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198 East 135th Street
Bronx, NEW YORK
Block 2319, Lots 60 and 160

SITE MANAGEMENT PLAN

NYSDEC Site Number: C203084

Prepared for:

Deegan 135th Realty LLC
199 Lee Avenue,
Brooklyn, New York
cschwimmer@csbuilders.com

Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2019

CERTIFICATION STATEMENT

Site Management Plan
198 East 135th Street

I Tarek Z. Khouri certify that I am currently a NYS registered professional engineer and that this Site Management 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).

Tarek Z. Khouri P.E

12/12/2019

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LIST OF ACRONYMS

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Green House Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party

RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification:
Site No: **C203084**
198 East 135th Street, Bronx, NY 10451

Institutional Controls:	1. The property may be used for restricted residential; Commercial, and Industrial use;
	2. All ECs must be operated and maintained as specified in this SMP;
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP;
	4. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
	5. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
	6. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
	7. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
	8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;

	9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;	
	10. Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;	
	11. Vegetable gardens and farming on the Site are prohibited.	
Engineering Controls:	1. Cover system	
Inspections:		Frequency
1. Cover inspection		Annually
Maintenance:		
1. Cover Integrity		As needed
Reporting:		
2. Periodic Review Report		Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 198 East 135th Street Site located in Bronx, New York (hereinafter referred to as the "Site"). The Site location map can be found in Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Index No. C203084-03-16, Site No. C203084 which is administered by New York State Department of Environmental Conservation (NYSDEC).

Deegan 135th Realty LLC entered into a Brownfield Cleanup Agreement (BCA), on May 18, 2016 (amended on June 20, 2017) with the NYSDEC to remediate the Site. A figure showing the Site location and boundaries of this Site is provided in Figure 2. The boundaries of the Site, within which Site management is required, are more fully described in the survey plan that indicates the metes and bounds Site description and the public easements that is part of the Environmental Easement provided in Appendix 1.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC and recorded with the Office of the City Register of the City of New York, under recording number 2019000393433, requires compliance with this SMP and all ECs and ICs placed on the Site. A copy of the proof of filing of the easement is provided in Appendix 1.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in Appendix 2 of this SMP.

This SMP was prepared by HydroTech Environmental Engineering and Geology, DPC, on behalf of Deegan 135th Realty LLC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the Site conditions. In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the BCA, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Brownfield Cleanup Agreement (BCA), and all approved work plans and reports, including this SMP.

- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix 2.

Table 1: Notifications*

Name	**Contact Information**
NYSDEC Project Manager Kyle Forster	(518) 402-8644. kyle.forster@dec.ny.gov
NYSDEC Regional DER Contact Jane O'Connell	(718) 482-4599. jane.oconnell@dec.ny.gov
NYSDEC Site Control Contact Kelly Lewandowski	(518) 402-9553. kelly.Lewandowski@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located at 198 East 135th Street in Bronx County, New York. The Site consists of two parcels identified as Block 2319 and Lots 60 and 160 on the New York City Tax Map. A Site location map is provided in Figure 1. The Site is an approximately 1.112-acre area (48,976.76 square feet) with Lot 60 is approximately 0.501 acres (21,817.41 square feet) and Lot 160 is approximately 0.624 acres (27,159.35 square feet). The Site is bounded by a 7-story commercial storage complex to the north, west and southwest, a vacant land and a 5-story residential building to the southeast and Exterior Street/Major Deegan Expressway to the northeast A Site Layout Map is provided in Figure 2. The boundaries of the site are more fully described in Appendix 1 – Environmental Easement. The owner(s) of the Site parcel(s) at the time of issuance of this SMP is/are:

Deegan 135th Realty LLC
199 Lee Avenue,
Brooklyn, New York 11211

2.2 Physical Setting

2.2.1 Land Use

The Site consists a vacant and undeveloped lot and was historically part of Lot 55, which was utilized as a railroad freight yard, a coal yard, a warehouse and various industrial uses. Utility easements are situated beneath the Site with a Con Edison Co. easement located along the far eastern portion and is approximately 39.25 feet wide and a gas easement and a sewer easement along the far northern portion and is approximately 10 feet wide.

The Site is zoned M1-3/R8/MX-1 (Residential, commercial and manufacturing). The M1-3 district allows for development of commercial and community facility buildings as towers with parking requirements. The MX-1 district is a special use district that allows for commercial, community and light industrial developments. The R8 district is a high density residential district allowing residential development set with height factor regulations that begin at height of 85 feet above the street line. Each lot at the Site is currently undergoing development of two 25-story mixed residential and Commercial use towers with a full basement, plus stair/elevator and bulkhead. In each building the first floor will be used for parking, commercial space, a residential lobby, residential amenity, compactor room and electric meter room. The second floor will also be used for parking. Floors 3-25 will consist of residential units. The combined buildings footprint at Lot 60 and 160 will be approximately 13,570-square feet. The development at the Site excludes the two areas of utility easements located in the eastern and northern portions.

The properties adjoining the Site, and in the neighborhood surrounding the Site, primarily include residential, commercial, industrial properties. The properties immediately south and west of the Site include commercial storage buildings, the properties immediately east of the Site include commercial buildings. The Major Deegan Expressway is located immediately to the north of the Site.

2.2.2 Geology

According to the previous Remedial Investigation (RI) and observations made during the site remedial excavation, bedrock resides at a depth greater than 40 feet below ground surface (bgs). Historic fill, which is composed of fill consisting of a mixture of gravel, sand, rocks and construction debris extends from surface down to about 8 and 12 feet or the depth of soil and groundwater interface beneath Lot 160 and to unknown depth below the groundwater interface beneath Lot 60. The fill layer is underlain by a native a peat and silty sand layer at Lot 160. Soil borings in the RI did not occur deeper than 16 feet bgs.

2.2.3 Hydrogeology

The property has an elevation of approximately 15 feet above mean sea level. The depth to groundwater beneath the Site, as determined from field measurements during the RI, ranges from 9.1 feet to 14.67 feet. Groundwater flow was found to generally be from southeast to northwest. A total of three (3) temporary monitoring wells were installed on the Site during the RI. All three monitoring wells were decommissioned following completion of the RI.

