	U	<0.81	U	<0.77	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	23	U	16	U	0.77	U	17	U	0.77	U	NO		0.89	U	1.20	U	12	U	0.77	U	14	U	18	U	0.78	U	<13	U	13	U	<0.77	U	0.77	U	0.41	U
1,2-Dichlorobenzene	<14	U	<12	U	<0.63	U	<0.6	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	18	U	12	U	0.60	U	14	U	0.60	U	NO		0.69	U	**0.95**	D	9.40	U	**1.10**		11	U	14	U	0.61	U	<10	U	9.90	U	<0.6	U	0.60	U	**1.20**	D
1,2-Dichloroethane	<9.4	U	<8.1	U	<0.42	U	<0.4	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	12	U	8.30	U	0.40	U	9.20	U	**2.00**		NO		**0.79**	D	**0.77**	D	6.30	U	**13**		7.50	U	9.40	U	**16**	D	<6.8	U	6.60	U	<0.4	U	0.40	U	0.21	U
1,2-Dichloropropane	<11	U	<9.2	U	<0.49	U	<0.46	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	14	U	9.40	U	0.46	U	10	U	0.46	U	NO		0.53	U	0.73	U	7.20	U	0.46	U	8.50	U	11	U	0.47	U	<7.8	U	7.60	U	<0.46	U	0.46	U	0.24	U
1,2-Dichlorotetrafluoroethane	<16	U	<14	U	<0.73	U	<0.7	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	21	U	14	U	0.70	U	16	U	0.70	U	NO		0.81	U	1.10	U	11	U	**0.70**		13	U	16	U	0.71	U	<12	U	11	U	<0.7	U	0.70	U	0.37	U
1,3,5-Trimethylbenzene	**19**	**D**	**47**	**D**	<0.52	U	<0.49	U	**2.59**		< 1.00	U	**2.31**		< 1.00	U	< 1.00	U	15	U	10	U	**0.84**		11	U	0.49	U	NO		0.57	U	**0.78**	D	7.70	U	**0.49**		9.10	U	11	U	0.50	U	<8.3	U	8.10	U	<0.49	U	0.49	U	**0.49**	D
1,3-Butadiene	<15	U	<13	U	<0.7	U	<0.66	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	20	U	14	U	0.66	U	15	U	**1.10**		NO		0.77	U	1	U	10	U	0.66	U	12	U	15	U	0.68	U	<11	U	11	U	<0.66	U	0.66	U	0.35	U
1,3-Dichlorobenzene	<14	U	<12	U	<0.63	U	<0.6	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	18	U	12	U	0.60	U	14	U	0.60	U	NO		0.69	U	0.95	U	9.40	U	0.60	U	11	U	14	U	0.61	U	<10	U	9.90	U	<0.6	U	0.60	U	**1.50**	D
1,3-Dichloropropane	<11	U	<9.2	U	<0.49	U	<0.46	U	NT		NT		NT		NT		NT		14	U	9.400	U	0.46	U	10	U	0.46	U	NO		0.53	U	0.730	U	7.200	U	0.460	U	8.500	U	11	U	0.47	U	<7.8	U	7.600	U	<0.46	U	0.46	U	0.24	U
1,4-Dichlorobenzene	<14	U	<12	U	<0.63	U	<0.6	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	18	U	12	U	0.60	U	14	U	0.60	U	NO		0.69	U	0.95	U	9.40	U	**2.70**	D	9.40	U	**2.30**		11	U	14	U	**4.70**	D	<10	U	9.90	U	<0.6	U	0.60	U	**2.52**	D
1,4-Dioxane	<17	U	<14	U	<0.76	U	<0.72	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	22	U	15	U	0.72	U	16	U	0.72	U	NO		0.83	U	1.10	U	11	U	0.720	U	13	U	17	U	0.74	U	<12	U	12	U	<0.72	U	0.72	U	0.40	U
2-Butanone	**15**	**D**	**18**	**D**	**1.50**	**D**	**0.97**		NT		NT		NT		NT		NT		9	U	6	U	**16**		6.70	U	**66.00**		NO		**64**	D	**2.10**	D	**9.20**	D	**120**		5.50	U	6.900	U	**3.90**	D	<5	U	**18**	D	**1.10**		**0.53**		**56.01**	D
2-Hexanone	<19	U	<16	U	<0.86	U	<0.82	U	**2.9**		< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	25	U	17	U	0.82	U	19	U	0.82	U	NO		0.94	U	1.30	U	13	U	0.82	U	15	U	19	U	0.84	U	<14	U	13	U	<0.82	U	0.82	U	**1.84**	D
3-Chloropropene	<36	U	<31	U	<1.6	U	<1.6	U	NT		NT		NT		NT		NT		48	U	32	U	1.60	U	36	U	1.60	U	NO		1.80	U	2.50	U	24	U	1.60	U	29	U	36	U	1.60	U	<26	U	26	U	<1.6	U	1.60	U	0.84	U
4-Methyl-2-pentanone	**31**	**D**	<8.2	U	0.43	U	<0.41	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	12	U	8.40	U	**11**		9.30	U	0.41	U	NO		0.47	U	**0.78**	D	6.40	U	**3.40**		7.60	U	9.50	U	0.42	U	<6.9	U	6.70	U	<0.41	U	0.41	U	0.22	U
Acetone	**1,600**	**D**	**3,000**	**D**	**11**	**D**	**13**		**53.4**		**38**		**1,610**		**22.6**		**444**		**3,100**	D	**140**	D	**22**		**52**	D	**540**	D	NO		**310**	D	**37**	D	**28**	D	**200**	D	**720**	D	**780**	D	**67**	D	**25**	**D**	**84**	D	**8.50**		**6.80**		**1,092.26**	D
Acrylonitrile	<5	U	<4.3	U	<0.23	U	<0.22	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	6.600	U	4.40	U	0.22	U	4.90	U	0.22	U	NO		0.25	U	0.34	U	3.40	U	0.22	U	4	U	5	U	0.22	U	<3.7	U	3.60	U	<0.22	U	0.22	U	0.11	U
Benzene	<7.4	U	<6.4	U	**0.60**	**D**	**0.77**		**1.52**		**1.43**		**1.04**		**1.31**		**2.44**		9.700	U	6.50	U	**1.20**		7.30	U	**4.40**		NO		**1.70**	D	0.50	U	5	U	**5**		5.90	U	7.40	U	**1.90**	D	<5.4	U	5.20	U	**0.64**		**0.61**		**1.31**	D
Benzyl chloride	<12	U	<10	U	<0.54	U	<0.52	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	16	U	11	U	0.52	U	12	U	0.52	U	NO		0.60	U	0.82	U	8.10	U	0.52	U	9.60	U	12	U	0.53	U	<8.8	U	8.50	U	<0.52	U	0.52	U	0.27	U
Bromodichloromethane	<16	U	<13	U	<0.7	U	<0.67	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	20	U	14	U	0.67	U	15	U	0.67	U	NO		0.77	U	1.10	U	10	U	0.67	U	12	U	16	U	0.68	U	<11	U	11	U	<0.67	U	0.67	U	0.35	U
Bromoform	<24	U	<21	U	<1.1	U	<1	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	31	U	21	U	1	U	23	U	1	U	NO		1.20	U	1.60	U	16	U	1	U	19	U	24	U	1.10	U	<17	U	17	U	<1	U	1	U	0.55	U
Bromomethane	<9	U	<7.8	U	<0.41	U	<0.39	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	12	U	7.90	U	0.39	U	8.80	U	0.39	U	NO		0.45	U	0.610	U	6	U	0.39	U	7.20	U	9	U	0.40	U	<6.6	U	6.40	U	<0.39	U	0.39	U	0.21	U
Carbon disulfide	<7.2	U	<6.2	U	<0.33	U	<0.31	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	9.500	U	6.400	U	0.31	U	7.100	U	0.31	U	NO		**0.83**	D	0.49	U	4.90	U	**2.50**		5.80	U	7.20	U	0.32	U	<5.3	U	5.100	U	<0.31	U	0.31	U	**0.31**	D
Carbon tetrachloride	<3.7	U	<3.1	U	**0.40**	**D**	**0.38**		**0.51**		**0.53**		**1.05**		**0.53**		**0.45**		4.80	U	3.20	U	**0.57**		3.60	U	**0.75**		NO		**0.51**	D	**1.10**	D	2.50	U	**6.30**		2.90	U	3.70	U	**0.71**	D	<2.7	U	**44**	D	**0.44**		**0.63**		**0.30**	D
Chlorobenzene	<11	U	<9.2	U	<0.48	U	<0.46	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	14	U	9.40	U	0.46	U	10	U	0.46	U	NO		0.53	U	0.73	U	7.20	U	0.46	U	8.50	U	11	U	0.47	U	<7.8	U	7.60	U	<0.46	U	0.46	U	**0.42**	D
Chloroethane	<6.1	U	<5.3	U	<0.28	U	<0.26	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	8	U	5.40	U	0.26	U	6	U	0.26	U	NO		0.30	U	0.42	U	4.10	U	0.26	U	4.90	U	6.10	U	0.27	U	<4.5	U	4.30	U	<0.26	U	0.26	U	0.14	U
Chloroform	<11	U	**17**	**D**	<0.51	U	<0.49	U	**26.1**		**4.59**		**17.2**		< 1.00	U	< 1.00	U	**220**	D	**22**	D	**0.68**		**13**	D	**1.50**		NO		**0.68**	D	**9**	D	7.60	U	**1.80**		9	U	11	U	**0.65**	D	<8.3	U	**13**	D	<0.49	U	0.49	U	**0.83**	D
Chloromethane	<4.8	U	<4.1	U	**1.10**	**D**	**1.10**		< 1.00	U	**1.36**		< 1.00	U	**1.29**		**1.63**		6.30	U	4.200	U	**1.70**		4.70	U	**6.50**		NO		**1.70**	D	0.33	U	3.200	U	**8.10**		3.80	U	4.80	U	0.21	U	<3.5	U	3.40	U	**1.20**		**1.70**		**0.60**	D
cis-1,2-Dichloroethylene	<9.2	U	<7.9	U	<0.42	U	**1.80**		**3.57**		< 1.00	U	**1.37**		< 1.00	U	< 1.00	U	**120**	D	**11**	D	0.40	U	9	U	0.400	U	NO		0.46	U	0.63	U	6.20	U	0.40	U	7.30	U	9.20	U	0.40	U	<6.7	U	6.50	U	<0.4	U	0.40	U	0.05	U
cis-1,3-Dichloropropylene	<11	U	<9.1	U	<0.48	U	<0.45	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	14	U	9.30	U	0.45	U	10	U	0.45	U	NO		0.52	U	0.72	U	7.10	U	0.45	U	8.40	U	11	U	0.46	U	<7.7	U	7.40	U	<0.45	U	0.45	U	0.24	U
Cyclohexane	<8	U	<6.9	U	<0.36	U	<0.34	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	**12.8**		10	U	7	U	0.34	U	7.80	U	0.34	U	NO		**5.90**	D	**0.54**	D	5.40	U	**61**		6.40	U	8	U	**2.80**	D	<5.8	U	5.60	U	<0.34	U	0.34	U	**13.07**	D
Dibromochloromethane	<20	U	<17	U	<0.89	U	<0.85	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	26	U	17	U	0.85	U	19	U	0.85	U	NO		0.98	U	1.30	U	13	U	0.85	U	16	U	20	U	0.87	U	<14	U	14	U	<0.85	U	0.85	U	0.45	U
Dichlorodifluoromethane	**11**	U	<9.9	U	**1.60**	**D**	**1.70**		**2.61**		**2.55**		**2.43**		**2.47**		**2.57**		15	U	10	U	**3.60**		11	U	**9.30**		NO		**11**	D	**3**	D	7.70	U	**18**		9.10	U	11	U	0.50	U	<8.4	U	8.10	U	**1.90**	D	**1.24**	D
Ethyl acetate	<17	U	<14	U	<0.76	U	<0.72	U	< 1.00	U	**6.66**		< 1.00	U	< 1.00	U	**29.1**		22	U	15	U	7		16	U	**22**		NO		**18**	D	1.10	U	11	U	**17**		13	U	17	U	**3.80**	D	<12	U	12	U	<0.72	U	0.72	U	**39.62**	D
Ethyl Benzene	**1,000**	**D**	**1,400**	**D**	<0.46	U	<0.43	U	**4.9**		**1.08**		**2.01**		< 1.00	U	**1.94**		13	U	**21**	D	**23**		9.90	U	**0.74**		NO		**1.60**	D	**0.68**	D	6.80	U	**1.50**		8	U	10	U	**1.80**	D	**23**	**D**	7.10	U	<0.43	U	0.43	U	**1.95**	D
Hexachlorobutadiene	<25	U	<21	U	<1.1	U	<1.1	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	32	U	22	U	1.10	U	24	U	1.10	U	NO		1.20	U	1.70	U	17	U	1.10	U	20	U	25	U	1.10	U	<18	U	17	U	<1.1	U	1.10	U	0.57	U
Isopropanol	<11	U	<9.8	U	**4.60**	**D**	<0.49	U	< 1.00	U	**83.3**		**7.79**		**10.8**		**130**		**22**	D	10	U	**21**		11	U	**28**		NO		**89**	D	**1.300**	D	7.700	U	**76**		**47**	D	11	U	**370**	DE	<8.3	U	8.10	U	<0.49	U	**0.93**		**61.43**	DE
Methyl Methacrylate	<9.5	U	<8.2	U	<0.43	U	<0.41	U	NT		NT		NT		NT		NT		12	U	8.40	U	0.41	U	9.30	U	0.41	U	NO		**10**	D	**0.71**	D	6.40	U	**5.90**		7.60	U	9.50	U	**7.60**	D	<6.9	U	6.70	U	<0.41	U	**1.20**		**3.40**	D
Methyl tert-butyl ether (MTBE)	<8.4	U	<7.2	U	<0.38	U	<0.36	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	< 1.00	U	11	U	7.400	U	0.36	U	8.20	U	0.36	U	NO		0.42	U	0.57	U	5.60	U	0.36	U	6.700	U	8.40	U	0.370	U	<6.1	U	5.90	U	<0.36	U	0.36	U	0.19	U
Methylene chloride	<16	U	<14	U	**3.10**	**D**	**9.50**		< 1.00		**3.15**		**1.77**		**3.82**		**41**		21	U	**45**	D	**2.60**		16	U	**240**	D	NO		**270**	D	**7.10**	D	**19**	D	**180**	D	13	U	16	U	**64**	D	<12	U	11	U	**2.90**		**3.60**		**86.80**	DE
n-Heptane	<9.5	U	<8.2	U	<0.43	U	<0.41	U	**2.67**		**2.09**		**1.14**		**4.02**		**143**		12	U	8.400	U	**2.50**		9.300	U	**62**		NO		**17**	D	**3.10**	D	6.40	U	**190**		7.600	U	9.50	U	**3.10**	D	<6.9	U	6.70	U	<0.41	U	0.41	U	**27.45**	D
n-Hexane	<8.2	U	<7	U	**0.56**	**D**	**2.40**		< 1.00	U	**2.16**		< 1.00	U	**6.34**		**238**		11	U	7.200	U	**0.85**		8	U	**61**		NO		**32**	D	**2.20**	D	**10**	D	**170**		6.500	U	8.20	U	**3.80**	D	<6	U	5.80	U	**0.42**		**0.35**		**77.51**	D
o-Xylene	**110**	**D**	**150**	**D**	**0.52**	**D**	<0.49	U	**6.51**		**1.05**		**3.48**		< 1.00		**2.23**		13	U	**12**	D	**14**		9.90	U	**0.82**		NO		**1.70**	D	**0.96**	D	6.80	U	**1.80**		8	U	10	U	**2.10**	D	**47**	**D**	7.10	U	<0.49	U	0.43	U	**1.91**	D
p- & m- Xylenes	**4,200**	**D**	**6,500**	**DE**	**1.60**	**D**	<0.87	U	**22.3**		**3.23**		**9.2**		**2**		**6.99**		**28**	D	**83**	D	**67**		20	U	**2.90**		NO		**5.90**	D	**2.30**	D	14	U	**5.80**		16	U	20	U	**5**	D	**110**	**D**	14	U	<0.87	U	0.87	U	**5.64**	D
p-Ethyltoluene	NT		NT		NT		NT		NT		NT		NT		NT		NT		15	U	10	U	**2.70**		11	U	**0.69**		NO		**1.10**	D	**0.93**	D	7.70	U	**1.30**		9.10	U	11	U	**1.20**	D	NT		8.10	U	NT		0.49	U	**1.87**	D
Propylene	<4	U	<3.4	U	**1.90**	**D**	<0.17	U	**2.05**		**8.31**		**2.03**		**6.04**		< 1.00		5.200	U	3.500	U	**2.20**		3.900	U	**29**		NO		**6.80**	D	**0.38**	D	2.70	U	**32**		3.20	U	4	U	**7.70**	D	<2.9	U	2.80	U	<0.17	U	**0.76**		**2.92**	D
Styrene	<9.9	U	<8.5	U	<0.45	U	<0.43	U	**1.09**		**1.05**		< 1.00	U	< 1.00	U	**1.11**		13	U	8.70	U	**1.80**		9.70	U	**0.55**		NO		**3.10**	D	**0.94**	D	6.60	U	**1.30**		7.90	U	9.90	U	**3.70**	D	<7.2	U	7	U	<0.43	U	0.43	U	**1.32**	D
Tetrachloroethylene	**580**	**D**	**1,300**	**D**	**28**	**D**	**22**		**1,360**		**1,740**		**1,680**		**472**		**32.1**		**9,000**	D	**1,400**	D	**22**		**400**	D	**15**		NO		**8.30**	D	**250**	D	**680**	D	**16**		**58**	D	**330**	D	**5.70**	D	**470**	**D**	**1,300**	D	**2.80**		**9.80**		**5,288.12**	D
Tetrahydrofuran	NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		0.32	U
Toluene	NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		**414.37**	D
trans-1,2-Dichloroethylene	NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		0.21	U
trans-1,3-Dichloropropylene	NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		NT		**0.41**	D
Trichloroethylene	<3.1	U	<2.7	U	<0.14	U	**5.20**		**9.94**		**0.74**		**7.84**		**1.06**		**14.2**		**240**	D	**18**	D	**0.54**		**8.50**	D	**76**		NO		**55**	D	**5.40**	D	**10**	D	**85**		2.50	U	3.10	U	**1.30**	D	<2.3	U	2.20	U	<0.13	U	**0.54**		**47.27**	D
Trichlorofluoromethane (Freon 11)	<13	U	<11	U	**1.10**	**D**	**1.20**		**2.03**		**2.19**		**1.49**		**1.38**		**1.3**		17	U	11	U	**4.50**		13	U	**5.70**		NO		**1.20**	D	**1.80**	D	8.80	U	**6.50**		10	U	13	U	**1.70**	D	<9.5	U	9.20	U	**1.20**		**1.70**		1.01	D
Vinyl acetate	<8.2	U	<7	U	<0.37	U	<0.35	U	NT		NT		NT		NT		NT		11	U	7.200	U	0.35	U	8	U	0.35	U	NO		0.41	U	0.56	U	5.50	U	0.35	U	6.50	U	8.200	U	0.36	U	<6	U	5.80	U	<0.35	U	0.35	U	0.19	U
Vinyl bromide	<10	U	<8.7	U	<0.46	U	<0.44	U	NT		NT		NT		NT		NT		13	U	8.900	U	0.44	U	9.900	U	0.44	U	NO		0.50	U	0.69	U	6.80	U	0.44	U	8.10	U	10	U	0.45	U	<7.4	U	7.20	U	<0.44	U	0.44	U	0.23	U
Vinyl Chloride	<5.9	U	<5.1	U	<0.27	U	<0.26	U	< 0.25	U	< 0.25	U	< 0.25	U	< 0.25	U	< 0.25	U	7.80	U	5.20	U	0.26	U	5.80	U	0.26	U	NO		0.29	U	0.40	U	4	U	0.26	U	4.70	U	5.90	U	0.26	U	<4.3	U	4.20	U	<0.26	U	0.26	U	0.03	U

NOTES:
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
U=analyte not detected at or above the level indicated
NT=this indicates the analyte was not a target for this sample

Table 9
Sediment Sample Analytical Results for VOCs
107-02 to 107-16 Queens Blvd, Queens, NY

Sample ID	SED-1		UUSCOs	RRSCOs
Sampling Date	4/7/2016			
Client Matrix	Sediment			
Compound	Result			
Units	mg/kg	Q	mg/Kg	mg/Kg
1,1,1,2-Tetrachloroethane	<0.011	U	NS	~
1,1,1-Trichloroethane	<0.011	U	0.68	100
1,1,2,2-Tetrachloroethane	<0.011	U	NS	NS
1,1,2-Trichloroethane	<0.011	U	NS	NS
1,1-Dichloroethane	<0.011	U	0.27	26
1,1-Dichloroethene	<0.011	U	0.33	100
1,1-Dichloropropene	<0.011	U	NS	NS
1,2,3-Trichlorobenzene	<0.011	U	NS	NS
1,2,3-Trichloropropane	<0.011	U	NS	NS
1,2,4-Trichlorobenzene	<0.011	U	NS	NS
1,2,4-Trimethylbenzene	<0.011	U	3.6	52
1,2-Dibromo-3-chloropropane	<0.011	U	NS	NS
1,2-Dibromoethane	<0.011	U	NS	NS
1,2-Dichlorobenzene	<0.011	U	1.1	100
1,2-Dichloroethane	<0.011	U	0.02	3.1
1,2-Dichloropropane	<0.011	U	NS	NS
1,3,5-Trimethylbenzene	<0.011	U	8.4	52
1,3-Dichlorobenzene	<0.011	U	2.4	49
1,3-Dichloropropane	<0.011	U	NS	NS
1,4-Dichlorobenzene	<0.011	U	1.8	13
2,2-Dichloropropane	<0.011	U	NS	NS
2-Chlorotoluene	<0.011	U	NS	NS
4-Chlorotoluene	<0.011	U	NS	NS
Acetone	<0.05	U	0.05	100
Benzene	<0.011	U	0.06	4.8
Bromobenzene	<0.011	U	NS	NS
Bromochloromethane	<0.011	U	NS	NS
Bromodichloromethane	<0.011	U	NS	NS
Bromoform	<0.011	U	NS	NS
Bromomethane	<0.011	U	NS	NS
Carbon tetrachloride	<0.011	U	0.76	2.4
Chlorobenzene	<0.011	U	1.1	100
Chloroethane	<0.011	U	NS	NS
Chloroform	<0.011	U	0.37	49
Chloromethane	<0.011	U	NS	NS
cis-1,2-Dichloroethene	<0.011	U	0.25	100
cis-1,3-Dichloropropene	<0.011	U	NS	NS
Dibromochloromethane	<0.011	U	NS	NS
Dibromomethane	<0.011	U	NS	NS
Dichlorodifluoromethane	<0.011	U	NS	NS
Ethylbenzene	<0.011	U	1	41
Hexachlorobutadiene	<0.011	U	NS	NS
Isopropylbenzene	<0.011	U	NS	NS
Methyl t-butyl ether (MTBE)	<0.022	U	0.93	100
Methylene chloride	<0.022	U	0.05	100
Naphthalene	<0.011	U	NS	100
n-Butylbenzene	<0.011	U	12	100
n-Propylbenzene	<0.011	U	3.9	100
m&p-Xylene	<0.011	U	NS	100
o-Xylene	<0.011	U	NS	100
p-Isopropyltoluene	<0.011	U	NS	NS
sec-Butylbenzene	<0.011	U	11	100
Styrene	<0.011	U	NS	NS
tert-Butylbenzene	<0.011	U	5.9	100
Tetrachloroethene	**2.8**		1.3	19
Toluene	<0.011	U	0.7	100
trans-1,2-Dichloroethene	<0.011	U	0.19	100
trans-1,3-Dichloropropene	<0.011	U	NS	NS
Trichloroethene	<0.011	U	0.47	21
Trichlorofluoromethane	<0.011	U	NS	NS
Vinyl chloride	<0.011	U	0.02	0.9

NOTES:
Q is the Qualifier Column with definitions as follows:
U=analyte not detected at or above the level indicated
NS=this indicates that no regulatory limit has been established for this analyte
UUSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCO=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
sample exceeds NYSDEC Part 375 UUSCO

Table 10

Applicable Track 1 Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
Metals		
Arsenic	7440-38-2	13 [c]
Barium	7440-39-3	350 [c]
Beryllium	7440-41-7	7.2
Cadmium	7440-43-9	2.5 [c]
Chromium, hexavalent [e]	18540-29-9	1[b]
Chromium, trivalent [e]	16065-83-1	30 [c]
Copper	7440-50-8	50
Total Cyanide [e, f]		27
Lead	7439-92-1	63 [c]
Manganese	7439-96-5	1600 [c]
Total Mercury		0.18 [c]
Nickel	7440-02-0	30
Selenium	7782-49-2	3.9[c]
Silver	7440-22-4	2
Zinc	7440-66-6	109 [c]
PCBs/Pesticides		
2,4,5-TP Acid (Silvex) [f]	93-72-1	3.8
4,4'-DDE	72-55-9	0.0033 [b]
4,4'-DDT	50-29-3	0.0033 [b]
4,4'-DDD	72-54-8	0.0033 [b]
Aldrin	309-00-2	0.005 [c]
alpha-BHC	319-84-6	0.02
beta-BHC	319-85-7	0.036
Chlordane (alpha)	5103-71-9	0.094

Contaminant	CAS Number	Unrestricted Use
delta-BHC [g]	319-86-8	0.04
Dibenzofuran [f]	132-64-9	7
Dieldrin	60-57-1	0.005 [c]
Endosulfan I [d, f]	959-98-8	2.4
Endosulfan II [d, f]	33213-65-9	2.4
Endosulfan sulfate [d, f]	1031-07-8	2.4
Endrin	72-20-8	0.014
Heptachlor	76-44-8	0.042
Lindane	58-89-9	0.1
Polychlorinated biphenyls	1336-36-3	0.1
Semivolatile organic compounds		
Acenaphthene	83-32-9	20
Acenapthylene [f]	208-96-8	100 [a]
Anthracene [f]	120-12-7	100 [a]
Benz(a)anthracene [f]	56-55-3	1 [c]
Benzo(a)pyrene	50-32-8	1 [c]
Benzo(b)fluoranthene [f]	205-99-2	1 [c]
Benzo(g,h,i)perylene [f]	191-24-2	100
Benzo(k)fluoranthene [f]	207-08-9	0.8 [c]
Chrysene [f]	218-01-9	1 [c]
Dibenz(a,h)anthracene [f]	53-70-3	0.33 [b]
Fluoranthene [f]	206-44-0	100 [a]
Fluorene	86-73-7	30
Indeno(1,2,3-cd)pyrene [f]	193-39-5	0.5 [c]
m-Cresol [f]	108-39-4	0.33 [b]
Naphthalene [f]	91-20-3	12
o-Cresol [f]	95-48-7	0.33 [b]

Contaminant	CAS Number	Unrestricted Use
p-Cresol [f]	106-44-5	0.33 [b]
Pentachlorophenol	87-86-5	0.8 [b]
Phenanthrene [f]	85-01-8	100
Phenol	108-95-2	0.33 [b]
Pyrene [f]	129-00-0	100
Volatile organic compounds		
1,1,1-Trichloroethane [f]	71-55-6	0.68
1,1-Dichloroethane [f]	75-34-3	0.27
1,1-Dichloroethene [f]	75-35-4	0.33
1,2-Dichlorobenzene [f]	95-50-1	1.1
1,2-Dichloroethane	107-06-2	0.02 [c]
cis -1,2-Dichloroethene [f]	156-59-2	0.25
trans-1,2-Dichloroethene [f]	156-60-5	0.19
1,3-Dichlorobenzene [f]	541-73-1	2.4
1,4-Dichlorobenzene	106-46-7	1.8
1,4-Dioxane	123-91-1	0.1 [b]
Acetone	67-64-1	0.05
Benzene	71-43-2	0.06
n-Butylbenzene [f]	104-51-8	12
Carbon tetrachloride [f]	56-23-5	0.76
Chlorobenzene	108-90-7	1.1
Chloroform	67-66-3	0.37
Ethylbenzene [f]	100-41-4	1
Hexachlorobenzene [f]	118-74-1	0.33[b]
Methyl ethyl ketone	78-93-3	0.12
Methyl tert-butyl ether [f]	1634-04-4	0.93
Methylene chloride	75-09-2	0.05

Contaminant	CAS Number	Unrestricted Use
n - Propylbenzene [f]	103-65-1	3.9
sec-Butylbenzene [f]	135-98-8	11
tert-Butylbenzene [f]	98-06-6	5.9
Tetrachloroethene	127-18-4	1.3
Toluene	108-88-3	0.7
Trichloroethene	79-01-6	0.47
1,2,4-Trimethylbenzene [f]	95-63-6	3.6
1,3,5-Trimethylbenzene[f]	108-67-8	8.4
Vinyl chloride[f]	75-01-4	0.02
Xylene (mixed)	1330-20-7	0.26

All soil cleanup objectives (SCOs) are in parts per million (ppm).

Footnotes

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

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

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

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

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

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

APPENDICES

APPENDIX 1

PROPERTY METES AND BOUNDS

Northeastern Metro Abstract Corp.

8 Duffy Avenue
Hicksville, NY 11801
Telephone: (516) 349-5900 Fax: (516) 349-7062

March 02, 2016

Avely Hart, Esq.
420 Lexington Avenue
Suite 2320
New York, NY 10170

Reference: NMQ-16-16254
107-02/107-16 Queens Boulevard
Forest Hills, County of Queens, State of New York
Backus Enterprises I LLC and Backus Land Management, LLC
de Boulevard LLC

To whom it may concern:

In connection with the above caption title, please be advised as follows:

- ☐ We have omitted the exception(s) numbered:
- ☐ We have added exception(s) numbered:
- ☐ Enclosed is your survey inspection.
- ☒ Enclosed is your survey print/survey reading.
- ☐ Enclosed is your metes and bounds description.
- ☐ Enclosed are the instruments/documents you requested.
- ☒ Enclosed is your amended: **Amended Legal Description**
  Amended Schedule B
- ☐ Enclosed are the results of the Search referred to in Exception:
- ☐ Enclosed please find:
- ☐ Other:

KINDLY ANNEX THIS LETTER AND ENCLOSURES TO THE FRONT OF CERTIFICATE OF TITLE AND CONSIDER IT A PART THEREOF.

Very truly yours,

Northeastern Metro Abstract Corp.

cc: Glen S. Edelman, Esq.

Northeastern Metro Abstract Corp.
8 Duffy Avenue
Hicksville, NY 11801
Telephone: (516) 349-5900 Fax: (516) 349-7062

Survey Reading

Survey made by Precision Surveys dated 2-9-16 shows a one (1) story brick and stucco building with screened porch. Concrete steps encroach onto 70th Avenue 1.87 feet west. The following encroachments and projections onto Queens Boulevard:

a. Canopy 1.57 feet north;
b. Canopy 4.94 feet north;
c. Canopy 1.09 feet north;
d. Canopy 3.47 feet north;
e. Metal door 1.27 feet north;
f. Metal door 1.17 feet north;
g. Metal door 0.98 feet north;
h. Metal door 3.05 feet east and 2.99 feet east;

Amended Legal Description

All that certain piece or parcel of land situate, lying and being in the Second Ward of the Borough of Queens, City and State of New York. Known and designated as block 3238 tax lot 44, which is more particularly bounded and described as follows:

BEGINNING at the corner formed by the southerly side of Queens Boulevard and the easterly side of 70th Avenue;

RUNNING THENCE easterly and along the southerly side of Queens Boulevard, 162.36 feet;

THENCE southerly forming an interior angle of 80 degrees 12 minutes 39 seconds, 120.04 feet;

THENCE westerly and at right angles to the last mentioned course, 160.00 feet;

THENCE northerly and at right angles to the last mentioned course, 92.43 feet to the point or place of BEGINNING.

NORTHEASTERN METRO ABSTRACT CORP.

as Agent for
Old Republic National Title Insurance Company

SCHEDULE B

Title Number: **NMQ-16-16254**

Hereinafter set forth are the additional matters which will appear in our policy as exceptions from coverage unless disposed of to the Company's satisfaction prior to the closing or delivery of the policy.

DISPOSITION

1. Rights of tenants or parties in possession, if any.

2. Taxes, tax liens, tax sales, water rates, sewer rents and assessments set forth in schedule herein.

3. Any state of facts an accurate survey and/or survey inspection of the premises would show.

4. Mortgages returned herewith and set forth herein. (0)

5. Covenants, conditions, easements, leases, agreements of record as follows:
   a. Telephone Easement Liber: 5618 Page: 325, (see herein).
   b. Agreement Liber: 2633 Page: 506, (see herein).

6. Due to problems with returned or dishonored checks, no uncertified checks for $500.00 or more will be accepted without advanced approval by counsel or manager. Under no circumstances will third party or seller's checks be accepted in any amount at closing without advanced approval. TITLE CLOSERS ARE NOT AUTHORIZED TO MAKE SUCH APPROVALS. ATTORNEY ESCROW CHECKS ARE ACCEPTABLE.

7. ALL parties will be required to provide two forms of identification one being photo identification, to the company's representative at closing.

8. Policy will except water and sewer rent not entered and/or water and sewer rent entered subsequent to date of last reading. NOTE: COMPANY REQUIRES SPECIAL METER READING TO DATE OF CLOSING, OR COMPANY WILL HOLD ESCROW UNTIL WE RECEIVE A FINAL READING TO DATE OF CLOSING.

9. If the conveyance or mortgage herein is to be made under Power of Attorney, proof is required that same has never been revoked and is still in full force and effect and that the donor thereof was living at the time of execution and delivery of instruments thereunder. NOTE: COMPANY REQUIRES POWER OF ATTORNEY TO BE DATED WITHIN THREE MONTHS OF CLOSING. IDENTIFICATION OF DONORS REQUIRED AT CLOSING. PLEASE CONTACT THIS COMPANY IF THE ABOVE REQUIREMENTS CAN NOT BE MET.

10. Company requires original documents for recording at closing. Faxed documents or documents that are not legible will not be accepted for recording. Please contact this company if the above requirement can not be met.

11. The proposed mortgagor(s) de Boulevard LLC has/have been run for judgments and liens. Nothing has been found of record.

NORTHEASTERN METRO ABSTRACT CORP.

as Agent for
Old Republic National Title Insurance Company

SCHEDULE B

Title Number: **NMQ-16-16254**

12. Deed to contain the following recital, "Being the same premises conveyed to the grantors herein by deed dated 7-24-00 recorded 8-15-00 in Liber/Reel 5661 page 652."

13. The Estate of F. Eugene Backus, as to 1/2 interest and John E. Backus, LLC has/have been run for judgments and liens. Nothing has been found of record.

14. In the absence of a survey Company will not certify as to the location or dimensions of within described premises on all sides, and will except any state of facts an accurate survey may show.

15. New York City vault of charges, if any.

16. Emergency Repair Liens filed pursuant to the Administrative Code of the City of New York may have attached and not been filed with the County Clerk. No liability is assumed for the same.

17. Contract of Sale to be submitted to this company prior to closing.

18. In order for this company to produce accurate bankruptcy searches, we require social security numbers for all parties. If social security numbers are not provided, this company can not guarantee the accuracy of searches.

19. Satisfactory proof by affidavit must be furnished showing whether any work has been done upon the premises by the City of New York, or demand has been made by the City of New York for any such work that may result in (i) charges by the New York City Department of Rent and Housing Maintenance Emergency Services, or (ii) charges by the New York City Department of Environmental Protection.

20. The following Sidewalk Lot Notice(s) to be satisfactorily disposed of, index # 411059191 filed 6-28-91, herein. Although this item will not appear in our policy, failure to remove violation may result in a future lien, in which this policy does not protect. (This objection will remain as an exception in the fee policy, but will be omited for mortgage purposes only).

21. The following Uniform Commercial Code financing statement (s) to be satisfactorily disposed of, CRFN # 2014000349851, herein.

22. The following Uniform Commercial Code financing statement (s) to be satisfactorily disposed of, CRFN # 2013000320519, herein.

23. The Administrative Code of the City of New York requires owners of designated income-producing properties to file annual income and expense statements with the Department of Finance ("Finance"). The annual filing of income and expense statements is necessary to improve the accuracy of assessments of income-producing properties and ultimately to achieve fairness in the assessment process.

24. Proof is required as to the date of formation of John E. Backus, LLC and that it has not been dissolved.

    An LLC or LLP must publish once a week for six (6) successive weeks in the county where it intends to be located. The publication must be in one daily paper and one weekly paper. If there is no paper in the county that fits the requirement, then publication must be in the closest county.

The publication must be within 120 days after formation. A certificate of publication and affidavits of publication must be filed with the Department of State within the 120-day period.

The publication must contain the names of the 10 persons with the most valuable interest.

FAILURE TO PUBLISH SHALL SUSPEND THE AUTHORITY OF THE LLC/LLP TO DO BUSINESS IN NEW YORK STATE.

Note: The prior law did not suspend authority to do business for failure to publish.

Proof is required that the transaction to be insured has been authorized in accordance with the Articles of Organization and the Operating Agreement of the Limited Liability Company.

A copy of the Articles of Organization and the Operating Agreement must be delivered to this Company prior to closing for review. Title is subject to such additional exceptions as a review discloses.

Proof is required that there has been no change in the composition of the Limited Liability Company, be either adding or dropping members since its formation.

Proof is required that John E. Backus, LLC, a Limited Liability Company, is treated, for federal income tax purposes, as a partnership or, in the alternative, if John E. Backus, LLC is treated by the IRS as a corporation, proof of payment of New York State corporation franchise taxes through date of closing is required.

An affidavit in the form attached must be executed and provided by the manager or authorized member of the Limited Liability Company.

Proof of payment of the annual fee to the State of New York and, if applicable, of the annual fee and unincorporated business tax to the City of New York must be provided.

25. Affidavit of no consideration to be executed at closing for deed recorded in CRFN # 2016000026010 dated 1-15-16 recorded on 1-27-16. (see affidavit herein).

    Mortgage affidavit to be executed at closing. (see herein).

26. Proof is required as to the date of formation of Backus Enterprises I, LLC, and Backus Land Management, LLC, and that it has not been dissolved.

    An LLC or LLP must publish once a week for six (6) successive weeks in the county where it intends to be located. The publication must be in one daily paper and one weekly paper. If there is no paper in the county that fits the requirement, then publication must be in the closest county.

    The publication must be within 120 days after formation. A certificate of publication and affidavits of publication must be filed with the Department of State within the 120-day period.

    The publication must contain the names of the 10 persons with the most valuable interest.

NORTHEASTERN METRO ABSTRACT CORP.

as Agent for
Old Republic National Title Insurance Company

SCHEDULE B

Title Number: **NMQ-16-16254**

FAILURE TO PUBLISH SHALL SUSPEND THE AUTHORITY OF THE LLC/LLP TO DO BUSINESS IN NEW YORK STATE.

Note: The prior law did not suspend authority to do business for failure to publish.

Proof is required that the transaction to be insured has been authorized in accordance with the Articles of Organization and the Operating Agreement of the Limited Liability Company.

A copy of the Articles of Organization and the Operating Agreement must be delivered to this Company prior to closing for review. Title is subject to such additional exceptions as a review discloses.

Proof is required that there has been no change in the composition of the Limited Liability Company, be either adding or dropping members since its formation.

Proof is required that Backus Enterprises I, LLC, and Backus Land Management, LLC,, a Limited Liability Company, is treated, for federal income tax purposes, as a partnership or, in the alternative, if Backus Enterprises I, LLC, and Backus Land Management, LLC,is treated by the IRS as a corporation, proof of payment of New York State corporation franchise taxes through date of closing is required.

An affidavit in the form attached must be executed and provided by the manager or authorized member of the Limited Liability Company.

Proof of payment of the annual fee to the State of New York and, if applicable, of the annual fee and unincorporated business tax to the City of New York must be provided.

27. Company requires correction deed to correct the legal description used for the recording of deed in CRFN # 2016000026010. Please submit to company for review approve prior to closing.

    Note: Legal Description correction will follow upon receipt of New Survey.

28. Proof is required as to the date of formation of de Boulevard, LLC and that it has not been dissolved.

Northeastern Metro Abstract Corp.

8 Duffy Avenue
Hicksville, NY 11801
Phone (516) 349-5900
Fax (516) 349-7062

BANKRUPTCY SEARCH

Date: March 02, 2016

Title No.: NMQ-16-16254

Name of Individual, Corporation or Business:
Buyer(s): de Boulevard LLC Seller(s)\Record Owner(s): The Estate of F. Eugene Backus, as to 1/2 interest, and John E. Backus, LLC

COUNTY: QUEENS

A search of the records of the United States Bankruptcy Court has been made with the following results:

(X) There are no record of a bankruptcy filing for the above mentioned individual, corporation or business. The following office (s) have been checked:

X	EASTERN DISTRICT COURT	X	SOUTHERN DISTRICT COURT
X	NORTHERN DISTRICT COURT	X	WESTERN DISTRICT COURT

() The following information is on file:

CaseNum	Filed	Name	SSN

Chap	Terminated	Discharged	Dismissed

IMPORTANT NOTICE ABOUT ABOVE SEARCH INFORMATION

Company does hereby certify that the records of the above government agency were examined and that the information recorded above is a true and accurate abstraction of the information contained therein. This report is submitted for information purposes only. Liability is limited to errors and omission of information properly indexed, filed and recorded with the above governmental agency.

Northeastern Metro Abstract Corp.

8 Duffy Avenue
Hicksville, NY 11801
Phone (516) 349-5900
Fax (516) 349-7062

UNITED STATES
SANCTIONS LIST SEARCH

COMPANY CERTIFIES THAT IT HAS SEARCHED THE LIST OF DESIGNATED NATIONALS AND BLOCKED PERSONS MAINTAINED BY THE OFFICE OF THE FOREIGN ASSETS CONTROL, U.S. DEPARTMENT OF THE TREASURY, PURSUANT TO EXECUTIVE ORDER 13224 AS AMENDED BY EXECUTIVE ORDER 13268, AND REPORTS THE FOLLOWING FINDINGS WITH RESPECT TO THE NAME (S) LISTED BELOW:

Date: March 02, 2016

Title No.: NMQ-16-16254

Name of Individual, Corporation or Business:
Buyers: de Boulevard LLC Sellers: The Estate of F. Eugene Backus, as to 1/2 interest, and John E. Backus, LLC

(X) There is no record of filing for the above mentioned individual.

() The following information is on file:

IMPORTANT NOTICE ABOUT ABOVE SEARCH INFORMATION

Company does hereby certify that the records of the above government agency were examined and that the information recorded above is a true and accurate abstraction of the information contained therein. This report is submitted for information purposes only. Liability is limited to errors and omission of information properly indexed, filed and recorded with the above governmental agency.

Northeastern Metro Abstract Corp.

8 Duffy Avenue
Hicksville NY,11801
Phone (516) 349-5900
Fax (516) 349-7062

UNITED STATES
PATRIOT NAME SEARCH

COMPANY CERTIFIES THAT IT HAS SEARCHED THE LIST OF DESIGNATED NATIONALS AND BLOCKED PERSONS MAINTAINED BY THE OFFICE OF THE FOREIGN ASSETS CONTROL, U.S. DEPARTMENT OF THE TREASURY, PURSUANT TO EXECUTIVE ORDER 13224 AS AMENDED BY EXECUTIVE ORDER 13268, AND REPORTS THE FOLLOWING FINDINGS WITH RESPECT TO THE NAME (S) LISTED BELOW:

Date:

March 02, 2016

Title No.:

NMQ-16-16254

Name of Individual, Corporation or Business:

Buyer: de Boulevard LLC Seller(s)\Record Owner(s): The Estate of F. Eugene Backus, as to 1/2 interest, and John E. Backus, LLC

(X) There is no record of filing for the above mentioned individual.

() The following information is on file:

IMPORTANT NOTICE ABOUT ABOVE SEARCH INFORMATION

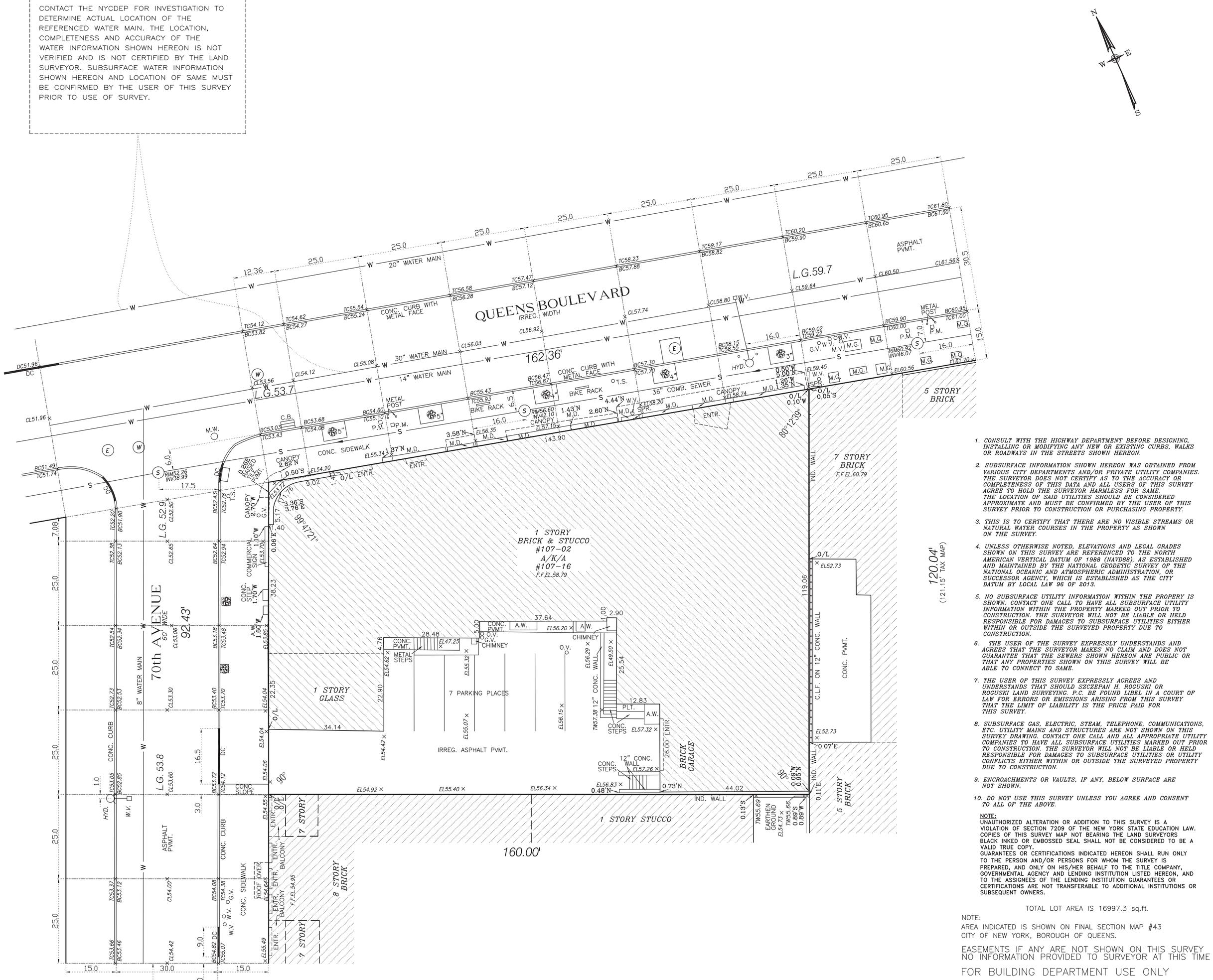
Company does hereby certify that the records of the above government agency were examined and that the information recorded above is a true and accurate abstraction of the information contained therein. This report is submitted for information purposes only. Liability is limited to errors and omission of information properly indexed, filed and recorded with the above governmental agency.

Job No. RLS171454

NOTE

THE 20" AND 30" WATER MAIN (PER SCALED LOCATION ON PROVIDED WATER MAPPING) SHOWN HEREON IS SHOWN PER A GRAPHICALLY SCALED LOCATION ON THE REFERENCED NYCDEP WATER MAPPING.

CONTACT THE NYCDEP FOR INVESTIGATION TO DETERMINE ACTUAL LOCATION OF THE REFERENCED WATER MAIN. THE LOCATION, COMPLETENESS AND ACCURACY OF THE WATER INFORMATION SHOWN HEREON IS NOT VERIFIED AND IS NOT CERTIFIED BY THE LAND SURVEYOR. SUBSURFACE WATER INFORMATION SHOWN HEREON AND LOCATION OF SAME MUST BE CONFIRMED BY THE USER OF THIS SURVEY PRIOR TO USE OF SURVEY.



1. *CONSULT WITH THE HIGHWAY DEPARTMENT BEFORE DESIGNING, INSTALLING OR MODIFYING ANY NEW OR EXISTING CURBS, WALKS OR ROADWAYS IN THE STREETS SHOWN HEREON.*

2. *SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FROM VARIOUS CITY DEPARTMENTS AND/OR PRIVATE UTILITY COMPANIES. THE SURVEYOR DOES NOT CERTIFY AS TO THE ACCURACY OR COMPLETENESS OF THIS DATA AND ALL USERS OF THIS SURVEY AGREE TO HOLD THE SURVEYOR HARMLESS FOR SAME. THE LOCATION OF SAID UTILITIES SHOULD BE CONSIDERED APPROXIMATE AND MUST BE CONFIRMED BY THE USER OF THIS SURVEY PRIOR TO CONSTRUCTION OR PURCHASING PROPERTY.*

3. *THIS IS TO CERTIFY THAT THERE ARE NO VISIBLE STREAMS OR NATURAL WATER COURSES IN THE PROPERTY AS SHOWN ON THE SURVEY.*

4. *UNLESS OTHERWISE NOTED, ELEVATIONS AND LEGAL GRADES SHOWN ON THIS SURVEY ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), AS ESTABLISHED AND MAINTAINED BY THE NATIONAL GEODETIC SURVEY OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, OR SUCCESSOR AGENCY, WHICH IS ESTABLISHED AS THE CITY DATUM BY LOCAL LAW 96 OF 2013.*

5. *NO SUBSURFACE UTILITY INFORMATION WITHIN THE PROPERY IS SHOWN. CONTACT ONE CALL TO HAVE ALL SUBSURFACE UTILITY INFORMATION WITHIN THE PROPERTY MARKED OUT PRIOR TO CONSTRUCTION. THE SURVEYOR WILL NOT BE LIABLE OR HELD RESPONSIBLE FOR DAMAGES TO SUBSURFACE UTILITIES EITHER WITHIN OR OUTSIDE THE SURVEYED PROPERTY DUE TO CONSTRUCTION.*

6. *THE USER OF THE SURVEY EXPRESSLY UNDERSTANDS AND AGREES THAT THE SURVEYOR MAKES NO CLAIM AND DOES NOT GUARANTEE THAT THE SEWERS SHOWN HEREON ARE PUBLIC OR THAT ANY PROPERTIES SHOWN ON THIS SURVEY WILL BE ABLE TO CONNECT TO SAME.*

7. *THE USER OF THIS SURVEY EXPRESSLY AGREES AND UNDERSTANDS THAT SHOULD SZCZEPAN H. ROGUSKI OR ROGUSKI LAND SURVEYING. P.C. BE FOUND LIBEL IN A COURT OF LAW FOR ERRORS OR EMISSIONS ARISING FROM THIS SURVEY THAT THE LIMIT OF LIABILITY IS THE PRICE PAID FOR THIS SURVEY.*

8. *SUBSURFACE GAS, ELECTRIC, STEAM, TELEPHONE, COMMUNICATIONS, ETC. UTILITY MAINS AND STRUCTURES ARE NOT SHOWN ON THIS SURVEY DRAWING. CONTACT ONE CALL AND ALL APPROPRIATE UTILITY COMPANIES TO HAVE ALL SUBSURFACE UTILITIES MARKED OUT PRIOR TO CONSTRUCTION. THE SURVEYOR WILL NOT BE LIABLE OR HELD RESPONSIBLE FOR DAMAGES TO SUBSURFACE UTILITIES OR UTILITY CONFLICTS EITHER WITHIN OR OUTSIDE THE SURVEYED PROPERTY DUE TO CONSTRUCTION.*

9. *ENCROACHMENTS OR VAULTS, IF ANY, BELOW SURFACE ARE NOT SHOWN.*

10. *DO NOT USE THIS SURVEY UNLESS YOU AGREE AND CONSENT TO ALL OF THE ABOVE.*

<u>NOTE:</u>
UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW. COPIES OF THIS SURVEY MAP NOT BEARING THE LAND SURVEYORS BLACK INKED OR EMBOSSED SEAL SHALL NOT BE CONSIDERED TO BE A VALID TRUE COPY.
GUARANTEES OR CERTIFICATIONS INDICATED HEREON SHALL RUN ONLY TO THE PERSON AND/OR PERSONS FOR WHOM THE SURVEY IS PREPARED, AND ONLY ON HIS/HER BEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION GUARANTEES OR CERTIFICATIONS ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

TOTAL LOT AREA IS 16997.3 sq.ft.

NOTE:
AREA INDICATED IS SHOWN ON FINAL SECTION MAP #43
CITY OF NEW YORK, BOROUGH OF QUEENS.

EASEMENTS IF ANY ARE NOT SHOWN ON THIS SURVEY
NO INFORMATION PROVIDED TO SURVEYOR AT THIS TIME

FOR BUILDING DEPARTMENT USE ONLY

TOPOGRAPHIC SURVEY

ROGUSKI
LAND SURVEYING. P.C.
TITLE • ARCHITECTURAL • BOUNDARY • CONSTRUCTION
60-17 56th DRIVE, MASPETH, N.Y. 11378
Tel. • (718)480-3761 • Fax. • (718)480-3762 •
Email • info@roguskils.net •
SZCZEPAN H. ROGUSKI
PROFESSIONAL LAND SURVEYOR

LOCATED AT:
107-02, 107-16 Queens Boulevard
Borough and County of Queens
City and State of New York

TAX DESIG: *Block 3238 Lot 44*

CERTIFIED TO:

Capital Holdings

DATE: *June 23, 2017*

SCALE: *1"=20'*

DRAWN: BK

STATE OF NEW YORK
SZCZEPAN HENRYK ROGUSKI
050775
LICENSED LAND SURVEYOR

LEGEND:
CATCH BASIN. C.B.
TREE DIAMETER. 3"
UTILITY POLE.
VALVES. GAS G.V. WATER W.V. METAL VELVE M.V.
OVERHEAD SERVICE WIRES. O.H.S.W.
CURB AND CURB CUT.
MANHOLES. SEWER (S) GAS (G) WATER (W) ELECTRIC (E)

TRAFFIC SIGN — T.S., CELLAR ENTRANCE — C.E., PARKING METER — P.M.
CHAIN LINK FENCE — C.L.F., PLATFORM — PLT., PAVEMENT — PVMT.,
METAL COVER — M.C. METAL DOOR — M.D. TRAFFIC LIGHT — T.L.
AIR CONDITIONER — A.C. BAY WINDOW — B.W. AREA WAY — A.W.
METAL GRATE — M.G. EARHEN GROUND — E.G. METAL FENCE — M.F.
EXISTING ELEVATION. — EL 43.54 TOP OF CURB — TC 43.54
BOTTOM OF CURB — BC 43.53 DROP CURB — DC 43.54
CENTER LINE OF STREET — CL 43.54 LEGAL GRADES. — L.G.43.60

ELECTRIC — E
GAS — G
TELEPHONE — T
SEWER — S
WATER — W
FIRE HYDRANT. — HYD.
ROOF OVER — R.O. ON LINE — O/L

APPENDIX 2

NYSDEC AND NYSDOH CORRESPONDENCES

NEW YORK STATE OF OPPORTUNITY. Department of Health

ANDREW M. CUOMO
Governor

HOWARD A. ZUCKER, M.D., J.D.
Commissioner

SALLY DRESLIN, M.S., R.N.
Executive Deputy Commissioner

March 26, 2018

Gerard Burke, Director
Remedial Bureau B
Division of Environmental Remediation
NYS Dept. of Environmental Conservation
625 Broadway – 12th Floor
Albany NY 12233

Re: **Significant Threat Determination**
107-02 Queens Boulevard
Site #C241196
Queens NY, Queens County

Dear Mr. Burke,

At your Department's request, we have reviewed the February 2018 *Remedial Investigation Report* and the *Remedial Action Work Plan* for the referenced site. Based on our review, I understand that on-site soil and groundwater are contaminated with volatile organic compounds (VOCs), semi-volatile compounds (SVOCs) and metals. On-site soil vapor and indoor air are contaminated with elevated levels of chlorinated VOCs, primarily tetrachloroethene.

The site currently consists of a 1-story commercial building with a full basement and five vacant and two occupied tenant spaces. Immediate actions have been recommended to address exposure associated with soil vapor intrusion in any occupied spaces. Site-related contamination is likely migrating off-site and environmental sampling indicates there is a potential for soil vapor intrusion to affect off-site structures. Therefore, additional environmental investigation is necessary to further evaluate exposure pathways.

Based on the available information and the potential for exposure to site-related contaminants both on and off-site, I believe this site represents a significant threat to public health. If you have any questions, or you would like to discuss this site further, please contact me at (518) 402-7860.

Sincerely,

Justin H. Deming, Chief
Regions 2, 4 & 8
Bureau of Environmental Exposure Investigation

ec: K. Anders / S. Wagh/ e-file
C. Westerman – NYSDOH MARO
C. D' Andrea – NYC DOHMH
J. O'Connell / M. Magloire – NYSDEC Region 2

APPENDIX 3

FISH AND WILDLIFE RESOURCES IMPACT ANALYSIS

Appendix 3C Fish and Wildlife Resources Impact Analysis Decision Key	If YES Go to:	If NO Go to:
1. Is the site or area of concern a discharge or spill event?	13 ✓	2
2. Is the site or area of concern a point source of contamination to the groundwater which will be prevented from discharging to surface water? Soil contamination is not widespread, or if widespread, is confined under buildings and paved areas.	13	3
3. Is the site and all adjacent property a developed area with buildings, paved surfaces and little or no vegetation?	4	9
4. Does the site contain habitat of an endangered, threatened or special concern species?	Section 3.10.1	5
5. Has the contamination gone off-site?	6	14
6. Is there any discharge or erosion of contamination to surface water or the potential for discharge or erosion of contamination?	7	14
7. Are the site contaminants PCBs, pesticides or other persistent, bioaccumulable substances?	Section 3.10.1	8
8. Does contamination exist at concentrations that could exceed ecological impact SCGs or be toxic to aquatic life if discharged to surface water?	Section 3.10.1	14
9. Does the site or any adjacent or downgradient property contain any of the following resources? i. Any endangered, threatened or special concern species or rare plants or their habitat ii. Any DEC designated significant habitats or rare NYS Ecological Communities iii. Tidal or freshwater wetlands iv. Stream, creek or river v. Pond, lake, lagoon vi. Drainage ditch or channel vii. Other surface water feature viii. Other marine or freshwater habitat ix. Forest x. Grassland or grassy field xi. Parkland or woodland xii. Shrubby area xiii. Urban wildlife habitat xiv. Other terrestrial habitat	11	10
10. Is the lack of resources due to the contamination?	3.10.1	14
11. Is the contamination a localized source which has not migrated and will not migrate from the source to impact any on-site or off-site resources?	14	12
12. Does the site have widespread surface soil contamination that is not confined under and around buildings or paved areas?	Section 3.10.1	12
13. Does the contamination at the site or area of concern have the potential to migrate to, erode into or otherwise impact any on-site or off-site habitat of endangered, threatened or special concern species or other fish and wildlife resource? (See #9 for list of potential resources. Contact DEC for information regarding endangered species.)	Section 3.10.1	14 ✓
14. No Fish and Wildlife Resources Impact Analysis needed.		✓

APPENDIX 4

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

107-02 Queens Boulevard
Block 3238, Lot 44
Queens, New York

NYSDEC Site Number: C241196

Table of Content

Tables

1. Sampling and Analytical Method Requirements for Post-Excavation End Point Soil

Attachments

A. Sample Chain of Custody Form
B. Conventional Laboratory QA/QC

1.0 Introduction

This Quality Assurance Project Plan (QAPP) has been prepared for the samples to be collected in accordance with the Interim Remedial Measures (IRM) developed for the property located 107-02 to 107-16 Queens Boulevard in Kew Garden Hills neighborhood of Flushing Section of the County of Queens, New York (Site #C241196). The intent of the QAPP is to ensure that (1) proper equipment handling and maintenance is followed, (2) cross-contamination between sampling locations does not occur, (3) standard number of quality control replicate environmental samples are obtained, (4) proper procedures for samples custody are performed and (5) data review, validation and verification requirements are complete.

All related portions of the fieldwork will be performed, at a minimum, in accordance with acceptable industry standards. These acceptable industry standards include, but are not limited to, the ASTM Standard Guide for Phase II Environmental Site Assessments (E 1903-97) and the New York State Department of Environmental Conservation (NYSDEC) Bureau of Spill Prevention & Response Sampling Guidelines and Protocols, March 1991 and NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation, May 2010, 6 NYCRR Subpart 360.

2.0 Project Objective and Scope of Work

2.1 End Point Soil Sampling

A total of eleven (11) post-excavation confirmation end point samples designated EP-1 to EP-11 will be collected at the conclusion of Site excavation. Tow (2) additional endpoint samples designated EP-U-1 and EP-U-2 will be collected beneath the underground storage tank excavation following tank closure and removal. The end point soil samples will be obtained directly from undisturbed soil from the bottom of excavation. Excavation will be paused and the end point sample will be collected when the limits of sampling requirement are met with reach bottom sample representing 900 square feet. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination utilizing field indicators such as field instrument measurements or visual contamination identified during the soil screening. It should be noted that grab VOC samples will be collected from 0 to 6 inches below final bottom grade within 24 hours of completing the excavation and 6 to 12 inches below final bottom grade past the 24 hours of completing the excavation.

This end point investigation will be performed in accordance to the New York State Department of Environmental Conservation (NYSDEC) requirements under the NYS Brownfield Cleanup Program (BCP) and in compliance with the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) and other acceptable industry standards.

3.0 Sampling Procedures

Each end point soil sample will be placed directly into pre-cleaned containers provided by the laboratory. Sample containers will be labeled and placed in a cooler filled with ice and maintained at 4 degrees Celsius. Each sample will be transmitted under proper chain of custody procedures to a NYSDOH ELAP-certified laboratory for analysis. **Table 1** provide the sample containers, volumes, test methods, preservation techniques, reporting limits and holding times for soil samples.

4.0 Decontamination Procedures

During the field sampling, Paul Matli, who is a Project Manager (PM) at Hydro Tech will be responsible for monitoring the decontamination procedure of every piece of sampling equipment prior to each use by field personnel. The following procedure will be implemented during the decontamination process:

- Wipe clean and wash with Alconox®
- Potable water rinse
- Methanol rinse
- Deionized water rinse
- Air dry

All decontamination procedures will be performed in an area segregated from any sampling areas. Any rinsate from the decontamination area will be contained and removed from the Site.

5.0 Quality Assurance and Quality Control (QA/QC)

The following Quality Assurance and Quality Control (QA/QC) samples will also be collected and analyzed.

- One trip blank per each shipment of samples will be analyzed for TCL VOCs via EPA Method 8260.
- Since the endpoint soil sampling involves the use dedicated disposal equipment, cross contamination is unlikely to occur and as such, field blanks will be not required during each day of sampling.
- Duplicate samples will be collected as per ASP. A Matrix Spike and a Matrix Spike duplicates will be collected at a frequency of 1 per 20 samples and will be analyzed for full set of analytical parameters as the end point soil samples.

A summary of anticipated QA/QC for soil samples is included in **Table 1**.

6.0 General QA/QC Considerations

The end point soil samples will be managed and analyzed as per the following protocols:

- Hydro Tech PM (Paul Matli) shall perform field audits to verify compliance with the RAWP and identify corrective measures where problems are identified.
- Samples will be labeled and logged in a monitor notebook and Chain of Custody upon collection including sampler name, sampling identification, date and time of sample collection and sampling depth, sampling methods and devices.
- In the field, samples will be the responsibility of, and will stay with, the Hydro Tech field geologist (Paul I. Matli).
- Once samples have been collected they are returned to Hydro Tech office and logged in for temporary storage under a proper Chain of Custody. **Attachment A** provides a sample chain of custody form.
- Soil samples will be refrigerated to maintain a temperature at a maximum 4 degrees Celsius.
- Hydro Tech staff will be then responsible for transporting samples to State-certified (ELAP) laboratory for analysis under a proper Chain of Custody.
- Laboratory personnel will record the date and time of samples arrival at the lab and ensure that all holding times for each matrix and analysis will be met.
- After samples are analyzed, laboratory information is added to the label.
- The Sample Chain of Custody form will be used to record all transport and storage information.
- Samples analytical data report will undergo QA/QC performed by a laboratory QA officer who checks each data sheet for precision, missing or illegible information, errors in calculation and values outside of the expected range. A minimum of five percent of the total of a given type of sample shall be devoted to internal QC checks. These checks are designed to insure accuracy in

the sampling procedure and the analytical methods and include blanks, duplicates, matrix spikes reference standards and performance evaluation samples. **Attachment B** provides a conventional lab QA/QC procedures associated with soil samples and analysis.

- The Laboratory data packages will conform to the Analytical Services Protocols (ASP) Category B Deliverables in accordance to NYSDEC DER-10 Appendix 2B.
- To ensure that data quality objectives are met, Hydro Tech QAO will assess data precision, accuracy, degree of representation, comparability and completeness of samples and data. This is primarily accomplished in the evaluation of data together with field notes and sampling logs.
- All deficiencies identified by Hydro Tech PM during the performance of field audits or evaluation of the data will be immediately reported to the field Geologist, and the NYSDEC. In addition to identifying deficiencies, the Hydro Tech PM is responsible for recommending corrective actions.
- The analytical data generated from this project will be provided in an electronic format in accordance with NYSDECs DER-10 Section 1.15. Specifically, the final reports shall be in an electronic format that complies with the NYSDEC's Electronic Document Standards (EDS).
- A Category B deliverable is required and a Data Usability Summary Report (DUSR) will be prepared. The DUSR will include all data and answer the following questions:
    2. Is the data package complete as defined under the requirements for the most current DEC ASP Category B or USEPA CLP data deliverables?
    3. Have all holding times been met?
    4. Do all the QC data; blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?
    5. Have all of the data been generated using established and agreed upon analytical protocols?
    6. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?
    7. Have the correct data qualifiers been used and are they consistent with the most current DEC ASP?
    8. Have any quality control (QC) exceedances been specifically noted in the DUSR and have the corresponding QC summary sheets from the data package been attached to the DUSR?
- All validated data will be reviewed by Donald C. Anné, an independent QAO of the laboratory who is responsible of generating a data usability analysis. This analysis shall consist of (1) an assessment to determine if the data quality objectives were met; (2) evaluation of field duplicate results to indicate the samples are representative; (3) comparison of the results of trip blanks and methods blanks with full data sets to provide information concerning contaminants that may have been introduced during sampling, shipping or analyzing; (4) evaluation of matrix effects to assess the performance of the analytical method with respect to sample matrix, and determine whether the data have been biased high or low due to matrix effects. A Data Usability Summary Report (DUSR) will be prepared and provided in an electronic format in accordance to NYSDEC DER-10 Appendix 2B and in compliance with the NYSDEC's Electronic Document Standards (EDS).
- Field investigation will be performed under the full oversight of Tarek Z. Khouri, a NYS registered professional engineer.

Table 1: Sampling & Analytical Method Requirements – Post-Excavation End Point Soil Samples

Soil Matrix [1] / Sample ID	Parameters	Minimum Sample Volume	Sample Container	Sample Preservation	Analytical Method	Lab Reporting Limit	Technical Holding Time
EP-1 to EP-11 & Matrix Spike /Matrix Spike Duplicate	TCL VOCs	120 ml + 2 OZ	2 oz. clear wide-mouth glass with Teflon lined septum + 40 ml methanol vial with Teflon lined cap + 40 ml DI water vial with Teflon lined cap + 40 ml unpreserved vial with Teflon lined cap	Cool to 4 °C[2]	EPA Method 8260	Compound Specific (0.001-0.05 mg/Kg)	14 days
	TCL SVOCs	8 OZ	8 oz. clear wide-mouth glass with Teflon lined septum	Cool to 4 °C	EPA Method 8270	Compound Specific (0.065-0.250 mg/Kg)	14 days
	TAL Metals	8 OZ	8 oz. clear wide-mouth glass with Teflon lined septum	Cool to 4 °C	EPA Method 6010/EPA 7470 for Mercury	Compound Specific (0.05-10 mg/Kg)	6 months/ Chromium Hexavelent 24 hours/Mercury 28 days
	Pesticides	8 OZ	8 oz. clear wide-mouth glass with Teflon lined septum	Cool to 4 °C	EPA Method 8082	Compound Specific (0.005-0.02 mg/Kg)	14 days
	PCBs	8 OZ	8 oz. clear wide-mouth glass with Teflon lined septum	Cool to 4 °C	EPA Method 8081	Compound Specific (0.025 mg/Kg)	14 days
Trip Blank	TCL VOCs	80 ml	40 ml VOC vial with Teflon lined cap	1:1 HCL to pH<2 Cool to 4 °C	EPA Method 8260	Compound Compound Specific (0.2-10 µg/L)	14 days

[(1)]….Analytical Services Protocols (ASP) Deliverables Package Category B.

(2)…If samples are not delivered to the lab with 48 hours after collection, the 40 ml DI Water vials should be preserved in a frozen condition following sampling

Soil Matrix [1] / Sample ID	Parameters	Minimum Sample Volume	Sample Container	Sample Preservation	Analytical Method	Lab Reporting Limit	Technical Holding Time
EP-U-1 and EP-U-2 & Matrix Spike /Matrix Spike Duplicate	TCL VOCs	120 ml + 2 OZ	2 oz. clear wide-mouth glass with Teflon lined septum + 40 ml methanol vial with Teflon lined cap + 40 ml DI water vial with Teflon lined cap + 40 ml unpreserved vial with Teflon lined cap	Cool to 4 °C[2]	EPA Method 8260	Compound Specific (0.001-0.05 mg/Kg)	14 days
	TCL SVOCs	8 OZ	8 oz. clear wide-mouth glass with Teflon lined septum	Cool to 4 °C	EPA Method 8270	Compound Specific (0.065-0.250 mg/Kg)	14 days
Trip Blank	TCL VOCs	80 ml	40 ml VOC vial with Teflon lined cap	1:1 HCL to pH<2 Cool to 4 °C	EPA Method 8260	Compound Compound Specific (0.2-10 µg/L)	14 days

[(1)]….Analytical Services Protocols (ASP) Deliverables Package Category B.

(2)…If samples are not delivered to the lab with 48 hours after collection, the 40 ml DI Water vials should be preserved in a frozen condition following sampling

ATTACHMENT A
SAMPLE CHAIN OF CUSTODY FORM

YORK
ANALYTICAL LABORATORIES, INC.
120 RESEARCH DR. STRATFORD, CT 06615
(203) 325-1371 FAX (203) 357-0166

Field Chain-of-Custody Record

NOTE: York's Std. Terms & Conditions are listed on the back side of this document.
This document serves as your written authorization to York to proceed with the analyses requested and your signature binds you to York's Std. Terms & Conditions unless superseded by written contract.

York Project No._____

Client Information	Report To:	Invoice To:	Client Project ID / Purchase Order No.	Turn-Around Time	Report Type/Deliverbles
Company:	Company:	Company:		24 hr _____	Summary _____ QA/QC Summary _____ Results Only
Address:	Address:	Address:		48 hr _____	RCP Package _____ ASP B Pkg _____
Phone No.	Phone No.	Phone No.		72 hr _____	ASP A Pkg _____ Excel format _____
Contact Person:	Attention:	Attention:		5 Day _____	EDD _____ OTHER _____
E-Mail Address:	E-Mail Address:	E-Mail Address:		Standard _____	

Print Clearly and Legibly. All Information must be complete. Samples will NOT be logged in and the turn-around time clock will not begin until any questions by York are resolved.

_____
Samples Collected/Authorized By (Signature)

_____
Name (printed)

Matrix Codes
S - soil
Other - specify(oil, etc.)
WW - wastewater
GW - groundwater
DW - drinking water
Air-A - ambient air
Air-SV - soil vapor

Volatiles		Semi-Vols.	Pest/PCB/Herb	Metals	Misc. Org.	Full Lists	Miscellaneous Parameters		
8260 full	TICs	8270 or 625	8082PCB	RCRA8	TPH GRO	Pri.Poll.	Corrosivity	Nitrate	Color
624	Site Spec.	STARS	8081Pest	PP13	TPH DRO	TCL Organics	Reactivity	Nitrite	Phenols
STARS	SPLP or TCLP	BN Only	8151Herb	TAL	CT ETPH	TAL Met/CN	Ignitability	TKN	Cyanide-T
BTEX	Benzene	Acids Only	CT RCP	CT15	NY 310-13	Full TCLP	Flash Point	Tot. Nitrogen	Cyanide-A
MTBE	Nassau Co.	PAH	App. IX	Total	TPH 418.1	Full App. IX	Sieve Anal.	Ammonia-N	BOD5
TCL list	Suffolk Co.	TAGM	Site Spec.	Dissolved	Air TO14A	Part 360-Routine	Heterotrophs	Chloride	CBOD5
TAGM	Ketones	CT RCP	SPLP or TCLP	SPLP or TCLP	Air TO15	Part 360-Baseline	TOX	Phosphate	BOD28
CT RCP	Oxygenates	TCL list	TCLP Pest	**Indiv. Metals**	Air STARS	Part 360-Expanded (No Dioxins/Furans)	BTU/lb.	Tot. Phos.	COD
Arom.	TCLP list	TICs	TCLP Herb	Hg, Pb, As, Cd	Air VPH	Part 360-Expanded (Full List)	Aquatic Tox.	Oil&Grease	TSS
Halog.	524.2	App. IX	Chlordane	Cr, Ni, Be, Fe,	Air TICs	NYCDEP Sewer	TOC	F.O.G.	Total Solids
App.IX	502.2	SPLP or TCLP	608 Pest	Se, Tl, Sb, Cu,	Methane	NYSDEC Sewer	Asbestos	pH	TDS
8021B list	5035	TCLP BNA	608 PCB	Na, Mn, Ag, etc.	Helium	TAGM	Silica	MBAS	TPH - IR

Special Instructions
Field Filtered ☐
Lab to Filter ☐

Sample Identification	Date Sampled	Sample Matrix	Choose Analyses Needed from the Menu Above and Enter Below	Container Description(s)

Preservation Check those Applicable								
4°C____ Frozen____ HCl____ MeOH	4°C____	4°C____	HNO_3___ 4°C	4°C____ H_2SO_4___	4°C____ Other	4°C____ ZnAc	H_2SO_4____ Ascorbic	NaOH____ Other

Comments

_____ _____
Samples Relinquished By Date/Time

_____ _____
Samples Relinquished By Date/Time

_____ _____
Samples Received By Date/Time

_____ _____
Samples Received in **LAB** by Date/Time

Temperature on Receipt
_____°C

ATTACHMENT B
CONVENTIONAL LABORATORY QA/QC

FORM I

PREVENTIVE MAINTENANCE – LABORATORY EQUIPMENT

Instrument	Activity	Frequency
Gas Chromatographs	Clean injector for capillary column Replace injector septum Check carrier gas connections/filters Check filter flow controller Inspect / replace capillary columns Replace detector due to excessive signal Replace Injection port liner	Weekly Daily As Required As Required As Required As Required Daily
Mass Spectrometers (MS)	Inspect/replace mass analyzer assembly Clean quadruple mass analyzer Replace electron multiplier Inspect/change oil for vacuum pumps Inspect turbomolecular or Diffusion pump Clean vacuum system filter (if equipped) Clean ion source/Retune	As Required Annually As Rrequired Annually Every 3 months Weekly As Required
Mercury Cold Vapor Analyzer	Replace tubing Replace Purge bottle Replace Cell	Monthly Monthly As-needed
Ion Chromatographs (anions)	Replace or flush guard column Replace Analytical Column Perform annual PM servicing of parts	Every 6 months Every 6 months Every 12 months
ICP (Inductively Coupled Plasma), and ICP/MS	Check tubing, waste and gas flow Replace tubing/Empty waste container Change coolant water Check air filters/Change air filters Clean/replace torch Check and clean filters Clean nebulizer chamber area/Replace	Daily Daily Daily Every 2/6 months As needed Every 6 months As needed

FORM J

CALIBRATION AND CORRECTIVE ACTION – LABORATORY INSTRUMENTATION

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
GC/MS-Volatiles Including Air	BFB Tuning	Every 12 hours, if necessary	Per Method 8260 and EPA TO-15 for AIR	Perform instrument maintenance, retune instrument	1a, 1b
	Initial Calibration (minimum of 5 standards)	Startup, CCC failure, LCS failure, major maintenance	Low STD @ 0.5 ppb for water, 5.0 ppb for soil ≤15% Average RSD or "r"≥0.99 CCC ≤30% and RSD or "r"≥0.99 Contains all target analytes, min. $R_f \geq 0.05$ If regression used curve must not be forced through origin	Recalibrate as required by method (1) if any of CCC %RSDs or if any one of CCC "r" <0.990 or (2) if >20% of remaining analytes have %RSD >30 or "r" < 0.990.	
	Initial Calib. Verification	After initial calibration	All compounds 80-120%; 20% of compounds can be outside of range; no compounds <65>135%.	Recalibrate	
	Continuing Calibration Check (CCC)	Every 12 hours prior to analysis of samples	Concentration level near midpoint of curve Contain all target analytes Percent difference must be ≤20% for CCC and ≤30% for other compounds.	Recalibrate as required by method (1) If %D of any CCC>20% (2) If %D of >10% of other analytes >30%	
	Method Blanks	Every 20 samples prior to running samples and after calibration STDs	Matrix and preservative specific Target analytes should be <RL except common contaminants laboratory contaminants. If not, note in narrative.	Locate the source of contamination, correct problem, reanalyze method blank	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
GC/MS-Volatiles	Laboratory Control Samples (LCS)	Every 20 field samples	Prepared using a std source different than initial calibration Concentration level near midpoint of curve Contain representative target analytes Matrix specific Laboratory determined recoveries must be between 70-130% for all compounds-narrative for outliers Can also be used as Cont. Cal. Verification.	Recalculate the percent recoveries, reanalyze the LCS, locate source of problem, reanalyze associated sample	1a
	Surrogates	Minimum of three at retention times across the GC run	Up to 10% outside of range acceptable as long as within 40-160%. Response must be 70-130% of the initial calibration response.Retention times must be +/- 30 seconds of initial calibration retention time	If surrogate outside lab control limits, rerun except when: (1) obvious interference documented by re-run (2) No targets detected	
	Internal Stds	3 must be used	Response must be > ½ the corres. Area in the CCC or 2x that area.		

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
GC/MS-Semi-Volatiles	DFTPP Tune	Every 12 hours	Per SW-846 Method 8270C	Perform instrument maintenance, retune instrument	2a, 2b, 2c, 2d
	Initial Calibration (minimum of 5 standards)	Startup, CCC failure, LCS failure, major maintenance	Low STD @ 5.0 ug/ml SCAN; 0.05 ug/ml SIM 1) Minimum of 5 standards. 2)Full Scan % RSD ≤ 15 or "r" ≥ 0.990 for all compounds except CCC's, which must be ≤ 30% RSD or "r" ≥ 0.990.; SIM % RSD ≤30 or "r" ≥ 0.990. 3) Must contain all target analytes 4) If SIM is used, laboratory must monitor at least two ions/analyte for all targets, surrogates, and IS's. 5) Minimum RF for all compounds > 0.05.	Recalibrate as required by method. (1) If any CCC RSD>20% or "r"<0.99 (2) If >20% of remaining analytes have a RSD>30% or "r"<0.99	
	Initial Calib. Verification	After Initial Calib.	1) Compounds must recover within 80-120% 2) Laboratories are allowed to have 20% of compounds out, as long as all compounds within recover 65-135%	Recalibrate system	
	Continuing Calibration Check (CCC)	Every 12 hours prior to analysis of samples	1)Contain all target analytes 2)Percent difference must be ≤20% for CCC and ≤30% for other compounds.	Recalibrate system	
	Method Blanks	Every 20 samples prior to running samples and after calibration STDs	Matrix specific Target analytes should be <RL except common phthalates, which cab be ≤ 3x RL 1) Every 20 samples or each batch, whichever is more frequent.	Locate the source of contamination, correct problem, reextract and reanalyze method blank	
	Lab Control Sample (LCS) and MS/MSD	One per Extraction batch of ≤ 20 samples Per matrix	2) Concentration level must be near or at the mid-point of the initial calibration. 3) Must contain all target analytes 4) Matrix and preservative specific 5) Laboratory determined percent recovery limits must be between 40-140% for base-neutrals and 30-130% for acid compounds. RPD ≤ 20 for waters and ≤30 for soils	Re-extract LCS and samples if >20% compounds outside acceptance criteria For Site Specific MS/MSD note outliers in narrative.	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
GC/ECD Pesticides	Endrin/DDT Breakdown	At beginning of each 12 hour clock	≤ 15% breakdown for each	Perform corrective action on injection port	3a, 2b, 2c, 2d
	Initial Calibration	Startup, CCC failure, LCS failure, major maintenance	1) Minimum of 5 stds for single response pesticides. 2) Low std at RL 3) % RSD must be ≤20% or if linear regression used "r" ≥ 0.990 4) For multi-response pesticides analysis of single std at mid-point of calibration range. 5) If curves are used, curve must NOT be forced through origin. Section 7.5 6) Curves must be verified with independent ICV prior to sample analysis.	Recalibrate after corrective action on injection port or column	
	Continuing Calibration Verification	Prior to samples, every 12-hours or 20 samples, whichever is more frequent, and at the end of the analytical sequence.	Percent difference or drift ≤15%. Verify all analytes fall in retention time windows.	1) Perform instrument maintenance, reanalyze CCAL and/or recalibrate. 2) Reanalyze associated samples if beginning or closing CCAL exhibited low response and associated pesticides not detected in samples. 3) Reanalyze associated samples if beginning or closing CCAL high and associated pesticides were detected in samples.	
	Method Blank	1) Extracted every 20 samples or every batch, whichever is greater. 2) Matrix specific	All target analytes < RL	Locate source of contamination and correct problem. Reanalyze method blank. Re-extract samples if method blank contamination found.	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
GC/ECD Pesticides	Laboratory Control Sample (LCS)	1) Extracted every 20 samples or every batch, whichever is greater. 2) Matrix specific 3) Standard source different from initial calibration source. 4) Concentration level must be near or at the mid-point of the initial calibration. 5) Must contain all single response pesticides.	Laboratory determined percent recovery limits must be between 40-140% except for difficult analytes, which must be between 30-140% recovery.	Reanalyze the LCS If MS/MSD in same batch compare to determine if problem isolated to LCS Re-extract LCS and samples if >10% compounds outside acceptance criteria and no MS/MSD with acceptable criteria Locate & correct problem, reanalyze associated samples	3a, 2b, 2c, 2d
	Site Specific Matrix Spike/Matrix Spike Duplicate	1) Every 20 samples per matrix* 2) Spike concentration in lower part of calibration curve. 3) Must contain all single response pesticides.	Laboratory determined percent recovery limits must be between 30-150% RPD's ≤ 30% for single response pesticides.	If compounds out compare to LCS; if LCS recoveries in note in narrative.	
	Surrogates	Minimum of two compounds across retention times of GC run. Recommended compounds Tetrachloro-m-xylene and decachlorobiphenyl.	Recovery limits lab generated and within 30-150% for both compounds on both columns.	1)Note exceedances in narrative. 2) If re-extraction or reanalysis confirms matrix interference or if re-extraction outside holding times report all results. 3) If re-extraction or reanalysis results in criteria and in holding time, report only compliant data.	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
GC/ECD PCBs	Initial Calibration	Startup, CCC failure, LCS failure, major maintenance	1) Minimum of 5 stds (Note 1) 2) Low std at or below reporting limit 3) % RSD must be ≤20% or if linear regression used "r" ≥ 0.990 4) 5-point cal for PCB-1016/1260. Single point for other Aroclors at mid-point within 12-hrs of sample analysis. If congeners are determined, must use 5-point for each congener. 5) If curves are used, curve must NOT be forced through origin. 6) Curves must be verified with independent ICV prior to sample analysis.	Recalibrate after corrective action on injection port or column	4a, 2b, 2c, 2d
	Continuing Calibration Verification	1) Prior to samples, every 12-hours or 20 samples, whichever is more frequent, and at the end of the analytical sequence. 2) Concentration near mid-point of curve using AR-1016/1260. Congeners; CCAL must include all congeners	Percent difference or drift ≤15%. Verify all analytes fall in retention time windows.	1) Perform instrument maintenance, reanalyze CCAL and/or recalibrate. 2) Reanalyze associated samples if beginning or closing CCAL exhibited low response and associated pesticides not detected in samples. 3) Reanalyze associated samples if beginning or closing CCAL high and associated pesticides were detected in samples.	
	Method Blank	1) Extracted every 20 samples or every batch, whichever is greater. 2) Matrix specific	All target PCBs < RL	Locate source of contamination and correct problem. Reanalyze method blank. Re-extract samples if method blank contamination found.	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
GC/ECD PCBs	Laboratory Control Sample (LCS)	1) Extracted every 20 samples or every batch, whichever is greater. 2) Matrix specific 3) Standard source different from initial calibration source. 4) Concentration level must be near or at the mid-point of the initial calibration. 5) Must contain all single response pesticides.	Laboratory determined percent recovery limits must be between 40-140%	1) Report non-conformances in case narrative. 2) If re-extraction performed within holding time, report only compliant data. If re-extraction performed outside holding time report all data.	4a, 2b, 2c, 2d
	Site Specific Matrix Spike/Matrix Spike Duplicate	1) Every 20 samples per matrix* 2) Spike concentration in middle of calibration curve. 3) Must contain PCB 1016/1260	Laboratory determined percent recovery limits must be between 40-140% RPD's ≤ 50% for PCB.	If compounds out compare to LCS; if LCS recoveries in note in narrative.	
	Surrogates	Minimum of two compounds across retention times of GC run. Recommended compounds Tetrachloro-m-xylene and decachlorobiphenyl.	Recovery limits lab generated and within 30-150% for both compounds on both columns.	1)Note exceedances in narrative. 2) If re-extraction or reanalysis confirms matrix interference or if re-extraction outside holding times report all results. 3) If re-extraction or reanalysis results in criteria and in holding time, report only compliant data.	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
ICP or ICP/MS Metals	Initial Calibration	1) Daily following instrument profiling and prior to sample analysis. 2) Minimum of calibration blank plus one standard.	Per instrument manufacturer's specification	Recalibrate system	5a,5c
	Initial Calibration Verification (ICV)	1) Daily immediately after calibration and prior to sample analysis. 2) 2nd source standard	ICV ±10% of true value. Must use at least two replicates with RPD <5%	Re-calibrate/Re-analyze ICV as required by method.	
	Initial Calibration Blank (ICB)	1) Daily immediately after ICV. 2) Matrix matched with standards and samples.	< Reporting Limit	Re-calibrate/Re-analyze ICB as required by method.	
	Low Level Calibration Check Standard	1) Daily prior to sample analysis 2) Std concentration ≤ RL for all analytes	Recovery ±30% of true value except for antimony, arsenic, cobalt, and thallium which have a ± 50% limit	Recalibrate/Explain in Narrative	
	Continuing Calibration Verification (CCV)	1) Every 10 samples and at end of analytical sequence. 2) Can be same source or second source.	Recovery ±10% of true value, Must use at least two replicates with RPD <5%	Recalibrate and rerun all samples run after non-compliant CCV	
	Continuing Calibration Blank (CCB)	1) Every 10 samples immediately after CCV. 2)) Matrix matched with standards and samples.	< Reporting limit	Recalibrate/Re-analyze all samples since last compliant CCV	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
ICP or ICP/MS Metals	Interference Check Standards (ICSA & ICSAB)	1) Daily prior to sample analysis and at the end of the analytical sequence. 2) ICSA and ICSAB containing known amounts of analytes and/or interferents per method.	Recoveries for all analytes ±20% of true value or 2x the RL, whichever is greater. If analyte not present, its true value is zero.	May require adjustment of interelement,, correction factors, background correction and/or linear ranges	5a,5c
	Method Blanks	1) Digested every 20 or every batch, whichever is greater. If no digestion, ICB = blank 2) Matrix specific and matrix matched	Target analytes must be <RL	Locate source of contamination and correct problem. Reanalyze method blank. Reprepare samples unless all analyte concentration >10x method blank level	
	Laboratory Control Sample (LCS)	1) Every 20 samples or each batch, whichever is more frequent. If samples not digested, ICV = LCS 2) Matrix specific (solid, aqueous, etc)	LCS recoveries ±20% for aqueous media and within vendor control (95% confidence limits) for solids.	Redigest and reanalyze all samples.	
	Site Specific Matrix Spike	Every 20 samples or batch per matrix	Percent recovery limits must be between 75-125%.	If recoveries >30% and LCS in limits note in narrative If MS recoveries <30%, reprepare and reanalyze samples	
	Site Specific Matrix Duplicate	Every 20 samples or batch per matrix*	For aqueous samples, if concentration >5x the RL, RPD <20%. If concentration <5x RL, difference ±RL. 3) For solids if conc >5x RL, RPD <35%. If conc. < 5x RL, difference ± 2x RL	If LCS in criteria, narrate outliers	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
Cold Vapor Mercury	Initial Calibration	1) Daily prior to sample analysis. 2) Minimum of calibration blank plus five calibration standards.	Linear curve with "r" ≥ 0.995. Can use second order fit if "r " ≥ 0.995.	Re-optimize instrument and recalibrate as necessary.	6a
	Initial Calibration Verification (ICV)	1) Daily immediately after calibration and prior to sample analysis. 2) 2nd source std	ICV ±10% of true value.	Re-calibrate/Re-analyze ICV as required by method.	
	Initial Calibration Blank (ICB)	1) Daily immediately after ICV. 2) Matrix matched with standards and samples.	ICB must be < RL	Recalibrate/Narrate	
	Continuing Calibration Verification (CCV)	1) Every 10 samples and at end of analytical sequence. 2) Can be same source or second source.	± 20% of true value	Recalibrate/Re-analyze all samples since last compliant CCV	
	Continuing Calibration Blank (CCB)	1) Every 10 samples immediately after CCV. 2)) Matrix matched with standards and samples.	CCB must be < RL	Recalibrate/Re-analyze all samples since last compliant CCV, Narrate outliers	
	Method Blanks	1) Digested every 20 or every batch, whichever is greater. 2) Matrix specific and matrix matched	Mercury < RL	Report non-conformances in case narrative. Reprepare samples unless all analyte concentration >10x method blank level	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
Cold Vapor Mercury	Laboratory Control Sample (LCS)	1) Every 20 samples or each batch, whichever is more frequent 2) Standard source can be initial calibration source. 3) Matrix specific (solid, aqueous, etc).	1) Every 20 samples or each batch, whichever is more frequent 2) Standard source can be initial calibration source. 3) Matrix specific (solid, aqueous, etc).	Redigest and reanalyze all samples	6a
	Site Specific Matrix Spike	Every 20 samples or batch per matrix	Percent recovery limits must be between 75-125%.	If recoveries >30% and LCS in limits note in narrative If MS recoveries <30%, reprepare and reanalyze samples	
	Site Specific Matrix Duplicate	Every 20 samples or batch per matrix	1) For aqueous samples RPD ± 20% if conc. >5x the RL. If conc. < 5x RL, the limit is ± RL 2) For solids RPD ±35% if conc >5x the RL. If conc. < 5x the RL, limit is ± the RL.	If LCS in criteria, narrate outliers.	