A groundwater contour map is shown in Figure 3. Groundwater elevation data is provided in Table 2.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

2.3.1 Remedial Investigation Reports

December 2006 - Subsurface (Phase II) Investigation prepared by AKRF, Inc.

This investigation cited previous environmental studies performed at the Site as part of a larger site and included a Phase I Environmental Site Assessment (ESA) in June 1995 by Aqua Terra Environmental Services Corp., a Phase I Update in September 1997, a Subsurface (Phase II) Investigation in January 1998, and a supplemental Subsurface (Phase II) Investigation in February 1998 by Land Tech Remedial, Inc. These reports were used to establish a Site history. The Site was historically part of Lot 55, which was utilized as a railroad freight yard, a coal yard, a warehouse and various industrial uses.

The Site is associated with NYSDEC Spill #0001384 which was reported on May 4, 2000 and subsequently closed on June 21, 2000 following the excavation and offsite removal of approximately 4,000 cubic yards of soil and the collection of post-excavation confirmatory endpoint samples from historical Lot 55.

The following Areas of Concern (AOCs) for this site were identified as follows:

1. The historical use of the Site as a railroad freight yard, a coal yard, a warehouse and various manufacturing purposes
2. The commercial use of surrounding properties includes furniture restoration.

The Subsurface (Phase II) Investigation AKRF was performed during November 2016 and included the installation of five soil probes (AK-SB-1 to AK-SB-5). Four (4) of the five soil proves were installed to 10 feet bgs and one boring was installed to 15 feet bgs. Refer to Figures 4 for the Site sampling plans that includes the locations of the five soil probes. A total of ten (10) soil samples were collected across the Site including three (3) shallow samples from 1 to 2 feet bgs, two (2) shallow samples from 2 to 3 feet bgs, one (1) deep samples from 6 to 7 feet bgs, two (2) deep samples from 8 to 10 feet bgs, and one (1) deep sample from 9 to 10 feet bgs to evaluate soil quality. Soil samples were analyzed for volatile organic compounds (VOCs) via EPA Method 8260, semi-volatile organic compounds (SVOCs) via EPA Method 8270, Pesticides and Polychlorinated Biphenyls (PCBs) via EPA Method 8081/8082 and Target Analyte List (TAL) Metals.

September 2015 - Remedial Investigation Report September 2015 and - Supplemental Remedial Investigation Report March 2017 by Hydro Tech Environmental, Corp.

Remedial Investigations (RIs) were conducted by Hydro Tech between *June 2015* and *February 2017*, and included the installation of nine (9) soil probes (SP1-SP9), three (3) groundwater wells (MW-1, MW-2R and MW3), six (6) soil vapor probes around the site perimeter (SV1-SV5), and Furthermore, a Ground Penetrating Radar (GPR) survey was conducted across the entire Site. six (6) of the nine soil probes were installed to 12 feet bgs and three (3) soil probes were installed to 16 feet bgs. Refer to Figure 4 for the Site sampling plans. This includes the locations of the soil borings, monitoring wells and sub-slab vapor probes installed by Hydro Tech. The GPR detected no underground anomalies that would be indicative of underground storage tanks.

A total of thirty (30) soil samples were collected across the Site including seven (7) shallow samples from zero to 2 feet bgs, three (3) shallow sample from 2 to 4 feet bgs, one (1) shallow sample from 4 to 6 feet bgs, three (3) deep sample from 6 to 8 feet bgs, one (1) deep sample from 8 to 10 feet bgs, nine (9) deep samples from 10 to 12 feet bgs, three (3) deep samples from 12 to 14 feet bgs, and three (3) deep samples from 14 to 16 feet bgs to evaluate soil quality. Three (3) groundwater samples were collected. Five (5) soil vapor samples were collected around the Site perimeter. Soil samples were analyzed for volatile organic compounds (VOCs) via EPA Method 8260, semi-volatile organic compounds (SVOCs) via EPA Method 8270, Pesticides and Polychlorinated Biphenyls (PCBs) via EPA Method 8081/8082 and Target Analyte List (TAL) Metals. Groundwater samples collected on-Site were analyzed for VOCs via EPA Method 8260, SVOCs via EPA Method 8270, Pesticides and PCBs via EPA Method 8081/8082 and total/dissolved TAL Metals. Groundwater samples collected on-Site and off-site were analyzed for VOCs via EPA Method 8260. Soil vapor sample were analyzed for VOCs via EPA TP-15. The findings from these tests were documented in two reports written by Hydro Tech: a Remedial Investigation Report (RIR) dated *September 2015*, and a Supplemental RIR dated *March 2017*.

Hydro Tech modified its initial list of AOCs to reflect the findings documented in the RIR as follows:

AOC-1: Presence of Historic fill material.

- AOC-2: Presence soil gas at the Site.

The remainder of this section will quantitatively summarize the findings of the RIRs.

Soil samples collected during the RI indicate that Analytical results of soil/fill samples reported trace concentrations of several volatile organic compounds (VOCs) with acetone (max. 0.180 mg/kg) exceeding Unrestricted Use SCOs in two shallow and twelve deep samples. Acetone is a common laboratory contaminant used to clean laboratory equipment and is not indicative of Site conditions. Several semi-volatile organic compounds (SVOCs) consisting of Polycyclic Aromatic Hydrocarbons (PAH) compounds were detected with benz(a)anthracene (max. 18.4 mg/kg), benzo(a)pyrene (max. 15.4 mg/kg), benzo(b)fluoranthene (max. 10.8 mg/kg), benzo(k)fluoranthene (max. 12.9 mg/kg), chrysene (max. 19.5 mg/kg), dibenzo(a,h)anthracene (max. 6.52 mg/kg) and indeno(1,2,3-cd)pyrene (max. 11.4 mg/kg) exceeding Restricted Residential SCOs in eighteen shallow and seven deep samples. Pesticides were detected in fifteen shallow samples and six deep samples at concentrations exceeding Unrestricted Use SCOs, including 4,4'-DDD (max. 0.231 mg/kg), 4,4'-DDE (max. 0.0364 mg/kg), 4,4'DDT (max. 0.213 mg/kg) and dieldrin (max. 0.0148 mg/kg). Total PCBs (max. 0.814 mg/kg) exceeded Unrestricted Use SCOs in seven shallow samples and in two deep samples. Several metals including arsenic (max. 18.8 mg/kg), barium (max. 1,010 mg/kg), cadmium (max. 2.61 mg/kg), copper (max. 395 mg/kg), lead (max. 1,020 mg/kg), manganese (max. 2,670 mg/kg), mercury (max. 5.5 mg/kg), nickel (max. 44.30 mg/kg), selenium (max. 12.70 mg/kg) and zinc (max. 20,600 mg/kg) were detected in seven shallow samples and twenty one deep samples at concentrations exceeding Unrestricted Use SCOs.

Of these metals, arsenic, copper, barium, cadmium, lead, manganese, mercury, also exceeded Restricted Residential SCOs in ten shallow samples and sixteen deep samples.

Groundwater samples collected during the RI showed no PCBs in any samples. No VOCs or pesticides were detected in any samples at concentrations above GQS. One SVOC, bis(2-ethylhexyl) phthalate (14.6 µg/L) was detected at a concentration exceeding its GQS in one groundwater sample. Several dissolved metals were identified in groundwater but only magnesium (max. 39,900 ug/L), manganese (max. 1,060 ug/L), selenium (max. 12 ug/L) and sodium (max. 269,000 ug/L) exceeded their respective GQS.

Soil vapor samples collected during the RI showed moderate levels of petroleum-related VOCs ranging from 1.10 µg/m^3 to 110 µg/m^3. The compound n-hexane was the highest detected compound with a concentration of 110 µg/m^3 in SV-5. Total concentrations of petroleum-related VOCs (BTEX) was 100 µg/m^3 in SV-5. Chlorinated VOCs were also detected with tetrachloroethylene (PCE) detected at a maximum of 240 µg/m^3, above monitoring level ranges established within the New York State Department of Health (NYSDOH) soil vapor guidance matrix.

2.3.2 Remedial Action

June 2017 – Remedial Action Work Plan by HAKS Engineers and Land Surveyors, P.C.

In response to the findings during the RIs, a Remedial Action Work Plan (RAWP) was prepared by HAKS in June 2017. The RAWP proposed a soil excavation remedy to the Unrestricted Use Soil Cleanup Objectives (UUSCOs) resulting in a Track 1 cleanup. Under this cleanup option, all soil/fill exceeding the UUSCOs across the entire Site will be removed to variable depths: to the depth of 8 feet bgs beneath the northeast corner, to the depth of 10 feet bgs beneath the southern portion, to the depth of 12 feet beneath the middle portion, to the depth of 16 feet beneath the northwest corner.

These excavation depths were established from the former grade elevation at the Site, which was approximately 2 feet higher than the benchmark elevation adopted for the Site development at the curb cut along E 135th Street to the north. The excavations of soil/fill below the depth of 12 feet was performed in an interim unsaturated zone facilitated by dewatering activities, which started on March 28, 2018 and April 15, 2019. Thirty (30) confirmation post-excavation end point samples would be collected following materials removal.

Remedial Actions Completed

Excavation at the Site was completed according the RAWP with certain deviations. The deviations relate to

- Two utility easements consisting of a ConEdison easement that is 40 feet wide and runs along the eastern portion of the Site and a Gas easement and sewer easement that is 10 feet wide and ring along the northern portion of the Site on East 135th Street.
- Additional excavation performed in eastern portion at Lot 160 as a result of movement and temporary stockpiling of soil/fill material exceeding UUSCOs in the central and southern portion of this lot.

Site remedial excavation commenced on December 22, 2017 and was completed on March 26, 2019. Site excavation was first performed at Lot 160 and progressed toward Lot 60 with the exclusion of utility easements. According to a survey dated May 30, 2019, the excavation at Lot 160 was performed to depths ranging between 11.72 feet and 13.10 feet in northern section, to the depth of 23 feet beneath elevator pit in the central portion and to depths ranging between 13.52 feet and 15.71 feet in the southern section. Native peat layer was encountered below 12. The excavation at Lot 60 was performed the depth of 12 feet across this lot except the northeastern portion which was excavated to the depth of 23 feet for the elevator pit. Native peat layer was not encountered at this lot below 12 ft.

A total of 36,048 tons of soil / fill material and a total of 1,759.14 tons of former concrete foundations removed from Lot 60 and 160 and sent to the following facilities:

- 7,496.1 tons were disposed at Former Gerdau Ameristeel Perth Amboy Mill located at 225 Elm Street, Perth Amboy, NJ.
- 16,936.6 tons of soil / fill material were disposed at Former Griffin Pipe Products Site located at 1100 West Front Street, Florence in Burlington County, NJ.
- 11,195.6 tons of soil / fill material were disposed at Former NJ Zinc Brownfield, LLC – Phase III Environmental, LLC located at 1120 Mauch Chunk Road, Palmerton, PA.
- 1,759.14 tons of former concrete foundations and 419.49 tons of soil / fill material were disposed as C&D at Impact Reuse & Recovery Center located at 1000 Page Avenue in Lyndhurst, NJ.

Off-site material consisting of 2.5-inch bluestone was imported to the Site to provide a temporary tracking pad support at the base of excavation for an oversized rig involved in the installation of sub-grade piles. Between May 15, 2018 and November 15, 2018, a total of 3,111.71 tons of 2.5-inch bluestone were imported Clinton Quarry Location at 5 Route 173, Union Township, Hunterdon County, NJ. Some of this tracking pad stone was mixed with the remining on-site soil at Lot 60. The stone tracking pad material placed at Lot 160 was completely removed during Site excavation.

Off-site material consisting of 1.5-inch bluestone was also imported to the Site to provide a structural base beneath the buildings mat slab at Lot 60 and Lot 160. Between January 30, 2017 and May 2, 2018, a total of 848.49 tons of 1.5-inch was imported from Impact Reuse & Recovery Center (“IRRC”) located at 1000 Page Avenue, Lyndhurst, NJ.