Instrument/Analysis	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref. *
Ion Chromatograph Anions (Nitrite/Nitrate)	Initial Calibration	1) As needed when operation dictates 2) Minimum of five calibration standards.	Linear curve with "r" ≥ 0.990 and RSD < 15	Re-optimize instrument and recalibrate as necessary.	7a
	Initial Calibration Verification (ICV)	1) Daily immediately after calibration and prior to sample analysis. 2) 2nd source std	ICV ±10% of true value.	Re-calibrate/Re-analyze ICV as required by method.	
	Initial Calibration Blank (ICB)	1) Daily immediately after ICV.	ICB must be < RL	Recalibrate/Narrate	
	Continuing Calibration Verification (CCV)	1) Every 10 samples and at end of analytical sequence. 2) Can be same source or second source.	± 10% of true value	Recalibrate/Re-analyze all samples since last compliant CCV	
	Continuing Calibration Blank (CCB)	1) Every 10 samples immediately after CCV.	CCB must be < RL	Recalibrate/Re-analyze all samples since last compliant CCV, Narrate outliers	
	Lab Control Sample(LCS)	One per 20 samples	Must revocer within mfg. limits	Rerun, if still out, recalibrate.	
	Matrix Spikes	One per 20 samples	Recovery 90-110%	Narrate outliers	
	Matrix Duplicates	One per 20 samples	RPD < 15% for results > 10x RL	Narrate outliers	

Standard Operating Procedure Cross Reference

Analysis/Method	YORK SOP Number-AQUEOUS/Air	YORK SOP Number-SOILS	Table Reference
Volatile Organics 8260	GCMSVOC011700 Rev 1.9 091107	GCMSVOC011700 Rev 1.9 091107	1a
Volatile Organics by EPA TO-15	GCMSAIR111692 Rev.6.0 111709	NA	1b
Semi-Volatile Organics 8270 Scan and SIM	GCMSSVOC011700 Rev 1.9 091107	GCMSSVOC011700 Rev 1.9 091107	2a
Extraction for SVOCs/Pest/PCB- 3545A		EXTSVOCSASE083106 Rev 1.3 102406	2b
Extraction for SVOCs/Pest/PCB- 3550C		EXTSVOCS052600 Rev 1.7 010307	2c
Extraction for SVOCs/Pest/PCB- 3510C	EXTAQSVOC052600 Rev 1.9 022608		2d
Pesticides 8081	GCPEST011700 Rev 1.2 091107	GCPEST011700 Rev 1.2 091107	3a
PCBs 8082	GCPCB011700 Rev 1.3 091107	GCPCB011700 Rev 1.3 091107	4a
Metals 6010B	ICP031195 Rev 1.3 091107	ICP031195 Rev 1.3 091107	5a
Metals 6020B	ICPMS6020 080106 Rev 1.2 11/25/08	ICPMS6020 080106 Rev 1.2 11/25/08	5b
Digestion of Samples for Metals -3010A and 3050B	MetalsPrep030695 Rev 1.2 091207	MetalsPrep030695 Rev 1.2 091207	5c
Mercury 7470A, 7471B	Hg120998 Rev 1.3 091107	Hg120998 Rev 1.3 091107	6a
Anions 300.0/9056	IC011400 Rtev 1.6 101107	IC011400 Rtev 1.6 101107	7a

APPENDIX 5

STORM-WATER POLLUTION PREVENTION PLAN

I. PROJECT DETAILS

1. Project Description

The purpose of the project is to remediate a 0.39-acre property located at 106-02 to 107-16 Queens Boulevard in Kew Garden Hills neighborhood of Flushing Section of the County of Queens, New York under the Brownfield Cleanup Program (BCP) and make it protective of human health and the environment consistent with the contemplated new residential and commercial development with a full basement. The entire property will be disturbed during this remedial construction period.

2. Site Description

The Site is approximately 17,090 square feet (0.39 acres) in area and is bounded by MacDonald Park to the north, a 7-story residential building and a synagogue to the south, a 5-story warehouse/commercial building to the east, and a US Post Office to the west in the Kew Garden Hills neighborhood of Flushing Section of the County of Queens, NY. The Site consist of a 1-story commercial building in the northern portion with a rear open parking area in the southern portion. The building at the Site has a full basement and consists of seven (7) tenant spaces identified as Café Biu Bela, Liz Cleaners, Twin Deli, Yury's Show Repair, D&L Skin Solution, Ship It Global, and Party World. A minor fire occurred in the ceiling of Café Biu Bella on May 24, 2017 and since then this tenant space has been vacant. Ship It Global has been vacant since August 2017.

3. Adjacent Property

Land use in the vicinity of the Site is residential and commercial properties. The Site is bounded by Queens Boulevard – East Bound Service Road to the north, 70th Avenue to the west and is bordered by a 7-story residential building and a synagogue to the south and a 5-story warehouse/commercial building to the east.

4. Soils

The soil at the Site is mapped with fill material at shallow depth to approximately 8 feet bgs. The fill layer is underlain by fine-grained sand to variable to the depth of 40 feet bgs. Sandy soil is considered to have a high degree of permeability, with the coefficient of permeability (k) ranging between $10^{-7}<k<10^{-5}$. The soil erodibility factor (K value) ranges from 0.42 at the surface to 0.28 in the subsoil.

Due to the soil/fill permeability of the deep subsoil that will be exposed during excavation, a surface wetness or runoff problems are not anticipated following significant rainfall events. The lower portion of excavations may temporarily fill with groundwater following significant rainfall events. However, since Site excavation is not expected to extend to the depth of soil and groundwater interface, any accumulated water

in the pit is expected to percolate fast due high infiltration rate and as such this accumulated water will unlikely require removal by mechanical means, i.e vacuum truck or via a dewatering system.

II. PLANNED EROSION AND SEDIMENT CONTROL PRACTICES

1. Sediment Basin

No sediment basin will be required. Soil/fill will be excavated across the entire Site to variable depths consistent with the plan of construction as well as the plan for SGCs established for this Site. The entire Site will be excavated during the soil removed action to the depth of 20 feet bgs. Should a dewatering system be required to remove accumulated rainwater in the excavated pit, this system will incorporate a frac tanks designed to retain sediments prior to discharging groundwater into the NYC combined sewer system following any necessary treatment.

2. Temporary Gravel Construction Entrance/Exit

A temporary gravel construction entrance will be installed on the western side of the property towards 70th Avenue. This will be done to reduce the amount of sediment transported on to roads by construction vehicles and run-off. During wet weather it may be necessary to wash vehicle tires at this location. The entrance will be graded so that runoff water will be directed to an inlet protection structure and away from the steep fill area.

3. Tree Preservation and Protection

No tree preservation and protection will be required.

4. Land Grading

No land grading will be required as soils will be excavated and disposed of as a result of Site development.

5. Temporary Sediment Trap

No temporary sediment trap will be required. All soils will be excavated and disposed of as a result of Site remedial development.

6. Sediment Fence

A sediment fence will be constructed around any temporary soil stockpiles to prevent sediment from entering non-excavated areas or areas off-site.

7. Surface Stabilization

Support of excavation (SOE) measures will be required during Site excavation as a results of site remedial development activities. These measures will be implemented in accordance with NYCDOB-approved SOE plans.

8. Dust Control

Dust control is not expected to be a problem due to relatively short time of exposure (not exceeding 3 months). Should excessive dust be generated, it will be controlled by sprinkling. Street sweeping will also be employed wherever required. Additional details regarding dust control can be found in Section 4.1.6 of the RAWP (Community Air Monitoring Plan).

III. CONSTRUCTION SCHEDULE

1. Obtain plan approval and other applicable permits.
2. Maintain construction fence before start of any construction activity.
3. Hold pre-construction conference at least one week prior to starting construction.
4. Install temporary gravel construction entrance/exit.
5. Install & operate dewatering system.
6. Commence excavation and disposal.
7. Construct foundations.
8. Estimated time before final stabilization – 3 months

IV. MAINTENANCE PLAN

1. General Conditions

Any erosion and sediment control measures will be checked for stability and operation following every runoff-producing rainfall but in no case less than once every week. Any needed repairs will be made immediately to maintain all practices as designed.

2. Construction Fence

a. A temporary construction fence will be installed per NYCDOB code around the Site along Queens Boulevard to the north and 70th Avenue to the west. The purpose of the construction fence is to prevent exposure of pedestrians to unsafe building condition.

b. The construction fence be maintained around the Site during building demolition and during construction in order to prohibit the undesirable use of the construction area during Site remedial development.

c. The construction fence should maintain a minimum height of 8 feet.

3. Temporary Gravel Construction Entrance/Exit

a. A temporary gravel construction entrance will be constructed to reduce the amount of sediment transported on to roads by construction vehicles and run-off.

b. Clear the entrance and exit area from of all vegetation, roots and other objectable material.

c. Grade the road foundation so that entrance/exit slopes towards south of the entrance.

d. The construction entrance will be built to a minimum width of 20 feet, minimum length of 30 feet and to minimum 6 inches in thickness.

e. 2-inch to 3-inch washed stone will be used at the construction entrance.

f. If wet conditions are anticipated a geotextile fabric will be placed over the graded foundation to improve stability.

g. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the site. Mud tracked or washed onto road, will be removed immediately.

4. Sediment Fence

a. A sediment fencing will be maintained to surround any temporary soil stockpiles.

b. Any sediment fence utilized will be inspected at the end of each day to ensure its integrity.

5. Dust Control

a. A min. 275-gallon water tank or tools to access via permit to use a fire hydrant and 50 feet of garden hose with spray nozzle will be maintained at the construction entrance.

b. All vehicles leaving property will be inspected for dust and sprayed as necessary.

APPENDIX 6

COMMUNITY AIR MONITORING PLAN

COMMUNITY AIR MONITORING PLAN (CAMP)

107-02 Queens Boulevard
Block 3238, Lot 44
Queens, New York

NYSDEC Site Number: C241196

1- Introduction

The Community Air Monitoring Plan (CAMP) has been prepared in accordance with the New York State Department of Health (NYSDOH) Generic CAMP to monitor the air quality during the intrusive activities proposed as a part of the Brownfield Cleanup Program (BCP) Remedial Action Work Plan (RAWP) activities at the property located at 107-02 to 107-16 Queens Boulevard in Kew Garden Hills neighborhood of Flushing Section of the County of Queens, New York (Site #C241196). Levels of VOCs and dust in the air will be monitored continuously and periodically utilizing a Photo Ionization Detector (PID) and Real-Time Particulate Dust Tracker, respectively. For this investigation, the PID will be calibrated at the beginning of each day to the compound isobutylene, which is published by the manufacturer. The PID has a minimum detection limit of 0.1 parts per million (ppm). The Dust Tracker provides real-time measurement based on 90° light scattering. The Dust Tracker has a minimum detection limit of 0.001 mg/m^3.

Continuous real-time air monitoring for VOCs and particulate levels at the perimeter of the exclusion zone or work area will be performed for all ground intrusive activities. Ground intrusive activities include, but are not limited to the soil excavation, stockpiling, movement, hauling and disposal.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of endpoint soil samples. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Exceedances of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the NYSDEC and recorded in a field daily log. A summary of daily logs/reports will be provided in the Remedial Investigation Report (RIR).

2- VOCs Monitoring, Response Levels And Actions

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 a PID, which will be calibrated at least daily for to the compound isobutylene. The PID 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 exceeding 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.

Activities will be shut down if the organic vapor level at the perimeter of the work area is above 25 ppm.

All 15-minute readings must be recorded in a daily field log. Instantaneous readings, if any, used for decision purposes will also be recorded.

3- PM Monitoring, Response Levels And Actions

Particulate concentrations will be monitored continuously at the downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using a Dust Tracker 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 are not 150 mcg/m^3 or greater 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 150 mcg/m^3 or greater above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume if dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration. All readings will be recorded in a daily field log.

APPENDIX 7

CITIZEN PARTICIPATION PLAN

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
107-02 Queens Boulevard

April, 2017

C241196
107-02 to 107-16 Queens Boulevard
Kew Gardens, New York 11350

Contents

* * * * *

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **RJ Capital Holdings LLC; AVG Capital LLC; De Boulevard LLC**
Site Name: **107-02 Queens Boulevard**
Site Address: **107-02 to 107-16 Queens Boulevard, Queens, NY**
Site County: **Queens**
Site Number: **C241196**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at:
http://www.dec.ny.gov/chemical/8450.html.

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision-makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment;

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process;

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process;

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community; and

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC website. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- Residents, owners, and occupants of the site and properties adjacent to the site;
- The public water supplier which services the area in which the site is located;
- Any person who has requested to be placed on the site contact list;
- The administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility; and
- Location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

Note: The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html.

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The

flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, **the significant threat determination for the site had not yet been made.**

To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at
http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

Citizen Participation Activities	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repositories	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement (BCA):	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report • Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC)	At the time the cleanup action has been completed. **Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

The site is not located in an Environmental Justice Area. Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

The site is not located in an Environmental Justice Area. Therefore, there is no need to translate future fact sheets into another language.

There may be truck traffic, noise and odor impacts with regards to the cleanup.

Based on the results of previous environmental investigation, Tetrachloroethene (PCE), Trichloroethene (TCE) and vinyl chloride contaminants were detected in subsurface soil, PCE was detected in groundwater and PCE, TCE, carbon tetrachloride and cis-1,2-dichloroethylene (cis-1,2-DCE) were detected in soil vapors. These chlorinated solvents represent a possible public concern at the site. However, the site is not near any public water supply or private water wells. The future on-site use and remediation will not create any restrictions on community activities but will render the Site protective of public health and the environment.

It should be noted that during future remedial activities at the site, potential contaminants known to be present in the soil, and potential unknown contaminants especially Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs) and metals may become airborne and pose potential health risks to site visitors and workers during remedial construction, workers and occupants on adjacent properties. However, a NYSDEC Community Air Monitoring Program (CAMP) is in place for the proposed remedial activities and will be followed to safeguard the workers and other adjacent occupants against any potential exposures.

4. Site Information

Site Description

The site is located at 107-02 to 107-16 Queens Boulevard in the Forest Hills section of Queens, and is identified as Block 3238 and Lot 44 on the New York City Tax Map. The site is 17,090 sq ft (0.39 acre) square feet in urban area and is bounded by MacDonald Park to the north, US Post Office to the west, 5-story warehouse/commercial building to the east and a 7-story residential building and a synagogue to the south.

The site is developed with a 1-story commercial building with a rear open parking area in the southern portion. The building at the site has a full basement and is currently occupied by seven (7) tenants spaces that will be vacating their units within the next few months.

Appendix C contains a map identifying the location of the site.

History of Site Use, Investigation, and Cleanup

The site was historically utilized as stables and residential homes before it became vacant in 1932. The on-site commercial building at the site was constructed in 1950 and was occupied by multiple tenants including a deli, an Italian restaurant, a dry cleaner and various retail stores. The dry cleaner has occupied the commercial unit identified as 107-06 since 1983 to this date. Primary contaminants identified at the site consisted of Chlorinated Volatile Organic Compounds (CVOCs) including PCE, TCE and their derivatives that are likely to be associated with the historic and current presence drycleaners at the property.

The following provides a list of reports that summarize the prior environmental assessments and investigation activities conducted at the site. These documents were previously provided to NYSDEC and referenced in the BCP application submitted by Applicant:

- Phase I Environmental Site Assessment Report, 107-02 to 107-16 Queens Boulevard, Queens, NY, February 17, 2016, Hydro Tech Environmental Corp.
- Phase II Environmental Site Assessment (ESA), 107-02 to 107-16 Queens Boulevard, Queens, NY, April 21, 2016, Hydro Tech Environmental Corp.

5. Investigation and Cleanup Process

Application

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a **Volunteer. This mean that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.**

The Applicant in its Application proposes that the site will be used for Restricted Residential purposes.

To achieve this goal, the Applicant will conduct **investigation and cleanup** activities as required, at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

Investigation

The Applicant has completed a **partial** site investigation before it entered into the BCP. **For the partial investigation, NYSDEC will determine if the data is useable.**

The Applicant will conduct an investigation of the site officially called a "remedial investigation" (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The site investigation has several goals:

1) Define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
2) Identify the source(s) of the contamination;
3) Assess the impact of the contamination on public health and the environment; and
4) Provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

The Applicant submits a draft “Remedial Investigation Work Plan” to NYSDEC for review and approval. NYSDEC makes the draft plan available to the public review during a 30-day public comment period.

When the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a “significant threat,” it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Interim Remedial Measures

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

Remedy Selection

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a “Certificate of Completion” (described below) to the Applicant.

or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a “Remedial Work Plan”. The Remedial Work Plan describes the Applicant’s proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a Final Engineering Report (FER) that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the FER. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

Site Management

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

Appendix A -
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

Manfred Magloire
Project Manager
NYSDEC – Region 2 Office
Division of Environmental Remediation
One Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101
Email: manfred.magloire@dec.ny.gov

Thomas Panzone
Citizen Participation Specialist
NYSDEC – Region 2 Office
47-40 21st Street
Long Island City NY 11101
Tel: (718) 482-4953
Email: Thomas.panzone@dec.ny.gov

New York State Department of Health (NYSDOH):

Sarita Wagh
Project Manager
NYSDOH
Bureau of Environmental Exposure Investigation
Empire State Plaza
Corning Tower Room 1787
Albany, NY 12237
Email: BEEI@health.ny.gov

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

Queens Public Library – Forest Hills Branch
108-19 71st Avenue
Forest Hills, NY 11375
Attn: Hwaiman Wood
Phone: (718) 268-7934
Hours:

Mon; 9:00 AM to 8:00 PM
Tue: 1:00 PM to 6:00 PM
Wed: 10:00 PM to 6:00 PM
Thu: 12:00 PM to 8:00 PM
Fri: 10:00 PM to 6:00 PM
Sat: 10:00 PM to 5:00 PM
Sun Closed

NYSDEC - Region 2 Office
Attn: Manfred Magloire
Phone: (718) 482-4078
Hours: call for appointment

Queens Community Board 6
Attn: Frank Gulluscio, District Manager
104-01 Metropolitan Avenue
Forest Hills, NY 11375
Phone: (718) 263-9250 Ext. 303

Appendix B - Site Contact List

1. **LOCAL AND STATE OFFICIALS**

Queens Borough President Melinda Katz
Borough President 120-55 Queens Boulevard
Kew Gardens, NY 11424

New York City Department of Planning
Queens Office John Young, Borough Director
120-55 Queens Blvd., Room 201 Kew Gardens, NY
11424

New York City Mayor's Office Bill De Blasio, Mayor
City Hall
New York, NY 10007

Hon. Scott Stringer
NYC Comptroller
1 Centre Street
New York, NY 10007

Hon. Letitia James
Public Advocate
1 Centre Street
New York, NY 10007

Carl Weisbrod
Commissioner; NYC Dept. Of Planning
120 Broadway, 31st Floor
New York, NY 10271

Joseph C. Hennessy, Chairman
Frank Gulluscio, District Manager
Queens Community Board 6
104-01 Metropolitan Avenue
Forest Hills, NY 11375

Hon. Karen Koslowitz
NYC Council Member District 29
118-35 Queens Blvd, 17th Floor Forest Hills, NY
11375

NYS DOH-Albany Sarita Wagh,
Public Health Specialist
Empire State Plaza
Corning Tower Rm. 1787
Albany, NY 12237

Thomas V. Panzone
NYSDEC Region 2
Citizen Participation Specialist
47-40 21st Street
Long Island City, NY 11101

Dan Walsh
NYC Office of Environmental Remediation
100 Gold Street – 2nd Floor
New York, NY 10038

Julie Stein
Office of Environmental Assessment & Planning
NYC Dept. of Environmental Protection
96-05 Horace Harding Expressway Flushing, NY
11373

Hon. Andrew Hevesi NYS, Assembly Member
70-50 Austin St., Suite 118
Forest Hills, NY 11375

Hon. Toby Ann Stavisky
NYS Senator
142-29 37th Ave, Suite 1
Flushing, NY 11373

Hon. Grace Meng
U.S. House of Representatives
118-35 Queens Blvd, 17th Floor
Forest Hills, NY 11375

Hon. Charles Schumer
U.S. Senator
780 Third Avenue, Suite 2301 New York, NY 10017

Hon. Kirsten Gillibrand
U.S. Senator
780 Third Avenue, Suite 2601 New York, NY 10017

Audrey Pheffer
Queens County Clerk
88-11 Sutphin Boulevard, 1st Floor
Jamaica, NY 11439

Manfred Magloire
NYS DEC Project Manager
625 Broadway
Albany, NY 12233

Larry Ennist
NYS DEC
625 Broadway
Albany, NY 12233

Frank Gulluscio, District Manager
Queens Community Board 6
104-01 Metropolitan Avenue
Forest Hills, NY 11375

Env. Protection Committee Chair
Queens Community Board 6 Env. Committee
104-01 Metropolitan Avenue
Forest Hills, NY 11375

COMMUNITY, CIVIC AND RELIGIOUS ORGANIZATIONS:

Carol Conslato
Consolidated Edison Public Affairs
59-17 Junction Boulevard, 2nd floor
Elmhurst, NY 11373

Heidi Chain, President
112th NYPD Police Precinct Council
68-40 Austin Street
Forest Hills, NY 11375

Engine 305 Ladder 151
FDNY
111-02 Queens Boulevard
Forest Hills, NY 11375

Forest Hills Jewish Center
Attn: Jack Gostl, President
106-06 Queens Boulevard
Forest Hills, NY 11375

Bukharian Jewish Center
Attn: Rabbi
106-16 70th Avenue
Forest Hills, NY 11375

Forest Hills Chamber of Commerce
Attn: Executive Director
71-58 Austin Street
Forest Hills, NY 11375

Brighter Futures Learning Center
Attn: Executive Director
68-60 Austin Street
Forest Hills, NY 11375

Self Help Austin Street Senior Center
Attn: Executive Director
106-06 Queens Boulevard
Forest Hills, NY 11375

Forest Hills Community & Civic Association
Attn: Barbara Stuchinski, President
PO Box 754053
Forest Hills, NY 11375

PUBLIC WATER SUPPLIER

Vincent Sapienza
Acting Commissioner, NYC Dept. of Environmental Protection
59-17 Junction Boulevard
Flushing, NY 11373

BY EMAIL:

NYC MOER
Dan Walsh, Director
Email: dwalsh@cityhall.nyc.gov

NYC DOS
Thomas Milora
Email: tmilora@dsny.nyc.gov

NYC DOHMH
Nathan Graber, MD, MPH
Email: Ngraber1@health.nyc.gov

NYC DOHMH
Christopher D'Andrea
Email: cdandrea@health.nyc.gov

NYSDEC
Dennis Farrar
Email: dennis.farrar@dec.ny.gov

NYS DEC Region 2
Jane O'Connell
Email: jane.oconnell@dec.ny.gov

NYC DEC
Thomas V. Panzone
Thomas.Panzone@dec.ny.gov

NYSDEC-Albany
Bob Cozzy
Email: robert.cozzy@dec.ny.gov

Joseph C. Hennessy, Borough Director
Queens Community Board Office 6 Email:
cb6q@nyc.rr.com

NYS DOH-Albany Michael
J. Hughes
Email: mjh03@health.ny.gov

2. **OWNERS, RESIDENTS, AND OCCUPANTS ON OR ADJACENT TO THE SITE**

Owner: US Post Office
106-28 Queens Blvd
Forest Hills, NY, 11375

Owner: Austin Mall Associates
71-25 Austin Street,
Forest Hills, New York, 11375

Owner: Jan Realty LLC
19 Overbrooke Lane
Old Brookville, NY, 11545

Owner: Austin Realty Holding, LLC.
70-23 Narrow Street
Forest Hills, New York, 11375

Owner: Austin Corner Assoc.
70-10 Austin Street
Forest Hills, New York, 11375

Owner: NYC Parks
Re: Macdonald Park
The Arsenal, 803 5th
Avenue
New York, New York, 11232

Owner: Liz Cleaners
107-06 Queens Blvd
Forest Hills, NY 11375

Owner: D & L Beauty
107-10 Queens Blvd
Forest Hills, New York, 11375

Owner: Yuriy's Shoe Repair
107-10A Queens Blvd,
Forest Hills, NY, 11375

Owner: Twin Deli
107-06 Queens Blvd
Forest Hills, New York, 11375

Owner: Esplosione Di Sapori, Inc
(Piu Bella) 107-02/04 Queens Blvd
Forest Hills, New York, 11375

Owner: Platinum Realty/The Milana Condominium
102-10 Metropolitan Avenue,
Forest Hills, New York, 11375

Owner: Kenneth Trading Corp
11-35 31st Drive
Astoria, New York, 11106

Owner: Consolidated Rail Corp. 500
Water Street, C1115 Jacksonville,
Florida, 32202

Owner: Verizon NY Inc.
107-15 70th Road
Forest Hills, NY, 11375

Owner: Cafe Biu Bella
107-02 Queens Blvd
Forest Hills, NY, 11375

Owner: Suzy's Deli
107-06 Queens Blvd
Forest Hills, New York, 11375

Owner: Party Home Corp.
107-16 Queens Blvd
Forest Hills, NY, 11375

Owner: Ship it Global
107-14 Queens Blvd
Forest Hills, New York, 11375

Owner: Urban Cuts & Color LLC.
107-10 Queens Blvd
Forest Hills, New York, 11375

Owner: M&L Shipping, Inc
107-14 Queens Blvd
Forest Hills, NY, 11375

3. **LOCAL NEWS MEDIA**

New York Post
1211 Avenue of Americas
New York, New York 10036-8790
Phone: 212-930-8000

Queens Chronicle
P.O. Box 74-7769
Rego Park, NY 11374

NY 1 News
75 Ninth Avenue
New York, NY 10011

New York Daily News
4 New York Plaza
New York, NY 10004

New York Post
1211 Avenue of the Americas
New York, NY 10036

Forest Hills/Rego Park Times
69-60 Grand Avenue
Maspeth, NY 11378

Queens Tribune
150-50 14th Road
Whitestone, NY 11357

Times-Ledger Newspapers
41-02 Bell Boulevard, 2nd Floor
Bayside, NY 11361

4. **PUBLIC WATER SUPPLIER**

NYC Department of Environmental Protection
Bureau of Water Supply
59-17 Junction Blvd. Flushing,
NY 11373

5. **ANY PERSON, COMMUNITY BASED ORGANIZATION, BOA GROUP, OR LOCAL MEDIA WHO HAS REQUESTED TO BE PLACED ON THE CONTACT LIST.**

Forest Hills Jewish Center
Attn: Jack Gostl,
President
106-06 Queens Blvd,
Forest Hills, NY 11375

Bramson ORT College
69-30 Austin St,
Forest Hills, NY 11375

6. **ADMINISTRATOR/OPERATOR OF ANY SCHOOL OR DAY CARE FACILITY LOCATED ON OR NEAR THE SITE.**

ATTN: Administrator
Ivy Day School
104-70 Queens Blvd,
Forest Hills, NY 11375

ATTN: Administrator
The Academy for Excellence Through the Arts Elementary School
108-55 69th Ave
Forest Hills, NY 11375

The Reform Temple of Forest Hills
71-11 112th St
Forest Hills, NY 11375

7. **DOCUMENT REPOSITORY**

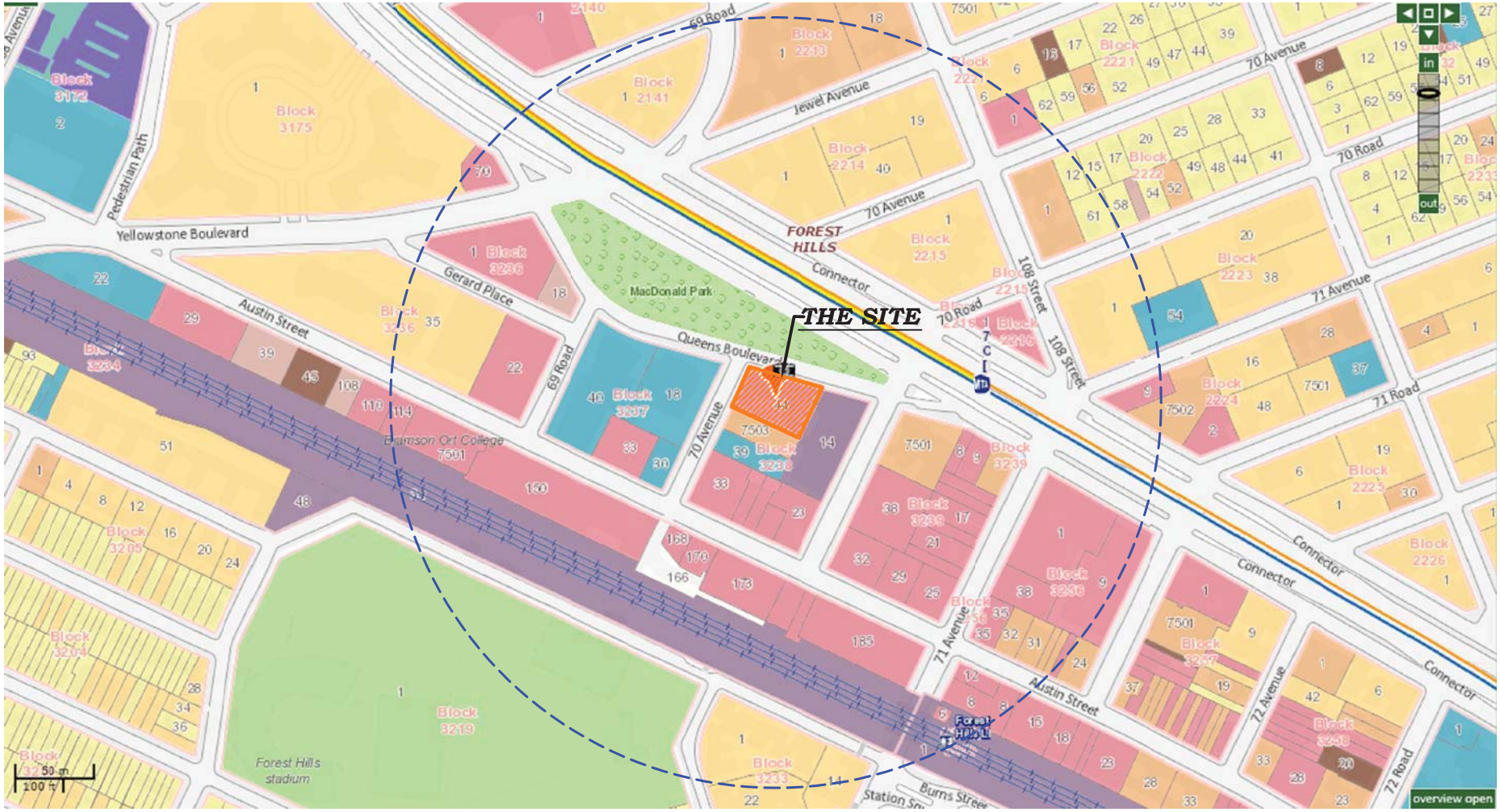
Queens Library - Forest Hills Branch
108-19 71 Avenue
Forest Hills, NY 11375
Please call (718) 268-7934 to call for Hours of Operation

Queens Community Board Office 6
104-01 Metropolitan Avenue
Forest Hills, NY 11375

NYS DEC
Region 2 Division of Environmental Remediation
47-40 21st Street
Long Island City, NY 11101

	A	B	C	D	E	F	G	H	I	J
1										
2	Site Contact List									
3	Site #: C241196									
4	Site Name: 107-02 Queens Boulevard Site			List Last Updated: 4-13-17						
5	Current Occupant	Name, Title	Address 1	Address 2	Address 3	Street Address	City	State	Zip	Site Name (County)
6	Current Occupant	Hon. Bill de Blasio	NYC Mayor			City Hall	New York	NY	10007	107-02 Queens Boulevard Site (Queens)
7	Current Occupant	Hon. Scott Stringer	NYC Comptroller			1 Centre Street	New York	NY	10007	107-02 Queens Boulevard Site (Queens)
8	Current Occupant	Hon. Letitia James	Public Advocate			1 Centre Street	New York	NY	10007	107-02 Queens Boulevard Site (Queens)
9	Current Occupant	Carl Weisbrod	Commissioner, NYC Dept. of City Planning			120 Broadway, 31st Floor	New York	NY	10271	107-02 Queens Boulevard Site (Queens)
10		Vincent Sapienza	Acting Commissioner, NYC Dept. of Environmental Protection			59-17 Junction Boulevard	Flushing	NY	11373	107-02 Queens Boulevard Site (Queens)
11		Dan Walsh, Director	NYC Office of Environmental Remediation	dwalsh@cityhall.nyc.gov		100 Gold Street - 2nd Floor	New York	NY	10038	107-02 Queens Boulevard Site (Queens)
12		Julie Stein	Office of Environmental Assessment & Plannir	NYC Dept. of Environmental Protection		96-05 Horace Harding Expressw	Flushing	NY	11373	107-02 Queens Boulevard Site (Queens)
13		Hon. Melinda Katz	Queens Borough President			120-55 Queens Boulevard	Kew Gardens	NY	11424	107-02 Queens Boulevard Site (Queens)
14		Manfred Magloire	NYSDEC Project Manager			625 Broadway	Albany	NY	12233	107-02 Queens Boulevard Site (Queens)
15		Thomas V. Panzone	NYSDEC Citizen Participation Specialist	Thomas.Panzone@dec.ny.gov		47-40 21st Street	Long Island City	NY	11101	107-02 Queens Boulevard Site (Queens)
16		Larry Ennist	NYSDEC			625 Broadway	Albany	NY	12233	107-02 Queens Boulevard Site (Queens)
17		Sarita Wagh	NYSDOH Public Health Specialist		Empire State Plaza	Corning Tower, Room 1787	Albany	NY	12237	107-02 Queens Boulevard Site (Queens)
18		Hon Charles Schumer	U.S. Senator			780 Third Avenue, Suite 2301	New York	NY	10017	107-02 Queens Boulevard Site (Queens)
19		Hon. Kirsten Gillibrand	U.S. Senator			780 Third Avenue, Suite 2601	New York	NY	10017	107-02 Queens Boulevard Site (Queens)
20		Hon. Grace Meng	U.S. House of Representatives			118-35 Queens Blvd, 17th Floor	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
21		Hon. Karen Koslowitz	NYC Councilmember			118-35 Queens Blvd, 17th Flo	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
22		Hon. Toby Ann Stavisky	NYS Senator			142-29 37th Ave, Suite 1	Flushing	NY	11354	107-02 Queens Boulevard Site (Queens)
23		Hon. Andrew Hevesi	NYS Assemblymember			70-50 Austin St., Suite 118	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
24		John Young, Borough Director	New York City Department of Planning – Queens Office			120-55 Queens Blvd., Room 1	Kew Gardens	NY	11424	107-02 Queens Boulevard Site (Queens)
25		Frank Gulluscio, District Manager	Queens Community Board 6			104-01 Metropolitan Avenue	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
26		Joseph Hennessy, Chairman	Queens Community Board 6	cb6q@nyc.rr.com		104-01 Metropolitan Avenue	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
27		Environmental Protection Committee Chair	Queens Community Board 6 Environmental Committee			104-01 Metropolitan Avenue	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
28		Audrey Pheffer	Queens County Clerk			88-11 Sutphin Boulevard, 1st Fl	Jamaica	NY	11439	107-02 Queens Boulevard Site (Queens)
29		Carol Conslato	Consolidated Edison Public Affairs			59-17 Junction Boulevard, 2nd f	Elmhurst	NY	11373	107-02 Queens Boulevard Site (Queens)
30		Heidi Chain, President	112th NYPD Police Precinct Council			68-40 Austin Street	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
31		Engine 305 Ladder 151	FDNY			111-02 Queens Boulevard	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
32		Forest Hills Jewish Center	Attn: Jack Gostl, President			106-06 Queens Boulevard	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
33		Bukharian Jewish Center	Attn: Rabbi			106-16 70th Avenue	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
34		Forest Hills Chamber of Commerce	Attn: Executive Director			71-58 Austin Street	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
35		Brighter Futures Learning Center	Attn: Executive Director			68-60 Austin Street	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
36		Self Help Austin Street Senior Center	Attn: Executive Director			106-06 Queens Boulevard	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
37		Forest Hills Community & Civic Association	Attn: Barbara Stuchinski, President			PO Box 754053	Forest Hills	NY	11375	107-02 Queens Boulevard Site (Queens)
38		NY 1 News				75 Ninth Avenue	New York	NY	10011	107-02 Queens Boulevard Site (Queens)
39		New York Daily News				4 New York Plaza	New York	NY	10004	107-02 Queens Boulevard Site (Queens)
40		New York Post				1211 Avenue of the Americas	New York	NY	10036	107-02 Queens Boulevard Site (Queens)
41		Forest Hills/Rego Park Times				69-60 Grand Avenue	Maspeth	NY	11378	107-02 Queens Boulevard Site (Queens)
42		Queens Tribune				150-50 14th Road	Whitestone	NY	11357	107-02 Queens Boulevard Site (Queens)
43		Queens Chronicle				P.O. Box 74-7769	Rego Park	NY	11374	107-02 Queens Boulevard Site (Queens)
44		Times-Ledger Newspapers				41-02 Bell Boulevard, 2nd Floo	Bayside	NY	11361	107-02 Queens Boulevard Site (Queens)
45		Thomas Milora	NYC DOS	tmilora@dsny.nyc.gov						107-02 Queens Boulevard Site (Queens)
46		Nathan Graber, MD, MPH	NYC DOHMH	Ngraber1@health.nyc.gov						107-02 Queens Boulevard Site (Queens)
47		Christopher D'Andrea	NYC DOHMH	cdandrea@health.nyc.gov						107-02 Queens Boulevard Site (Queens)
48		Dennis Farrar	NYSDEC	dennis.farrar@dec.ny.gov						107-02 Queens Boulevard Site (Queens)
49		Jane O'Connell	NYS DEC Region 2	jane.oconnell@dec.ny.gov						107-02 Queens Boulevard Site (Queens)
50		Bob Cozzy	NYSDEC-Albany	robert.cozzy@dec.ny.gov						107-02 Queens Boulevard Site (Queens)

Appendix C - Site Location Map



LEGEND:

SITE BOUNDARY

1,000 FEET BARRIER

HYDRO TECH ENVIRONMENTAL CORP.