Off-site material consisting of clean soil of native origin (general fill) and also of recycled source (RCA) was imported to the Site as a permanent backfill to restore the elevation across the footprint of the building at the site following excavation. RCA was also used to backfill around foundation walls outside the BCA site boundaries. Between December 10, 2018 and January 7, 2019, a total of 780 cubic yard of general fill was imported to the Site from NYC OER soil bank from 1860 Eastern Parkway located in Brooklyn, NY. Between December 6, 2018 and September 25, 2019, a total of 2,546.7 tons of RCA was imported to the Site from Lyndhurst IRRC Facility located at 1000 Page Avenue in Lyndhurst, NJ.

On April 18, 2018, a groundwater sample was taken from a sediment containment tank associated with the dewatering system in order to be analyzed for emerging contaminants.

A building 12-inch thick slab was poured across the build area at Lot 160 on April 1, 2018 and d at Lot 60 on November 27, 2018 A slab that is 12-inch thick will be poured the two utilities easements at the Site around November 1, 2019.

At the conclusion of Site excavation, confirmation end-point sampling was performed on different dates. On June 8, 2018 endpoint soil samples EP-4, EP-5, EP-11, EP-12 and EP-17 to EP-24 were collected at Lot 160 from native peat layer 8 at bottom of trenches excavated for spread footings. On October 10, 2018 endpoint samples EP-4, EP-5, EP-11, EP-12 and EP-17 to EP-24 were recollected with a suffix “a” assigned to the sample IDs following additional excavation at the request of NYSDEC along with EP-2 and EP-3. On October 29, 2018, samples EP-11a, EP-12a, EP-17a and EP-19a were recollected a suffix ‘b” assigned to their IDs for failing UUSCOs and following additional excavation. On July 2, 2018 and endpoint samples EP-13 to EP-16 were collected at Lot 60 followed by EP-25 to EP-30, which were collected and on December 14, 2018.

On May 10, 2019 endpoint samples EP-1 and EP-6 to EP-10 were collected in the unexcavated Con Edison easement located along the eastern portion of Lot 160 and endpoint samples EP-31 to EP-34, which were then added to the scope of RAWP were collected in the unexcavated gas and sewer easement located in the northern portion of Lot 160 and Lot 60.

A post-remedial action soil vapor intrusion evaluation was conducted based on the end point sampling results and remedial activities that were performed at the Site. The outcome of this evaluation indicated that the mitigation of potential soil vapor intrusion is not needed at the Site.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated June 30, 2017 are as follows:

2.4.1 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.4.2 Soil Vapor

RAOs for Public Health Protection

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

2.5 Remaining Contamination

2.5.1 Soil

Confirmation post excavation end-point samples designated were collected from the bottom of excavation across the excavated and non-excavated easement areas at the Site in compliance with the RAWP and other stipulations required by NSYDEC for end point sampling in the unexcavated gas and sewer easement. A total of fourteen (14) endpoint samples were collected beneath the build area at Lot 160 beneath Building A. Twelve (12) samples EP-11, EP-12 and EP-17 to EP-24 were collected on June 18, 2019. These 12 samples were re-collected with suffix "a" along with EP-2 and EP-3 on October 10, 2018 following the removal of temporary stockpiles of soil/fill located across Lot 160. Four of these samples, EP-11a, EP-12a, EP-17a and EP-19a were re-collected with a suffix "b" on October 29, 2019 following additional excavation of soil fill at these locations for failing UUSCOs. A total of ten (10) endpoint samples EP-13 to EP-16 and EP-25 to EP-30 were collected beneath the build area at Lot 60 beneath Building B; EP-16 and EP-25 were collected on July 2, 208 and EP-25 to EP-30 were collected on December 14, 2018. Six (6) end point samples EP-1, EP-6 to EP-10 were collected in the unexcavated Con Edison easement and four (4) end point samples EP-31 to EP-34 were collected at the unexcavated gas and sewer easement on May 10, 2019.

All endpoint samples were analyzed for (VOCs) via EPA Method 8260, SVOCs via EPA Method 8270, Pesticides and PCBs via EPA Method 8081/8082 and Target Analyte List (TAL) Metals.

The UUSCOs were achieved beneath the build area at Lot 160, while the Restricted Residential Soil Cleanup Objectives (RRSCOs) were achieved in the Con Edison easement in the eastern portion of this lot and the gas and sewer easement in the northern portion. In addition, RRSCOs were also achieved for the entire Lot 60 including the gas and sewer easement in the northern portion of this lot.

Analytical results for endpoint samples collected at the final elevations of excavation floor were compared to the 6NYCRR Part 375, Table 6.8(b) UUSCOs and RRSCOs. The VOC acetone was detected at concentrations exceeding UUSCOs in three samples in the excavated area at Lot 160, four samples in the excavated area at lot 60 and four samples in the two utility easements. Acetone was reported in the analysis batch blank and also in the trip blanks and is commonly known as a laboratory contamination. The final endpoint samples collected in the excavated area at Lot 160 were at concentrations below Unrestricted Use SCOs. SVOCs were detected at concentrations exceeding UUSCOs and the RRSCOs in five samples of the ten samples collected at Lot 60, five of the six samples collected in the Con-Edison easement and two of the four samples collected in the gas and sewer easement. These detected SVOCs include Benzo (a) Anthracene (max. 6.09 ppm), Chrysene (max. 6.28 ppm), Benzo (b) Fluoranthene (max. 5.65 ppm), Benzo (k) Fluoranthene (max. 5.10 ppm), Benzo (a) Pyrene (max. 6.46 ppm), Indeno (1,2,3-cd) Pyrene (max. 4.44 ppm), and Dibenzo (a,h) Anthracene (max. 1.46 ppm). Two pesticides 4,4'-DDD (max. 0.048 ppm), and 4,4'-DDT (max. 0.36 ppm) were detected in one sample collected at Lot 60 and three samples collected in the Con Edison easement. No PCBs were detected in any of the collected endpoint samples. Metals were detected at concentrations in exceedance of UUSCOs in four samples collected at Lot 160 including chromium trivalent (max 30.8 ppm), nickel (max 31.8 ppm) and selenium (max 4.14 ppm). These detected metals at Lot 160 marginally exceeded the UUSCOs and are considered as naturally occurring compounds in native soil at this lot. Metals were also at concentrations in exceedance of UUSCOs and the RRSCOs in nine samples collected at Lot 60, in six samples collected at the Con Edison easement and in three samples collected at the gas and sewer easement.