MAIN OFFICE:
77 ARKAY DRIVE, SUITE G
HAUPPAUGE, NEW YORK 11788
T (631)462-5866 F (631)462-5877

NYC OFFICE:
15 OCEAN AVENUE, 2nd Floor
BROOKLYN, NEW YORK 11225
T (718)636-0800 F (718)636-0900

www.hydrotechenvironmental.com

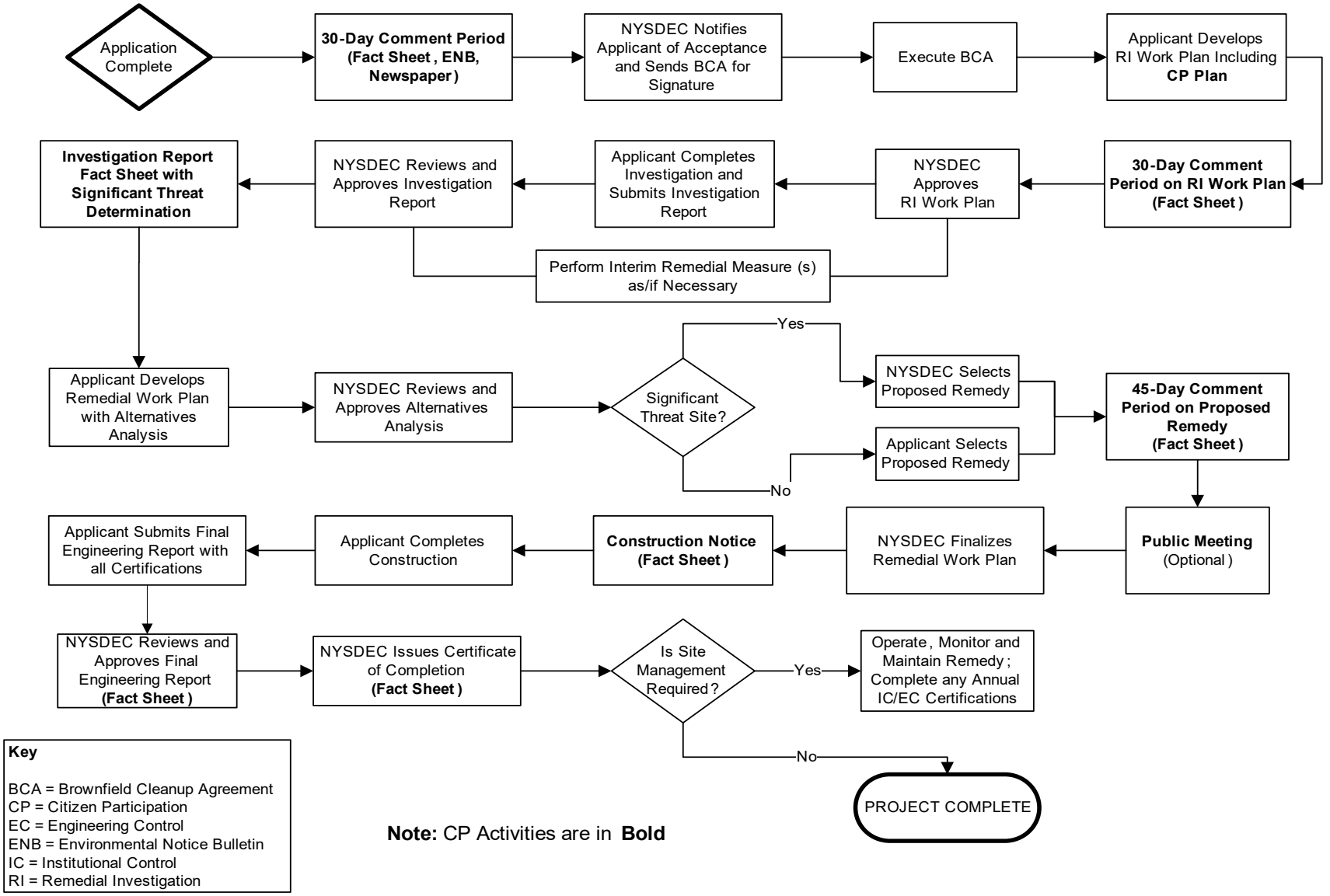
107-02 to 107-16
Queens Blvd
Queens, NY.
HTE Job # 160196

Drawn By: C.Q.
Reviewed By: P.M.
Approved By: M.R
Date: 06/30/16
Scale: AS NOTED

TITLE:

SURROUNDING LAND USE MAP

Appendix D– Brownfield Cleanup Program Process



Key

BCA = Brownfield Cleanup Agreement
CP = Citizen Participation
EC = Engineering Control
ENB = Environmental Notice Bulletin
IC = Institutional Control
RI = Remedial Investigation

Note: CP Activities are in **Bold**

NEW YORK STATE OF OPPORTUNITY. | Department of Environmental Conservation

Division of Environmental Remediation

Remedial Programs
Scoping Sheet for Major Issues of Public Concern

Instructions

This Scoping Sheet assesses major issues of public concern; impacts of the site and its remedial program on the community; community interest in the site; information the public needs; and information needed from the public.

The information generated helps to plan and conduct required citizen participation (CP) activities, and to choose and conduct additional CP activities, if appropriate. The scoping sheet can be revisited and updated as appropriate during the site's remedial process to more effectively implement the site's CP program.

Note: Use the information as an aid to prepare and update the Major Issues of Public Concern section of the site CP Plan.

General Instructions

- When to prepare: During preparation of the CP Plan for the site. It can be revisited and updated anytime during the site remedial process.
- Fill in site name and other information as appropriate.
- The Scoping Sheet may be prepared by DEC or a remedial party, but must be reviewed and approved by the DER site project manager or his/her designee.

Instructions for Numbered Parts

Consider the bulleted issues and questions below and any others that may be unique or appropriate to the site and the community to help complete the five Parts of this Scoping Sheet. Identify the issue stakeholders in Parts 1 through 3 and adjust the site's contact list accordingly.

Part 1. List Major Issues of Public Concern and Information the Community Wants.

- Is our health being impacted? (e.g. Are there problems with our drinking water or air? Are you going to test our water, yards, sumps, basements? Have health studies been done?)
- There are odors in the neighborhood. Do they come from the site and are they hazardous?
- Are there restrictions on what we may do (e.g. Can our children play outside? Can we garden? Must we avoid certain areas? Can we recreate (fish, hunt, hike, etc. on/around the site?)
- How and when were the site's contamination problems created?
- What contaminants are of concern and why? How will you look for contamination and find out where it is going? What is the schedule for doing that?
- The site is affecting our property values!
- How can we get more information (e.g. who are the project contacts?)
- How will we be kept informed and involved during the site remedial process?
- Who has been contacted in the community about site remedial activities?
- What has been done to this point? What happens next and when?
- The site is going to be cleaned up for restricted use. What does that mean? We don't want redevelopment on a "dirty" site.

Part 2. List Important Information Needed From the Community, if Applicable.

- Can the community supplement knowledge about past/current uses of the site?
- Does the community have knowledge that the site may be significantly impacting nearby people, properties, natural resources, etc.?
- Are activities currently taking place at the site or at nearby properties that may need to be restricted?
- Who may be interested or affected by the site that has not yet been identified?
- Are there unique community characteristics that could affect how information is exchanged?
- Does the community and/or individuals have any concerns they want monitored?
- Does the community have information about other sources in the area for the contamination?

Part 3. List Major Issues and Information That Need to be Communicated to the Community.

- Specific site investigation or remediation activities currently underway, or that will begin in the near future.
- The process and general schedule to investigate, remediate and, if applicable, redevelop the site.
- Current understanding about the site contamination and effects, if any, on public health and the environment.
- Site impacts on the community and any restrictions on the public's use of the site and/or nearby properties.
- Planned CP activities, their schedule, and how they relate to the site's remedial process.
- Ways for the community to obtain/provide information (document repositories, contacts, etc.).

Part 4. Community Characteristics

a. - e. Obtain information from local officials, property owners and residents, site reports, site visits, "windshield surveys," other staff, etc.

f. Has the affected community experienced other **significant** present or past environmental problems unrelated to this site? Such experiences could significantly affect public concerns and perspectives about the site; how the community will relate to project staff; the image and credibility of project staff within the community; and the ways in which project staff communicate with the community.

g. In its remedial programs, DER seeks to integrate, and be consistent with, environmental justice principles set forth in *DEC Commissioner Policy 29 on Environmental Justice* and *DER 23 – Citizen Participation Handbook for Remedial Programs*. Is the site and/or affected community wholly or partly in an Environmental Justice (EJ) Area? Use the Search feature on DEC's public web site for "environmental justice". DEC's EJ pages define an EJ area, and link to county maps to help determine if the site and/or community are in an EJ area.

h. Consider factors such as:

- Is English the primary language of the affected community? If not, provisions should be considered regarding public outreach activities such as fact sheets, meetings, door-to-door visits and other activities to ensure their effectiveness.
- The age demographics of the community. For example, is there a significant number of senior citizens in the community? It may be difficult for some to attend public meetings and use document repositories. This may suggest adopting more direct interaction with the community with activities such as door-to-door visits, additional fact sheets, visits to community and church centers, nursing homes, etc.
- How do people travel about the community? Would most people drive to a public meeting or document repository? Is there adequate public transportation?

Part 5. Affected/Interested Public.

Individuals and organizations who need or want information and input can change during the site's remedial process. This need is influenced by real, potential, or perceived impacts of the site or the remedial process. Some people may want information and input throughout the remedial process. Others may participate only during specific remedial stages, or may only be interested in particular issues.

It is important to revisit this question when reviewing this scoping sheet. Knowing who is interested in the site – and the issues that are important to them – will help to select and conduct appropriate outreach activities, and to identify their timing and the information to be exchanged.

Check all affected/interested parties that apply to the site. **Note: Adjust the site's contact list appropriately.** The following are some ways to identify affected/interested parties:

- Tax maps of adjacent property owners
- Attendees at public meetings
- Telephone discussions
- Letters and e-mails to DER, the remedial party, and other agencies
- Political jurisdictions and boundaries
- Media coverage
- Current/proposed uses of site and/or nearby properties (recreational, commercial, industrial)
- Discussions with community organizations: grass roots organizations, local environmental groups, environmental justice groups, churches, and neighborhood advisory groups

Division of Environmental Remediation

Remedial Programs
Scoping Sheet for Major Issues of Public Concern (see instructions)

Site Name: 107-02 Queens Boulevard

Site Number: C241196

Site Address and County: 107-02 to 10-16 Queens Boulevard, Queens, NY

Remedial Party(ies): RJ Capital Holdings LLC; AVG Capital LLC; De Boulevard LLC

Note: For Parts 1. – 3. the individuals, groups, organizations, businesses and units of government identified should be added to the site contact list as appropriate.

Part 1. List major issues of public concern and information the community wants. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and information needs. **Use this information as an aid to prepare or update the Major Issues of Public Concern section of the site Citizen Participation Plan.**
The site is not located in an Environmental Justice Area, therefore, no need to translate future fact sheets into another language. However, there may be truck traffic, noise or odor related impacts.

How were these issues and/or information needs identified?
NA

Part 2. List important information needed **from** the community, if applicable. Identify individuals, groups, organizations, businesses and/or units of government related to the information needed.
NA

How were these information needs identified?
NA

Part 3. List major issues and information that need to be communicated **to** the community. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and/or information.
Click here to enter text.

How were these issues and/or information needs identified?
Click here to enter text.

Part 4. Identify the following characteristics of the affected/interested community. This knowledge will help to identify and understand issues and information important to the community, and ways to effectively develop and implement the site citizen participation plan (mark all that apply):

a. Land use/zoning at and around site:
☒ **Residential** ☐ **Agricultural** ☐ **Recreational** ☒ **Commercial** ☐ **Industrial**

b. Residential type around site:
☒ **Urban** ☐ **Suburban** ☐ **Rural**

c. Population density around site:
☒ **High** ☐ **Medium** ☐ **Low**

d. Water supply of nearby residences:
☒ **Public** ☐ **Private Wells** ☐ **Mixed**

e. Is part or all of the water supply of the affected/interested community currently impacted by the site?
☐ **Yes** ☒ **No**

Provide details if appropriate:
Click here to enter text.

f. Other environmental issues significantly impacted/impacting the affected community?
☒ **Yes** ☐ **No**

Provide details if appropriate:
Click here to enter text.

g. Is the site and/or the affected/interested community wholly or partly in an Environmental Justice Area?
☐ **Yes** ☒ **No**

h. Special considerations:
☐ **Language** ☐ **Age** ☐ **Transportation** ☒ **Other**

Explain any marked categories in **h:**
Click here to enter text.

Part 5. The site contact list must include, at a minimum, the individuals, groups, and organizations identified in Part 2. of the Citizen Participation Plan under 'Site Contact List'. Are *other* individuals, groups, organizations, and units of government affected by, or interested in, the site, or its remedial program? (Mark and identify all that apply, then adjust the site contact list as appropriate.)

☒ **Non-Adjacent Residents/Property Owners:** Click here to enter text.

☒ **Local Officials:** Click here to enter text.

☒ **Media:** Click here to enter text.

☒ **Business/Commercial Interests:** Click here to enter text.

☐ **Labor Group(s)/Employees:** Click here to enter text.

☐ **Indian Nation:** Click here to enter text.

☒ **Citizens/Community Group(s):** Click here to enter text.

☐ **Environmental Justice Group(s):** Click here to enter text.

☒ **Environmental Group(s):** Click here to enter text.

☒ **Civic Group(s):** Click here to enter text.

☐ **Recreational Group(s):** Click here to enter text.

☐ **Other(s):** Click here to enter text.

Prepared/Updated By: Paul Matli **Date:** 3-22-2017

ReviewedApproved By: Thomas V. Panzone **Date:** 4/13/17

APPENDIX 8
RESUMES OF KEY PERSONNEL

TAREK Z. KHOURI, P.E. *President/CEO/Principal Environmental Engineer*

Education
M.S. Environmental Engineering, University of Central Florida

B.S. Chemistry, University of Central Florida

Professional Registration
Professional Engineer (P.E.)
Connecticut # 0031583
D.C. # 908711
Maryland # 49155
Massachusetts # 52601
New Jersey # 24GE04697200
New York # 086611
Pennsylvania # PE084919
Rhode Island # 12059
Texas # 125442
Virginia # 0402056415

Certifications
OSHA: 40 Hour HAZWOPER; 8 Hour Supervisor Management; 10 Hour Construction Safety

USACE Construction Quality Management

Affiliations
Transportation & Infrastructure Committee, NY Building Congress (NYBC), NY, USA

Environmental and Energy Committee, American Society of Engineering Companies (ACEC) NY, USA

Chairman (2013), Solid Waste Committee, Qatar Green Building Council (QGBC) Qatar

Legislative Committee (2008-2010), National Brownfield Association (NBA), NY, USA

Environmental Council (2008-2010), The Business Council of NY State (BCNY), NY, USA

Summary of Experience
Mr. Khouri has more than 20 years of experience in the real estate development, construction and engineering industries.

He has been a trusted partner, providing environmental consulting services to public and private sector clients including developers, real estate owners, investors, facility managers and city, state and federal agencies and municipalities.

Mr. Khouri has participated and managed the remediation and reuse of contaminated properties for over 20 years. He has performed, directed, and overseen environmental investigations and remedial actions at petroleum and chlorinated solvent spill sites, fuel farms, refineries, former manufactured gas, landfills, and a variety of residential, commercial and industrial settings.

Mr. Khouri integrates environmental risk management with land use planning and sustainable development to meet the needs and objectives of diverse clients and stakeholders for residential, commercial, and industrial real estate, in urban and rural environment. Mr. Khouri utilizes his technical expertise as well as his leadership and management skills to direct and oversee teams of professionals for the successful completion of these complex projects.

Relevant Experience
- **Principal Environmental Engineer –** Hydro Tech Environmental Engineering and Geology, DPC (2017-Present)
- **Senior Vice President** – HAKS (2015-2017)
- **Vice President** – Langan Engineering and Environmental Services, USA. (2013-2015)
- **Managing Director** – Averda Environmental Services, Qatar. (2011-2013)
- **Managing Director** – Clean Planet International, USA, Africa and Middle East. (2010-2011)
- **Associate** – Langan Engineering and Environmental Services, USA and Middle East. (2004-2010)
- **Senior Project Manager** – URS Corporation, USA and Middle East. (1998-2004)
- **Senior Scientist** – Solidere, Lebanon. (1996-1998)
- **Environmental Engineer** – University of Central Florida, USA. (1994-1996)

- **Environmental Impact Assessments, Phase I ESAs, and Phase II ESIs - Clients: Developers, Property Managers, Environmental Attorneys, Architects, Banks, and Insurance Firms** - Conducted 100s of environmental assessments for various entities specializing in urban renewal: Mixed use, residential, commercial, retail, warehouses, manufacturing facilities, gas stations and vacant lands. I also designed and executed subsurface investigations for soil, groundwater, and soil gas.

- **Remedial Investigation, Remedial Design and Associated Remediation Projects - Clients: Developers, Property Managers, Environmental Attorneys, Architects, Banks, Insurance Firms -** Managed myriads of environmental investigations and remedial actions at petroleum and chlorinated solvent spill sites, former manufactured gas and a variety of other commercial and industrial settings. Constituents of concern have included LNAPLs and DNAPLs, petroleum hydrocarbons, chlorinated solvents, soil vapor, coal tar, creosote, PCBs, and metals. Managed and participated in historical research, sample collection and data evaluation, synthesis of information to determine site-specific cleanup levels, remedial technology evaluation, design of treatment systems, site cleanup, installation and operation of treatment systems, optimizing systems, and performance monitoring.

- **LIRR/MTA East Side Access Project, New York, NY - Client: MTA** - The project involves the construction of new metro tunnels system in densely developed areas of midtown Manhattan, new tunnels system construction beneath active Amtrak, Metro North and NYCTA facilities, construction of new terminals, ventilation facilities, off street entrances, and yards development. In addition to establishing the guidelines of the project specific environmental management system, I provided direct and extensive public and community relations outreach, educational and awareness programs, as well technical support for the design engineering and construction teams, inspectors, and environmental sub consultants, so that construction of the project proceeds in compliance with environmental commitments, be conducted under budget and on time, while maintaining the utmost quality. Another key component of the project success was the direct and constant coordination between the environmental department and the multiple agencies and operators/owners of the project, such as USEPA, NYSDEC, NYSDOH, NYCDOT, NYCDEP, NYCDOB, MTA, LIRR, NYCTA, Amtrak, and Metro North. Construction Cost: $8.4 Billion

- **Hudson Yards, Proposed New York Jets Stadium, New York, NY – Client: NY Jets -** Served as the environmental project manager for the due diligence, investigation, and preliminary design phases of the proposed Jets Stadium. The work included subsurface investigation for soil, groundwater, and soil gas, and required close interaction with multiple entities including the MTA, LIRR, NYCTA, NYCDOS, NYSDEC, and Amtrak. Construction Cost: $1.4 Billion

- **Columbia University Manhattanville Expansion Project, New York, NY – Client: Columbia University -** Columbia University new campus will be built within a 17-acre area and will be comprised of academic and research facilities, housing, as well as commercial retail stores and open space areas. As the senior environmental project manager, I oversaw all environmental engineering related activities, including site assessment prior to the development, pre-construction support for demolition, recycling, soil and groundwater management, air quality controls, and LEED certification support. Construction Cost: $2+ Billion

- **Potable Water System Testing for Lead, New York, NY – Client: NYCSCA** - Directly managed the emergency work for the sampling, testing, evaluation and reporting of lead in the potable water of approximately 300 public schools in New York City. HAKS was one of the main consultants working for NYCSCA to implement a potable water system testing protocol which included coordination with school facilities, field work encompassing flushing and sampling, laboratory testing, analyzing, and reporting sample results. The project was conducted on a tight 24/7 timetable. The project was completed successfully under the direct supervision and daily coordination with the NYCSCA, with limited to no disturbance to schools' schedule and extracurricular activities, on time and on budget.

- **City University of New York, Tank Rehabilitation, Remediation and Closure Program, New York, NY – Client: DASNY -** Served as the project manager for the technical assessment, remediation design, and oversight of the Underground Storage Tank (UST) facilities at seven City

University campuses. Tanks sizes ranged from 550 Gal to 50,000 Gal. The work included design drawings and construction documents for the tanks and dispensing systems for vapor recovery, fire suppression, electronic monitoring/sensing, pumping/delivery, storage tank details, site restoration, subsurface investigation, and spill remediation. Construction Cost: $5 Million

- **Active Fuel Oil Terminal, Brooklyn, NY – Client: Bayside Fuel Oil Depot Corporation -** Managed the remedial investigation in connection with petroleum releases at an active fuel oil terminal located on Gravesend Bay. Developed and executed a strategy to manage client's liability relating to light non-aqueous phase liquid (LNAPL). Negotiated an alternative remedial action which benefitted the adjacent property and NYSDEC while eliminating client from liabilities at the adjacent property. Investigated and evaluated storm water infrastructure, and included an updated storm water management plan, as part of a sustainable groundwater remedy. Fees: $1.1 Million

- **54 Rutledge St, Insitu Bio-Remediation, Brooklyn, NY – Client: Fortis Property Group -** Managed the implementation of a remedial action for major petroleum and gasoline spills. The remedial action consisted of a multi-phased approach to site cleanup, which included excavation and removal of contaminated soil and groundwater, removal of underground storage tanks, injection of chemical oxidation compounds into the groundwater table, installation of permanent remedial injection and monitoring points, installation of a soil vapor mitigation system, and delineation of off-site contamination. Fees: $1.0 Million

- **Circuitron Corporation Superfund Site, Ground Water Treatment System, East Farmingdale, NY – Client: USACE** - Served as the Project Engineer and the Health and Safety Officer providing technical direction for on-site staff, guidance in hazardous waste/material management, and performing technical review of reports and contract deliverables. Coordinated with USEPA and USACE for the day-to-day operations and quality control matters. Fees: $1.6 Million

- **Constructability Review – Justice Sonia Sotomayor Houses, Bronx, NY – Client: NYCHA -** Constructability Review for the upgrading/rehabilitation of the Justice Sonia Sotomayor Houses in the Bronx for the New York City Housing Authority (NYCHA). The scope of work includes such repairs as Local Law 11 Brick Facade repair/waterproofing for areas of significant disrepair (including brick masonry, window sills/lintels, and brick parapet replacement with metal railing); roof replacement (asbestos abatement, 4-ply insulated roofing, roof drains); interior repairs/sheet rock/painting to apartments with water damage, new window installation at all locations; replacement of the water tanks, pumps, and repairs to the water tank structures in particular buildings; repairs to the property's main loop and improvements to entrances, lobbies and security. Construction Cost: $102 Millions

- **LCP Chemicals Inc. Superfund Site, Linden, NJ – Client: LCP Chemicals Inc. -** Served as the Project Manager and the Health and Safety Officer for the interim removal action program for mercury clean up and removal, petroleum contaminated soil excavation, storage tanks and steel structure demolition. The job also included a drum landfill investigation, done in level B PPE. Awarded the 74th Annual Governor's Occupational Safety & Health Award Citation of Merit of the State of New Jersey in 2002. Fees: $1.1 Million

- **FAA Technical Center, PCB Soil Remediation at Area 20A Superfund Site, Atlantic City, NJ – Client: USACE -** Served as a Laboratory Manager for the PCB contaminated soils removal project at FAA Technical Center. Responsibilities included the development of sampling and analysis plans, establishment of project data quality objectives, evaluation and selection of laboratories for testing programs, data quality assessment, and reports preparation. Fees: $3.2 Million

- **FAA Technical Center, Area D Jet Fuel Farm Superfund Site, Atlantic City, NJ – Client: USACE** - Served as the Quality Control Manager, supervising laboratory prequalification, fieldwork, and laboratory analysis. Evaluated and optimized the operation of the groundwater treatment system, CEM, and SVE bioremediation system, and prepared quarterly reports deliverables to the USEPA and the USACE. Also performed quality assurance audit and review for the pre-excavation sampling results performed by FAA subcontractors, using field test kits for PCB and TPH. Fees: $2.1 Million

- **US Federal Government, Anthrax Investigation, New Jersey and New York – Client: USPS -** Mr. Khouri was part of a team that was contracted by the Federal Government and the United States Postal Services (USPS) to perform Anthrax sampling and investigation throughout dozens of USPS facilities in the Northeast.

International Representative Projects

- **Global Infrastructure Project, Harare, Zimbabwe** – Provided owner representation services for conducting due diligence and feasibility studies for multibillion dollars infrastructure development projects. Projects are BOT and included a 120,000-bbd oil refinery, 300 Km oil pipeline, 20,000 unit's housing project, resorts, telecommunication improvement, and assessing mining concessions. Construction Cost: $7.2 Billion

- **OQYANA World First, Dubai, UAE** – Provided geotechnical and waterfront/marine engineering evaluations of the island's perimeter seawalls and ground improvement schemes, as well as seismic slope stability analysis at the edge of the islands. The proposed design effort and creative approach led to enormous budget and schedule savings for the client. Construction Cost: $1+ Billion

- **Normandy Landfill Treatment Project, Beirut, Lebanon** - Managed the remediation program of a 60 acres' landfill reclamation project. Additionally, I corresponded with management, owners, developers, and government representatives, and my involvement with the project from the design stage throughout the full remediation led to the project ultimate success with regard to the remediation design and schedule and budget compliance. Construction Cost: $65 Million

- **Beach Restoration, Al Athaiba Beach (Muscat, Oman) and Saint Germain sur Ay Beach (La Manche, France) -** Provided environmental engineering and site civil support for erosion control and restoration of the beach. Fees: $500,000

Publications

- Reductive Dehalogenation of Tetrachloroethylene by Soil Sulfate Reducing Microbes Under Various Electron Donor Conditions (2000).

- The Effect of Organic Substrates on Enhanced Biological Phosphorus Removal in Continuous Culture and Batch Experiments (1998).

- Comparison of Enhanced Biological Phosphorus Removal Populations under Ten Different Environmental Conditions (1998).

- Observations From Steady State and Batch Experiments Concerning the Effect on Enhanced Biological Phosphorus Removal of Volatile Fatty Acids and Glucose (1997).

- Single Stage Anaerobic and Aerobic Sequencing Biotransformation and Mineralization of Tetrachloroethylene (PCE) for the Remediation of Contaminated Soils and Groundwater (1996).

Mark E. Robbins, C.P.G., C.E.I.
Vice President, Senior Geologist

Mr. Robbins has over nine (9) years experience in geology and hydrogeology, involving such activities as Phase I Environmental Site Assessments, Phase II Environmental Site Assessments, Subsurface Investigations, Remedial Actions, data acquisition, evaluation and contouring, and geotechnical investigations. Mr. Robbins has performed over 400 Phase I Assessments involving residential through heavy industrial properties and over 200 Subsurface Investigations throughout the United States. Mr. Robbins has also designed and implemented over 20 remediation systems for both public and private sectors.

Representative Occupational Experience

- *Environmental Site Assessments*
  Conducted Phase I and II Environmental Site Assessments, analysis of site investigation reports, identifying contamination locations and sources. Soil, soil-vapor and water sampling, analyzing laboratory results for QA/QC, magnetometer and Ground-Penetrating Radar surveys for locating buried drums and underground storage tanks (USTs), estimating UST and other subsurface leaks, monitoring well logging, Project Management, liability assessments and estimating costs to attain compliance.

- *Remedial Investigation and Feasibility Studies*
  Oversight/planning of site investigations; data analysis, including statistical analysis and geostatistical contouring utilizing SURFER; performance of feasibility studies, including technology evaluations, alternatives development and evaluation and cost estimations.

- *Due- Diligence Programs*
  Designed and implemented due-diligence programs (ranging from Phase I Assessment to Comprehensive Hydrogeologic Investigations) to assess environmental liabilities for numerous land development clientele.

- *Delineation of Chlorinated Organic Plumes*
  Supervised the delineation of a dissolved chlorinated organic plume from underground tank loss. Developed a remedial action program in accordance with New York State regulatory guidelines to abate soil and groundwater contamination.

- *Remedial Action*
  Prepared numerous Remedial Action Plans. Designed and implemented hydrocarbon and chlorinated solvent remediation systems for soil and groundwater.

- *Pump Test Aquifer Analysis*
  Conducted several pump tests and pump test analysis and field coordination in relation to dewatering permit requirements for Keyspan Energy and the private sector.

Employment

2001 - Present Vice President, Senior Geologist
Hydro Tech Environmental Corp., Commack, New York

2000 – 2001 Assistant Director, Professional Services
Fenley & Nicol Environmental, Inc., Deer Park, New York

1999 – 2000 Senior Geologist
Fenley & Nicol Environmental, Inc. Deer Park, New York

1995 – 1999 Operations Director
Advanced Cleanup Technologies, Inc., Farmingdale, New York

1992 – 1995 Project Geologist
Advanced Cleanup Technologies, Inc., Roslyn Heights, New York

Education

B.S. Geology, State University of New York at Oneonta, 1991

Affiliations and Certifications

- American Institute of Professional Geologists
- American Association of Petroleum Geologists
- Long Island Geologist Organization
- Geological Society of America
- American Standards in Testing Materials – E50 Committee Member
- Environmental Assessment Association
- OSHA 40-Hour & 8-Hour, Supervisor

Registrations and Certifications

- Certified Professional Geologist (C.P.G. # 10527)
- Certified Environmental Inspector (C.E.I. # 73383)
- GPR Operator's Course, Geophysical Survey Systems, Inc., 1993.

Publications/Presentations

- *A Case Study of the Impact of MTBE on the Investigation and Remediation of a Fuel Oil Release,* National Groundwater Focus Conference MTBE in Groundwater: Assessment, Remediation Technologies & Public Policy, Baltimore, MD June 4-5, 2001.
- *Is MTBE in Fuel Oil? Why MTBE Plays a Major Concern on Long Island,* Long Island Business News, February 2001.

Paul I. Matli, Ph.D., P.G.

EXPERIENCES

Senior Project Manager / Vice President of Technical Operations
December 2017- Present
Hydro Tech Environmental Engineering and Geology, DPC - USA
Senior Project Manager / Director of Technical Operations
Apr. 2005 - Nov. 2005 & July 2006 – December 2017/June 2015 – December 2017
Hydro Tech Environmental Corp. – USA
Completed Environmental Assessment Statements, Phase I Environmental Site Assessments, Phase II Investigations Work Plans, environmental monitoring programs of groundwater and indoor air quality, field sampling of soil, water, air, soil gas, mold and solid wastes, data evaluation through Quality Assurance and Quality Control programs and reports writing. Prepared and engineered Phase III Remedial Action Work Plans for regulated developments, superfund sites and hazardous waste facilities by implementing in-situ bio-chemical remedial technologies, ex-situ disposal of impacted media and on-site mitigation methods of soil vapor intrusion. Supervised and coordinated the closure and removal of petroleum storage tanks. Fulfilled the task of Health and Safety Officer and the duties of a Geologist at a New York State Brownfield Cleanup Program site and multiple New York City Brownfield Cleanup Program sites.

Vocational Lecturer of the Course "Ecology and Environment"
Nov. 2003 - Feb. 2004
Saint Joseph University – Lebanon
Introduced undergraduate students in the School of Agriculture Engineering and the Nursing School to advanced knowledge in the fields of ecology, environment, ecosystem management, earth science and multivariate statistical analytical methods.

Agriculture Engineer in the Italian Rural Development Project in the Upper Bekaa Valley, Baalbek-Hermel Region
May 2003 - Jan. 2004
Lebanese Agricultural Research Institute - Lebanon
Contributed to boosting agricultural production in rural communities in a semi-arid region by identifying deficient production and marketing elements in their farming system and promoting sustainable agriculture by introducing drought tolerant crops and the construction and management of engineered water reservoirs.

Teaching Assistant
Apr.1999-Sept. 2002
Tokyo University of Agriculture and Technology - Japan
Played a key role in the completion of research thesis of graduate research students by instructing and assisting them in their experimental designs and the application of statistical analytical methods.

Environmental Manager of Ammiq Private Wetlands in the Bekaa Valley - Lebanon
Oct.1997 - Sept. 1998
Successfully managed the exploitation of natural resources of privately owned wetlands by local stake-holders and implemented the United Nations strategies to suppress hunting of endangered bird species and waterfawls in coordination with government and international non-government organizations.

EDUCATION

Ph.D. in Environmental Sciences [(a)]
Apr. 1999 - Sept. 2002
Tokyo University of Agriculture and Technology- Japan
Research Theme: Conducted field research of crop physiological responses to micro-climatic conditions and developed empirical and multivariate statistical models predicting the impact of future global warming on crop production.

M.Sc. in Environmental Sciences [(b)]
Sept. 1995 - Sept. 1997
International Center for Advanced Mediterranean Agronomic Studies - Greece
Research Theme: Performed field surveys and laboratory analytical studies of the physico-chemical properties of forest and plant species in promoting wildland fires and developed empirical statistical models predicting their inputs into forest fire behavior prediction systems.

D.S.P.G.S. in Management and Conservation of Mediterranean Ecosystems
Nov. 1994 - Aug. 1995
International Center for Advanced Mediterranean Agronomic Studies - Greece

Diploma of Agricultural Engineer [(c)]
Sept. 1989 - July 1994
University of Saint Joseph - Lebanon
Research Theme: Collected and established a socio-economic database of the impact of trout fish farms on the bio-chemical property and microbial quality of fresh watercourses.

PEER-REVIEWED PUBLICATIONS

- **Matli P.I.**, Aoki M., Ozawa Y., Hideshima Y., Nakayama H., and Maruya S. 2002. Characterization of canopy photosynthetic CO_2 flux and leaf stomatal conductance responses of potato crop to changing field meteorological conditions in Hokkaido (in English). Journal of Agricultural Meteorology, **58**(3)115-122.
- Dimitrakopoulos A.P., and **Matli P.** 2001. Bulk density and physical properties of *Sarcopoterium spinosum* (L.) Spach as fuel characteristics (in English). Journal of Mediterranean Ecology, **2**:75-82.
- Elzein G., **Matli P.**, and Darwish S. 1997. The Study of physico-chemical and biological parameters of fresh water in fisheries in the Bekaa Valley (in French). Lebanese Scientific Bulletin, **10**(1):3-20.
- **Matli P.** 1998. Measures and strategies to prevent and manage forest fires in Lebanon (in Arabic). Al
- Nahar Newspaper; Nahar El Shabab, Sept. 22, pp.2-3.
- **Matli P.** 1997. A preliminary planning of managerial strategies for the conservation and management of Ammiq private wetlands (in English). Technical report submitted to the owners committee of Ammiq Estates-Lebanon, 10p.

PROFESSIONAL AFFILATIONS

- New York State Professional Geologist.
- Member of the American Institute of Professional Geologists.

EXTRACURRICULAR TRAININGS AND SKILLS

- 40 Hours OSHA training Course in Health & Safety Methods in Handling Hazardous Materials, USA, Feb. 2010.
- 10 Hours OSHA Training Course in Construction Safety & Health, Feb. 2013.
- Gold Certified Environmental Professional for oversight and management of remedial activities at hazardous sites in compliance with the New York City Mayor's Office of Environmental Remediation, Feb. 2015.

[(a), (b), (c)] Accredited US Educational Equivalence, *Globe Language Services, Inc.*

DONALD C. ANNÉ
SENIOR CHEMIST

EDUCATION: M.S., Chemical Oceanography, Florida Institute of Technology, 1981
B.A., Earth Sciences, Millersville University of Pennsylvania, 1975

SPECIAL TRAINING:
Certified 40-Hour OSHA Health and Safety
Certified 8-Hour OSHA Supervisory Course
Ground Water Geochemistry (NWWA)
Ground Water Pollution and Hydrology (Princeton Associates)
Quality Assurance Programs for Environmental Monitoring Data (Stat-A-Matrix)

PROFESSIONAL AFFILIATIONS: American Chemical Society (AFS), 1979-Present

EXPERIENCE SUMMARY:

Mr. Anné has more than 27 years of environmental chemistry experience specializing in data validation, environmental sampling, analytical methodologies, petroleum fingerprinting, laboratory audits, field sampling audits, and preparing Quality Assurance Project Plans and Quality Assurance Manuals. Mr. Anné's experience includes analytical laboratory work with gas chromatography, atomic absorption, infrared spectrometry and wet chemistry methods.

PROJECT EXPERIENCE:

Quality Assurance/Quality Control of Chemical Data

Mr. Anné has more than 20 years experience as a data validator and quality assurance officer. Mr. Anné has validated data for most EPA Regions and under several independent state programs, including the NYSDEC. He has performed laboratory and field audits as well as written Quality Assurance Project Plans. Mr. Anné has written, reviewed, and initiated laboratory Quality Assurance Manuals for laboratories to maintain their regulatory compliance. Typical project experience includes:

- Senior Chemist responsible for data validation. Reviewed chemical data for several projects under the New Jersey ISRA regulations. The clients included industry and utilities.

- Supervising Environmental Scientist responsible for data validation. Reviewed chemical laboratory data for adherence to QA/QC protocols for several key projects, including National Priorities List sites and RCRA Corrective Actions located in EPA Regions I, II, III, IV, V, and IX. Validated analytical data, outlined problems and actions to be taken, and qualified all affected data. Consulted with project managers on data usability, and recommended corrective actions to support project goals. Responded to comments made by regulators regarding data quality.

- Supervising Environmental Scientist recognized by the New York State Department of Environmental Conservation (NYSDEC) to perform third party data validation. Attended NYSDEC workshop on data validation as part of the requirements set forth by NYSDEC. Performed data validation in support of NYSDEC STARS and ASP programs as well as data in support of the NYSDEC Part 360 Regulations for landfills. Validated data for an Albany area municipal landfill.

- Supervising Environmental Scientist responsible for developing and preparing Quality Assurance Project Plans (QAPPs) for several state and federal Superfund sites and federal RCRA corrective action sites. Negotiated with regulators for the acceptance of the QAPPs. The sites were located throughout the eastern United States.

- Environmental Chemist responsible for developing a laboratory QA/QC program which fulfilled requirements of the EPA and agencies from the States of Texas and Louisiana. Implemented and managed the program throughout DOE's SPR Environmental laboratories. Received verbal commendations from EPA and the Texas Water commission on the QA/QC Program.

Environmental Chemistry

Mr. Anné is experienced in sampling soil, water, air, and wastes in accordance with federal and state guidelines. He has performed field sampling audits and prepared sampling plans for numerous projects in accordance with applicable programmatic requirements. Mr. Anné is familiar with the geochemical aspects of fate and transport of contaminants. Mr. Anné's typical project experience includes:

- Data manager for the Pennwalt Corporation's RCRA Corrective Action RFI Phase I program. The project included quantifying and characterizing soil contamination and hydrogeologic flow systems of 12 SWMUs at a flourochemicals plant in Thorofare, New Jersey. Validated and prepared QA/QC reports for data generated during the project. Qualified all data in preparation of the final report. Work was performed under the direction of NJDEP.

- Project Chemist in charge of field sampling activities, including coordinating and scheduling all subcontracted laboratory work for more than 25 sites in Connecticut. Trained field teams in sampling techniques for soil, groundwater, and surface water; chain of custody requirements; sampling QA/QC protocols; and analytical requirements. Work was performed under the scrutiny of ConnDEP.

- Field Team Leader for a major hazardous waste drum excavation project. Supervised all field activities including site safety; excavation; removal, sampling, and over packing of drums; staging and sampling of contaminated soil; and preparation of samples. Coordinated excavation and laboratory subcontractors. Work was performed under the scrutiny of ConnDEP.

- Created an environmental monitoring program for the Bryan Mound site of DOE's Strategic Petroleum Reserve for testing ground water and surface water. Developed sampling protocols, frequency of sampling, and lists of target analytes. This program was designed to provide baseline data for pre-spill conditions in the event of a release. The site was under scrutiny by EPA Region V and the Texas Water commission.

- Project Chemist responsible for developing analytical QA/QC program that included sampling and chemical analyses of surface water, groundwater, soil, and sediment matrices as part of a Remedial Investigation/Feasibility Study (RI/FS). The RI/FS involved more than 25 sites throughout the State of Connecticut. Work was under the guidance of ConnDEP.

Analytical Chemistry

Mr. Anné has experience working in both fixed-base and mobile laboratories. His experience includes the use of gas chromatography, atomic absorption spectrometers, infrared spectrometers, and numerous wet chemistry and preparation equipment methods. He has served in the laboratory as an analyst, laboratory advisor, and QA officer. He has interfaced with regulators in the area of analytical chemistry and has experience in petroleum fingerprinting techniques and methods. Typical projects include:

- Performed bench scale experiments for St. Lawrence Zinc in order to obtain the optimum level of Phlotec necessary to treat discharged water to resolve an N.O.V. for the SPDES outfall. The optimum level of Phlotec would precipitate enough dissolved zinc for the water to meet the discharge requirement. Also performed routine analyses of samples after implementing the treatment, to insure that the proper concentration was being used.

- Environmental Chemist in charge of project to design updates for the DOE's laboratories at its SPR facilities. Evaluated IR and FT-IR instrumentation and personal computers to link with existing and future instrumentation. Wrote procedures for the acceptance of an alternative oil & grease method for NPDES permit

monitoring by EPA Region V. Coordinated all site activities necessary for implementing upgrades.

- Environmental Chemist in charge of replacing obsolete total organic carbon (TOC) analyzers for the SPR laboratories. Evaluated state-of-the-art TOC analyzers and recommended replacement TOC analyzer. Negotiated with supplier and wrote technical specification for the bid process required by DOE. Supervised installation and set-up of all new TOC analyzers.

- Analytical Chemist for Berkley Products Company responsible for product development. Analyzed competitor's products and formulated new coatings with equal or better quality. Responsible for solvent operations which included managing the waste solvent recovery operations, solvent formulation, and manufacturing QA/QC. Worked with sales and manufacturing staff to address and resolve client complaints. Received two cash bonuses for suggestions on the manufacture of products which saved the company money.

- Analytical Chemist for the mobile laboratory responsible for sample preparation in support of several projects for a range of clients located in three EPA regions and in conjunction with several state agencies. Extracted, concentrated, and prepared water and soil samples for analyses by GC/FIND, GC/ECD, GC/PID, and GC/MS. Samples were prepared for PCB, pesticide, polynuclear aromatic hydrocarbon, and petroleum hydrocarbon analyses.

EMPLOYMENT:

2005- present, Alpha Geoscience
1998-2005, Alpha Environmental Consultants, Inc.
1990-1998, McLaren/Hart
1986-1990, Fred C. Hart Associates
1985-1986, Boeing Petroleum Services
1982-1985, Petroleum Operations and Support Services
1981-1982, Dravo Utility Constructors
1979-1981, Florida Institute of Technology
1975-1979, Berkley Products Company

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APPENDIX 9
HEALTH AND SAFETY PLAN

HEALTH & SAFETY PLAN

107-02 Queens Boulevard
Block 3238; Lot 44
Queens, New York

NYSDEC BCP Site Number: C241196

Table of Content

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1. Directions to Hospital

Attachments
A. Health and Safety Fact Sheets

1.0 Introduction

The HASP has been prepared in conformance with the United States Department of Labor's Occupational Safety and Health Administration (OSHA) applicable regulations, safe work practices and the project's requirements. It addresses those activities associated with the implementation of the proposed Remedial Action Work Plan (RAWP) for the property located at 107-02 to 107-16 Queens Boulevard in Kew Garden Hills neighborhood of Flushing Section of the County of Queens, New York (the "Site"). The Project Manager (PM), Site Safety Officer (SSO) and Hydro Tech field staff will implement the Plan during site work under the direction of the Qualified Environmental Professional (QEP) and the Corporate Safety Officer (CSO). Compliance with this HASP is required of all persons and third parties who perform fieldwork for this project. Assistance in implementing this HASP can be obtained from the Hydro Tech's SSO. The content of this HASP may change or undergo revision based upon additional information that is made available to health and safety personnel, monitoring results or changes in the technical scope of work. Any changes proposed must be reviewed by the SSO.

SCOPE OF WORK

The Scope of Work activities will include the following:

- Remedial excavation;
- Performance of Community Air Monitoring Program (CAMP);
- Collection of end-point soil samples;
- Oversight of installation of vapor barrier and composite cover elements.

EMERGENCY NUMBERS

Contact	Phone Number
Long Island Jewish Forest Hills	718-830-4000
New York City EMS	911
NYPD	911
NYFD	911
National Response Center	800-424-8802
Poison Information Center	800-562-8816
Chemtree	800-424-9555

Project Management/Health and Safety Personnel

Title	Contact	Phone Number	Cell Phone
QEP	Mark E. Robbins	(631) 462-5866	(631) 457-0032
CSO	Dorina Aliu	(631) 462-5866	(631) 457-0032
PM/SSO	Paul I. Matli	(718) 636-0800	(631) 457-0033

Directions to *Long Island Jewish Forest Hills (See Figure 1)*
Upon leaving the Site, take 70th Road on the right and then turn right onto Austin Avenue and continue toward 71st Avenue/Continental Avenue on the left. Turn right onto Queens Boulevard and New York 25 Service to 102nd Street. Follow 102nd Street to 66th Street. The hospital will be on the right side.

2.0 Health and Safety Staff

This section briefly describes the personnel and their health and safety responsibilities for the:

PROJECT MANAGER (PM)
- Maintains the overall responsibility for the health and safety of site personnel
- Ensures that adequate resources are provided to the field health and safety staff to carry out their responsibilities as outlined below.

- Ensures that fieldwork is scheduled with adequate personnel and equipment resources to complete the job safely.
- Ensures that adequate telephone communication between field crews and emergency response personnel is maintained.
- Ensures that field site personnel are adequately trained and qualified to work at the Site.

Resumes for Hydro Tech Project Staff involved in this project are provided in the QAPP (Appendix E) of the Supplemental Remedial Investigation Work Pan (Supplemental RIWP).

SITE SAFETY OFFICER (SSO)

- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment (PPE).
- Conducts initial onsite, specific training prior to personnel and/or subcontractors proceeding to work.
- Conducts and documents periodic safety briefings; ensures that field team members comply with this HASP.
- Completes and maintains Accident/Incident Report Forms.
- Notifies Hydro Tech corporate administration of all accidents/incidents.
- Determines upgrade or downgrade of PPE based on site conditions and/or downgrade of PPE based on site conditions and/or real-time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as determined by manufactured suggested instructions.
- Maintains health and safety field log books.
- Develops and ensures implementation of the HASP.
- Approves revised or new safety protocols for field operations.
- Coordinates revisions of this HASP with field personnel and the SSO Division Contracting Officer.
- Responsible for the development of new company safety protocols and procedures and resolution of any outstanding safety issues which may arise during the conduction of site work.
- Reviews personnel and subcontractors current and up-to-date medical examination and acceptability of health and safety training.

FIELD PERSONNEL AND SUBCONTRACTORS (IF ANY)

- Reports any unsafe or potentially hazardous conditions to the SSO.
- Maintains knowledge of the information, instructions and emergency response actions contained in this HASP.
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions that are instituted.
- Prevents admittance to work sites by unauthorized personnel.

3.0 Chemical & Waste Description/Characterization

The following list of chemicals is based on the materials either once stored onsite or believed to be formerly stored onsite:

- Unknown Contaminant(s) including VOCs, SVOCs, TAL metals, pesticides, PCBs

Attachment A contains information regarding assessing health risks from contaminants of concern.

The following information references are presented in order to identify the properties and hazards of the materials that may/will be encountered at the Site.

- Safety Data Sheets (SDSs) - OSHA
- Dangerous Properties of Industrial Materials - Sax
- Chemical Hazards of the Workplace - Proctor/Hughes
- Condensed Chemical Dictionary – Hawley
- Rapid Guide to Hazardous Chemical in the Workplace - Lewis 1990.
- NIOSH Guide to Chemical Hazards - 1990
- ACGIH TLV Values and Biological Exposure Indices - 1991-1992

4.0 Hazard Assessment

The potential hazards associated with planned site activities include chemical, physical and biological hazards. This section discusses those hazards that are anticipated to be encountered during the activities listed in the scope of work.

The potential to encounter chemical hazards is dependent upon the work activity performed (invasive or non-invasive), the duration and location of the work activity. Such hazards could include inhalation or skin contact with chemicals that could cause: dermatitis, skin burn, being overcome by vapors or asphyxiation. In addition, the handling of contaminated materials and chemicals could result in fire and/or explosion.

The potential to encounter physical hazards during site work includes: heat stress, exposure to excessive noise, loss of limbs, being crushed, head injuries, cuts and bruises and other physical hazards due to motor vehicle operation, heavy equipment and power tools.

CHEMICAL HAZARDS

The potential for personnel and subcontractors to come in contact with chemical hazards may occur during the following tasks:

- Remedial excavation;
- Collection of end-point soil samples;
- Installation of vapor barrier and composite cover elements.

Exposure Pathways
Exposure to these compounds during ongoing activities may occur through inhalation of contaminated dust particles, inhalation of volatile (VOC) and semi-volatile (SVOC) vapor fume compounds, by way of dermal absorption, and accidental ingestion of the contaminant by either direct or indirect cross contamination activities (eating, smoking, poor hygiene). Indirectly, inhalation of contaminated dust particles (VOCs, SVOCs) can occur during adverse weather conditions (high or changing wind directions) or during operations that may generate airborne dust such as excavation, and sampling activities. Dust control measures such as applying water to roadways and work sites will be implemented, where visible dust is generated from non-contaminated and contaminated soils in accordance with the CAMP presented for the Site. Where dust control measures are not feasible or effective, respiratory protection will be used.

Additional Precautions
Dermal absorption or skin contact with chemical compounds is possible during invasive activities at the Site, including removal of product, excavation of tanks, and handling of contaminated soils. The use of PPE in accordance with Section 9.2 and strict adherence to proper decontamination procedures should significantly reduce the risk of skin contact.

The potential for accidental ingestion of potentially hazardous chemicals is expected to be remote, when good hygiene practices are used.

PHYSICAL HAZARDS

A variety of physical hazards may be present during Site activities. These hazards are similar to those associated with any construction type project. These physical hazards are due to motor vehicles, and heavy equipment operation, the use of improper use of power and hand tools, misuse of pressurized cylinders, walking on objects, tripping over objects, working on surfaces which have the potential to promote falling (slips, trips, falls), mishandling and improper storage of solid and hazardous materials, skin burns, crushing of fingers, toes, limbs, hit on the head by falling objects or hit one's head due to not seeing the object of concern, temporary loss of one's hearing and/or eyesight. Theses hazards are not unique and are generally familiarly to most hazardous waste site workers at construction sites. Additional task specific safety requirements will be covered during safety briefings.

Noise
Noise is a potential hazard associated with operation of heavy equipment, power tools, pumps and generators. High noise operators will be evaluated at the discretion of the SSO. Employees with an 8-hour time weighted average exposure exceeding 85 decibels (db) will be included in the hearing conservation program in accordance with 29 CFR 1910.85.

It is mandated that employees working around heavy equipment or using power tools that dispense noise levels exceeding 95 db are to wear hearing protection that shall consist of earplugs and earphones. This is particularly relevant as the jet engines of modern airplanes can give sound level readings of greater than 110 db.

Heat/Cold Stress
Extremes in temperature and the effects of hard work in impervious clothing can result in heat stress and/or hypothermia. The human body is designed to function at a certain internal temperature. When metabolism or external sources (fire, hot summer day, winter weather, etc.) cause the body temperature to rise or fall excessively, the body seeks to protect itself by triggering cooling/warming mechanisms. Profuse sweating is an example of a cooling mechanism, while uncontrollable shivering is an example of a warming mechanism. The SSO monitor the temperature to determine potential adverse affects the weather can cause on site personnel.

Protective clothing worn to guard against chemical contact effectively stops the evaporation of perspiration. Thus the use of protective clothing increases heat stress problems. Cold stress can easily occur in winter with sub-freezing ambient temperatures. Workers in protective garments may heat-up and sweat, only to rapidly cool once out of the tank and the PPE. The major disorders due to heat stress are heat cramps, heat exhaustion and heat stroke.

HEAT CRAMPS are painful spasms that occur in the skeletal muscles of workers who sweat profusely in the heat and drink large quantities of water, but fail to replace the body's lost salts or electrolytes. Drinking water while continuing to lose salt tends to dilute the body's extra cellular fluids. Soon water seeps by osmosis into active muscles and causes pain. Muscles fatigued from work as usually most susceptible to cramps.

HEAT EXHAUSTION is characterized by extreme weakness or fatigue, dizziness, nausea, and headache. In serious cases, a person may vomit or lose consciousness. The skin is clammy and moist, complexion pale or flushed, and body temperature normal or slightly higher than normal. Treatment is rest in a cool place and replacement of body water lost by perspiration. Mild cases may recover spontaneously with this treatment; severe cases may require care for several days. There are no permanent effects.

HEAT STROKE is a very serious condition caused by the breakdown of the body's heat regulating mechanisms. The skin is very dry and hot with red mottled or bluish appearance. Unconsciousness, mental

confusion or convulsions may occur. Without quick and adequate treatment, the result can be death or permanent brain damage. Get medial assistance quickly! As first aid treatment, the person should be moved to a cool place. Soaking the person's clothes with water and fanning them should reduce body heat artificially, but not too rapidly.
Steps that can be taken to reduce heat stress are:

- Acclimatize the body. Allow a period of adjustment to make further heat exposure endurable.
- Drink more liquids to replace body water lost during sweating.
- Rest is necessary and should be conducted under the monitoring condition from the SSO and the effect personnel physiological state.

- Wearing personal cooling devices. There are two basic designs; units with pockets for holding frozen packets and units that circulate a cooling fluid from a reservoir through tubes to different parts of the body. Both designs can be in the form of a vest, jacket or coverall. Some circulating units also have a copy for cooling the head.

Cold temperatures can cause problems. The severe effects are FROSTBITE and HYPOTHERMIA.

FROSTBITE is the most common injury resulting from exposure to cold. The extremities of the body are often affected. The signs of frostbite are:

- The skin turns white or grayish-yellow
- Pain is sometimes felt early but subsides later. Often there is no pain
- The affected part feels intensely cold and numb

Shivering, numbness, drowsiness, muscular weakness and a low internal body temperature characterize the condition known as HYPOTHERMIA. This can lead to unconsciousness and death. With both frostbite and hypothermia, the affected areas need to be warmed quickly. Immersing in warm, not hot, water best does this. In such cases medical assistance will be sought.

To prevent these effects from occurring, persons working in the cold should wear adequate clothing and reduce the time spent in the cold area. The field SSO, to determine appropriate time personnel may spend in adverse weather conditions, will monitor this.

Lockout/Tagout
PURPOSE -- This program establishes procedures for de-energizing, isolating and ensuring the energy isolation of equipment and machinery. The program will be used to ensure that equipment and machinery is de-energizing and isolated from unexpected energization by physically locking (Lockout) energy isolation devices or, in the absence of locking capabilities, tagout (Tagout) the device to warn against energization. These procedures will provide the means of achieving the purpose of this program, prevention of injury to Hydro Tech employees from the unexpected energization or start-up of equipment and machinery, or from the release of stored energy.

APPLICATION -- This program applies to the control of energy during the servicing and/or maintenance of equipment and machinery. This program covers normal operations only if a guard or other safety device is removed or bypassed, or any part of the body is placed into an area of the equipment or machinery where work is performed on the material, or a danger zone exists during the operating cycle. Minor tool changes, adjustments, and other minor servicing activities which take place during normal production operations do not require isolation and lockout/tagout if they are routine and integral to the use of the equipment.

SCOPE -- This program will include all employees whose duties require them to service, install, repair, adjust, lubricate, inspect or perform work on powered equipment or machinery that may also have the potential for stored energy.

PROGRAM RESPONSIBILITIES -- The SSO will have the overall responsibility of the program to ensure that; authorized and affected employees receive adequate training and information, the program is evaluated annually, and the lockout/tagout equipment is properly used and the procedures of this program are followed.

The program evaluation will be conducted to ensure that the procedures and requirements of the program are being followed and will be utilized to correct any deviations or inadequacies that may be discovered. The evaluation will consist of one or more inspections or audits of actual lockout/tagout procedures being used to isolate equipment. A review of the authorized and affected employee's responsibilities will be conducted at the time of the inspection /audit. Any authorized employee, except the one(s) utilizing the energy isolation procedure being inspected, may perform the inspection/audit.
A record will be maintained of program evaluation inspections and will include:

1. The identity of the equipment or machine on which energy control procedures were being utilized.
2. The date(s) of the inspection(s).
3. The employee(s) included in the inspection(s).
4. The person performing the inspection.

Authorized employees (persons who implement lockout/tagout procedures) will be responsible for following the procedures established by this program.

Affected employees are responsible for understanding the significance of a lockout/tagout device and the prohibition relating to attempts to restart or re-energize equipment or machinery that is locked out or tagged out.

TRAINING – Where applicable, Hydro Tech employees will be provided instruction in the purpose and functions of the energy control program to ensure that they understand the significance of locked or tagged out equipment and also have the knowledge and skill to correctly apply and remove energy controls. Training will include:

The recognition of applicable hazardous energy source(s), the type and magnitude of energy available, and the policies and procedures of the Hydro Tech energy control program.

1. Affected employees will be made aware of the purpose and use of energy control procedures and the prohibition relating to attempts to remove lockout or tagout devices.
3. Instruction in the limitations of tagout as a sole means of energy control.
   a. Tags are warning devices and <u>do not</u> provide the physical restraint that a lock would.
   b. Tags may provide a false sense of security.
   c. Tags may become detached during use.

Initial training will be provided during to energy control program implementation, when new employees are hired or when job responsibilities change to include utilization of energy control procedures.

Retraining will be conducted whenever there is a change in job assignments that require the employee to utilize energy control procedures, a change in equipment that presents a new hazard, a change in the energy control procedures or when the program evaluation identifies inadequacies in the energy control program procedures.

Records of employee training will be maintained and will include the employee's name and date(s) of training.

STANDARD OPERATING PROCEDURES –where necessary, Hydro Tech will provide the necessary devices to effectively lockout or tagout energy isolating devices. Lockout/tagout devices will be the only devices used for controlling energy and shall not be used for other purposes. Any device used for lockout/tagout will be capable of withstanding the environment to which they are exposed for the maximum period they are to be exposed. The devices will be substantial enough to prevent removal without excessive force. Excessive force for a locking device would be bolt cutters or other metal cuttings tools. Tagout devices will be attached by a non-reusable method, attachable by hand, and very difficult to remove by hand. A nylon cable tie or equivalent will be used.

Lockout/tagout devices will indicate the identity of the employee who applied the device, and the tagout device will warn against the hazards if the equipment is energized.

Lockout is the preferred method of energy isolation. When physical lockout is not possible, the energy isolation will be tagged out of service with a warning tag attached at the power source. In the case of plug-in power source, the tag will be attached at the male plug. To ensure full employee protection using tagout instead of lockout, additional steps should be taken to guard against accidental or inadvertent energization. These steps may include, where applicable: removal of fuses, blocking switches, removal of a valve handle.

STANDARD OPERATING PROCEDURES

I. APPLICATION OF CONTROLS

A. Preparing to Shut Down Equipment

1. Prior to equipment shutdown, the authorized employee(s) must have knowledge of:
    a. The type(s) and magnitude of power.
    b. The hazards of the energy to be controlled.
    c. The method(s) to control the energy.
    d. The location and identity of all isolating devices that control or feed the equipment to be locked/tagged out.
2. Notify all affected employees that the lockout/tagout system will be in effect.
3. Assemble applicable lockout/tagout devices, i.e., padlocks, tags, multiple lock hasps, etc.

B. Equipment Shutdown and Isolation

1. If equipment is in operation, shut it down by the normal stopping procedure (stop button, switch).
2. Operate disconnects, switches, valves, or other energy isolating devices so that the equipment is de-energizing and isolated from its energy source(s).
3. Verify that equipment is shut down by operating equipment from the normal operating location and any remote locations.

C. Installation of Lockout/Tagout Device, Release of Stored Energy, and Verification

1. Attach individually assigned lock(s) or tag(s) to energy isolating device(s). Where it is not possible to lock a switch, valve or other isolating device, electrical fuses must be removed, blank flanges installed in piping, lines disconnected, or other suitable methods used to ensure that equipment is isolated from energy sources. A tag must be installed at the point of power interruption to warn against energizing.
    a. Each lock or tag must positively identify the person who applied it and locks must be individually keyed.
    b. If more than one person is involved in the task, employees will place their own lock and tag. Multiple lock hasps are available for this.
2. Release, restrain, or dissipate stored energy such spring tension, elevated machine members, rotating flywheels, hydraulic pressure, pistons and air, gas, steam, water pressure, etc. by repositioning, blocking bleeding, or other suitable means.
3. Prior to starting work on equipment and after ensuring that no personnel are exposed, the authorized employee will verify that isolation and de-energization have been accomplished by:
    a. Attempting, through normal effort, to operate energy isolating devices such as switches, valves, or circuit breaker with locks or tags installed.

b. Attempting to operate the equipment or machinery that is locked or tagged out. This includes all sources of energy, i.e. electrical, hydraulic, gravity, air, water, stream pressure, etc.
c. Verifying the presence and effectiveness of restraint (blocking) and energy dissipation or release (bleeding).

4. If there is a possibility of the re-accumulation of stored energy to a hazardous level, verification of isolation will be contained until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

D. Group Lockout/Tagout

1. When more than one individual is involved in locking or tagging equipment out of operation, each individual will attach their individual lock or tag, or the equivalent, to the energy isolating device(s).

a. An equivalent lockout device may be in the form of a group lockout device such as a multiple lock hasp or lock box.
b. Primary responsibility for a group of authorized employees working under a group lockout device will be vested in a designated authorized employee.
c. Group lockout methods will provide a level of protection equal to that afforded by a personal lockout/tagout device.

II. RETURNING EQUIPMENT TO SERVICE

A. Restore Equipment to Normal Operating Status

1. Re-install all parts or subassemblies removed for servicing or maintenance.
2. Re-install all tools, rests, or other operating devices
3. Re-install all guards and protective devices (i.e. limit switches).
4. Remove all blocks, wedges, or other restraints from the operating area of the equipment (ways, slides, etc.).
5. Remove all tools, equipment, and shop towels from the operating area of the equipment.

B. Verify Equipment Ready for Operation

1. Inspect area for non-essential items
2. Ensure that all employees are safely positioned clear of the operating areas of the equipment. Post a watch if energy isolation devices are not in line of sight of the equipment.

C. Notify Affected Employees of Impending Start-up

1. The sudden noise of start-up may startle nearby employees.
2. Equipment may need to be tested to determine operational safety by a qualified operator.

D. Remove Energy Isolation Devices - Only by authorized employee(s) who installed it/them.

1. Remove line blanks, reconnect piping (if applicable), and remove warning tag.
2. Close bleeder valves, remove warning tag.
3. Replace fuse(s), close circuit breaker(s) and remove warning tag.
4. Remove lock and tag from control panel, valve, etc.

Employee(s) who installed them may make an exception for removal of lockout/tagout devices. If it is necessary to operate a piece of equipment that is locked/tagged out, <u>every</u> effort must be made to locate the employee whose lock or tag is on the equipment. If he or she cannot be located and only after positive assurance is made that no one is working on the locked out equipment, the <u>supervisor</u> may personally remove the lock. The supervisor must assure that the equipment is once again locked out, or the employee notified that the equipment has been re-energized, before the employee resumes work. Employees will recheck locked out equipment if they have left the equipment (breaks, lunch, and end of shift) to make sure it is still de-energized and locked out.

III. TEMPORARY REMOVAL OF LOCKOUT/TAGOUT PROTECTION

A. In situations when the equipment must be temporarily energized to test or position the equipment or its components, the following steps will be followed:

1. Clear the equipment of tools and materials that are non-essential to the operation.
2. Ensure the equipment components are operationally intact.
3. Remove employees from the equipment area.
4. Remove the lockout/tagout devices by the employee who installed in/them.
5. Energize and proceed with testing or positioning.
6. De-energize all systems and re-install all energy control measures.
7. Verify re-installed energy control measures are effective.

IV. SHIFT OR PERSONNEL CHANGES

A. The following steps will be followed to ensure continuity of employee protection during personnel changes.

1. All personnel involved in the maintenance or servicing activity will be notified that a transfer of personal locks/tags is about to occur.
2. Clear all personnel from hazardous area(s) of equipment.
3. Under the supervision of the shift supervisor or group designee, the off-going employee will immediately install theirs.
    a. If an entire group or more than one employee will be transferring work responsibility, locks/tags will be removed and replaced one at a time in order of installation.
4. When the transfer of lockout/tagout devices is complete, the effectiveness of all energy isolation devices will be verified to the satisfaction of all personnel involved.
5. Once the effectiveness of energy isolation protection is confirmed, the service/maintenance operation may continue.

V. CONTRACTOR NOTIFICATION

A. Whenever outside personnel may be engaged in activities covered by this program, they will inform the contractor of applicable lockout/tagout procedures used to protect Hydro Tech employees from the hazards of working near energized equipment.

1. The contractor will be expected to ensure that his/her employees understand and comply with the restrictions and prohibitions of this program.
2. Hydro Tech requires, under these circumstances, the contractor to inform us of their lockout/tagout procedures so that HTE employees can comply with the restrictions and prohibitions of the contractor's program.
3. Hydro Tech also requires the contractor to notify the program administrator, the area supervisor, and affected Hydro Tech employees prior to de-energizing, isolating and locking out Hydro Tech equipment. Conversely, notification is also required when this equipment will be returned to service.

DEFINITIONS

Affected employee - An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

Authorized employee(s) - A person or persons who locks or implements a tagout system procedure to perform servicing or maintenance on a machine or equipment. An authorized employee and an affected employee may be the same person when the affected employee's duties also include performing maintenance or service on a machine or equipment that must be locked or tagged out.

"Capable of being locked out" - An energy isolating device will be considered to be capable of being locked out either if it is designed with a hasp or other attachment or integral part to which, or through which, a lock can be affixed, or if it has a locking mechanism built into it. Other energy isolating devices

will also be considered to be capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

Energized - Connected to an energy source or containing residual or stored energy.

Energy isolating device - A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, in addition, no pole can be operated independently; a slide gate; a slip blind; a line valve; a block; and any similar device used to block or isolate energy. The term does not include a push button, selector switch, and other control circuit type devices.

Energy source - any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other type of energy.

Lockout - The placement of lockout device on an energy-isolating device, in accordance with an established procedure, is ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout device - A device that utilizes positive means such as a lock, either key or combination type, to hold an energy isolating device in the safety position and prevent the energizing of a machine or equipment.

Normal production operations - The utilization of a machine or equipment to perform its intended production function.

Servicing and/or maintenance - Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

Setting up - Any work performed to prepare a machine or equipment to perform its normal production operation.

Stored energy - Energy that is available and may cause movement even after energy sources have been isolated. Stored energy may be in the form of compressed springs, elevated equipment components, hydraulic oil pressure, pressurized water, air, steam, or gas, or rotating flywheels, shafts or cams.

Tagout - The placement of a tagout device on an energy-isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout device - A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

GENERAL MACHINERY AND EQUIPMENT LIST

EQUIPMENT/LOCATION	ENERGY SOURCES/LOCATION
A. Excavator/backhoe	Diesel Engine
B. Dewatering pumps and piping system	Electric Power

5.0 Training

GENERAL HEALTH AND SAFETY TRAINING

In accordance with Hydro Tech corporate policy, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations. As a minimum, the training shall have consisted of instruction in the topics outlined in the above reference. Personnel who have not met the requirements for initial training will not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical).

Completion of the Hydro Tech Health and Safety Training Course for Hazardous Waste Operations or an approved equivalent will fulfill the requirements of this section. In addition to the required initial training, each employee shall have received 3 days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.
The Hydro Tech SSO the responsibility of ensuring that personnel assigned to this project complies with these requirements. Written certification of completion of the required training will be provided to the SSO.

MANAGER/SUPERVISOR TRAINING

In accordance with 29 CFR 1910.120, onsite management and supervisors who will be directly responsible for, or who supervise employees engaged in hazardous waste operation shall receive training as required in this HASP and at least eight (8) additional hours of specialized training on managing such operations at the time of job assignment.

ANNUAL 8-HOUR REFRESHER TRAINING

Annual 8-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualification for fieldwork. The following topics will be reviewed: toxicology, respiratory protection, including air purifying devices and self-contained breathing apparatus (SCBA), medical surveillance, decontamination procedures and personnel protective clothing. In addition, topics deemed necessary by the SSO may be added to the above list.

SITE SPECIFIC TRAINING

Prior to commencement of field activities, all personnel assigned to the project will be provided training that will specifically address the activities, procedures, monitoring and equipment for the site operations. It will include Site and facility layout, hazards, and emergency services at the Site, and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

ONSITE SAFETY BRIEFINGS

Project personnel and visitors will be given periodic onsite health and safety briefings by the SSO, or their designee, to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the Site's environmental conditions. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety audits.

ADDITIONAL TRAINING

Additional training may be required by the SSO for participation in certain field tasks during the course of the project. Such additional training could be in the safe operation of heavy or power tool equipment or hazard communication training.

SUBCONTRACTOR TRAINING

Subcontractor personnel who work onsite, only occasionally, for a specific limited task and who are unlikely to be exposed over permissible exposure limits, may be exempted from the initial 40-hour training requirement. The SSO will determine if this exemption is allowed. In any case, the subcontractor personnel who are exposed to hazards are not exempted from the 40-hours training requirement nor medical surveillance requirements found in Section 8.1.

6.0 Medical Surveillance

GENERAL

All contractor and subcontractor personnel performing field work at the Site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin site activities. Such examinations shall include a statement as to the worker's present health status, the ability to work in a hazardous environment (including any required PPE which may be used during temperature extremes), and the worker's ability to wear respiratory protection.

A medical data sheet will be completed by all onsite personnel and kept at the Site. Where possible, this medical data sheet will accompany the personnel needing medical assistance or transport to hospital facilities.

MEDICAL SURVEILLANCE PROTOCOL
The medical surveillance protocol to be implemented is the occupational physicians' responsibility, but shall meet the requirements of CFR 1910.120 and ANSI Z88.2 (2000). The medical surveillance protocol shall, as a minimum, cover the following:

a. Medical and Occupational History
b. General physical examination (including evaluation of major organ system)
c. Serum lead and ZPP
d. Chest X-ray (performed no more frequently that every four years, except when otherwise indicated).
e. Pulmonary Function Testing (FVC and FEV1.0).
f. Ability to wear respirator
g. Audiometric testing.

Additional clinical tests may be included at the discretion of the occupational physician.

7.0 Site Control, PPE & Communications

SITE CONTROL

A Support Zone (SZ) is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples. A contamination reduction corridor will be established. This is the route of entry and egress to the Site, and it provides an area for decontamination of personnel and portable equipment as well.

The area where contamination exists is considered to be the Exclusion Zone (EZ). All areas where excavation and handling of contaminated materials take place are considered the EZ. This zone will be clearly delineated by cones, tape or other means. The SSO may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Personnel are not allowed in the EZ without:

- A buddy
- Appropriate personal protective equipment
- Medical authorization
- Training certification

PERSONAL PROTECTIVE EQUIPMENT

GENERAL
The level of protection worn by field personnel will be enforced by the SSO. Levels of protection for general operations are provided below and are defined in this section. Levels of protection may be upgraded or downgraded at the discretion of the SSO. The decision shall be based on real-time air monitoring, site history data, and prior site experience. Any changes in the level of protection shall be recorded in the health and safety field logbook. It is assumed that Level D PPE will be required during the entire duration of the Site redevelopment.

PERSONAL PROTECTIVE EQUIPMENT SPECIFICATIONS
For tasks requiring Level B PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Chemical protective suit (e.g. Saran-coated Tyvek®)
- Gloves, inner (latex)
- Gloves, outer (Nitrile®)
- Boots (PVC), steel toe/shank
- Boot Covers (as needed)
- Hard Hat
- Hearing protection (as needed)
- Splash suit and face shield for decontamination operations (as needed)
- An airline respirator or self-contained breathing apparatus (SCBA)

For tasks requiring Level C PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Disposable outer coveralls (Poly-coated Tyvek)
- Gloves, inner (latex)
- Gloves, outer (Nitrile®)
- Boots (PVC), steel toe/shank
- Boot covers (as needed)
- Hard Hat
- Hearing protection (as needed)
- Splash suit and face shield for decontamination operations (as needed)

For tasks requiring Level D PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Gloves, inner (latex)

- Gloves, outer (Nitrile®)
- Boots (PVC) steel toe/shank
- Boot covers (as needed)
- Hard hat
- Hearing protection (as needed)
- Safety glasses

For tasks requiring respiratory protection, the following equipment shall be used:

Level D - No respiratory protective equipment necessary except for a dust mask
Level C - A full-face air-purifying respirator equipped with organic vapor/pesticide-HEPA cartridges
Level B - An air line respirator or a self-contained breathing apparatus (SCBA)

INITIAL LEVELS OF PROTECTION
Levels of protection for the activities may be upgraded or downgraded depending on direct-reading instruments or personnel monitoring. The following are the initial levels of protection that shall be used for each planned field activity.

LEVEL OF PERSONAL PROTECTIVE EQUIPMENT REQUIRED

Activity	Level of Protection Respiratory/PPE
Excavation	D/D
Sampling	D/D

COMMUNICATIONS
Communications is the ability to talk with others. While working in Level C/B Protection, personnel may find that communication becomes a more difficult task and process to accomplish. This is further complicated by distance and space. In order to address this problem, electronic instruments, mechanical devices or hand signals will be used as follows:

- Walkie-Talkies - Hand held radios would be utilized as much as possible by field teams for communication between downrange operations and the Command Post base station.

- Telephones - A mobile telephone will be located in the Command Post vehicle in the Support Zone for communication with emergency support services/facilities. If a telephone is demobilized, the nearest public phones will be identified.

- Air Horns - A member of the downrange field team will carry an air horn and another will be evident in the Support Zone to alert field personnel to an emergency situation.

- Hand Signals - Members of the field team long with use of the buddy system will employ this communication method. Signals become especially important when in the vicinity of heavy moving equipment and when using Level B respiratory equipment. The signals shall become familiar to the entire field team before site operations commence and they will be reinforced and reviewed during site-specific training.

HAND SIGNALS FOR ONSITE COMMUNICATION

Signal	Meaning
Hand gripping throat	Out of air, can't breathe
Grip partners' wrist	Leave area immediately; no debate
Hands on top of head	Need assistance

Thumbs up	OK, I'm all right; I understand
Thumbs down	No; negative, unable to understand you. I'm not all right

8.0 Air Monitoring Plan

GENERAL
Continuous air monitoring in the EZ during invasive tasks will accompany site operations, as indicated in this HASP and CAMP or as required by the SSO. Monitoring will be performed to verify the adequacy of respiratory protection, to aid in site layout and to document work exposure. All monitoring instruments shall be operated by qualified personnel only and will be calibrated daily prior to use, or more often as necessary.

REAL-TIME MONITORING

INSTRUMENTATION
At least one (1) of the following monitoring instruments will be available for use during field operations as necessary:

- Photoionization Detector (PID), Rae Instruments with 10.2 EV probe or equivalent
- Flame Ionization Detector (FID), Foxboro Model 128 or equivalent
- Combustible Gas Indicator (CGI)/Oxygen (O_2) Meter, MSA or equivalent.
- Particulate Meter, DustTrak or equivalent

A FID or PID shall be used to monitor the organic vapor concentrations in active work areas. Organic vapor concentrations shall be measured upwind of the work areas to determine background concentrations. The SSO will interpret monitoring results using professional judgment. The PPE utilized shall always be the most protective, thus the action level criteria are flexible guidelines.

A CGI/O_2 meter shall be used to monitor for combustible gases and oxygen content in the boreholes during drilling activities.

Calibration records shall be documented, and included in the health and safety logbook or instrument calibration logbook. All instruments shall be calibrated before and after each daily use in accordance with the manufacturers' procedures.

ACTION LEVELS
Action levels for upgrading of PPE in this HASP will apply to all site work during the duration of field activities at the Site. Action levels are for unknown contaminants using direct reading in the Breathing Zone (BZ) for organic vapors and dusts, and at the source for combustible gases.

MONITORING DURING FIELD ACTIVITIES
Hydro Tech shall perform real time air monitoring prior to the commencement of work to establish baseline conditions. Baseline conditions will be established at the approximate center of the Site and at the perimeter of the Site both upwind and downwind.

During all work activities real time monitoring will occur. As necessary, Hydro Tech shall have at each applicable workstation a PID, explosimeter and oxygen deficiency meter. The real time monitoring for remedial activities will be conducted approximating the Breathing Zone of the workers. The monitoring will be continuous during working operations.

The air-monitoring instrument may indicate that personnel working in the exclusion zone increase their level of protection. All personnel will be trained in the action levels. When conditions warrant an increase in protection, all personnel will stop working and immediately leave the exclusion zone. They will then don the appropriate safety equipment necessary and return to their current workstation. All of this activity will be monitored by the SSO. The SSO will keep the Hydro Tech Project Manager aware of any extraordinary situations and conditions that may occur. Working conditions and monitoring levels will be noted in the Field Notebook along with the time, date and page number. Verbal reports will be given to the Project Manager when there is a change in the PPE level.

The previous day's results shall be reviewed each morning to determine what actions are necessary and the general conditions resulting from and around the Site.

The record keeping will include:

- Date & Time of Monitoring
- Air Monitoring Location
- Instrument, Model #, Serial #
- Calibration/Background Levels
- Results of Monitoring
- SSO Signature
- Comments

Excavation Operations - Monitoring will be performed continuously during all excavation and demolition operations. A PID and/or FID shall be utilized to monitor the breathing zone, the excavated area and any material taken from the excavation. A CGI/O_2 meter shall be used to monitor the excavation for the presence of combustible gases.

ACTION LEVELS OF AIRBORNE CONTAMINANTS

Instrument	Action Level	Action to be Taken
FID/PID	< 100 ppm, for a 15-minute average	Stop work & initiate vapor control
	> 100 ppm, for a 15-minute average	Stop work & initiate evacuation procedure
CGI	10% LEL	Stop work, initiate ventilating
	50% LEL	Stop work, initiate evacuation procedure and contact fire dept.

PERSONNEL MONITORING PROCEDURE

The Site SSO, concurrent with activities that may generate the contaminants in excess of OSHA PEL's, may perform assessment and evaluation of field personnel exposures to airborne contaminants.

Procedures to be followed include:

The SSO may select high-risk individuals who may be subject to contaminant exposure based on job assignment.
The Personal Sampling is being conducted to determine the proper levels of respiratory protection required, to document potential exposures to compounds, and to assure compliance with OSHA standards. Therefore, it is important that the data collected be from "worst case" locations and personnel.

For example: when work is being conducted to excavate at an underground tank location, those persons closest to the excavation and most intimately involved with the work should be sampled. If a backhoe operator solely conducted the excavation, then that employee should be monitored. However, if there are

additional workers who must enter the excavation and work with the freshly excavated soil, these persons would be closer to the potential contaminants and they should be sampled.

To meet the intent of the sampling will require sampling at periods of the most disturbances. To be accurate in determining potential exposures, as many tasks/trades shall be sampled as possible during the course of this project. At completion of the project, a goal of 20% of all workers who must perform their duties in or around the contaminated soil, tanks and excavations is sought.

Hydro Tech must provide all sampling data in writing to the employees within three (3) days of receipt of results.

Air sampling pumps used to collect employee exposure samples shall be calibrated before and after use each day. Calibration shall be accomplished using a primary standard calibration system, e.g. the bubble tube method. Results of the calibrations shall be included in the health and safety field logbook and with the exposure report.

Chemical analysis of samples collected for assessment of employee exposures shall be performed in accordance with NIOSH or OSHA analytical methods only by laboratories accredited by the American Industrial Hygiene Association.

Results of the personal exposure assessment shall be provided to the individual, in writing within fifteen (15) working days after receipt of laboratory reports. Reports to field personnel shall provide calculated time-weighted average exposures and shall provide comparative information relative to established permissible exposure limits. The air sampling data sheet and laboratory report is considered a part of the employee exposure report. A copy of the employee personal exposure assessment report shall also be included in the project file and the employees' medical record for Hydro Tech employees. Reports for subcontractor employees will be sent directly to the subcontractors' employer.

AIR MONITORING REPORTS

Air Monitoring Reports will be completed by the SSO and/or authorized personnel and submitted to the Project Manager in the daily safety logs and will include the following:

- Date of monitoring
- Equipment utilized for air monitoring
- Real-time air monitoring results from each work location
- Calibration method of equipment and results

9.0 Safety Considerations

GENERAL

In addition to the specific requirements of this HASP, common sense should be used at all times. The general safety rules and practices below will be in effect at the Site at the discretion of the Project Manager, SSO or other authorized personnel.

- The site will be suitably marked or barricaded as necessary to prevent unauthorized visitors but not hinder emergency services if needed.

- As needed, all open holes, trenches and obstacles will be properly barricaded in accordance with local site requirements. These requirements will be determined by proximity to traffic ways, both pedestrian and vehicular, and site of the hole, trench or obstacle. If holes are required to be left open during non-working hours, they will be adequately decked over or barricaded and sufficiently lighted.

- Before any digging or boring operations are conducted, underground utility locations will be identified. All boring, excavation and other site work will be planned and performed with consideration for underground lines. Any excavation work will be performed in accordance with Hydro Tech's Standard Operating Procedures for Excavations.

- Either workers or other people will enact dust-mitigating procedures when there exists the potential for the inhalation of dust particles.

- The act of smoking and ignition sources in the vicinity of potentially flammable or contaminated material is strictly prohibited.

- Drilling, boring, and use of cranes and drilling rigs, erection of towers, movement of vehicles and equipment and other activities will be planned and performed with consideration for the location, height, and relative position of aboveground utilities and fixtures, including signs; canopies; building and other structures and construction; and natural features such as trees, boulders, bodies of water, and terrain.

- When working in areas where flammable vapors may be present, particular care shall be exercised with tools and equipment that may be sources of ignition. All tools and equipment provided must be properly bonded and/or grounded. Metal buttons and zippers are prohibited on safety clothing for areas that may contain a flammable or explosive atmosphere.

- Approved and appropriate safety equipment (as specified in this HASP), such as eye protection, hard hats, foot protection, and respirators, must be worn in areas where required. In addition, eye protection must be worn when sampling soil or water that may be contaminated.

- Beards interfere with respirator fit and are not allowed within the site boundaries because all site personnel may be called upon to use respirator protection is some situations.

- No smoking, eating, chewing tobacco, gum chewing or drinking will be allowed in the contaminated areas.

- Contaminated tools and hands must be kept away from the face.

- Personnel must use personal hygiene safe guards (washing up) at the end of the shift or as soon as possible after leaving the Site.

- Each sample must be treated and handled as though it were contaminated.

- Persons with long hair and/or loose fitting clothing that could become entangled in power equipment must take adequate precautions.

- Horseplay is prohibited in the work area.

- Work while under the influence of intoxicants, narcotics or controlled substances is prohibited.

POSTED SIGNS

Posted danger signs will be used where an immediate hazard exists. Caution signs will be posted to warn against potential hazards and to caution against unsafe practices. Traffic control methods and barricades will be used as needed. Wooden stakes and flagging tape, or equally effective material will be used to demarcate all restricted areas.

Other postings may include the OSHA poster, emergency hospital route and telephone numbers of contact personnel.

INVASIVE OPERATIONS

The SSO will be present onsite during all invasive work (e.g. demolition, excavations). The SSO will ensure that appropriate levels of protection and safety procedures are followed. No personnel will enter any excavations for any reasons. All personnel will stay at least 10 feet back from the edge of the excavation and out of the swing radius of the backhoe. No drums or other potential sources will be sampled or removed during this phase without further additions to the HASP.

The proximity of water, sewer and electrical lines will be identified prior to invasive operations. The possibility of the presence of underground conduits or vessels containing materials under pressure will also be investigated prior to invasive operations. Properly-sized containment systems will be utilized and consideration of the potential volume of liquid or waste released during operations will be discussed with members of the field team to minimize the potential for spills and provide a method for collection of waste materials. Emergency evacuation procedures and the location of safety equipment will be established prior to start up operations. The use of protective clothing, especially hard hats, boots, and gloves will be required during drilling and other heavy equipment work.

SOIL SAMPLING

Personnel must wear prescribed protective clothing and equipment including eye protection, chemical resistant gloves and splash aprons (where appropriate) when sampling solids and liquids. Sample bottles are to be bagged prior to sampling to ease decontamination. Personnel must be aware of the location of emergency equipment, including spill containment materials prior to sampling. Personnel are to practice contamination avoidance at all times, as well as to utilize the buddy system and maintain communications with the Command Post.

SAMPLE HANDLING

Personnel responsible for the handling of samples will wear the prescribed level of protection. Samples are to be identified as to their hazard and packaged as to prevent spillage or breakage. Any unusual sample conditions shall be noted. Laboratory personnel and all field personnel shall be advised of sample hazard

levels and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling in order to assure that the practices are appropriate for the suspected contaminants in the sample.

HEAVY EQUIPMENT DECONTAMINATION

Personnel steam cleaning heavy equipment shall use the prescribed level of protection and adhere to the buddy system. Initially this task usually employs level C. The heavy equipment decontamination shall be restricted to authorized personnel only. Special consideration will be given to wind speed and direction. Downwind areas are to be kept free of personnel to avoid unnecessary exposure to potential airborne contamination.

ADDITIONAL SAFETY CONSIDERATIONS

No other additional safety considerations at this time.

10.0 Decontamination and Disposal Procedures

CONTAMINATION PREVENTION

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel:
Do not walk through areas of obvious or known contamination
Do not directly handle or touch contaminated materials
Make sure that there are no cuts or tears on PPE
Fasten all closures in suits; cover with tape if necessary
Particular care should be taken to prevent any skin injuries
Stay upwind of airborne contaminants
Do not carry cigarettes, cosmetics, gum, etc. into contaminated areas

Sampling and Monitoring:
When required by the SSO, cover instruments with clear plastic, leaving openings for sampling ports and bag sample containers prior to emplacement of sample material.

Heavy Equipment:
Care should be taken to limit the amount of contamination that comes in contact with heavy equipment (tires, contaminated augers). Dust control measures may be needed on roads inside the site boundaries.