These metals included arsenic (22.9 ppm), cadmium (max. 4.56 ppm), chromium trivalent (max. 78.9 ppm), lead (max. 361 ppm), zinc (max. 626 ppm), copper (max. 221 ppm), and mercury (max. 4.75 ppm) and barium (max. 762 ppm).

Table 3 and Figure 5 summarize the results of all soil samples collected that exceed the Unrestricted Use SCOs and the Restricted Residential Use SCOs at the Site after completion of remedial action.

2.5.2 Soil Vapor Intrusion Assessment

As part of the remedial action, a soil vapor evaluation was conducted at the conclusion of site excavation and installation of ECs to determine the need to mitigate potential vapor intrusion impact beneath the new buildings at the site.

The results of end point samples collected following the removal of contaminated soil/fill material to or below the depth of the soil/ground water interface of 12 feet bgs revealed no VOC impact that would act as a potential source for soil vapors intrusion into the new building. Groundwater samples collected beneath the site during a remedial investigation performed in 2015 indicated the presence of VOCs consisting of gasoline derivatives beneath the northeastern portion at concentrations exceeding regulatory standards. The re-sampling of groundwater at this location of the site during a supplemental RI performed in 2017 indicated no VOCs were detected at concentrations exceeding regulatory standards. We assume that the concentration of dissolved VOCs must have decreased over time by monitored natural attenuation. Therefore, soil and groundwater at the site do not represent a source of soil vapors.

The soil vapor samples collected at 6 feet bgs during the RIR indicate the presence of VOCs that include moderate concentrations of chlorinated solvents and petroleum compounds. A concentration of PCE of 130 $\mu g/m^3$ was reported in the far southwestern portion of the Site. Chlorinated solvents were not detected in any soil or groundwater samples collected at the site.

The pathway of migration of any soil vapors into the new building is interrupted vertically by a mat concrete slab installed on top of a waterproofing membrane and laterally by the concrete foundations walls that are also sealed with a waterproofing membrane to the north and east and by the presence of open ramp to parking basement to the south and west. It should also be noted that the basement space at the site is designed for use as a parking garage, laundry room and spaces for storage and mechanical equipment. Since the Site is associated with a New York City Little E-designation for Air Quality and Noise (E-designation Number E-143), these common areas in the basement will be actively aerated and ventilated in accordance with New York City Mechanical Code.

Based on this evaluation, soil vapor intrusion mitigation will not be required at the Site.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since Track 4 cleanup was achieved across Lot 60 and across the gas easement and the Con Edison easement at Lot 160 due to remaining soil with contaminants at concentrations above RRSCOs, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment in these specific areas of the Site. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix 3) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the Site to Restricted Residential, Commercial, and Industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 6. These ICs are:

- The property may be used for: residential, restricted residential; commercial, industrial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;

- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.

- Vegetable gardens and farming on the Site are prohibited;

3.3 Engineering Controls

3.3.1 Cover

Exposure to remaining contamination at the Site is prevented by a cover system placed over the Site. This cover system is comprised of a minimum of 12-inch concrete slabs beneath the Building B at Lot 60 and also in open utility gas and sewer easement in the northern portion and in the Con Edison Co. easement located along the far eastern portion. Figure 7 presents the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in Appendix 3 outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) provided in Appendix 4 and associated Community Air Monitoring Plan (CAMP) prepared for the Site provided in Appendix 5.

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity. Procedures for maintaining the cover system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As built drawings showing the location of the cover system, signed and sealed by a professional engineer is included in Appendix 6.

3.3.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

4.0 MONITORING PLAN

4.1 General

This Monitoring Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring Plan may only be revised with the approval of the NYSDEC.

This Monitoring Plan describes the methods to be used for:

- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring Plan provides information on:

- Annual inspection and periodic certification.

Reporting requirements are provided in Section 6.0 of this SMP.

4.2 Site – wide Inspection

Site-wide inspections will be performed at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix 7 – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;

- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that Site records are up to date.

Inspections of all remedial components installed at the Site will be conducted. A comprehensive Site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If Site records are complete and up to date; and

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Cover System Monitoring

EC inspections and monitoring of the composite cover will be conducted annually. These activities shall include observations of the conditions of the concrete sidewalks, concrete building slab and asphalt-paved areas surrounding the building at the Site. The composite cover will be inspected for cracks, holes or other openings. Any cracks, holes or other openings in the composite cover that are observed during the EC inspection will be recommended to be immediately filled and/or sealed as necessary.

5.0 OPERATION AND MAINTENANCE PLAN

The Site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

5.0 PERIODIC ASSESSMENTS/EVALUATIONS

5.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the Site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the Site during periodic assessments, and briefly summarizes the vulnerability of the Site and/or engineering controls to severe storms/weather events and associated flooding.

The Site is located in the Port Morris neighborhood of the borough of Bronx, NY at an elevation of approximately 15 feet above mean sea level. Harlem River is located approximately 600 feet to the southwest. According to the FEMA Flood Map, this Site is located within a 0.2% annual chance flood hazard area. The Site is served by the NYC Municipal sewer system and the completed building will meet all NYC building codes for drainage. Therefore, the Site is considered to be vulnerable to storm events related to climate change.

5.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology.

This section of the SMP provides a summary of any green remediation evaluations to be completed for the Site during site management, and as reported in the Periodic Review Report (PRR).

5.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the Project Manager feels appropriate, e.g. during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

5.2.2 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption.

As part of this effort the following components shall be evaluated:

- Heating/cooling systems and temperature set-points;
- Building skin, insulation and building use and occupancy;
- Ventilation;
- Lighting and plug loads; and
- Grounds and property management.

5.2.3 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site and use of consumables in relation to visiting the Site in order to conduct system checks and or collect samples and shipping samples to a laboratory for analyses have direct and/or inherent energy costs.

The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

As part of this effort, consideration shall be given to:

- Reduced Site visits and system checks;
- Coordination/consolidation of activities to maximize foreman/labor time; and
- Use of mass transit for Site visits, where available.