PERSONNEL DECONTAMINATION

All personnel shall pass through an outlined decontamination procedure when exiting the hot zone at each location. Field washes for equipment and PPE shall be set up at each drilling location. The system will include a gross wash and rinse for all disposable clothing and boots worn in the EZ. Upon exiting the EZ, all personnel will wash their hands, arms, neck, and face before entering the Support Zone.

EQUIPMENT DECONTAMINATION

Equipment used at the Site that is potentially contaminated shall be decontaminated to prevent hazardous materials from leaving the Site. All heavy equipment will be decontaminated at the decontamination pad and inspected by the SSO and Project Manager before it leaves the Site. The decontamination area will provide for the containment of all wastewater from the decontamination process. Respirators, airline and any other personnel equipment that comes in contact with contaminated soils shall pass through a field wash.

DECONTAMINATION DURING MEDICAL EMERGENCIES

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or omitted. The Site SSO or designee will accompany contaminated victims to the medical facility to advice on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut

away. If the outer contaminated garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances and /or medical personnel. Outer garments are then removed at the medical facility.

No attempt will be made to wash or rinse the victim, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material that could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed. Note that heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing must be promptly removed. Less serious forms of heat stress also require prompt attention and removal of protective clothing immediately; unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately.

DISPOSAL PROCEDURES

A segregating system of non-hazardous waste and hazardous waste will be developed by the SSO and PM. All discarded material, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating sanitary hazards, or causing litter to be left on site. All potentially contaminated materials, e.g. clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste.

11.0 Emergency Plan

The potential for the development of an emergency situation is low considering the low concentrations of hazardous substances at the work site. Nevertheless, an emergency situation could occur. All Hydro Tech and subcontractor field team members prior to the start of work will know the emergency plan outlined in this section. The emergency plan will be available for use at all times during site work.

Various individual site characteristics will determine preliminary actions taken to assure that this emergency plan is successfully implemented in the event of a site emergency. Careful consideration must be given to the proximity of neighborhood housing or places of employment, and to the relative possibility of site fire, explosion or release of vapors or gases that could affect the surrounding community.

The Project Manager shall make contact with local fire, police and other emergency units prior to beginning work on site. In these contacts, the Project Manager will inform the emergency units about the nature and duration of work expected to the Site and the type of contaminants and the possible health or safety effects of emergencies involving these contaminants. At this time, the Project Manager and the emergency response units shall make the necessary arrangements to be prepared for any emergencies that could occur.

The Project Manager shall implement the contingency plan whenever conditions at the Site warrant such action. The Project Manager will be responsible for coordination of the evacuation emergency treatment, and transportation of site personnel as necessary, and notification of emergency response units and the appropriate management staff.

The cases where the PM is not available, the SSO shall serve as the alternate emergency coordinator.

EVACUATION

In the event of an emergency situation, such as fire, explosion, or significant release of toxic gases, an air horn or other appropriate device will be sounded for approximately 10 second intervals indicating the initiation of evacuation procedures. All personnel will evacuate and assemble near the entrance to the site. The location shall be upwind of the Site where possible.

For efficient and safe site evacuation and assessment of the emergency situation, the Project Manager will have authority to initiate action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SSO or designated SSO must ensure that access for emergency equipment is provided and that all combustion apparatuses have been shut down once the alarm has been sounded. Once the safety of all personnel is established, the Fire Department and other emergency response groups as necessary will be notified by telephone of the emergency.

POTENTIAL OR ACTUAL FIRE OR EXPLOSION

Immediately evacuate the Site (air horn will sound for 10-second intervals), notify the local fire and police departments, and other appropriate emergency response groups if an actual fire or explosion has taken place.

PERSONNEL INJURY

Emergency first aid shall be applied on site as deemed necessary. If necessary, the individual shall be decontaminated and transported to the nearest medical facility.

The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. However, since some situations may require transport of an injured party by other means, the hospital route is identified below. A map to this facility provided with this HASP in Section 2.2.3.

ACCIDENT/INCIDENT REPORTING

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

1. Mark E. Robbins-Cell phone (631) 457-0030
2. The employer of any injured worker if not an Hydro Tech employee

Written confirmation of verbal reports is to be submitted within 24 hours. The report form entitled "Accident Data Report" is to be used for this purpose. All Hydro Tech representatives contacted by telephone are to receive a copy of this report. If the employee involved is not a Hydro Tech employee, his employer shall receive a copy of this report.

For reporting purposes, the term accident refers to fatalities, lost time injuries, spill or exposure to hazardous materials (toxic materials, explosive or flammable materials).
Any information released from the health care provider, which is not deemed confidential patient information, is to be attached to the appropriate form. Any medical information that is released by patient consent is to be filed in the individuals' medical records and treated as confidential.

OVERT PERSONNEL EXPOSURE

SKIN CONTACT:	Use copious amounts of soap and water. Wash/rinse affected area thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination.
INHALATION:	Move personnel to fresh air and if necessary, decontaminate and transport to hospital.

INGESTION: Decontamination and transport to emergency medical facility.

PUNCTURE WOUND
OR LACERATION: Decontaminate and transport to emergency medical facility.

ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the SSO or designee will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries
- Potential for cold stress and cold-related injuries
- Treacherous weather-related conditions
- Limited visibility
- Potential for electrical storms

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions include heavy rain, fog, high winds, and lighting. Observe daily weather reports and evacuate if necessary in case of inclement weather conditions.

EMERGENCY RESPONSE EQUIPMENT LIST

Some or all of the following will either be available onsite or be able to be brought to the Site within a 2-hour period:

- 55 Gallon Drums
- 85 Gallon Drums
- Absorbent Pads
- Absorbent Booms
- Speedy-Dry
- Plastic Sheeting
- Hay Bales
- Pneumatic Nibbler
- Back Hoe
- Pressure Washer
- Air Compressor
- Wilden Pumps
- Equipment Storage Trailer
- Submersible Pumps
- Miscellaneous Hand Tools
- Portable Lighting

LARGE EQUIPMENT

If necessary, Hydro Tech can have the following large equipment brought to the Site within 2-hours:

- Large Vacuum Truck
- Super Sucker
- Dump Trucks
- Drill Rig
- Utility Vehicle

12.0 Logs, Reports and Record Keeping

MEDICAL AND TRAINING RECORDS

The employer keeps medical and training records. All subcontractors must provide verification of training and medical qualifications to the SSO. The SSO will keep a log of personnel meeting appropriate training and medical qualifications for site work. The log will be kept in the project file. Medical records will be maintained in accordance with 29 CFR 1910.20.

ONSITE LOG

A log of personnel onsite each day will be kept by the SSO or designee. A copy of these logs will be sent to the Hydro Tech records coordinator for data entry. Originals will be kept in the project file.

EXPOSURE RECORDS

Any personal monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be kept in accordance with 29 CFR 1910.20. For Hydro Tech employees, the originals will be sent to the Hydro Tech records coordinator. For subcontractor employees, the original will be sent to the subcontractor employer and a copy kept in the project file.

ACCIDENT/INCIDENT REPORTS

An accident/incident report must be completed for all accidents and incidents. Hydro Tech will send the originals to the appropriate Hydro Tech records coordinator for maintenance. Copies will be distributed as stated. A copy of the forms will be kept in the project file.

OSHA FORM 200

An OSHA Form 200 (Log of Occupational Injuries and Illnesses) will be kept at the Site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the Hydro Tech corporate records administrator for maintenance. Subcontractor employers must also meet the requirements of maintaining an OSHA 200 form.

The Hydro Tech accident/incident report meets the requirements of the OSHA Form 101 (Supplemental Record) and must be maintained with the OSHA Form 200 for all recordable injuries or illnesses.

HEALTH AND SAFETY FIELD LOG BOOK

The SSO or designee will maintain the logbook in accordance with standard Hydro Tech procedures. Daily site conditions, activities, personnel, calibration records, monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.

13. Sanitation

If sanitary sewers are not provided at the Site, provisions shall be made for access to sanitary systems by using nearby public facilities consistent with provisions of governing local ordinance codes. In the latter case, provisions are required for the removal of accumulated waste products within those units.

If a commercial/industrial laundry is used to clean or launder clothing that is potentially contaminated, they shall be informed of the potential harmful effects of exposure to hazardous substances related to the affected clothing.

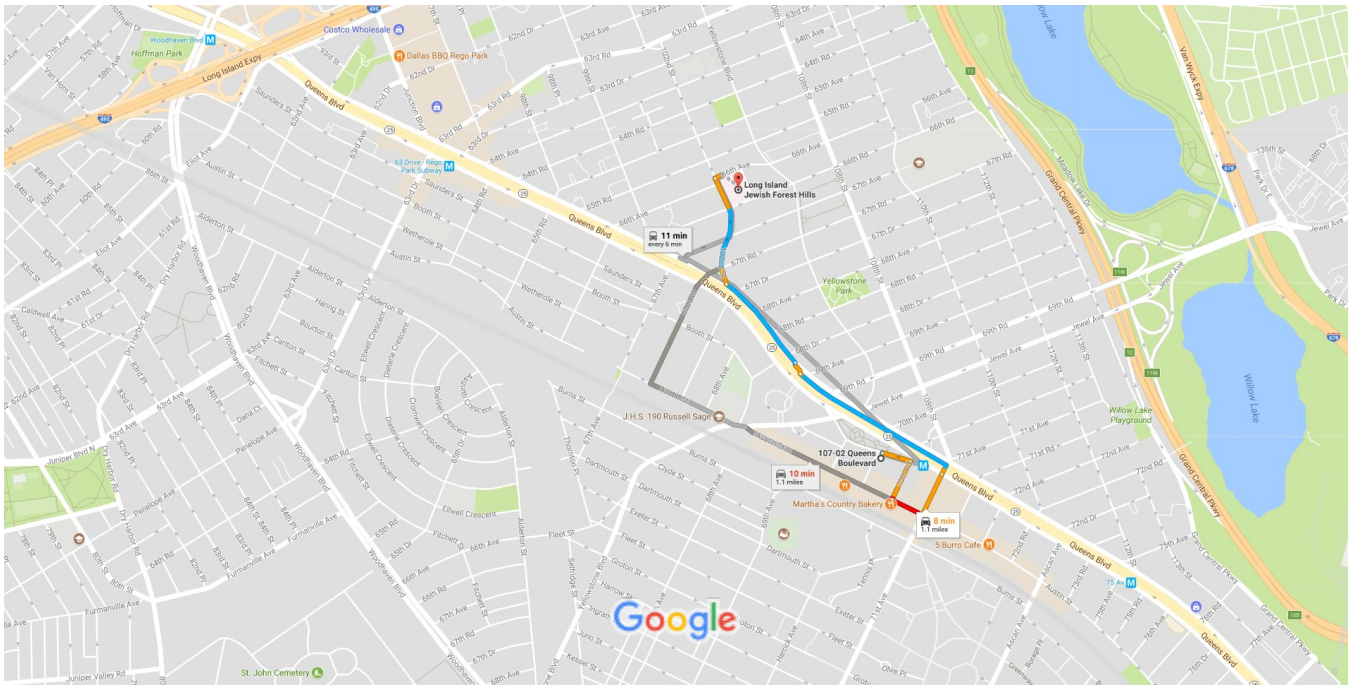
Personnel and subcontractors sites shall follow decontamination procedures described in the HASP, or as directed by the SSO. This will generally include at a minimum site-specific training in shower usage and cleanup, personal hygiene requirements and the donning of protective equipment/clothing.

FIGURE 1
DIRECTIONS TO HOSPITAL

Google Maps

107-02 Queens Boulevard, Flushing, NY to Long Island Jewish Forest Hills

Drive 1.1 miles, 8 min



Map data ©2017 Google 500 ft

107-02 Queens Blvd

Flushing, NY 11375

Take 70th Rd to 71st Ave/Continental Ave

2 min (0.2 mi)

1. Head east on Queens Blvd toward 70th Rd

292 ft

2. Turn right onto 70th Rd

427 ft

3. Turn left onto Austin St

338 ft

Take Queens Blvd and New York 25 Service to 102nd St

5 min (0.6 mi)

4. Turn left at the 1st cross street onto 71st Ave/Continental Ave

446 ft

5. Turn left at the 1st cross street onto Queens Blvd

0.3 mi

6. Take the exit toward 68 Rd/102 St/65 Ave

131 ft

7. Merge onto New York 25 Service/Queens Blvd

0.2 mi

Follow 102nd St to 66th Ave

2 min (0.2 mi)

8. Slight right onto 102nd St

0.2 mi

9. Turn right onto 66th Ave

Destination will be on the right

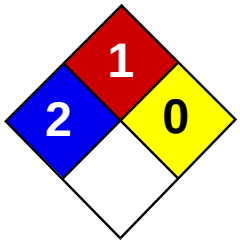
72 ft

Long Island Jewish Forest Hills

102-01 66th Rd, Queens, NY 11375

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

ATTACHMENT A
HEALTH AND SAFETY FACT SHEETS



Material Safety Data Sheet
Trichloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroethylene

Catalog Codes: SLT3310, SLT2590

CAS#: 79-01-6

RTECS: KX4560000

TSCA: TSCA 8(b) inventory: Trichloroethylene

CI#: Not available.

Synonym:

Chemical Formula: C2HCl3

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Trichloroethylene	79-01-6	100

Toxicological Data on Ingredients: Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 420°C (788°F)

Flash Points: Not available.

Flammable Limits: LOWER: 8% UPPER: 10.5%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/

spray. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 50 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m3) from ACGIH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 131.39 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 86.7°C (188.1°F)

Melting Point: -87.1°C (-124.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.4649 (Water = 1)

Vapor Pressure: 58 mm of Hg (@ 20°C)

Vapor Density: 4.53 (Air = 1)

Volatility: Not available.

Odor Threshold: 20 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:
Easily soluble in methanol, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity:
Extremely corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human. Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Trichloroethylene : UN1710 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Trichloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

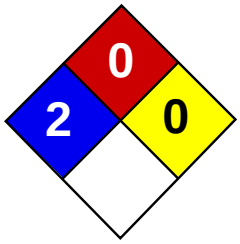
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:54 PM

Last Updated: 11/01/2010 12:00 PM

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 ScienceLab.com 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 ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	0
Reactivity	0
Personal Protection	G

Material Safety Data Sheet
Tetrachloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tetrachloroethylene

Catalog Codes: SLT3220

CAS#: 127-18-4

RTECS: KX3850000

TSCA: TSCA 8(b) inventory: Tetrachloroethylene

CI#: Not available.

Synonym: Perchloroethylene; 1,1,2,2-Tetrachloroethylene; Carbon bichloride; Carbon dichloride; Ankilostin; Didakene; Dilatin PT; Ethene, tetrachloro-; Ethylene tetrachloride; Perawin; Perchlor; Perclene; Perclene D; Percosolvel; Tetrachloroethene; Tetraleno; Tetralex; Tetravec; Tetroguer; Tetropil

Chemical Name: Ethylene, tetrachloro-

Chemical Formula: C2-Cl4

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Tetrachloroethylene	127-18-4	100

Toxicological Data on Ingredients: Tetrachloroethylene: ORAL (LD50): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC50): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC50): Acute: 5200 ppm 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (anticipated carcinogen) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, peripheral nervous system, respiratory tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 (ppm) from OSHA (PEL) [United States] TWA: 25 STEL: 100 (ppm) from ACGIH (TLV) [United States] TWA: 170 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal.

Taste: Not available.

Molecular Weight: 165.83 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 121.3°C (250.3°F)

Melting Point: -22.3°C (-8.1°F)

Critical Temperature: 347.1°C (656.8°F)

Specific Gravity: 1.6227 (Water = 1)

Vapor Pressure: 1.7 kPa (@ 20°C)

Vapor Density: 5.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 5 - 50 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.4

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Miscible with alcohol, ether, chloroform, benzene, hexane. It dissolves in most of the fixed and volatile oils. Solubility in water: 0.015 g/100 ml @ 25 deg. C It slowly decomposes in water to yield Trichloroacetic and Hydrochloric acids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Oxidized by strong oxidizing agents. Incompatible with sodium hydroxide, finely divided or powdered metals such as zinc, aluminum, magnesium, potassium, chemically active metals such as lithium, beryllium , barium. Protect from light.

Special Remarks on Corrosivity: Slowly corrodes aluminum, iron, and zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2629 mg/kg [Rat]. Acute dermal toxicity (LD50): >3228 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5200 4 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Publishe Lethal Dose/Conc: LDL [Rabbit] - Route: Oral; Dose: 5000 mg/kg LDL [Dog] - Route: Oral; Dose: 4000 mg/kg LDL [Cat] - Route: Oral; Dose: 4000 mg/kg

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects(teratogenic). May affect genetic material (mutagenic). May cause cancer.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation with possible dermal blistering or burns. Symtoms may include redness, itching, pain, and possible dermal blistering or burns. It may be absorbed through the skin with possible systemic effects. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts. Eyes: Contact causes transient eye irritation, lacrimation. Vapors cause eye/conjunctival irritation. Symptoms may include redness and pain. Inhalation: The main route to occupational exposure is by inhalation since it is readily absorbed through the lungs. It causes respiratory tract irritation, . It can affect behavior/central nervous system (CNS depressant and anesthesia ranging from slight inebriation to death, vertigo, somnolence, anxiety, headache, excitement, hallucinations, muscle incoordination, dizziness, lightheadness, disorentiation, seizures, enotional instability, stupor, coma). It may cause pulmonary edema Ingestion: It can cause nausea, vomiting, anorexia, diarrhea, bloody stool. It may affect the liver, urinary system (proteinuria, hematuria, renal failure, renal tubular disorder), heart (arrhythmias). It may affect behavior/central nervous system with symptoms similar to that of inhalation. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may result in excessive drying of the skin, and irritation. Ingestion/Inhalation: Chronic exposure can affect the liver(hepatitis,fatty liver degeneration), kidneys, spleen, and heart (irregular heartbeat/arrhythmias, cardiomyopathy, abnormal EEG), brain, behavior/ central nervous system/peripheral nervous system (impaired memory, numbness of extremeties, peripheral neuropathy and other

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 18.4 mg/l 96 hours [Fish (Fatthead Minnow)]. 18 mg/l 48 hours [Daphnia (daphnia)]. 5 mg/l 96 hours [Fish (Rainbow Trout)]. 13 mg/l 96 hours [Fish (Bluegill sunfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Tetrachloroethylene UNNA: 1897 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Tetrachloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Tetrachloroethylene Connecticut hazardous material survey.: Tetrachloroethylene Illinois toxic substances disclosure to employee act: Tetrachloroethylene Illinois chemical safety act: Tetrachloroethylene New York release reporting list: Tetrachloroethylene Rhode Island RTK hazardous substances: Tetrachloroethylene Pennsylvania RTK: Tetrachloroethylene Minnesota: Tetrachloroethylene Michigan critical material: Tetrachloroethylene Massachusetts RTK: Tetrachloroethylene Massachusetts spill list: Tetrachloroethylene New Jersey: Tetrachloroethylene New Jersey spill list: Tetrachloroethylene Louisiana spill reporting: Tetrachloroethylene California Director's List of Hazardous Substances: Tetrachloroethylene TSCA 8(b) inventory: Tetrachloroethylene TSCA 8(d) H and S data reporting: Tetrachloroethylene: Effective date: 6/1/87; Sunset date: 6/1/97 SARA 313 toxic chemical notification and release reporting: Tetrachloroethylene CERCLA: Hazardous substances.: Tetrachloroethylene: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S23- Do not breathe gas/fumes/vapour/spray S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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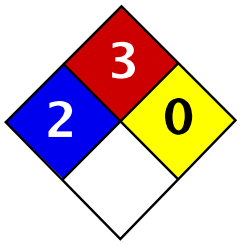

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
p-Xylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: p-Xylene

Catalog Codes: SLX1120

CAS#: 106-42-3

RTECS: ZE2625000

TSCA: TSCA 8(b) inventory: p-Xylene

CI#: Not applicable.

Synonym: p-Methyltoluene

Chemical Name: 1,4-Dimethylbenzene

Chemical Formula: C6H4(CH3)2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{p-}Xylene	106-42-3	100

Toxicological Data on Ingredients: p-Xylene: ORAL (LD50): Acute: 5000 mg/kg [Rat.]. DERMAL (LD50): Acute: 12400 mg/kg [Rabbit.]. VAPOR (LC50): Acute: 4550 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant).
Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to blood, kidneys, the nervous system, liver.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 527°C (980.6°F)

Flash Points: CLOSED CUP: 25°C (77°F). OPEN CUP: 28.9°C (84°F) (Cleveland).

Flammable Limits: LOWER: 1.1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV)
TWA: 434 STEL: 651 (mg/m3) from ACGIHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 138°C (280.4°F)

Melting Point: 12°C (53.6°F)

Critical Temperature: Not available.

Specific Gravity: 0.86 (Water = 1)

Vapor Pressure: 9 mm of Hg (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.62 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:
Easily soluble in methanol, diethyl ether.
Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 5000 mg/kg [Rat.].
Acute dermal toxicity (LD50): 12400 mg/kg [Rabbit.].
Acute toxicity of the vapor (LC50): 4550 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to blood, kidneys, the nervous system, liver.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant).
Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

0347 Animal: embryotoxic, foetotoxic, passes through the placental barrier.
0900 Detected in maternal milk in human.
Narcotic effect; may cause nervous system disturbances.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Xylene : UN1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: p-Xylene
Florida: p-Xylene
Massachusetts RTK: p-Xylene
New Jersey: p-Xylene
TSCA 8(b) inventory: p-Xylene
SARA 313 toxic chemical notification and release reporting: p-Xylene
CERCLA: Hazardous substances.: p-Xylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.
R48/20- Harmful: danger of serious

damage to health by prolonged exposure through inhalation.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Material safety data sheet emitted by: la Commission de la SantÃ© et de la SÃ©curitÃ© du Travail du QuÃ©bec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du rÃ¨glement sur le transport des marchandises dangeureuses au canada. Centre de conformitÃ© internatinal LtÃ©e. 1986.

Other Special Considerations: Not available.

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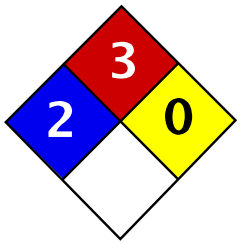

Health	2
Fire	3
Reactivity	0
Personal Protection	J

Material Safety Data Sheet
m-Xylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: m-Xylene

Catalog Codes: SLX1066

CAS#: 108-38-3

RTECS: ZE2275000

TSCA: TSCA 8(b) inventory: m-Xylene

CI#: Not applicable.

Synonym: m-Methyltoluene

Chemical Name: 1,3-Dimethylbenzene

Chemical Formula: C6H4(CH3)2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{m-}Xylene	108-38-3	100

Toxicological Data on Ingredients: m-Xylene: ORAL (LD50): Acute: 5000 mg/kg [Rat.]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit.].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant).
Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to blood, kidneys, the nervous system, liver.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 527°C (980.6°F)

Flash Points: CLOSED CUP: 25°C (77°F). OPEN CUP: 28.9°C (84°F) (Cleveland).

Flammable Limits: LOWER: 1.1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid, insoluble in water.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection: Splash goggles. Lab coat. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV)
TWA: 434 STEL: 651 (mg/m3) from ACGIHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 139.3°C (282.7°F)

Melting Point: -47.87°C (-54.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.86 (Water = 1)

Vapor Pressure: 6 mm of Hg (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.62 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:
Easily soluble in methanol, diethyl ether.
Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact.

Toxicity to Animals:
Acute oral toxicity (LD50): 5000 mg/kg [Rat.].
Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit.].

Chronic Effects on Humans: The substance is toxic to blood, kidneys, the nervous system, liver.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant).
Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
0347 Animal: embryotoxic, foetotoxic, passes through the placental barrier.
0900 Detected in maternal milk in human.
Narcotic effect; may cause nervous system disturbances.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Xylene : UN1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: m-Xylene
Massachusetts RTK: m-Xylene
TSCA 8(b) inventory: m-Xylene
SARA 313 toxic chemical notification and release reporting: m-Xylene
CERCLA: Hazardous substances.: m-Xylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Material safety data sheet emitted by: la Commission de la SantÃ© et de la SÃ©curitÃ© du Travail du QuÃ©bec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du rÃ¨glement sur le transport des marchandises dangeureuses au canada. Centre de conformitÃ© internatinal LtÃ©e. 1986.

Other Special Considerations: Not available.

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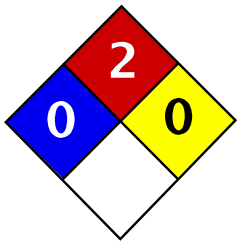

Health	0
Fire	2
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Mesitylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Mesitylene

Catalog Codes: SLM2410

CAS#: 108-67-8

RTECS: OX6825000

TSCA: TSCA 8(b) inventory: Mesitylene

CI#: Not available.

Synonym: 1,3,5-Trimethylbenzene

Chemical Formula: C9H12

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Mesitylene	108-67-8	100

Toxicological Data on Ingredients: Mesitylene: VAPOR (LC50): Acute: 4881.9 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (irritant, permeator), .

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes,

keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 559°C (1038.2°F)

Flash Points: CLOSED CUP: 43°C (109.4°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a

concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Avoid contact with eyes Wear suitable protective clothing If ingested, seek medical advice immediately and show the container or the label.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 CEIL: 35 (ppm)
TWA: 125 CEIL: 170 (mg/m3)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 120.2 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 164.7°C (328.5°F)

Melting Point: -44.8°C (-48.6°F)

Critical Temperature: Not available.

Specific Gravity: 0.8637 (Water = 1)

Vapor Pressure: 1.86 mm of Hg (@ 20°C)

Vapor Density: 4.14 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.23 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute toxicity of the vapor (LC50): 4881.9 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation (lung irritant).
Slightly hazardous in case of skin contact (irritant, permeator), .

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : 1,3,5-Trimethylbenzene : UN2325 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Florida: Mesitylene
New Jersey: Mesitylene
TSCA 8(b) inventory: Mesitylene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

DSCL (EEC):
R10- Flammable.
R36/37- Irritating to eyes and respiratory system.

HMIS (U.S.A.):

Health Hazard: 0

Fire Hazard: 2

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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International Chemical Safety Cards

BENZO(B)FLUORANTHENE

ICSC: 0720

BENZO(B)FLUORANTHENE
Benzo(e)acephenanthrylene
2,3-Benzofluoroanthene
$C_{20}H_{12}$
Molecular mass: 252.3

CAS # 205-99-2
RTECS # CU1400000
ICSC # 0720

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• **INHALATION**		Local exhaust or breathing protection.	Fresh air, rest.
• **SKIN**	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• **EYES**		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**		Do not eat, drink, or smoke during work.	Wear protective gloves when inducing vomiting. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Tightly closed.	Unbreakable packaging; put breakable packaging into closed unbreakable container.

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

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International Chemical Safety Cards

BENZO(B)FLUORANTHENE

ICSC: 0720

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS TO YELLOW CRYSTALS. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Melting point: 168°C Solubility in water: none	Vapour pressure, Pa at 20°C: <10 Octanol/water partition coefficient as log Pow: 6.04
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats.	

NOTES

Depending on the degree of exposure, periodic medical examination is indicated. Data are insufficiently available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home.

ADDITIONAL INFORMATION

ICSC: 0720 **BENZO(B)FLUORANTHENE**

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International Chemical Safety Cards

BENZO(K)FLUORANTHENE

ICSC: 0721

BENZO(K)FLUOROANTHENE
11,12-Benzofluoroanthene
Dibenzo(b,j,k)fluorene
$C_{20}H_{12}$
Molecular mass: 252.3

CAS # 207-08-9
RTECS # DF6350000
ICSC # 0721

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• **INHALATION**		Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• **SKIN**	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• **EYES**		Safety goggles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**		Do not eat, drink, or smoke during work.	Wear protective gloves when inducing vomiting. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Separated from strong oxidants. Tightly closed.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0721

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International Chemical Safety Cards

BENZO(K)FLUORANTHENE

ICSC: 0721

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. Reacts with strong oxidants. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 480°C Melting point: 215.7°C	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.84
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats.	

NOTES

Data are insufficiently available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home.

ADDITIONAL INFORMATION

ICSC: 0721 **BENZO(K)FLUORANTHENE**

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International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

BENZ(a)ANTHRACENE
1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
$C_{18}H_{12}$
Molecular mass: 228.3

CAS # 56-55-3
RTECS # CV9275000
ICSC # 0385
EC # 601-033-00-9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
• **INHALATION**		Local exhaust or breathing protection.	Fresh air, rest.
• **SKIN**		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• **EYES**		Safety goggles, face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Well closed.	T symbol R: 45 S: 53-45

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385

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International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO YELLOW-BROWN FLUORESCENT FLAKES OR POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Sublimation point: 435°C
Melting point: 162°C
Relative density (water = 1): 1.274
Solubility in water: none
Vapour pressure, Pa at 20°C: 292
Octanol/water partition coefficient as log Pow: 5.61

ENVIRONMENTAL DATA

In the food chain important to humans, bioaccumulation takes place, specifically in seafood.

NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name.

ADDITIONAL INFORMATION

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Material Safety Data Sheet

Benzo[a]pyrene, 98%

ACC# 37175

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzo[a]pyrene, 98%
Catalog Numbers: AC105600000, AC105600010, AC105601000, AC377200000, AC377200010, AC377201000 AC377201000
Synonyms: 3,4-Benzopyrene; 3,4-Benzpyrene; Benzo[def]chrysene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
50-32-8	Benzo[a]pyrene	>96	200-028-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow to brown powder.
Danger! May cause harm to the unborn child. May impair fertility. May cause eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Cancer hazard. May cause allergic skin reaction. May cause heritable genetic damage.
Target Organs: Reproductive system, skin.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. May be harmful if absorbed through the skin. May cause an allergic reaction in certain individuals.
Ingestion: May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated. May be harmful if swallowed.
Inhalation: May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. May be harmful if inhaled.
Chronic: May cause cancer in humans. May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs

Benzo[a]pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Benzo[a]pyrene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: yellow to brown
Odor: faint aromatic odor
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 495 deg C @ 760 mm Hg
Freezing/Melting Point:175 - 179 deg C
Decomposition Temperature: Not available.
Solubility: 1.60x10-3 mg/l @25°C
Specific Gravity/Density: Not available.
Molecular Formula:C20H12
Molecular Weight:252.31

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 50-32-8: DJ3675000
LD50/LC50:

Not available.

Carcinogenicity:
CAS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: Adverse reproductive effects have occurred in experimental animals.
Mutagenicity: Mutagenic effects have occurred in humans.Mutagenic effects have occurred in experimental animals.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 50-32-8: waste number U022.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NOT REGULATED FOR DOMESTIC TRANSPORT	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL (Benzo{a} pyrene)
Hazard Class:		9
UN Number:		UN3077
Packing Group:		III

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 50-32-8 is listed on the TSCA inventory.

Health & Safety Reporting List

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

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.

CERCLA Hazardous Substances and corresponding RQs

CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 50-32-8: immediate, delayed.

Section 313

This material contains Benzo[a]pyrene (CAS# 50-32-8, >96%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

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

STATE

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzo[a]pyrene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 50-32-8: 0.06 æg/day NSRL

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 43 May cause sensitization by skin contact.
R 45 May cause cancer.
R 46 May cause heritable genetic damage.
R 60 May impair fertility.
R 61 May cause harm to the unborn child.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardou
s waste.
S 61 Avoid release to the environment. Refer to special instructions
/safety data sheets.

WGK (Water Danger/Protection)
CAS# 50-32-8: No information available.

Canada - DSL/NDSL
CAS# 50-32-8 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #7 Date: 6/30/2006

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

Material Safety Data Sheet

Chrysene, 98%

ACC# 95251

Section 1 - Chemical Product and Company Identification

MSDS Name: Chrysene, 98%
Catalog Numbers: AC224140000, AC224140010, AC224140050, AC224145000
Synonyms: 1,2-Benzophenanthrene; Benzo(a)phenanthrene; 1,2,5,6-Dibenzonaphthalene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
218-01-9	Chrysene	98	205-923-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: very light beige solid.
Caution! May cause eye and skin irritation. May cause respiratory tract irritation. May cause cancer in humans.
Target Organs: Liver, skin.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: May cause respiratory tract irritation.
Chronic: May cause cancer according to animal studies.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
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. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air

immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: Not applicable.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: ; Flammability: 1; Instability:

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash hands before eating. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Avoid breathing dust.
Storage: Store in a tightly closed container. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Chrysene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Chrysene: No OSHA Vacated PELs are listed for this chemical.
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 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: very light beige
Odor: Not available.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 448 deg C @ 760 mm Hg
Freezing/Melting Point:250-255 deg C
Decomposition Temperature: Not available.
Solubility: insoluble
Specific Gravity/Density: Not available.
Molecular Formula:C18H12
Molecular Weight:228.29

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 218-01-9: GC0700000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 218-01-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans

- **California:** carcinogen, initial date 1/1/90
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: Chrysene was mutagenic to S. Typhimurium in the presence of an exogenous metabolic system.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Water flea LC50 = 1.9 mg/L; 2 Hr.; Unspecified Fish toxicity : LC50 (96hr) Neauthes arenacedentata >1ppm.(Rossi,S.S. et al Marine Pollut. Bull. 1978) Invertebrate toxicity : lethal treshold concentration (24hr) Daphnia Magna 0,7æg/l.(* Newsted,J.L. et al Environ. Toxicol. Chem. 1987) Bioaccumulation : 24hr Daphnia Magna log bioconcentration factor 3.7845 (*)
Environmental: Degradation studies : biodegradated by white rot fungus (Proc.Annu.Meet.Am.Wood-Preserv.Assoc.1989) May be utilised by axenic cultures of microorganisms e.g. Pseudomonas pancimobilis EPA505, which may have novel degradative systems(Mueller,J.G. et al ppl.Environ.Microbiol.1990; Mueller, J.G. et al Environ.Sci.Technol.1991).
Physical: Not found.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 218-01-9: waste number U050.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 218-01-9 is listed on the TSCA inventory.

Health & Safety Reporting List

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

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.

CERCLA Hazardous Substances and corresponding RQs

CAS# 218-01-9: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

Section 313

This material contains Chrysene (CAS# 218-01-9, 98%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

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

STATE

CAS# 218-01-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Chrysene, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 218-01-9: 0.35 æg/day NSRL (oral)

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 45 May cause cancer.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardou s waste.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 218-01-9: No information available.

Canada - DSL/NDSL

CAS# 218-01-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 218-01-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/30/1999
Revision #4 Date: 10/03/2005

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

Material Safety Data Sheet

Fluoranthene, 98%

ACC# 80991

Section 1 - Chemical Product and Company Identification

MSDS Name: Fluoranthene, 98%
Catalog Numbers: AC119170000, AC119170250, AC119171000, AC119175000
Synonyms: 1,2-(1,8-Naphthalenediyl)benzene; 1,2-(1,8-Naphthylene)benzene; 1,2-Benzacenaphthene; Benzene, 1,2-(1,8-naphthylene)-; Benzo(j,k)fluorene; Benzo(jk)fluoranthene; Benzo(jk)fluorene
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
206-44-0	Fluoranthene	98	205-912-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow needles.
Caution! Harmful. Causes eye and skin irritation and possible burns. May be harmful if absorbed through the skin. May be harmful if swallowed. May cause heart and liver injury.
Target Organs: Heart, liver, lungs.

Potential Health Effects

Eye: Causes eye irritation and possible burns.
Skin: May be harmful if absorbed through the skin. Causes severe skin irritation and possible burns.
Ingestion: May be harmful if swallowed. May cause rapid heartbeat and cardiac arrythmias. May cause liver injury, pulmonary edema, and respiratory arrest. May cause gastrointestinal disturbances such as nausea.
Inhalation: May cause effects similar to those described for ingestion. May produce cardiac failure and pulmonary edema.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the

upper and lower eyelids. Get medical aid imme diately. Do NOT allow victim to rub eyes or keep eyes closed. Extensiv e irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Remove contaminated clothing and shoes.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

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

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood. Do not breathe dust.
Storage: Keep containers tightly closed. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Fluoranthene	none listed	none listed	none listed

OSHA Vacated PELs: Fluoranthene: No OSHA Vacated PELs are listed for this chemical.
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 and clothing to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Needles
Appearance: yellow
Odor: None reported.
pH: Not available.
Vapor Pressure: 0.01 mm Hg @ 20 deg C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 384 deg C @ 760.00mmHg
Freezing/Melting Point:107.00 - 110.00 deg C
Decomposition Temperature: Not available.
Solubility: insoluble
Specific Gravity/Density:1.252 g/cm3
Molecular Formula:C16H10
Molecular Weight:202.25

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, strong oxidants.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, acrid smoke and fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 206-44-0: LL4025000
LD50/LC50:
CAS# 206-44-0:
Oral, rat: LD50 = 2 gm/kg;

Skin, rabbit: LD50 = 3180 mg/kg;
.

Carcinogenicity:
CAS# 206-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: IARC Group 3: Limited or insufficient evidence for carcinogenicity in both animals and humans.Experimental tumorigenic data has been reported.
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: Mutation in microorganisms: Salmonella typhimurium = 5ug/plate.Mutation in mammalian somatic cells: Human Lymphocyte = 2 umol/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 3980 um/L; 96 H; (not specified) No data available.
Environmental: Remains in the upper few cm of soil, but can be transported to groundwater. Biodegrades from soil in a few years. Will not volatilize from soil or water. Rapidly absorbed to sediment and particulates and will readily bioconcentrate. Unadsorbed substance in water will degrade by photolysis in a days to weeks. Stable in sediment for decades or more. In the atmostphere, photodegrades with half life of 4 - 5 days, but may transport long distances without settling or raining out.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 206-44-0: waste number U120.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 206-44-0 is listed on the TSCA inventory.

Health & Safety Reporting List

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

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.

CERCLA Hazardous Substances and corresponding RQs

CAS# 206-44-0: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 206-44-0: immediate.

Section 313

This material contains Fluoranthene (CAS# 206-44-0, 98%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 206-44-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 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# 206-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN

Risk Phrases:

R 21/22 Harmful in contact with skin and if swallowed.

Safety Phrases:

S 22 Do not breathe dust.
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 206-44-0: No information available.

Canada - DSL/NDSL

CAS# 206-44-0 is listed on Canada's NDSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 206-44-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #5 Date: 10/03/2005

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

MSDS Number: **L2347** * * * * * *Effective Date:* ***08/10/04*** * * * * * *Supercedes:* ***11/02/01***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

LEAD METAL

1. Product Identification

Synonyms: Granular lead, pigment metal; C.I. 77575
CAS No.: 7439-92-1
Molecular Weight: 207.19
Chemical Formula: Pb
Product Codes:
J.T. Baker: 2256, 2266
Mallinckrodt: 5668

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Lead	7439-92-1	95 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Lead can be absorbed through the respiratory system. Local irritation of bronchia and lungs can occur and, in cases of acute exposure, symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. See also Ingestion.

Ingestion:

POISON! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.

Skin Contact:

Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Contact over short periods may cause local irritation, redness and pain.

Eye Contact:

Absorption can occur through eye tissues but the more common hazards are local irritation or abrasion.

Chronic Exposure:

Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels. The symptoms of chronic exposure are like those of ingestion poisoning; restlessness, irritability, visual disturbances, hypertension and gray facial color may also be noted.

Aggravation of Pre-existing Conditions:

Persons with pre-existing kidney, nerve or circulatory disorders or with skin or eye problems may be more susceptible to the effects of this substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. Powder/dust is flammable when heated or exposed to flame.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Can produce toxic lead fumes at elevated temperatures and also react with oxidizing materials.

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6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Areas in which exposure to lead

metal or lead compounds may occur should be identified by signs or appropriate means, and access to the area should be limited to authorized persons. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For lead, metal and inorganic dusts and fumes, as Pb:
-OSHA Permissible Exposure Limit (PEL): 0.05 mg/m3 (TWA)
For lead, elemental and inorganic compounds, as Pb:
-ACGIH Threshold Limit Value (TLV): 0.05 mg/m3 (TWA), A3 animal carcinogen
ACGIH Biological Exposure Indices (BEI): 30 ug/100ml, notation B (see actual Indices for more information).
For lead, inorganic:
-NIOSH Recommended Exposure Limit (REL): 0.1 mg/m3 (TWA)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face high efficiency particulate respirator (NIOSH type N100 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency particulate respirator (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.
Other Control Measures:
Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1025).

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9. Physical and Chemical Properties

Appearance:
Small, white to blue-gray metallic shot or granules.
Odor:
Odorless.
Solubility:
Insoluble in water.
Density:
11.34
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
1740C (3164F)
Melting Point:
327.5C (622F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
1.77 @ 1000C (1832F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Does not decompose but toxic lead or lead oxide fumes may form at elevated temperatures.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Ammonium nitrate, chlorine trifluoride, hydrogen peroxide, sodium azide, zirconium, disodium acetylide, sodium acetylide and oxidants.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Lead and other smelter emissions are human reproductive hazards. (Chemical Council on

Environmental Quality; Chemical Hazards to Human Reproduction, 1981).
Carcinogenicity:
EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Lead (7439-92-1)	No	No	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to leach into groundwater. This material may bioaccumulate to some extent.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Lead (7439-92-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

	--Canada--

Ingredient	Korea	DSL	NDSL	Phil.
Lead (7439-92-1)	Yes	Yes	No	Yes

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Lead (7439-92-1)	No	No	Yes	No

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Lead (7439-92-1)	10	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Solid)

WARNING:
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: None allocated.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not

breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
No Changes.

Disclaimer:
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **M1599** * * * * * *Effective Date:* ***12/19/05*** * * * * * *Supercedes:* ***08/10/04***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

MERCURY

1. Product Identification

Synonyms: Quicksilver; hydrargyrum; Liquid Silver
CAS No.: 7439-97-6
Molecular Weight: 200.59
Chemical Formula: Hg
Product Codes:
J.T. Baker: 2564, 2567, 2569
Mallinckrodt: 1278, 1280, 1288

2. Composition/Information on Ingredients

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

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Mercury vapor is highly toxic via this route. Causes severe respiratory tract damage. Symptoms include sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath, headache, muscle weakness, anorexia, gastrointestinal disturbance, ringing in the ear, liver changes, fever, bronchitis and pneumonitis. Can be absorbed through inhalation with symptoms similar to ingestion.

Ingestion:
May cause burning of the mouth and pharynx, abdominal pain, vomiting, corrosive ulceration, bloody diarrhea. May be followed by a rapid and weak pulse, shallow breathing, paleness, exhaustion, tremors and collapse. Delayed death may occur from renal failure. Gastrointenstinal uptake of mercury is less than 5% but its ability to penetrate tissues presents some hazard. Initial symptoms may be thirst, possible abdominal discomfort.

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

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

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

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

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Undergoes hazardous reactions in the presence of heat and sparks or ignition. Smoke may contain toxic mercury or mercuric oxide. Smoke may contain toxic mercury or mercuric oxide.