5.2.4 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix 7 – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits; a set of metrics has been developed.

5.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;

- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a Site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focuses on overall Site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to Site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

6.0. REPORTING REQUIREMENTS

6.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix 7. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 4 and summarized in the Periodic Review Report.

Table 4: Schedule of Interim Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report and Periodic Review Report (PRR)	Annually, or as otherwise determined by the Department

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;

- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

6.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the Department beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted every 5 years to the Department or at another frequency as may be required by the Department. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix 1 -Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. A Site evaluation will assure compliance of the remedy with the requirements of the Site-specific RAWP, ROD or Decision Document and a visual assessment of the performance and effectiveness of the remedy.

6.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:*

- *The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*

- *Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;*

- *Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*

- *If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;*

- *Use of the Site is compliant with the environmental easement;*

- *The engineering control systems are performing as designed and are effective;*

- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Ssite remedial program and generally accepted engineering practices; and*

- *The information presented in this report is accurate and complete.*

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/Remedial Party or Owner's/Remedial Party's Designated Site Representative]: [I have been authorized and designated by all Site owners/remedial parties to sign this certification] for the Site."

At the end of each certifying period, as determined by the NYSDEC, the following certification will be provided to the Department:

"For each institutional identified for the Site, I certify that all of the following statements are true:

- *The institutional control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;*

- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*

- *Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;*

- *Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*

- *If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;*

- *Use of the Site is compliant with the environmental easement.*

- *The information presented in this report is accurate and complete.*

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 or Owner's Designated Site Representative]: [and I have been authorized and designated by all Site owners to sign this certification] for the Site."

- *No new information has come to my attention, including groundwater monitoring data from wells located at the Site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and*

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the Site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

6.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

6.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3, upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report is provided in Appendix 8. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual Site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the Site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

7.0 REFERENCES

- 6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.
- NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".
- NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).
- AKRF, Inc., Subsurface (Phase II) Investigation Report, 200 E 135th Street, Bronx, NY, December 2006.
- Hydro Tech Environmental, Corp., Remedial Investigation Report, 200 E 135th Street, Bronx, NY, September 2015.
- Hydro Tech Environmental, Corp., Supplemental Remedial Investigation Report, 198 E 135th Street, Bronx, NY, March 2017.
- HAKS., Remedial Action Work Plan, 198 E 135th Street, Bronx, NY, June 2017.

Tables

Table 2

Groundwater Monitoring and Surveying Data

198 East 135th Street, Bronx

Well ID	DTW (ft)	Water Table Elevation (ft)
MW-1	9.1	13.48
MW-2R	14.67	11.09
MW-3	10.24	13.38

All elevations are reported in feet above mean sea level NAVD-88 Datum

DTW = Depth to Water

Table 4
End Point Samples Analytical Results for VOCs
198 East 135th Street, Bronx , NY

Location	Build Area at Lot 160 - Building A																															
Sample ID	EP-2		EP-3		EP-4		EP-4 a		EP-5		EP-5 a		EP-11		EP-11 a		EP-11 b		EP-12		EP-12 a		EP-12 b		EP-17		EP-17 a		EP-17 b		EP-18	
Sample Depth **	-11.72		-13.37		-13.44		-11.40		-13.41		-12.06		-10.88		-13.59		-14.59		-10.88		-13.13		-14.13		-12.53		-14.45		-13.45		-13.29	
Sampling Date	10/10/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018	
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
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
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
1,1,1,2-Tetrachloroethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,1,1-Trichloroethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,1,2,2-Tetrachloroethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,1,2-Trichloro-1,2,2-trifluor	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,1,2-Trichloroethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,1-Dichloroethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,1-Dichloroethylene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2,3-Trichlorobenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2,3-Trichloropropane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2,4-Trichlorobenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2,4-Trimethylbenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2-Dibromo-3-chloropropa	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2-Dibromoethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2-Dichlorobenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2-Dichloroethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,2-Dichloropropane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,3,5-Trimethylbenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,3-Dichlorobenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,4-Dichlorobenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
1,4-Dioxane	0.0570	U	0.0480	U	0.0460	U	0.0550	U	0.0560	U	0.0490	U	0.0850	U	0.0570	U	0.0790	U	0.0410	U	0.0550	U	0.0740	U	0.0700	U	0.0770	U	0.0900	U	0.0800	U
2-Butanone	0.00560	J	0.00240	U	0.00340	J	0.00270	U	0.00280	U	0.00240	U	0.00430	U	**0.00630**		0.00400	U	0.00220	J	0.00270	U	**0.00900**		0.00510	J	**0.0120**		0.00450	U	**0.0120**	
2-Hexanone	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
4-Methyl-2-pentanone	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Acetone	**0.0210**		0.00480	U	**0.0230**		0.00550	U	**0.0270**		0.00530	J	**0.0430**		**0.0260**		**0.0640**		**0.0290**		0.00550	U	**0.0350**		**0.0370**		**0.0410**		**0.0550**		**0.0570**	
Acrolein	0.00570	U	0.00480	U	0.00460	U	0.00550	U	0.00560	U	0.00490	U	0.00850	U	0.00570	U	0.00790	U	0.00410	U	0.00550	U	0.00740	U	0.00700	U	0.00770	U	0.00900	U	0.00800	U
Acrylonitrile	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Benzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Bromochloromethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Bromodichloromethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Bromoform	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Bromomethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Carbon disulfide	0.00530	J	0.00240	U	0.00230	U	0.00270	U	**0.00730**		0.00240	U	0.00490	J	0.00420	J	0.00400	U	0.00300	J	0.00270	U	0.00370	U	0.00350	U	**0.00900**		0.00450	U	0.00420	J
Carbon tetrachloride	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Chlorobenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Chloroethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Chloroform	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Chloromethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
cis-1,2-Dichloroethylene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
cis-1,3-Dichloropropylene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Cyclohexane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00290	J	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Dibromochloromethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Dibromomethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Dichlorodifluoromethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Ethyl Benzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Hexachlorobutadiene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Isopropylbenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Methyl acetate	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Methyl tert-butyl ether (MT	0.00400	J	0.00240	U	0.00230	U	0.00270	U	0.00310	J	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Methylcyclohexane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Methylene chloride	0.00570	U	0.00480	U	0.00460	U	0.00550	U	0.00560	U	0.00490	U	0.00910	J	0.00570	U	0.00790	U	0.00430	J	0.00550	U	0.00740	U	0.00700	U	0.00770	U	0.00900	U	0.00800	U
n-Butylbenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
n-Propylbenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
o-Xylene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
p- & m- Xylenes	0.00570	U	0.00480	U	0.00460	U	0.00550	U	0.00560	U	0.00490	U	0.00850	U	0.00570	U	0.00790	U	0.00410	U	0.00550	U	0.00740	U	0.00700	U	0.00770	U	0.00900	U	0.00800	U
p-Isopropyltoluene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
sec-Butylbenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Styrene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
tert-Butyl alcohol (TBA)	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
tert-Butylbenzene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Tetrachloroethylene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Toluene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
trans-1,2-Dichloroethylene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
trans-1,3-Dichloropropylene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
trans-1,4-dichloro-2-butene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Trichloroethylene	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Trichlorofluoromethane	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Vinyl Chloride	0.00290	U	0.00240	U	0.00230	U	0.00270	U	0.00280	U	0.00240	U	0.00430	U	0.00290	U	0.00400	U	0.00200	U	0.00270	U	0.00370	U	0.00350	U	0.00390	U	0.00450	U	0.00400	U
Xylenes, Total	0.00860	U	0.00720	U	0.00690	U	0.00820	U	0.00840	U	0.00730	U	0.0130	U	0.00860	U	0.0120	U	0.00610	U	0.00820	U	0.0110	U	0.0100	U	0.0120	U	0.0140	U	0.0120	U

Location	Build Area at Lot 160 - Building A																												UUSCOs	RRSCOs
Sample ID	EP-18 a		EP-19		EP-19 a		EP-19 b		EP-20		EP-20 a		EP-21		EP-21 a		EP-22		EP-22 a		EP-23		EP-23 a		EP-24		EP-24 a			
Sample Depth **	-13.29		-12.53		-12.52		-13.27		-13.10		-13.10		-15.57		-15.57		10.77		10.77		-13.05		-13.05		-15.57		-15.57			
Sampling Date	10/10/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
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		
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
1,1,1,2-Tetrachloroethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,1,1-Trichloroethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.68	100
1,1,2,2-Tetrachloroethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,1,2-Trichloro-1,2,2-trifluor	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,1,2-Trichloroethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,1-Dichloroethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.27	26
1,1-Dichloroethylene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.33	100
1,2,3-Trichlorobenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,2,3-Trichloropropane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,2,4-Trichlorobenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,2,4-Trimethylbenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	3.6	52
1,2-Dibromo-3-chloropropa	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,2-Dibromoethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,2-Dichlorobenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	1.1	100
1,2-Dichloroethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.02	3.1
1,2-Dichloropropane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
1,3,5-Trimethylbenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	8.4	52
1,3-Dichlorobenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	2.4	49
1,4-Dichlorobenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	1.8	13
1,4-Dioxane	0.0700	U	**0.110**	U	0.0730	U	0.0970	U	**0.140**	U	0.0490	U	**0.180**	U	0.0530	U	0.0930	U	0.0520	U	**0.150**	U	0.0540	U	0.0450	U	0.0540	U	0.1	13
2-Butanone	**0.0150**		0.00540	U	0.00370	U	**0.0160**		**0.0160**		0.00240	U	0.00900	U	0.00270	U	**0.0220**		0.00260	U	**0.0240**		0.00270	U	0.00220	U	0.00270	U	0.12	100
2-Hexanone	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
4-Methyl-2-pentanone	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Acetone	**0.0500**		**0.0720**		0.00730	U	**0.0620**		**0.0700**		0.00490	U	**0.0770**		0.00530	J	**0.0920**	B	0.00520	U	**0.120**	B	0.00730	J	0.0140	B	0.00540	U	0.05	100
Acrolein	0.00700	U	0.0110	U	0.00730	U	0.00970	U	0.0140	U	0.00490	U	0.0180	U	0.00530	U	0.00930	U	0.00520	U	0.0150	U	0.00540	U	0.00450	U	0.00540	U	NS	NS
Acrylonitrile	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Benzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.06	4.8
Bromochloromethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Bromodichloromethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Bromoform	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Bromomethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Carbon disulfide	**0.00940**		**0.0160**		0.00370	U	0.00490	J	0.0120	J	0.00240	U	0.0150	J	0.00270	U	**0.00950**		0.00260	U	0.00960	J	0.00360	J	0.00220	U	0.00270	U	NS	NS
Carbon tetrachloride	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.76	2.4
Chlorobenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	1.1	100
Chloroethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Chloroform	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.37	49
Chloromethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
cis-1,2-Dichloroethylene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.25	100
cis-1,3-Dichloropropylene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Cyclohexane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Dibromochloromethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Dibromomethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Dichlorodifluoromethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Ethyl Benzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	1	41
Hexachlorobutadiene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Isopropylbenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Methyl acetate	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Methyl tert-butyl ether (MT	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00710	J	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.93	100
Methylcyclohexane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Methylene chloride	0.00700	U	0.0180	J	0.00730	U	0.00970	U	0.0170	J	0.00490	U	0.0180	U	0.00530	U	0.00930	U	0.00520	U	0.0150	U	0.00540	U	0.00770	J	0.00540	U	0.05	100
n-Butylbenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	12	100
n-Propylbenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	3.9	100
o-Xylene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
p- & m- Xylenes	0.00700	U	0.0110	U	0.00730	U	0.00970	U	0.0140	U	0.00490	U	0.0180	U	0.00530	U	0.00930	U	0.00520	U	0.0150	U	0.00540	U	0.00450	U	0.00540	U	NS	NS
p-Isopropyltoluene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
sec-Butylbenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	11	100
Styrene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
tert-Butyl alcohol (TBA)	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
tert-Butylbenzene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	5.9	100
Tetrachloroethylene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	1.3	19
Toluene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.7	100
trans-1,2-Dichloroethylene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.19	100
trans-1,3-Dichloropropylene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
trans-1,4-dichloro-2-butene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Trichloroethylene	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.47	21
Trichlorofluoromethane	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	NS	NS
Vinyl Chloride	0.00350	U	0.00540	U	0.00370	U	0.00480	U	0.00680	U	0.00240	U	0.00900	U	0.00270	U	0.00460	U	0.00260	U	0.00770	U	0.00270	U	0.00220	U	0.00270	U	0.02	0.9
Xylenes, Total	0.0110	U	0.0160	U	0.0110	U	0.0150	U	0.0200	U	0.00730	U	0.0270	U	0.00800	U	0.0140	U	0.00770	U	0.0230	U	0.00810	U	0.00670	U	0.00810	U	0.26	100