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6. Accidental Release Measures

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

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate misting. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Do not flush to sewer. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker CINNASORB® and RESISORB® are recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Do not use or store on porous work surfaces (wood, unsealed concrete, etc.). Follow strict hygiene practices. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Acceptable Ceiling Concentration:
mercury and mercury compounds: 0.1 mg/m3 (TWA), skin
- ACGIH Threshold Limit Value (TLV):
inorganic and metallic mercury, as Hg: 0.025 mg/m3 (TWA) skin, A4 Not classifiable as a human carcinogen.
- ACGIH Biological Exposure Indices:
total inorganic mercury in urine (preshift): 35 ug/g creatinine;
total inorganic mercury in blood (end of shift): 15 ug/l.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face respirator with a mercury vapor or chlorine gas cartridge may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with a mercury vapor or chlorine gas cartridge may be worn up to 50 times the exposure limit, or the maximum use concentraiton specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Silver-white, heavy, mobile, liquid metal.
Odor:
Odorless.
Solubility:
Insoluble in water.
Density:
13.55
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
356.7C (675F)
Melting Point:
-38.87C (-38F)
Vapor Density (Air=1):
7.0
Vapor Pressure (mm Hg):
0.0018 @ 25C (77F)
Evaporation Rate (BuAc=1):
4

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
At high temperatures, vaporizes to form extremely toxic fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Acetylenes, ammonia, ethylene oxide, chlorine dioxide, azides, metal oxides, methyl silane, lithium, rubidium, oxygen, strong oxidants, metal carbonyls.
Conditions to Avoid:
Heat, flames, ignition sources, metal surfaces and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
All forms of mercury can cross the placenta to the fetus, but most of what is known has

been learned from experimental animals. See Chronic Health Hazards.
Carcinogenicity:
EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Mercury (7439-97-6)	No	No	3

12. Ecological Information

Environmental Fate:
This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material is expected to significantly bioaccumulate.
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are less than 1 mg/l.

13. Disposal Considerations

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

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 1LB

International (Water, I.M.O.)

Proper Shipping Name: MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 1LB

International (Air, I.C.A.O.)

Proper Shipping Name: MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 1LB

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15. Regulatory Information

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--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
--------------------------------------------  ----  ---  -----  ---------
Mercury (7439-97-6)                            Yes  Yes   No       Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
--------------------------------------------  -----  ---   ----  -----
Mercury (7439-97-6)                            Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Mercury (7439-97-6)                       No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                      -RCRA-    -TSCA-
Ingredient                                CERCLA      261.33     8(d)
----------------------------------------  ------      ------    ------
Mercury (7439-97-6)                       1           U151       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2Z
Poison Schedule: S7
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3.
Disclaimer:
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****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

Phenanthrene, 90%

ACC# 59921

Section 1 - Chemical Product and Company Identification

MSDS Name: Phenanthrene, 90%
Catalog Numbers: AC130100000, AC130100010, AC130102500
Synonyms:
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
85-01-8	Phenanthrene	90.0	201-581-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: brown solid.
Caution! Powdered material may form explosive dust-air mixtures. May cause allergic skin reaction. May cause eye and skin irritation. May cause respiratory tract irritation. Cancer suspect agent.
Target Organs: None.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. May cause photosensitive skin reactions in certain individuals.
Ingestion: May cause irritation of the digestive tract.
Inhalation: Inhalation of dust may cause respiratory tract irritation.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

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

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Dusts at sufficient concentrations can form explosive mixtures with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Use water spray or dry chemical.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Phenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Phenanthrene: No OSHA Vacated PELs are listed for this chemical.

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 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: brown
Odor: none reported
pH: Not available.
Vapor Pressure: 1 mm Hg @116c
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 340 deg C
Freezing/Melting Point:101 deg C
Decomposition Temperature: Not available.
Solubility: insoluble
Specific Gravity/Density:1.0630g/cm3
Molecular Formula:C14H10
Molecular Weight:178.23

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, dust generation, strong oxidants.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 85-01-8: SF7175000
LD50/LC50:
CAS# 85-01-8:
Oral, mouse: LD50 = 700 mg/kg;
Oral, rat: LD50 = 1.8 gm/kg;
.

Carcinogenicity:
CAS# 85-01-8:

- **ACGIH:** A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 85-01-8 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
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.

CERCLA Hazardous Substances and corresponding RQs

CAS# 85-01-8: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 85-01-8: immediate.

Section 313

This material contains Phenanthrene (CAS# 85-01-8, 90.0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 85-01-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

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

STATE

CAS# 85-01-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 45 May cause cancer.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 85-01-8: No information available.

Canada - DSL/NDSL

CAS# 85-01-8 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

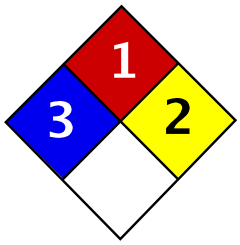
Canadian Ingredient Disclosure List

CAS# 85-01-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/14/1998
Revision #3 Date: 10/03/2005

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



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to kidneys, lungs, the nervous system, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.
Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation.
Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic
Pennsylvania RTK: Arsenic
Massachusetts RTK: Arsenic
TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed.
R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec.
-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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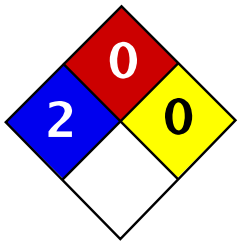

Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Nickel metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nickel metal

Catalog Codes: SLN2296, SLN1342, SLN1954

CAS#: 7440-02-0

RTECS: QR5950000

TSCA: TSCA 8(b) inventory: Nickel metal

CI#: Not applicable.

Synonym: Nickel Metal shot; Nickel metal foil.

Chemical Name: Nickel

Chemical Formula: Ni

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

Toxicological Data on Ingredients: Nickel metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer).
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to skin.
The substance may be toxic to kidneys, lungs, liver, upper respiratory tract.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

Special Remarks on Explosion Hazards:
Material in powder form, capable of creating a dust explosion.
Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode.
Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion.
Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable.
TWA: 0.5 (mg/m3) [United Kingdom (UK)]
TWA: 1 (mg/m3) from OSHA (PEL) [United States] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid. Lustrous solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 58.71 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 2730°C (4946°F)

Melting Point: 1455°C (2651°F)

Critical Temperature: Not available.

Specific Gravity: Density: 8.908 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water.
Insoluble in Ammonia.
Soluble in dilute Nitric Acid.
Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, combustible materials, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + indusorial earth.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.
Causes damage to the following organs: skin.
May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:

Hazardous in case of inhalation.
Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose/Conc:
LDL [Rat] - Route: Oral; Dose: 5000 mg/kg
LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Nickel dust and fume can irritate skin.
Eyes: Nickel dust and fume can irritate eyes.
Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis.
Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased cornary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation).
Chronic Potential Health Effects:
Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis.
Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count).
Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy. Chronic ingestion of NIckel may also affect respiration and cause pneumoconiosis or fibrosis.
Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal
Connecticut hazardous material survey.: Nickel metal
Illinois toxic substances disclosure to employee act: Nickel metal
Illinois chemical safety act: Nickel metal
New York release reporting list: Nickel metal
Rhode Island RTK hazardous substances: Nickel metal
Pennsylvania RTK: Nickel metal
Michigan critical material: Nickel metal
Massachusetts RTK: Nickel metal
Massachusetts spill list: Nickel metal
New Jersey: Nickel metal
New Jersey spill list: Nickel metal
Louisiana spill reporting: Nickel metal
California Director's List of Hazardous Substances: Nickel metal
TSCA 8(b) inventory: Nickel metal

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects.
R43- May cause sensitization by skin contact.
S22- Do not breathe dust.
S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:42 PM

Last Updated: 10/10/2005 08:42 PM

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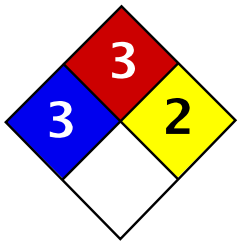

Health	3
Fire	3
Reactivity	2
Personal Protection	J

Material Safety Data Sheet
Calcium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Calcium

Catalog Codes: SLC2782

CAS#: 7440-70-2

RTECS: EV8040000

TSCA: TSCA 8(b) inventory: Calcium

CI#: Not available.

Synonym:

Chemical Formula: Ca

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Calcium	7440-70-2	100

Toxicological Data on Ingredients: Calcium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to lungs, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Corrosive solid. Flammable solid that, in contact with water, emits flammable gases.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep under inert atmosphere. Keep container dry. Do not breathe dust. Never add water to this product Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as acids, moisture.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 40.08 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 1484°C (2703.2°F)

Melting Point: 839°C (1542.2°F)

Critical Temperature: Not available.

Specific Gravity: 1.54 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Not available.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:
Highly reactive with acids.
Reactive with moisture.
The product reacts violently with water to emit flammable but non toxic gases.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.3: Material that emits flammable gases on contact with water.

Identification: : Calcium : UN1401 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Calcium
Massachusetts RTK: Calcium
TSCA 8(b) inventory: Calcium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-6: Reactive and very flammable material.
CLASS E: Corrosive solid.

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 3

Reactivity: 2

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 3

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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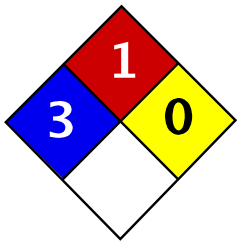

Health	3
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Cadmium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cadmium

Catalog Codes: SLC3484, SLC5272, SLC2482

CAS#: 7440-43-9

RTECS: EU9800000

TSCA: TSCA 8(b) inventory: Cadmium

CI#: Not applicable.

Synonym:

Chemical Name: Cadmium

Chemical Formula: Cd

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cadmium	7440-43-9	100

Toxicological Data on Ingredients: Cadmium: ORAL (LD50): Acute: 2330 mg/kg [Rat.]. 890 mg/kg [Mouse]. DUST (LC50): Acute: 50 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to kidneys, lungs, liver.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: No known effect on eye contact, rinse with water for a few minutes.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 570°C (1058°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Non-flammable in presence of open flames and sparks, of heat, of oxidizing materials, of reducing materials, of combustible materials, of moisture.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (ppm)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 112.4 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 765°C (1409°F)

Melting Point: 320.9°C (609.6°F)

Critical Temperature: Not available.

Specific Gravity: 8.64 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, methanol, diethyl ether, n-octanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Reacts violently with potassium.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 890 mg/kg [Mouse].
Acute toxicity of the dust (LC50): 229.9 mg/m3 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP.
The substance is toxic to kidneys, lungs, liver.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation.
Slightly hazardous in case of skin contact (irritant, sensitizer).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: An allergen. 0047 Animal: embryotoxic, passes through the placental barrier.

Special Remarks on other Toxic Effects on Humans: May cause allergic reactions, exzema and/or dehydration of the skin.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport:

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cadmium
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cadmium
Pennsylvania RTK: Cadmium
Massachusetts RTK: Cadmium
TSCA 8(b) inventory: Cadmium
SARA 313 toxic chemical notification and release reporting: Cadmium
CERCLA: Hazardous substances.: Cadmium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R26- Very toxic by inhalation.
R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec.
-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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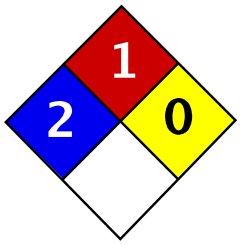

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Copper MSDS

Section 1: Chemical Product and Company Identification

Product Name: Copper

Catalog Codes: SLC4939, SLC2152, SLC3943, SLC1150, SLC2941, SLC4729, SLC1936, SLC3727, SLC5515

CAS#: 7440-50-8

RTECS: GL5325000

TSCA: TSCA 8(b) inventory: Copper

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Cu

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Copper	7440-50-8	100

Toxicological Data on Ingredients: Copper LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to lungs, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH [1990]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 63.54 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2595°C (4703°F)

Melting Point: 1083°C (1981.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.94 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion.
Hazardous in case of inhalation.
Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Copper
Massachusetts RTK: Copper
TSCA 8(b) inventory: Copper
CERCLA: Hazardous substances.: Copper

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator

when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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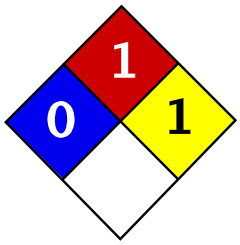

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Material Safety Data Sheet
Magnesium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Magnesium

Catalog Codes: SLM4408, SLM2263, SLM3637

CAS#: 7439-95-4

RTECS: OM2100000

TSCA: TSCA 8(b) inventory: Magnesium

CI#: Not applicable.

Synonym: Magnesium ribbons, turnings or sticks

Chemical Name: Magnesium

Chemical Formula: Mg

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Magnesium	7439-95-4	100

Toxicological Data on Ingredients: Magnesium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at

least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat.
Flammable in presence of acids, of moisture.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
Explosive in presence of acids, of moisture.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Magnesium turnings, chips or granules, ribbons, are flammable. They can be easily ignited. They may reignite after fire is extinguished. Produces flammable gases on contact with water and acid. May ignite on contact with water or moist air.
Magnesium fires do not flare up violently unless moisture is present.

Special Remarks on Explosion Hazards: Reacts with acids and water to form hydrogen gas with is highly flammable and eplosive

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid.
Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage:
Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Moisture sensitive. Dangerous when wet.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 24.31 g/mole

Color: Silver-white

pH (1% soln/water): Not applicable.

Boiling Point: 1100°C (2012°F)

Melting Point: 651°C (1203.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.74 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Very slightly soluble in hot water.
Insoluble in cold water.
Insoluble in chromium trioxides, and mineral acids, alkalies.
Slightly soluble with decomposition in hot water.
Soluble in concentrated hydrogen fluoride, and ammonium salts.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, incompatible materials, water or moisture, moist air.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Violent chemical reaction with oxidizing agents.
Reacts with water to create hydrogen gas and heat. Must be kept dry.
Reacts with acids to form hydrogen gas which is highly flammable and explosive.
Magnesium forms hazardous or explosive mixtures with aluminum and potassium perchlorate; ammonium nitrate; barium nitrate, barium dioxide and zinc; beryllium oxide; boron phosphodiiodide; bromobenzyl trifluoride; cadmium cyanide; cadmium oxide; calcium carbide; carbonates; carbon tetrachloride; chlorine; chlorine trifluoride; chloroform; cobalt cyanide; copper cyanide; copper sulfate(anhydrous), ammonium nitrate, potassium chlorate and water; cupric oxide; cupric sulfate; fluorine; gold cyanide; hydrogen and calcium carbonate; hydrogen iodide; hydrogen peroxide; iodine; lead cyanide; mercuric oxide; mercury cyanide; methyl chloride; molybdenum trioxide; nickel cyanide; nitric acid; nitrogen dioxide; oxygen (liquid); performic acid; phosphates; potassium chlorate; potassium perchlorate; silver nitrate; silver oxide; sodium perchlorate; sodium peroxide; sodium peroxide and carbon dioxide; stannic oxide; sulfates; trichloroethylene; zinc cyanide; zinc oxide.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: May cause skin irritation by mechanical action. May get mechanical injury or embedding of chips/particles in skin. The particles that are embedded in the wounds may retard healing.
Eyes: May cause eye irritation by mechanical action. Mechanical injury may occur. Particles or chips may embed in eye and retard healing.
Inhalation: Low hazard for ususal industrial handling. It may cause respiratory tract irritation. However, it is unlikely due to physical form. When Magnesium metal is heated during welding or smelting process, Metal Fume Fever may result from inhalation of magnesium fumes. Metal Fume Fever is a flu-like condition consisting of fever, chills, sweating, aches, pains, cough, weakness, headache, nausea, vomiting, and breathing difficulty. Other symptoms may include metallic taste, increased white blood cell count. There is no permanent ill-effect.
Ingestion: Low hazard for usual industrial handling. There are no known reports of serious industrial poisonings with Magnesium. Ingeston of large amounts of chips, turnings or ribbons may cause gastrointestinal tract irritation with nausea, vomiting, and diarrhea. Acute ingestion may also result in Hypermagnesia. Hypermagnesia may cause hypotension, bradycardia, CNS depression, respiratory depression, and impairment of neuromuscular transmission (hyporeflexia, paralysis).

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Magnesium UNNA: 1869 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Magnesium
Rhode Island RTK hazardous substances: Magnesium
Pennsylvania RTK: Magnesium

Massachusetts RTK: Magnesium
Massachusetts spill list: Magnesium
New Jersey: Magnesium
TSCA 8(b) inventory: Magnesium

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-4: Flammable solid.
CLASS B-6: Reactive and very flammable material.

DSCL (EEC):
R11- Highly flammable.
R15- Contact with water liberates extremely flammable gases.
S7/8- Keep container tightly closed and dry.
S43- In case of fire, use dry chemical. Never use water.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 3

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 1

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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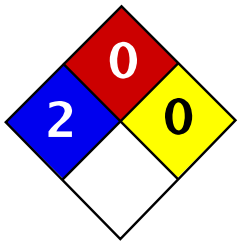

Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Nickel metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nickel metal

Catalog Codes: SLN2296, SLN1342, SLN1954

CAS#: 7440-02-0

RTECS: QR5950000

TSCA: TSCA 8(b) inventory: Nickel metal

CI#: Not applicable.

Synonym: Nickel Metal shot; Nickel metal foil.

Chemical Name: Nickel

Chemical Formula: Ni

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

Toxicological Data on Ingredients: Nickel metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer).
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to skin.
The substance may be toxic to kidneys, lungs, liver, upper respiratory tract.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

Special Remarks on Explosion Hazards:
Material in powder form, capable of creating a dust explosion.
Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode.
Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion.
Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable.
TWA: 0.5 (mg/m3) [United Kingdom (UK)]
TWA: 1 (mg/m3) from OSHA (PEL) [United States] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid. Lustrous solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 58.71 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 2730°C (4946°F)

Melting Point: 1455°C (2651°F)

Critical Temperature: Not available.

Specific Gravity: Density: 8.908 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water.
Insoluble in Ammonia.
Soluble in dilute Nitric Acid.
Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, combustible materials, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + indusorial earth.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.
Causes damage to the following organs: skin.
May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:

Hazardous in case of inhalation.
Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose/Conc:
LDL [Rat] - Route: Oral; Dose: 5000 mg/kg
LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Nickel dust and fume can irritate skin.
Eyes: Nickel dust and fume can irritate eyes.
Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis.
Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased cornary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation).
Chronic Potential Health Effects:
Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis.
Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count).
Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy. Chronic ingestion of NIckel may also affect respiration and cause pneumoconiosis or fibrosis.
Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal
Connecticut hazardous material survey.: Nickel metal
Illinois toxic substances disclosure to employee act: Nickel metal
Illinois chemical safety act: Nickel metal
New York release reporting list: Nickel metal
Rhode Island RTK hazardous substances: Nickel metal
Pennsylvania RTK: Nickel metal
Michigan critical material: Nickel metal
Massachusetts RTK: Nickel metal
Massachusetts spill list: Nickel metal
New Jersey: Nickel metal
New Jersey spill list: Nickel metal
Louisiana spill reporting: Nickel metal
California Director's List of Hazardous Substances: Nickel metal
TSCA 8(b) inventory: Nickel metal

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects.
R43- May cause sensitization by skin contact.
S22- Do not breathe dust.
S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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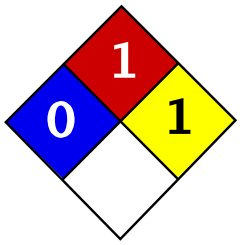

Health	1
Fire	1
Reactivity	1
Personal Protection	E

Material Safety Data Sheet
Zinc Metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Zinc Metal

Catalog Codes: SLZ1054, SLZ1159, SLZ1267, SLZ1099, SLZ1204

CAS#: 7440-66-6

RTECS: ZG8600000

TSCA: TSCA 8(b) inventory: Zinc Metal

CI#: Not applicable.

Synonym: Zinc Metal Sheets; Zinc Metal Shot; Zinc Metal Strips

Chemical Name: Zinc Metal

Chemical Formula: Zn

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Zinc Metal	7440-66-6	100

Toxicological Data on Ingredients: Zinc Metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat, of oxidizing materials, of acids, of alkalis, of moisture.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Zinc + NaOH causes ignition.
Oxidation of zinc by potassium proceeds with incandescence.
Residues from zinc dust /acetic acid reduction operations may ignite after long delay if discarded into waste bins with paper.
Incandescent reaction when Zinc and Arsenic or Tellurium, or Selenium are combined.
When hydrazine mononitrate is heated in contact with zinc, a flamming decomposition occurs at temperatures a little above its melting point.
Contact with acids and alkali hydroxides (sodium hydroxide, postasium hydroxide, calcium hydroxide, etc.) results in evolution of hydrogen with sufficient heat of reaction to ignite the hydrogen gas.
Zinc foil ignites if traces of moisture are present.
It is water reactive and produces flammable gases on contact with water. It may ignite on contact with water or

moist air.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Flammable solid that, in contact with water, emits flammable gases.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, alkalis, moisture.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Keep from any possible contact with water. Do not allow water to get into container because of violent reaction.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid. Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 65.39 g/mole

Color: Bluish-grey

pH (1% soln/water): Not applicable.

Boiling Point: 907°C (1664.6°F)

Melting Point: 419°C (786.2°F)

Critical Temperature: Not available.

Specific Gravity: Not available.

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, methanol, diethyl ether, n-octanol, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials, moisture

Incompatibility with various substances:
Reactive with oxidizing agents, acids, alkalis.
Slightly reactive to reactive with moisture.
The product may react violently with water to emit flammable but non toxic gases.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with acids, halogenated hydrocarbons, NH_4NO_3, barium oxide, $Ba(NO_3)_2$, Cadmium, CS_2, chlorates, Cl_2, CrO_3, F_2, Hydroxylamine, $Pb(N_3)_2$, $MnCl_2$, HNO_3, performic acid, $KClO_3$, KNO_3, N_2O_2, Selenium, $NaClO_3$, Na_2O_2, Sulfur, Te, water, $(NH_4)_2S$, As_2O_3, CS_2, $CaCl_2$, chlorinated rubber, catalytic metals, halocarbons, o-nitroanisole, nitrobenzene, nonmetals, oxidants, paint primer base, pentacarbonoyliron, transition metal halides, seleninyl bromide, HCl, H_2SO_4, (Mg +$Ba(NO_3)_2$ +BaO_2), (ethyl acetoacetate +tribromoneopentyl alcohol.
Contact with Alkali Hydroxides(Sodium Hydroxide, Potassium Hydroxide, Calcium Hydroxide, etc) results in evolution of hydrogen.
Ammonium nitrate + zinc + water causes a violent reaction with evolution of steam and zinc oxide.
May react with water.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available.
LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: May cause skin irritation. Dermal exposure to zinc may produce leg pains, fatigue, anorexia and weight loss.
Eyes: May cause eye irritation.
Ingestion: May be harmul if swallowed. May cause digestive tract irritation with tightness in throat, nausea, vomiting, diarrhea, loss of appetite, malaise, abdominal pain. fever, and chills. May affect behavior/central nervous system and autonomic nervous system with ataxia, lethargy, staggering gait, mild derrangement in cerebellar function, lightheadness, dizzness, irritability, muscular stiffness, and pain. May also affect blood.
Inhalation: Inhalation of zinc dust or fumes may cause respiratory tract and mucous membrane irritation with cough and chest pain. It can also cause "metal fume fever", a flu-like condition characterized appearance of chills, headached fever, maliase, fatigue, sweating, extreme thirst, aches in the legs and chest, and difficulty in breathing. A sweet taste may also be be present in metal fume fever, as well as a dry throat, aches, nausea, and vomiting, and pale grey cyanosis.
The toxicological properties of this substance have not been fully investisgated.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: Not available.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

New York release reporting list: Zinc Metal
Rhode Island RTK hazardous substances: Zinc Metal
Pennsylvania RTK: Zinc Metal
Florida: Zinc Metal
Michigan critical material: Zinc Metal
Massachusetts RTK: Zinc Metal
New Jersey: Zinc Metal
California Director's List of Hazardous Substances: Zinc Metal
TSCA 8(b) inventory: Zinc Metal
TSCA 12(b) one time export: Zinc Metal
SARA 313 toxic chemical notification and release reporting: Zinc Metal
CERCLA: Hazardous substances.: Zinc Metal: 1000 lbs. (453.6 kg)

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not Available

DSCL (EEC):
R15- Contact with water liberates
extremely flammable gases.
R17- Spontaneously flammable in air.
S7/8- Keep container tightly closed and dry.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 1

Reactivity: 1

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 1

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an
approved/certified respirator or
equivalent.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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ATSDR Department of Health and Human Services Agency for Toxic Substances & Disease Registry

ToxFAQs™: Chemical Agent Briefing Sheets (CABS)

Lead

January 2006

PDF Version

What is lead?

Lead is a heavy, bluish-gray metal that has a low melting point. It occurs naturally in the Earth' s crust, but it is not a particularly abundant element. It is rarely found naturally as a metal, but rather in its divalent (2+) oxidative state in ore deposits widely distributed throughout the world. The most im portant lead containing ores are galena (PbS), anglesite ($PbSO_4$), and cerussite ($PbCO_3$). Natural lead is a mixture of four stable isotopes: ^{208}Pb (51%–53%), ^{206}Pb (23.5%–27%), ^{207}Pb (20.5%–23%), and ^{204}Pb (1.35%–1.5%).

What are the forms of lead?

- Metallic lead
- Inorganic lead and lead compounds (or lead salts)
- Organic lead (containing carbon)

What are the common uses of lead?

The largest use for lead is in storage batteries in cars and other vehicles. Lead may be used as a pure metal, alloyed with other metals, or as chemical compounds.

Lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). However, most lead today is obtained from recovery of recycled scrap, mostly lead-a cid batteries.

Human activities, such as lead mining and smelting operations and manufacturing and use of lead products (*e.g.*, leaded gasoline, lead-based paint), have resulted in the contamination of many industrial and residential areas with lead.

Form	Uses
Metallic lead **Lead and lead compounds (or lead salts), such as** • **lead acetate** • **lead chloride** • **lead nitrate** • **lead oxide** • **lead phosphate** • **lead acetate**	Certain uses of lead, such as leaded gasoline, lead-based paints for domestic use, lead-based solder in food cans and water pipes, lead sinkers, and ammunition, have been reduced or banned to minimize lead's harmful effects on people and animals. • **Cosmetics and hair dye** - Some hair dyes and some non-Western cosmetics, such as kohl and surma, contain lead. • **Fishing equipment** - Most fishing weights and sinkers are made from lead. • **Folk remedies** - Many non-Western folk remedies used to treat diarrhea or other ailments may contain substantial amounts of lead. Examples of these include alarcon, ghasard, alkohl, greta, azarcon,

• **lead sulfate** • **lead sulfide**	liga, bali goli, pay-loo-ah, coral, and rueda. • **Glazing** - Applied to some ceramicware can contain lead. • **Lead based paint** - Although the sale of residential lead-based paint was banned in the United States in 1978, it remains a major source of lead exposure for young children residing in older houses. • **Lead batteries** - Production of lead-acid batteries is the major use of lead. • **Lead-based solder** - Has been banned for use in water distribution systems, but many buildings and homes contain lead pipes or lead-based solder. Lead-based solder also is used for electrical circuitry applications. • **Lead-shot** and **ammunition** - It is the second highest production use of lead. • Other uses of lead include the production of lead alloys, soldering materials, shielding for x-ray machines, and manufacturing of corrosion- and acid-resistant materials used in the building industry.
Organic • **tetraethyl lead** • **tetramethyl lead**	The use of lead in gasoline was phased out in the 1980s, and has been banned since January 1, 1996. The use of lead in gasoline has contributed to its dispersion throughout the environment. During the combustion of gasoline containing these alkyllead compounds, significant amounts of inorganic lead can be released to the surrounding areas. **Current Uses** • Gasoline for off-road vehicles, farm equipment, and airplanes **Past Uses** • Gasoline additives (to increase octane rating)

What are the routes of exposure for lead?

People are most likely to be exposed to lead by consuming contaminated food and drinking water. Exposure can also occur by inadvertently ingesting contaminated soil, dust, or lead-based paint.

Form	Routes of Exposure
Metallic lead **Lead and lead compounds (or lead salts), such as** • **lead acetate** • **lead chloride** • **lead nitrate** • **lead oxide** • **lead phosphate** • **lead subacetate** • **lead sulfate** • **lead sulfide**	• Ingestion is the primary source of exposure to the general population. • Lead paint is a major source of environmental exposure for children who ingest flaking paint, paint chips, and weathered powdered paint (mostly from deteriorated housing units in urban areas). Lead paint can also contribute to soil/dust lead which can be inadvertently ingested via hand-to-mouth activity of young children. • Lead can leach into drinking water from lead-based solder used in water pipes. • Lead can leach into foods or liquids stored in ceramic containers made with lead glazing. • Engaging in hobbies such as casting ammunition, making fishing weights, and stained glass can result in exposure to lead. • Exposure by inhalation can result during activities such as soldering with lead solder or sanding or sandblasting lead-based paint.
Organic • **tetraethyl lead** • **tetramethyl lead**	• Inhalation • Dermal studies in animals have shown that organic lead is well absorbed through the skin

Who are the populations most at risk and how are they usually exposed?

People living near hazardous waste sites, lead smelters or refineries, battery recycling or crushi ng centers, or other industrial lead sources may be exposed to lead and chemicals that contain lead. Workers in occupations that have sources of lead exposure (*e.g.*, plumbers, miners, mechanics, and lead smelter or refinery workers).

Certain hobbies, folk remedies, home activities, and car repairs (*e.g.*, radiator repair) can contribute to lead exposure. Smoking cigarettes or breathing second-hand smoke increases exposure because tobacco smoke contains small amounts of lead.

Pregnant women, the developing fetuses, and young children are particularly vulnerable to the effe cts of lead. Young children are more likely to play in dirt and to place their hands and other objects in their

mouths, thereby increasing the opportunity for exposure via ingestion of lead-contaminated soil an d dust.

What are the possible toxic effects of lead?

The most sensitive targets for lead toxicity are the developing nervous system, the hematological and cardiovascular systems, and the kidney. However, because of lead's many modes of action in biologi cal systems, lead could potentially affect any system or organs in the body. The effects are the same whether it is breathed or swallowed.

Blood Lead Concentrations Corresponding to Adverse Health Effects

Life Stage	Effect	Blood lead (µg/dL)
Children	Depressed ALAD* activity	<5
	Neurodevelopmental effects	<10
	Sexual maturation	<10
	Depressed vitamin D	>15
	Elevated EP**	>15
	Depressed NCV***	>30
	Depressed hemoglobin	>40
	Colic	>60
Adults	Depressed GFR****	<10
	Elevated blood pressure	<10
	Elevated EP (females)	>20
	Enzymuria/proteinuria	>30
	Peripheral neuropathy	>40
	Neurobehavioral effects	>40
	Altered thyroid hormone	>40
	Reduced fertility	>40
	Depressed hemoglobin	>50
Elderly adults	Depressed ALAD*	<5
	Neurobehavioral effects	>4

*aminolevulinic acid dehydratase (ALAD)

**erythrocyte porphyrin (EP)

***nerve conduction velocity (NCV)

****glomerular filtration rate (GFR)

Source: ATSDR Toxicological Profile for Lead (Draft for Public Comment), 2005.

How can I reduce the risk of exposure to lead?

- Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint (homes built before 1978).
- If you have a water lead problem, the U.S. Environmental Protection Agency (EPA) recommends that you flush your cold water pipes if they have not been used in over 6 hours by running water until it is cold (5 seconds to 2 minutes) before drinking or cooking with it.
- Avoid some types of paints and pigments that contain lead and are used as make-up or hair coloring; keep these kinds of products away from children.
- Hire a professional contractor, who is required to follow certain health safety requirements for remediation or renovation involving lead-based paint, (www.epa.gov/lead/pubs/leadinfo.htm#remodeling).
- Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

What are the safety guidelines for lead exposure?

Air

- National Institute for Occupational Safety and Health (NIOSH)

  Recommended exposure limit (REL) time-weighted average (TWA) - 0.05 mg/m^3
  Immediately dangerous to life or health (IDLH) - 100 mg/m^3

- Occupational Safety and Health Administration (OSHA)

  Air - workplace 50 $\mu g/m^3$
  Action level - 40 µg/100 g of whole blood

- The American Conference of Governmental Industrial Hygienists (ACGIH)

Threshold limit values (TLV)/(TWA) - 0.05 mg/m^3
TLV/TWA guideline for lead arsenate - 150 µg/m^3
TLV/TWA guideline for other forms of lead - 50 µg lead/m^3

- U.S. Environmental Protection Agency (EPA)

  National Primary and Secondary Ambient Air Quality Standards - 1.5 µg/m^3

- World Health Organization (WHO)

  Air quality guidelines -- 0.5 µg/m^3

Water

- EPA

  Maximum contaminant level (MCL) - action level 0.015 mg/L
  Action level for public supplies - 15 µg/L

- WHO

  Drinking Water Quality Guidelines - 0.01 mg/L

Blood

- Centers for Disease Control and Prevention (CDC)

  Level of concern for children - 10 µg/dL

- OSHA

  Cause for written notification and medical exam - 40 µg/dL
  Cause for medical removal from exposure - 50 µg/dL

- ACGIH

  Advisory; biological exposure index - 30 µg/dL

Food

- Food and Drug Administration (FDA)

  Bottled drinking water - 0.005 mg/L

Other

- ACGIH

  Biological exposure indices (lead in blood) - 30 µg/100 mL

- Consumer Product Safety Commission

  Paint - 600 ppm

- FDA

  Ceramicware (µg/mL leaching solution) - 0.5-3.0 µg/mL

µg/m^3: micrograms per cubic meter
µg/dL: micrograms per deciliter
µg/L: micrograms per liter
g: gram
mg/L: milligrams per liter
mL: milliliter
ppm: parts per million

What are the most important or common mediating factors?

Factors that determine the severity of the health effects from lead exposure include

- Dose
- Age of the person exposed
  - the developing nervous system is the most sensitive system to the effects of lead
  - the efficiency of lead absorption from the gastrointestinal tract is greater in children than in adults
- Life stages of women (childbirth, lactating, menopause)
- Occupational exposures
- Duration of exposure
- Health and lifestyle of the person exposed
- Nutritional status of the person exposed
  - a diet adequate in calcium and iron may decrease lead absorption

The toxic effects of lead exposure may be worse in individuals with inherited genetic diseases or gene polymorphisms such as thalassemia, individuals with glucose-6-phosphate dehydrogenase (G6PD) deficiency, and carriers of certain gene polymorphic forms (*e.g.*, ALAD and vitamin D receptor). Research continues about this topic.

Is there a test to see if my child or I have been exposed to lead?

Blood	• The screening test of choice is blood lead levels. • Blood tests are commonly used to screen children for lead poisoning. • Analysis of lead in whole blood is the most common and accurate method of assessing lead exposure. • Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL).
Bone and Teeth	• X-ray fluorescence techniques have been used to determine lead concentration in bones and teeth. It is not widely available and is used mostly in research. • Lead partitions to bone over a lifetime of exposure; therefore, bone lead measurements may be a better indicator of cumulative exposure than blood lead.
Urine	• Measurements of urinary lead levels have been used to assess lead exposure. • The measurement of lead excreted in urine following chelation with calcium disodium EDTA (EDTA provocation) has been used to detect elevated body burden of lead in adults and children.
Hair and Nails	• These are not reliable for testing due to errors external contamination. They are relatively poor predictors of blood lead, particularly at low concentrations.

Future Research Needs

To close current gaps in the scientific database on the health effects of lead, a long–term resear ch program is needed that might include the following:

- Further short-term studies or studies in vitro designed to clarify mechanisms of action for the various toxicities might be useful.
- Studies identifying exposures during different developmental periods can help identify critical periods of vulnerability for immunocompetence, development of sex organs, or neurobehavioral parameters.
- Chronic-duration exposure studies in animals would expand information on the toxicity of lead. Special studies that examine biochemical and morphological effects of lead may provide new information on mechanisms of action of lead, particularly for the effects of greatest concern such as neurobehavioral changes in children.
- Development of new and more sensitive tests of specific neuropsychological functions.
- Further investigation of links between lead and amyotrophic lateral sclerosis, essential tremor, schizophrenia, and Parkinson's disease.
- Epidemiological studies designed in a manner that permits more rigorous assessments of effect modification.
- Studies about the long-term consequences of lead-related neurobehavioral deficits detected in infants and children and the manifestation of chronic neurobehavioral problems in adolescence and adulthood.
- Further characterization of bone lead concentration as a biomarker of exposure for various effect end points (*e.g.*, blood pressure and renal effects).
- Studies of the potential prevalence of elevated bone lead stores in women of reproductive age and the associated risk that this poses to fetal development by mobilization of maternal bone stores during pregnancy.
- Further clarification of the role of some genetic polymorphisms.
- Evaluation of cohorts from prospective studies into adulthood for potential late-appearing effects including cancer.

For more information

- Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profile for Lead

  http://www.atsdr.cdc.gov/toxprofiles/tp13.html

- ATSDR ToxFAQs™ for Lead

  http://www.atsdr.cdc.gov/tfacts13.html

- ATSDR Case Studies in Environmental Medicine Lead Toxicity

  http://www.atsdr.cdc.gov/csem/lead/

- ATSDR Interaction Profile for Chemical Mixtures for Arsenic, Cadmium, Chromium, and Lead

  http://www.atsdr.cdc.gov/interactionprofiles/ip04.html

- ATSDR Interaction Profile for Chemical Mixtures for Lead, Manganese, Zinc, and Copper

  http://www.atsdr.cdc.gov/interactionprofiles/ip06.html

- ATSDR Interaction Profile for Chemical Mixtures for Chlorpyrifos, Lead, Mercury, and Methylmercury

  http://www.atsdr.cdc.gov/interactionprofiles/ip11.html

- Centers for Disease Control and Prevention Lead Web Page

  http://www.cdc.gov/lead/

- U.S. Environmental Protection Agency Lead Web Page

  http://www.epa.gov/lead/

- U.S. Department of Labor, Occupational Safety & Health Administration

  http://www.osha.gov/SLTC/lead/

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Environmental Medicine
1600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333
Phone: 1-800-CDC-INFO (800-232-4636)
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Email: CDCINFO@cdc.gov

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Mercury

Mercury is a naturally occurring metal found in air, water, and soil. It exists in several forms, including elemental (or metallic) mercury, inorganic mercury compounds, and organic mercury compounds:

- **Elemental mercury** is liquid at room temperature and is used in thermometers, fluorescent light bulbs, some electrical switches, and some industrial processes.
- **Inorganic mercury** compounds are formed when mercury combines with other elements to form salts, which are usually powders or crystals. Inorganic mercury compounds are found naturally in the environment. Some forms of inorganic mercury have been used in antiseptic creams, ointments, and preservatives.
- **Organic mercury** compounds are formed when mercury combines with carbon. Microscopic organisms can produce organic mercury compounds (methylmercury) in contaminated water and soil, which can accumulate in the food chain. Other special types of organomercurials have been used as medical preservatives and medicines.

How People Are Exposed to Mercury

- Eating fish or shellfish that is contaminated with methylmercury, which is the main source of general human exposures to mercury;
- Breathing air contaminated with elemental mercury vapors (e.g., in workplaces such as dental offices and industries that use mercury or in locations where a mercury spill or release has occurred);
- Having dental fillings that contain mercury; and
- Practicing cultural or religious rituals that use mercury.

How Mercury Affects People's Health

- Short-term exposure to extremely high levels of elemental mercury vapors can result in lung damage, nausea, diarrhea, increases in blood pressure or heart rate, skin rashes, eye irritation, and injury to the nervous system.
- Prolonged exposure to lower levels of elemental mercury can permanently damage the brain and kidneys.
- The developing brain of a fetus can be injured if the mother is exposed to methylmercury.

Levels of Mercury in U.S. Population

Scientists tested levels of mercury in the blood of 16,780 participants who took part in CDC's national study known as the National Health and Nutrition Examination Survey (NHANES). These findings are based on total blood mercury levels in the U.S. general

population for persons aged 1 year and older who participated in NHANES during 2003-2006, as well as trends in the total mercury of children aged 1–5 and females aged 16–49 during 1999–2006.

- In the total population during 2003–2006, the total blood mercury levels for non–Hispanic blacks and non–Hispanic whites were higher than those for Mexican Americans.
- Across the age groups in the total population during 2003-2006, total blood mercury levels increased with age, peaked at the fifth or sixth decade, depending on race/ethnicity, and then declined.
- In the most recent survey period of 2005–2006, the 95th percentile levels for total blood mercury in children aged 1-5 years and females aged 16-49 years were 1.43 µg/L and 4.48 µg/L, respectively. The 95th percentile means that 95 percent of the U.S. population's exposure is below this estimated level. Conversely, only 5 percent of the population will have values at this level or higher.
- Over the four survey periods from 1999-2006, blood mercury levels increased slightly for non–Hispanic white children and decreased slightly for non–Hispanic black and Mexican American children. Female children had slightly higher blood mercury levels than male children.

For More Information

- Agency for Toxic Substances and Disease Registry
  Detailed information about mercury and public health is available at
  http://www.atsdr.cdc.gov/alerts/970626.html and
  http://www.atsdr.cdc.gov/cabs/mercury/index.html
- CDC Emergency Preparedness and Response
  Case definitions of mercury, toxicology FAQs, and toxicological profile at
  http://emergency.cdc.gov/agent/mercury/

May 2009

The Centers for Disease Control and Prevention (CDC) protects people's health and safety by preventing and controlling diseases and injuries; enhances health decisions by providing credible information on critical health issues; and promotes healthy living through strong partnerships with local, national, and international organizations.

Department of Health and Human Services
Agency for Toxic Substances & Disease Registry

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ToxFAQs™

ToxFAQs™
for
Arsenic
(*Arsénico*)
August 2007

PDF Version, 92 KB

CAS#: 7440-38-2

This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

Highlights

Exposure to higher than average levels of arsenic occur mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found in at least 1,149 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Copper chromated arsenate (CCA) is used to make "pressure-treated" lumber. CCA is no longer used in the U.S. for residential uses; it is still used in industrial applications. Organic arsenic compounds are used as pesticides, primarily on cotton fields and orchards.

What happens to arsenic when it enters the environment?

- Arsenic occurs naturally in soil and minerals and may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching.
- Arsenic cannot be destroyed in the environment. It can only change its form.
- Rain and snow remove arsenic dust particles from the air.
- Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.
- Fish and shellfish can accumulate arsenic; most of this arsenic is in an organic form called arsenobetaine that is much less harmful.

How might I be exposed to arsenic?

- Ingesting small amounts present in your food and water or breathing air containing arsenic.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.
- Working in a job that involves arsenic production or use, such as copper or lead smelting, wood treating, or pesticide application.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause naus ea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of “pins an d needles” in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of th e skin and the appearance of small “corns” or “warts” on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Almost nothing is known regarding health effects of organic arsenic compounds in humans. Studies i n animals show that some simple organic arsenic compounds are less toxic than inorganic forms. Ingestion of methyl and dimethyl compounds can cause diarrhea and damage to the kidneys.

How likely is arsenic to cause cancer?

Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cance r and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen. The International Agency for R esearch on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans.

How does arsenic affect children?

There is some evidence that long-term exposure to arsenic in children may result in lower IQ score s. There is also some evidence that exposure to arsenic in the womb and early childhood may increase mortality in young adults.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals show that large doses of arsenic that cause illness in pregnant fem ales, can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal ti ssues. Arsenic is found at low levels in breast milk.

How can families reduce their risk for exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protecti ve clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner source s of water and limit contact with soil.
- If you work in a job that may expose you to arsenic, be aware that you may carry arsenic home on y our clothing, skin, hair, or tools. Be sure to shower and change clothes before going home.

Is there a medical test to show whether I've been exposed to arsenic?

There are tests available to measure arsenic in your blood, urine, hair, and fingernails. The urin e test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels of ars enic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict whether the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

The EPA has set limits on the amount of arsenic that industrial sources can release to the environ ment 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) has set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter of workplace air (10 $\mu g/m^3$) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Arsenic *(Update)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Environmental Medicine
1600 Clifton Road NE, Mailstop F-62
Atlanta, GA 30333
Phone: 1-800-CDC-INFO • 888-232-6348 (TTY)
FAX: 770-488-4178
Email: cdcinfo@cdc.gov

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state heal th or environmental quality department if you have any more questions or concerns.

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U.S. Environmental Protection Agency

Pesticides: Topical & Chemical Fact Sheets

Assessing Health Risks from Pesticides

January 1999
735-F-99-002

The Federal Government, in cooperation with the States, carefully regulates pesticides to ensure that they do not pose unreasonable risks to human health or the environment. As part of that effort, the Environmental Protection Agency (EPA) requires extensive test data from pesticide producers that demonstrate pesticide products can be used without posing harm to human health and the environment. EPA scientists and analysts carefully review these data to determine whether to register (license) a pesticide product or a use and whether specific restrictions are necessary. This fact sheet is a brief overview of EPA's process for assessing potential risks to human health when evaluating pesticide products.

Background

There are more than 865 active ingredients registered as pesticides, which are formulated into thousands of pesticide products that are available in the marketplace. About 350 pesticides are used on the foods we eat, and to protect our homes and pets.

EPA plays a critical role in evaluating these chemicals prior to registration, and in reevaluating older pesticides already on the market, to ensure that they can be used with a reasonable certainty of no harm. The process EPA uses for evaluating the health impacts of a pesticide is called risk assessment.

EPA uses the National Research Council's four-step process for human health risk assessment:

Step One: Hazard Identification
Step Two: Dose-Response Assessment
Step Three: Exposure Assessment
Step Four: Risk Characterization

Step One: Hazard Identification (Toxicology)

The first step in the risk assessment process is to identify potential health effects that may occur from different types of pesticide exposure. EPA considers the full spectrum of a pesticide's potential health effects.

Generally, for human health risk assessments, many toxicity studies are conducted on animals by pesticide companies in independent laboratories and evaluated for acceptability by EPA scientists. EPA evaluates pesticides for a wide range of adverse effects, from eye and skin irritation to cancer and birth defects in laboratory animals. EPA may also consult the public literature or other sources of supporting information on any aspect of the chemical.

Step Two: Dose-Response Assessment

Paracelsus, the Swiss physician and alchemist, the "father" of modern toxicology (1493-1541) said,

> "The dose makes the poison."

In other words, **the amount of a substance a person is exposed to** is as important as **how toxic the chemical might be**. For example, small doses of aspirin can be beneficial to people, but at very high doses, this common medicine can be deadly. In some individuals, even at very low doses, aspirin may be deadly.

Dose-response assessment involves considering the dose levels at which adverse effects were observed in test animals, and using these dose levels to calculate an equal dose in humans.

Step Three: Exposure Assessment

People can be exposed to pesticides in three ways:

1. Inhaling pesticides (inhalation exposure),
2. Absorbing pesticides through the skin (dermal exposure), and
3. Getting pesticides in their mouth or digestive tract (oral exposure).

Depending on the situation, pesticides could enter the body by any one or all of these routes. Typical sources of pesticide exposure include:

- **Food**
  Most of the foods we eat have been grown with the use of pesticides. Therefore, pesticide residues may be present inside or on the surfaces of these foods.

- **Home and Personal Use Pesticides**
  You might use pesticides in and around your home to control insects, weeds, mold, mildew, bacteria, lawn and garden pests and to protect your pets from pests such as fleas. Pesticides may also be used as insect repellants which are directly applied to the skin or clothing.

- **Pesticides in Drinking Water**
  Some pesticides that are applied to farmland or other land structures can make their way in small amounts to the ground water or surface water systems that feed drinking water supplies.

- **Worker Exposure to Pesticides**
  Pesticide applicators, vegetable and fruit pickers and others who work around pesticides can be exposed due to the nature of their jobs. To address the unique risks workers face from occupational exposure, EPA evaluates occupational exposure through a separate program. All pesticides registered by EPA have been shown to be safe when used properly.

Step Four: Risk Characterization

Risk characterization is the final step in assessing human health risks from pesticides. It is the process of combining the hazard, dose-response and exposure assessments to describe the overall risk from a pesticide. It explains the assumptions used in assessing exposure as well as the uncertainties that are built into the dose-response assessment. The strength of the overall database is considered, and broad

conclusions are made. EPA's role is to evaluate both toxicity and exposure and to determine the risk associated with use of the pesticide.

Simply put,

RISK = TOXICITY x EXPOSURE.

This means that the risk to human health from pesticide exposure depends on both the toxicity of the pesticide and the likelihood of people coming into contact with it. At least *some* exposure and *some* toxicity are required to result in a risk. For example, if the pesticide is very poisonous, but no people are exposed, there is no risk. Likewise, if there is ample exposure but the chemical is non-toxic, there is no risk. However, usually when pesticides are used, there is some toxicity and exposure, which results in a potential risk.

EPA recognizes that effects vary between animals of different species and from person to person. To account for this variability, *uncertainty factors* are built into the risk assessment. These uncertainty factors create an additional margin of safety for protecting people who may be exposed to the pesticides. FQPA requires EPA to use an extra 10-fold safety factor, if necessary, to protect infants and children from effects of the pesticide.

Types of Toxicity Tests EPA Requires for Human Health Risk Assessments

EPA evaluates studies conducted over different periods of time and that measure specific types of effects. These tests are evaluated to screen for potential health effects in infants, children and adults.

Acute Testing: Short-term exposure; a single exposure (dose).

- Oral, dermal (skin), and inhalation exposure
- Eye irritation
- Skin irritation
- Skin sensitization
- Neurotoxicity

Sub-chronic Testing: Intermediate exposure; repeated exposure over a longer period of time (i.e., 30-90 days).

- Oral, dermal (skin), and inhalation
- Neurotoxicity (nerve system damage)

Chronic Toxicity Testing: Long-term exposure; repeated exposure lasting for most of the test animal's life span. Intended to determine the effects of a pesticide after prolonged and repeated exposures.

- Chronic effects (non-cancer)
- Carcinogenicity (cancer)

Developmental and Reproductive Testing: Identify effects in the fetus of an exposed pregnant female (birth defects) and how pesticide exposure affects the ability of a test animal to successfully reproduce.

Mutagenicity Testing: Assess a pesticide's potential to affect the cell's genetic components.

Hormone Disruption: Measure effects for their potential to disrupt the endocrine system. The endocrine system consists of a set of glands and the hormones they produce that help guide the development, growth, reproduction, and behavior of animals including humans.

Risk Management

Once EPA completes the risk assessment process for a pesticide, we use this information to determine if (when used according to label directions), there is a reasonable certainty that the pesticide will not harm a person's health.

Using the conclusions of a risk assessment, EPA can then make a more informed decision regarding whether to approve a pesticide chemical or use, as proposed, or whether additional protective measures are necessary to limit occupational or non-occupational exposure to a pesticide. For example, EPA may prohibit a pesticide from being used on certain crops because consuming too much food treated with the pesticide may result in an unacceptable risk to consumers. Another example of protective measures is requiring workers to wear personal protective equipment (PPE) such as a respirator or chemical resistant gloves, or not allowing workers to enter treated crop fields until a specific period of time has passed.

If, after considering all appropriate risk reduction measures, the pesticide still does not meet EPA's safety standard, the Agency will not allow the proposed chemical or use. Regardless of the specific measures enforced, EPA's primary goal is to ensure that legal uses of the pesticide are protective of human health, especially the health of children, and the environment.

Human Health Risk Assessment and the Law

Federal law requires detailed evaluation of pesticides to protect human health and the environment. In 1996, Congress made significant changes to strengthen pesticide laws through the Food Quality Protection Act (FQPA). Many of these changes are key elements of the current risk assessment process. FQPA required that EPA consider:

- **A New Safety Standard**: FQPA strengthened the safety standard that pesticides must meet before being approved for use. EPA must ensure with a reasonable certainty that no harm will result from the legal uses of the pesticide.
- **Exposure from All Sources**: In evaluating a pesticide, EPA must estimate the combined risk from that pesticide from all non-occupational sources, such as:
  - Food Sources
  - Drinking Water Sources
  - Residential Sources
- **Cumulative Risk**: EPA is required to evaluate pesticides in light of similar toxic effects that different pesticides may share, or "a common mechanism of toxicity." At this time, EPA is developing a methodology for this type of assessment.
- **Special Sensitivity of Children to Pesticides**: EPA must ascertain whether there is an increased susceptibility from exposure to the pesticide to infants and children. EPA must build an additional 10-fold safety factor into risk assessments to ensure the protection of infants and children, unless it is determined that a lesser margin of safety will be safe for infants and children.

For More Information

If you would like more information about EPA's pesticide programs, contact the Communication Service Branch at (703) 305-5017 or visit the Pesticides Web site.

For more information on specific pesticides, or to inquire about the symptoms of pesticide poisoning, call the National Pesticide Information Center (NPIC), a toll-free hotline information at: 1-800-858-7378, or visit their Web site EXIT Disclaimer .

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Last updated on Tuesday, May 2nd, 2006
URL: http://www.epa.gov/pesticides/factsheets/riskassess.htm

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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February 2001

ToxFAQs™ for Polychlorinated Biphenyls (PCBs)

(Bifenilos Policlorados (BPCs))

This fact sheet answers the most frequently asked health questions about polychlorinated biphenyls (PCBs). For more information, you may call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls (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.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors,

Contact Information

RELATED RESOURCES

ToxFAQ™ 35k

ToxFAQ™ en Español 32k

Public Health Statement 125k

Public Health Statement en Español 321k

Toxicological Profile 13.6MB

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ATSDR RESOURCES

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MMGs

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Priority List of Hazardous Substances

Division of Toxicology

and old microscope and hydraulic oils.

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What happens to polychlorinated biphenyls (PCBs) when they enter the environment?

- PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.
- PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.
- PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.
- PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

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How might I be exposed to polychlorinated biphenyls (PCBs)?

- Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.
- Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.
- Breathing air near hazardous waste sites and drinking contaminated well water.
- In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

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How can polychlorinated biphenyls (PCBs) affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

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How likely are polychlorinated biphenyls (PCBs) to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

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How do polychlorinated biphenyls (PCBs) affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported In most cases, the benefits of breast-feeding outweigh any risks from exposure to PCBs in mother's milk.

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How can families reduce the risk of exposure to polychlorinated biphenyls (PCBs)?

- You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.
- Children should be told not play with old appliances, electrical equipment, or transformers, since they may contain PCBs.
- Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.
- If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

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Is there a medical test to show whether I've been exposed to polychlorinated biphenyls (PCBs)?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

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Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

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References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333
Phone: 1-888-42-ATSDR (1-888-422-8737)
FAX: (770)-488-4178
Email: ATSDRIC@cdc.gov

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ATSDR Department of Health and Human Services
Agency for Toxic Substances & Disease Registry

2007 CERCLA Priority List of Hazardous Substances

2007 RANK	SUBSTANCE NAME	TOTAL POINTS	2005 RANK	CAS #
1	ARSENIC	1672.58	1	007440-38-2
2	LEAD	1534.07	2	007439-92-1
3	MERCURY	1504.69	3	007439-97-6
4	VINYL CHLORIDE	1387.75	4	000075-01-4
5	POLYCHLORINATED BIPHENYLS	1365.78	5	001336-36-3
6	BENZENE	1355.96	6	000071-43-2
7	CADMIUM	1324.22	8	007440-43-9
8	POLYCYCLIC AROMATIC HYDROCARBONS	1316.98	7	130498-29-2
9	BENZO(A)PYRENE	1312.45	9	000050-32-8
10	BENZO(B)FLUORANTHENE	1266.55	10	000205-99-2
11	CHLOROFORM	1223.03	11	000067-66-3
12	DDT, P,P'-	1193.36	12	000050-29-3
13	AROCLOR 1254	1182.63	13	011097-69-1
14	AROCLOR 1260	1177.77	14	011096-82-5
15	DIBENZO(A,H)ANTHRACENE	1165.88	15	000053-70-3
16	TRICHLOROETHYLENE	1154.73	16	000079-01-6
17	DIELDRIN	1150.91	17	000060-57-1
18	CHROMIUM, HEXAVALENT	1149.98	18	018540-29-9
19	PHOSPHORUS, WHITE	1144.77	19	007723-14-0
20	CHLORDANE	1133.21	21	000057-74-9
21	DDE, P,P'-	1132.49	20	000072-55-9
22	HEXACHLOROBUTADIENE	1129.63	22	000087-68-3
23	COAL TAR CREOSOTE	1124.32	23	008001-58-9
24	ALDRIN	1117.22	25	000309-00-2
25	DDD, P,P'-	1114.83	24	000072-54-8
26	BENZIDINE	1114.24	26	000092-87-5
27	AROCLOR 1248	1112.20	27	012672-29-6
28	CYANIDE	1099.48	28	000057-12-5
29	AROCLOR 1242	1093.14	29	053469-21-9
30	AROCLOR	1091.52	62	012767-79-2
31	TOXAPHENE	1086.65	30	008001-35-2
32	HEXACHLOROCYCLOHEXANE, GAMMA-	1081.63	32	000058-89-9
33	TETRACHLOROETHYLENE	1080.43	31	000127-18-4
34	HEPTACHLOR	1072.67	33	000076-44-8
35	1,2-DIBROMOETHANE	1064.06	34	000106-93-4
36	HEXACHLOROCYCLOHEXANE, BETA-	1060.22	37	000319-85-7
37	ACROLEIN	1059.07	36	000107-02-8
38	DISULFOTON	1058.85	35	000298-04-4
39	BENZO(A)ANTHRACENE	1057.96	38	000056-55-3
40	3,3'-DICHLOROBENZIDINE	1051.61	39	000091-94-1

41	ENDRIN	1048.57	41	000072-20-8
42	BERYLLIUM	1046.12	40	007440-41-7
43	HEXACHLOROCYCLOHEXANE, DELTA-	1038.27	42	000319-86-8
44	1,2-DIBROMO-3-CHLOROPROPANE	1035.55	43	000096-12-8
45	PENTACHLOROPHENOL	1028.01	45	000087-86-5
46	HEPTACHLOR EPOXIDE	1027.12	44	001024-57-3
47	CARBON TETRACHLORIDE	1023.32	46	000056-23-5
48	AROCLOR 1221	1018.41	47	011104-28-2
49	COBALT	1015.57	50	007440-48-4
50	DDT, O,P'-	1014.71	49	000789-02-6
51	AROCLOR 1016	1014.33	48	012674-11-2
52	DI-N-BUTYL PHTHALATE	1007.49	52	000084-74-2
53	NICKEL	1005.40	55	007440-02-0
54	ENDOSULFAN	1004.65	54	000115-29-7
55	ENDOSULFAN SULFATE	1003.56	53	001031-07-8
56	DIAZINON	1002.08	57	000333-41-5
57	ENDOSULFAN, ALPHA	1001.30	58	000959-98-8
58	XYLENES, TOTAL	996.07	59	001330-20-7
59	CIS-CHLORDANE	995.08	51	005103-71-9
60	DIBROMOCHLOROPROPANE	994.87	60	067708-83-2
61	METHOXYCHLOR	994.47	61	000072-43-5
62	BENZO(K)FLUORANTHENE	981.26	63	000207-08-9
63	ENDRIN KETONE	978.99	64	053494-70-5
64	TRANS-CHLORDANE	973.99	56	005103-74-2
65	CHROMIUM(VI) OXIDE	969.58	66	001333-82-0
66	METHANE	959.78	67	000074-82-8
67	ENDOSULFAN, BETA	959.19	65	033213-65-9
68	AROCLOR 1232	955.64	68	011141-16-5
69	ENDRIN ALDEHYDE	954.86	69	007421-93-4
70	BENZOFLUORANTHENE	951.48	70	056832-73-6
71	TOLUENE	947.50	71	000108-88-3
72	2-HEXANONE	942.02	72	000591-78-6
73	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	938.11	73	001746-01-6
74	ZINC	932.89	74	007440-66-6
75	DIMETHYLARSINIC ACID	922.06	75	000075-60-5
76	DI(2-ETHYLHEXYL)PHTHALATE	919.02	76	000117-81-7
77	CHROMIUM	908.52	77	007440-47-3
78	NAPHTHALENE	896.67	78	000091-20-3
79	1,1-DICHLOROETHENE	891.19	79	000075-35-4
80	METHYLENE CHLORIDE	888.96	81	000075-09-2
81	AROCLOR 1240	888.11	80	071328-89-7
82	2,4,6-TRINITROTOLUENE	883.59	82	000118-96-7
83	BROMODICHLOROETHANE	870.00	83	000683-53-4
84	HYDRAZINE	864.41	85	000302-01-2
85	1,2-DICHLOROETHANE	863.99	84	000107-06-2
86	2,4,6-TRICHLOROPHENOL	863.71	86	000088-06-2
87	2,4-DINITROPHENOL	860.45	87	000051-28-5
88	BIS(2-CHLOROETHYL) ETHER	859.88	88	000111-44-4
89	THIOCYANATE	849.21	89	000302-04-5
90	ASBESTOS	841.54	90	001332-21-4
91	CHLORINE	840.37	92	007782-50-5
92	CYCLOTRIMETHYLENETRINITRAMINE (RDX)	840.28	91	000121-82-4
93	HEXACHLOROBENZENE	838.34	93	000118-74-1

94	2,4-DINITROTOLUENE	837.88	96	000121-14-2
95	RADIUM-226	835.93	94	013982-63-3
96	ETHION	834.03	97	000563-12-2
97	1,1,1-TRICHLOROETHANE	833.81	95	000071-55-6
98	URANIUM	833.41	98	007440-61-1
99	ETHYLBENZENE	832.13	99	000100-41-4
100	RADIUM	828.07	100	007440-14-4
101	THORIUM	825.17	101	007440-29-1
102	4,6-DINITRO-O-CRESOL	822.78	102	000534-52-1
103	1,3,5-TRINITROBENZENE	820.17	103	000099-35-4
104	CHLOROBENZENE	819.69	105	000108-90-7
105	RADON	817.89	104	010043-92-2
106	RADIUM-228	816.76	106	015262-20-1
107	THORIUM-230	814.72	107	014269-63-7
107	URANIUM-235	814.72	107	015117-96-1
109	BARIUM	813.46	109	007440-39-3
110	FLUORANTHENE	812.40	113	000206-44-0
111	URANIUM-234	812.11	110	013966-29-5
112	N-NITROSODI-N-PROPYLAMINE	811.05	111	000621-64-7
113	THORIUM-228	810.36	112	014274-82-9
114	RADON-222	809.78	114	014859-67-7
115	HEXACHLOROCYCLOHEXANE, ALPHA-	809.56	116	000319-84-6
116	1,2,3-TRICHLOROBENZENE	808.41	143	000087-61-6
117	MANGANESE	807.90	115	007439-96-5
118	COAL TARS	807.07	117	008007-45-2
119	CHRYSOTILE ASBESTOS	806.68	119	012001-29-5
119	STRONTIUM-90	806.68	119	010098-97-2
121	PLUTONIUM-239	806.67	118	015117-48-3
122	POLONIUM-210	806.39	122	013981-52-7
123	METHYLMERCURY	806.39	121	022967-92-6
124	PLUTONIUM-238	806.01	123	013981-16-3
125	LEAD-210	805.90	124	014255-04-0
126	PLUTONIUM	805.23	125	007440-07-5
127	CHLORPYRIFOS	804.93	125	002921-88-2
128	COPPER	804.86	133	007440-50-8
129	AMERICIUM-241	804.55	128	086954-36-1
130	RADON-220	804.54	127	022481-48-7
131	AMOSITE ASBESTOS	804.07	129	012172-73-5
132	IODINE-131	803.48	130	010043-66-0
133	HYDROGEN CYANIDE	803.08	132	000074-90-8
134	TRIBUTYLTIN	802.61	131	000688-73-3
135	GUTHION	802.32	134	000086-50-0
136	NEPTUNIUM-237	802.13	135	013994-20-2
137	CHRYSENE	802.10	139	000218-01-9
138	CHLORDECONE	801.64	136	000143-50-0
138	IODINE-129	801.64	136	015046-84-1
138	PLUTONIUM-240	801.64	136	014119-33-6
141	S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	797.88	140	000078-48-8
142	BROMINE	789.15	142	007726-95-6
143	POLYBROMINATED BIPHENYLS	789.11	141	067774-32-7
144	DICOFOL	787.56	144	000115-32-2
145	PARATHION	784.14	145	000056-38-2
146	1,1,2,2-TETRACHLOROETHANE	782.15	146	000079-34-5

147	SELENIUM	778.98	147	007782-49-2	
148	HEXACHLOROCYCLOHEXANE, TECHNICAL GRADE	774.91	148	000608-73-1	
149	TRICHLOROFLUOROETHANE	770.74	149	027154-33-2	
150	TRIFLURALIN	770.12	150	001582-09-8	
151	DDD, O,P'-	768.73	151	000053-19-0	
152	4,4'-METHYLENEBIS(2-CHLOROANILINE)	766.66	152	000101-14-4	
153	HEXACHLORODIBENZO-P-DIOXIN	760.42	153	034465-46-8	
154	HEPTACHLORODIBENZO-P-DIOXIN	754.47	154	037871-00-4	
155	PENTACHLOROBENZENE	753.58	155	000608-93-5	
156	1,3-BUTADIENE	747.31	201	000106-99-0	
157	AMMONIA	745.55	156	007664-41-7	
158	2-METHYLNAPHTHALENE	743.24	157	000091-57-6	
159	1,4-DICHLOROBENZENE	737.32	159	000106-46-7	
160	1,1-DICHLOROETHANE	736.23	158	000075-34-3	
161	ACENAPHTHENE	731.25	160	000083-32-9	
162	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	726.14	161	039001-02-0	
163	1,1,2-TRICHLOROETHANE	724.96	162	000079-00-5	
164	TRICHLOROETHANE	723.32	163	025323-89-1	
165	HEXACHLOROCYCLOPENTADIENE	719.01	164	000077-47-4	
166	HEPTACHLORODIBENZOFURAN	718.58	165	038998-75-3	
167	1,2-DIPHENYLHYDRAZINE	713.90	166	000122-66-7	
168	2,3,4,7,8-PENTACHLORODIBENZOFURAN	710.71	167	057117-31-4	
169	TETRACHLOROBIPHENYL	709.21	168	026914-33-0	
170	CRESOL, PARA-	707.83	169	000106-44-5	
171	OXYCHLORDANE	706.32	170	027304-13-8	
172	1,2-DICHLOROBENZENE	704.91	171	000095-50-1	
173	1,2-DICHLOROETHENE, TRANS-	704.04	178	000156-60-5	
174	INDENO(1,2,3-CD)PYRENE	703.30	180	000193-39-5	
175	GAMMA-CHLORDENE	702.59	172	056641-38-4	
176	CARBON DISULFIDE	702.55	174	000075-15-0	
177	TETRACHLOROPHENOL	702.54	173	025167-83-3	
178	AMERICIUM	701.62	175	007440-35-9	
178	URANIUM-233	701.62	175	013968-55-3	
180	PALLADIUM	700.66	177	007440-05-3	
181	HEXACHLORODIBENZOFURAN	700.56	179	055684-94-1	
182	PHENOL	696.96	183	000108-95-2	
183	CHLOROETHANE	693.90	182	000075-00-3	
184	ACETONE	693.31	181	000067-64-1	
185	P-XYLENE	690.20	185	000106-42-3	
186	DIBENZOFURAN	689.19	187	000132-64-9	
187	ALUMINUM	688.13	186	007429-90-5	
188	2,4-DIMETHYLPHENOL	685.76	189	000105-67-9	
189	CARBON MONOXIDE	684.49	188	000630-08-0	
190	TETRACHLOROETHANE	677.97	190	025322-20-7	
191	HYDROGEN SULFIDE	676.51	193	007783-06-4	
192	PENTACHLORODIBENZOFURAN	673.21	192	030402-15-4	
193	CHLOROMETHANE	670.19	191	000074-87-3	
194	BIS(2-METHOXYETHYL) PHTHALATE	666.08	194	034006-76-3	
195	BUTYL BENZYL PHTHALATE	659.38	195	000085-68-7	
196	CRESOL, ORTHO-	658.66	196	000095-48-7	
197	HEXACHLOROETHANE	653.10	199	000067-72-1	
198	VANADIUM	651.70	198	007440-62-2	

199	N-NITROSODIMETHYLAMINE	650.71	200	000062-75-9
200	1,2,4-TRICHLOROBENZENE	647.30	203	000120-82-1
201	BROMOFORM	643.53	202	000075-25-2
202	TETRACHLORODIBENZO-P-DIOXIN	635.74	204	041903-57-5
203	1,3-DICHLOROBENZENE	631.41	205	000541-73-1
204	PENTACHLORODIBENZO-P-DIOXIN	625.12	207	036088-22-9
205	N-NITROSODIPHENYLAMINE	624.79	208	000086-30-6
206	1,2-DICHLOROETHYLENE	622.49	206	000540-59-0
207	2,3,7,8-TETRACHLORODIBENZOFURAN	622.15	210	051207-31-9
208	2-BUTANONE	620.01	209	000078-93-3
209	2,4-DICHLOROPHENOL	616.45	212	000120-83-2
210	1,4-DIOXANE	616.29	215	000123-91-1
211	FLUORINE	613.28	214	007782-41-4
212	NITRITE	612.64	216	014797-65-0
213	CESIUM-137	612.50	217	010045-97-3
214	SILVER	612.19	213	007440-22-4
215	CHROMIUM TRIOXIDE	610.85	218	007738-94-5
216	NITRATE	610.66	219	014797-55-8
217	POTASSIUM-40	608.91	220	013966-00-2
218	DINITROTOLUENE	607.65	221	025321-14-6
219	ANTIMONY	605.37	222	007440-36-0
220	COAL TAR PITCH	605.33	224	065996-93-2
221	THORIUM-227	605.32	223	015623-47-9
222	2,4,5-TRICHLOROPHENOL	604.83	225	000095-95-4
223	ARSENIC ACID	604.45	226	007778-39-4
224	ARSENIC TRIOXIDE	604.36	227	001327-53-3
225	PHORATE	603.10	228	000298-02-2
226	BENZOPYRENE	603.00	230	073467-76-2
227	CRESOLS	602.74	229	001319-77-3
228	CHLORDANE, TECHNICAL	602.62	231	012789-03-6
229	DIMETHOATE	602.61	232	000060-51-5
230	ACTINIUM-227	602.57	233	014952-40-0
230	STROBANE	602.57	233	008001-50-1
232	4-AMINOBIPHENYL	602.51	235	000092-67-1
232	PYRETHRUM	602.51	235	008003-34-7
234	ARSINE	602.42	237	007784-42-1
235	NALED	602.32	238	000300-76-5
236	DIBENZOFURANS, CHLORINATED	602.13	239	042934-53-2
236	ETHOPROP	602.13	239	013194-48-4
238	ALPHA-CHLORDENE	601.94	241	056534-02-2
238	CARBOPHENOTHION	601.94	241	000786-19-6
240	DICHLORVOS	601.64	243	000062-73-7
241	CALCIUM ARSENATE	601.45	244	007778-44-1
241	MERCURIC CHLORIDE	601.45	244	007487-94-7
241	SODIUM ARSENITE	601.45	244	007784-46-5
244	FORMALDEHYDE	599.64	247	000050-00-0
245	2-CHLOROPHENOL	599.62	248	000095-57-8
246	PHENANTHRENE	597.68	249	000085-01-8
247	HYDROGEN FLUORIDE	588.03	250	007664-39-3
248	2,4-D ACID	584.47	251	000094-75-7
249	DIBROMOCHLOROMETHANE	580.59	252	000124-48-1
250	DIURON	579.16	253	000330-54-1
251	BUTYLATE	578.43	254	002008-41-5

252	DIMETHYL FORMAMIDE	578.23	255	000068-12-2
253	PYRENE	577.95	256	000129-00-0
254	DICHLOROBENZENE	577.70	211	025321-22-6
255	ETHYL ETHER	572.47	257	000060-29-7
256	DICHLOROETHANE	570.46	258	001300-21-6
257	4-NITROPHENOL	567.79	259	000100-02-7
258	1,3-DICHLOROPROPENE, CIS-	561.82	184	010061-01-5
259	PHOSPHINE	559.74	260	007803-51-2
260	TRICHLOROBENZENE	557.96	261	012002-48-1
261	2,6-DINITROTOLUENE	555.20	262	000606-20-2
262	FLUORIDE ION	549.64	263	016984-48-8
263	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	547.90	264	035822-46-9
264	METHYL PARATHION	545.83	265	000298-00-0
265	PENTAERYTHRITOL TETRANITRATE	545.59	266	000078-11-5
266	1,3-DICHLOROPROPENE, TRANS-	543.37	267	010061-02-6
267	BIS(2-ETHYLHEXYL)ADIPATE	540.20	268	000103-23-1
268	CARBAZOLE	534.52	269	000086-74-8
269	METHYL ISOBUTYL KETONE	533.24	271	000108-10-1
270	1,2-DICHLOROETHENE, CIS-	533.15	270	000156-59-2
271	STYRENE	532.70	272	000100-42-5
272	CARBARYL	530.98	273	000063-25-2
273	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	529.45	274	067562-39-4
274	ACRYLONITRILE	528.28	275	000107-13-1
275	1-METHYLNAPHTHALENE	526.51	NEW	

Substances were assigned the same rank when two (or more) substances received equivalent total point scores.

CAS #= Chemical Abstracts Service Registry Number

This page was updated on 01/10/2008

APPENDIX 10
PERMITS REQUIRED

Permits Required

NYC DOB

New Building
Builders Pavement Plan
SD1 & SD2
Electrical Plumbing
Sprinkler
Sheeting and Shoring
Temp Electric

NYC DOT

Street Crossing
Container
Lane Closure

APPENDIX 11
ESTIMATED REMEDIAL COSTS

Track 1 – Estimated Remedial Cost

Tasks	Budget Cost/Range*
-Waste Characterization Sampling and Analysis	$57,970
-Air Monitoring/Geologist on-site	$104,000
-Sheeting and Shoring	$1,268,960
-Supervision of excavation	$106,800
-Soil disposal	$979,800
-Post-excavation end point soil samples/DUSR	$12,300
-Excavator	$125,500
-Supervision of installation of vapor barrier	$150,000
-Operation and Maintenance Plan	TBD
-EFR	$11,000
Total	$2,816,330

*Subject to change based on field conditions

APPENDIX 12
FER APPROVAL CHECKLIST

Checklist for Final Engineering Report (FER) Approval

Applies to sites in the Brownfield Cleanup Program (BCP), Environmental Restoration Program (ERP), Voluntary Cleanup Program (VCP) and Inactive Hazardous Waste Disposal Site Program (SSF)

Site Name:
Municipality:
County:
Site No.:

This FER is for a project which:

- ☐ Includes a summary of one or more construction completion reports (CCRs) - if checked the FER must reference of these previous CCRs for the areas identified below.
- ☐ Is for a single remedial action

All FERs submitted to DEC for approval will be prepared by an individual licensed or otherwise authorized in accordance with article 145 of the education law of the State of New York to practice the profession of engineering, and include the following:

Technical Content of the Report:

The FER must include the following:

☐ **Yes** Clear identification of the boundaries of the site as described in the Brownfield Cleanup Agreement (BCA), ERP State Assistance Contract, Voluntary Cleanup Agreement, or for a Superfund site as defined in the Order on Consent or the Inactive Hazardous Waste Disposal Site Registry.

☐ **Yes** ☐ **N/A** Clear identification of the boundaries of the real property subject to the environmental easement or other institutional controls, if different than the site boundaries described above.

☐ **Yes** A metes and bounds description and survey map must be included in the FER which corresponds to the above site boundaries. If no survey was required as part of and institutional control, (i.e., for Track 1 or unrestricted remedies of an entire tax parcel), then these can be the metes and bounds description from the property deed and the property tax map.

☐ **Yes** A description of the remedial activities completed at the site, including previous CCRs and the project which is the subject of this FER, completed in accordance with the remedial work plan(s) and/or decision document(s) for the site.

☐ **Yes** ☐ **N/A** A complete description of any ICs/ECs employed at the site.

☐ **Yes** Identification of the cleanup levels applied to the remedial actions, for each media of concern and area of concern at the site.

☐ **Yes** A summary of the implementation of the remedial actions, which includes as appropriate:

□ A description of any problems encountered during construction and their resolution;
□ A description of changes to the design documents and why the changes were made; including documentation of the approval of the change by DEC.
□ Quantities and concentration of contaminants removed or treated;
□ A listing of the waste streams, quantity of materials disposed and where they were disposed.

□ **Yes** The FER substantially follows the guidance provided in DER-10: Technical Guidance for Site Investigation and Remediation and specifically includes the following, as appropriate to the remedy:

□ **Yes** □ **No** □ **N/A** A detailed description of site restoration activities pursuant to DER-10.

□ **Yes** □ **No** □ **N/A** A detailed description of the source and quality of imported fill pursuant to DER-10.

□ **Yes** □ **No** □ **N/A** For active groundwater remedial actions consisting of groundwater extraction or control: The FER should also include figures representative of flow conditions immediately preceding initiation of the remedial action and flow conditions representative of pumping conditions required by the remedy.

□ **Yes** □ **No** □ **N/A** For SSF and ERP projects, where State funding is provided: A detailed summary of actual costs including bid tabulations and change orders.

Tables and Figures: **Included** □ **Yes** □ **No** □ **N/A**
As set forth in DER-10 tables and figures presenting post-remedial data as appropriate to document the satisfactory completion of the remedial action. The figure/tables should clearly indicate the nature and extent of any contamination remaining at the site.

As-Built Drawings: **Included** □ **Yes** □ **No** □ **N/A**
"As-built" drawings, with a NYS P.E. stamp and signature on each drawing, were provided. The as-built drawings must identify:

□ **Yes** The boundaries of the site, and if different, the real property subject to the environmental easement; other institutional controls must be incorporated on all figures.

□ **Yes** □ **N/A** The location and extent of all engineering controls including, without limitation, slurry walls, treatment units, piping and instrumentation wiring or other remedial structures which will remain in place after completion of the remedial action.

□ **Yes** □ **No** □ **N/A** Permanent survey markers for horizontal and vertical control for site management, where required.

□ **Yes** □ **No** □ **N/A** For projects with soil covers and/or caps: the areal and vertical (depth) extent of the covered/capped area, including identification of buildings and/or paving which are considered part of the site cover/cap as well as a description of the material and depths of the demarcation layer.

□ **Yes** □ **No** □ **N/A** For projects with soil removals: the limits of the excavation, the depth of the excavation and location of all documentation samples.

□ **Yes** □ **No** □ **N/A** For projects with underground storage tank removals: the size and contents of the tank(s) identified and addressed by the remedy, the surveyed location of the tanks removed or abandoned in place and the extent of any soil removal as per above.

Electronic Attachments: **Included** □ **Yes** □ **No** □ **N/A**
The following information should be submitted only in an electronic format that is acceptable to the DER with the FER.

□ **Yes** □ **No** □ **N/A** Copies of all fully executed manifests documenting off-site transport and disposal of all material deemed hazardous or solid wastes.
□ **Yes** □ **No** □ **N/A** All analytical data for pre and post-excavation samples, soil backfill analyses, treated water effluent analyses, and waste disposal characterizations, including all laboratory data sheets and the required laboratory data deliverables pursuant to DER-10.
□ **Yes** □ **No** □ **N/A** Photographs

EQuIS Data Packages
□ **Yes** □ **No** □ At a minimum, post-excavation soil data and baseline groundwater groundwater data must be submitted and accepted into EQuIS.

Site Management Plan (SMP):
□ **N/A** If none is required for the remedy which is the subject of this FER, check here.
□ **Yes** The approved SMP is included in, or specifically referenced by, the FER.
□ **Yes** The required certification regarding the SMP is included in the Certification Section below.

Environmental Easement or Deed Restriction (where applicable)
□ **N/A** If none is required for the remedy which is the subject of this FER, check here.
□ **Yes** A filed copy of the environmental easement or deed restriction with proof of filing with the responsible municipal authority is included in the FER or has been provided to DEC.
□ **Yes** A certification that the easement or deed restriction has been filed and the municipalities having jurisdiction over the easement or deed restriction have been notified is required. See Certification Section below for the language of this certification.
□ **Yes** □ **No** The County Recording Identifier number is provided in the FER.

Financial Assurance
□ **N/A** If none is required for the remedy which is the subject of this FER, check here.
□ **Yes** □ **No** □ **N/A** Identify the financial assurance mechanisms required for the site and include the copy of the executed mechanism.
□ **Yes** A certification that the Financial Assurance has been submitted by the applicant must be included in the FER. See Certification Section below for the language of this certification.

Citizen Participation
□ **Yes** (BCP Only) A fact sheet was issued to the site contact list after the FER was submitted, but prior to DEC approval of the FER.

□ **Yes** (BCP Only) A fact sheet to the site contact list will also be issued within 10 days of when the Certificate of Completion is issued by DEC and, if applicable, will include a summary of the institutional and/or engineering controls implemented by the remedy.
□ **Yes** (SSF Only) A Notice of the COC/Reclassification shall be combined into one Fact Sheet and mailed to the site contact list no sooner than 20 days after issuance of the of the COC. If the site is being delisted, the notice may be mailed immediately; allow for a 30 day public comment period and the classification will be changed 60 days after the COC issuance (or end of comment period if later)
□ **N/A** (ERP)

FER Professional Engineer Certification and Stamp: **Included □ Yes □ No**

The FER will be prepared, stamped and the following certification signed by an individual licensed or otherwise authorized in accordance with article 145 of the education law to practice the profession of engineering:

□ I, _____, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the [Remedial Action Work Plan or Remedial Design] was implemented and that all construction activities were completed in substantial conformance with the Department-approved [Remedial Action Work Plan or Remedial Design].

Included □ Yes □ No

If the RAWP or RD identifies time frames to be achieved by the remedial program:

□ I certify that the data submitted to the Department with this Final Engineering Report demonstrates that the remediation requirements set forth in the [Remedial Action Work Plan or Remedial Design] and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established for the remedy.

Included □ Yes □ No

□ I certify that all use restrictions, Institutional Controls, Engineering Controls, and/or any operation and maintenance requirements applicable to the Site are contained in an environmental easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

Included □ Yes □ No □ N/A

□ I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by Department.

Included □ Yes □ No □ N/A

If financial assurance is required:

□ I certify that any financial assurance mechanisms required by the Department pursuant to Environmental Conservation Law have been executed.

Included □ Yes □ No □ N/A

□ I certify that all documents generated in support of this report have been submitted in accordance with the DER's electronic submission protocols and have been accepted by the Department.

Included □ Yes □ No

□ I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

Included □ Yes □ No

□ I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as Owner's Designated Site Representative (and if the site consists of multiple properties): [and I have been authorized and designated by all site owners to sign this certification] for the site.

Included □ Yes □ No

****

For DEC Internal Use Only:

Site Contact List:
□ **N/A** (BCP, ERP, SSF if site locality was canvassed for list serve)
□ **Yes** (SSF if not exempt thru list serve participation and deemed necessary by ADD) Provide to SCS as defined in Part 375-1.2(as). For additional guidance in preparing the SCL, go to http://internal.dec.state.ny.us/der/der309.html

UIS:

Update Remedial Site Information on Main Page

- □ **Site Description:** For guidance see http://internal.dec.state.ny.us/der/der274.html
- □ **Site Environmental Assessment:** Be sure it reflects conditions after the remedy is implemented (see http://internal.dec.state.ny.us/der/der274.html)
- □ **Site Health Assessment:** request from DOH to reflect post-remediation conditions.
- □ **Site Name, Address, & Size:** verify and notify SCS for changes
- □ **Contacts**: verify owner and all other affiliations are accurate and complete
- □ **Easement Identifier:** Enter the County Recording Identifier using the Cross Reference button on the main site page.
- □ **Clean Up Track:** (for BCP sites) provide to SCS for data entry

Class History File - A Class History file (A to C) should have been auto-generated when the COC project was created. However, for older projects, this may not have occurred, and one must be

requested from Site Control. The Basis for Classification should be entered as follows:

- ☐ **Basis for Classification Change:** Use the standard language for this type of reclassification "Approval of the FER constitutes final approval of the Department's decision to reclassify the site to a class C. The classification in the UIS will be changed upon COC issuance and associated citizen participation." (see http://internal.dec.state.ny.us/der/der256.html)

IC/EC Module

- ☐ Property information is complete and accurate for all parcels
- ☐ Control information: If UNRESTRICTED USE/TRACK 1, check No Controls Needed in site property details

ICs: ☐ **Yes (**indicate all) or; ☐ **N/A**

ECs: ☐ **Yes (**indicate all) or; ☐ **N/A**

- ☐ Dates - applicable dates, e.g. ☐Control In Place☐ date (filed with County Clerk)
- ☐ Control Description - provide a summary of restrictions, in sufficient level of detail to list on the Site Management Form.

UIS Projects - as applicable, verify start and end dates, status for all projects, especially;

- ☐ RA End Date – Set this for the month the COC issuance is anticipated. This will auto-update the COC End Date, SM Start Date, and first PRR dates.

Filed in EDMS - as applicable, verify that all applicable documents or equivalent, are present and properly named;

- ☐ **Agreement/Order/SAC:** (e.g., agreement.C231011.2006-01-01.BCA.pdf)
- ☐ **Environmental Easement / Deed Restr.:** w/co. Clerk Certificate (e.g., easement.130058.2006-01-01.pdf)
- ☐ **Site Management Plan:** (e.g., workplan.130058.2006-01-01.SMP.pdf)
- ☐ **Final Engineering Report:** (e.g., report.E915182.2006-01-01.FER.pdf)
- ☐ **Site Boundary Map:** Provide tax map, or other that clearly indicates the site boundaries.

The review of the Final Engineering Report has been completed and found to satisfy all applicable requirements and guidance as detailed above. The Final Engineering Report is therefore recommended for approval.

Completed by:_____ Date:_____
Project Manager

Reviewed by: _____ Date:_____
Section Chief/Regional HWR Engineer

APPENDIX 13
PROJECT SCHEDULE

RAWP Implementation Schedule

	2018					2019				
Site Remedial Development and Closure	**August**	**September**	**October**	**November**	**December**	**January**	**February**	**March**	**April**	**May to December**
Construction Notice Fact Sheet	**Aug 1**									
Obtain Permits	**Aug 1 to 14**									
Site Development and construction of Engineering Controls	**Aug 22 to Jan 21**									
Environmental Easement Development (if necessary)			**Oct 2 to 12**							
Draft SMP (if necessary)			**Oct 2 to 31**							
Draft FER			**Oct 2 to Nov 22**							
Environmental Easement recording					**Dec 10**					
FER Fact Sheet						**Jan 18**				
DEC Review and Approval of FER and SMP							**Feb 13 to Mar 11**			
Certificate of Completion								**Mar 25**		
IC/EC Notice Fact Sheet (within 10 days of Notice)									**Apr 29**	
Implement of SMP (Operations, Maintenance and Annual Inspections)										TBS

TBS…to be scheduled