NOTES:
Any Regulatory Exceedences are color coded by Regulation
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NS=No Standard exists for this analyte
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
**=Depth of surveyed floor of site excavation from established Site grade elevation by Perfect Point Land Surveying RT
UUSCOS=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCOs=NYSDEC Part 375 Restricted Use Soil Cleanup Objectives -Restricted Residential
sample exceeds UUSCOs

Table 4 (Cont.)
End Point Samples Analytical Results for SVOCs
198 East 135th Street, Bronx , NY

Location	Build Area at Lot 160 - Building A																																	
Sample ID	EP-2		EP-3		EP-4		EP-4 a		EP-5		EP-5 a		EP-11		EP-11 a		EP-11 b		EP-12		EP-12 a		EP-12 b		EP-17		EP-17 a		EP-17 b		EP-18		EP-18 a	
Sample Depth **	-11.72		-13.37		-13.44		-11.40		-13.41		-12.06		-10.88		-13.59		-14.59		-10.88		-13.13		-14.13		-12.53		-14.45		-13.45		-13.29		-13.29	
Sampling Date	10/10/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018	
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
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	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
1,1-Biphenyl	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
1,2,4,5-Tetrachlorobenzene	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
1,2,4-Trichlorobenzene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
1,2-Dichlorobenzene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
phenylhydrazine (as Azober	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
1,3-Dichlorobenzene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
1,4-Dichlorobenzene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
1-Methylnaphthalene	0.110	U	0.0976	U	NT		0.0987	U	NT		0.0958	U	NT		0.114	U	0.130	U	NT		0.109	U	0.128	U	NT		0.136	U	0.126	U	NT		0.123	U
2,3,4,6-Tetrachlorophenol	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
2,4,5-Trichlorophenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2,4,6-Trichlorophenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2,4-Dichlorophenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2,4-Dimethylphenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2,4-Dinitrophenol	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
2,4-Dinitrotoluene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2,6-Dinitrotoluene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2-Chloronaphthalene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2-Chlorophenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2-Methylnaphthalene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2-Methylphenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
2-Nitroaniline	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
2-Nitrophenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
3- & 4-Methylphenols	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
3,3-Dichlorobenzidine	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
3-Nitroaniline	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
4,6-Dinitro-2-methylphenol	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
4-Bromophenyl phenyl ether	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
4-Chloro-3-methylphenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
4-Chloroaniline	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
4-Chlorophenyl phenyl ether	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
4-Nitroaniline	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
4-Nitrophenol	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
Acenaphthene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0584	JD	0.0653	U	0.0679	U	0.0573	JD	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Acenaphthylene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0767	JD	0.0653	U	0.0679	U	0.238	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Acetophenone	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Aniline	0.220	U	0.195	U	0.205	U	0.198	U	0.255	U	0.192	U	0.197	U	0.229	U	0.261	U	0.271	U	0.217	U	0.256	U	0.259	U	0.273	U	0.252	U	0.233	U	0.246	U
Anthracene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.183	D	0.0653	U	0.0679	U	0.466	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Atrazine	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzaldehyde	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzidine	0.220	U	0.195	U	0.205	U	0.198	U	0.255	U	0.192	U	0.197	U	0.229	U	0.261	U	0.271	U	0.217	U	0.256	U	0.259	U	0.273	U	0.252	U	0.233	U	0.246	U
Benzo(a)anthracene	0.0551	U	0.129	D	0.0513	U	0.100	D	0.101	JD	0.188	D	0.0494	U	0.612	D	0.0653	U	0.0679	U	2.550	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzo(a)pyrene	0.0551	U	0.151	D	0.0513	U	0.120	D	0.101	JD	0.220	D	0.0494	U	0.787	D	0.0653	U	0.0679	U	2.640	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzo(b)fluoranthene	0.0551	U	0.121	D	0.0513	U	0.0963	JD	0.0794	JD	0.164	D	0.0494	U	0.583	D	0.0653	U	0.0679	U	1.950	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzo(g,h,i)perylene	0.0551	U	0.0858	JD	0.0513	U	0.0552	JD	0.0638	U	0.124	D	0.0494	U	0.435	D	0.0653	U	0.0679	U	1.180	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzo(k)fluoranthene	0.0551	U	0.113	D	0.0513	U	0.0813	JD	0.0906	JD	0.152	D	0.0494	U	0.595	D	0.0653	U	0.0679	U	1.980	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzoic acid	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzyl alcohol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Benzyl butyl phthalate	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Bis(2-chloroethoxy)methane	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Bis(2-chloroethyl)ether	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Bis(2-chloroisopropyl)ether	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Bis(2-ethylhexyl)phthalate	0.191	D	0.185	D	0.0513	U	0.264	D	0.0638	U	0.0788	JD	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0981	JD	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Caprolactam	0.110	U	0.0976	U	0.102	U	0.0987	U	0.127	U	0.0958	U	0.0985	U	0.114	U	0.130	U	0.135	U	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.123	U
Carbazole	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0573	JD	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Chrysene	0.0551	U	0.120	D	0.0513	U	0.0978	JD	0.104	JD	0.171	D	0.0494	U	0.571	D	0.0653	U	0.0679	U	2.240	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Cresols, total	0.110	U	0.0976	U	NT		0.0987	U	NT		0.0958	U	NT		0.114	U	0.130	U	NT		0.109	U	0.128	U	NT		0.136	U	0.126	U	NT		0.123	U
Dibenzo(a,h)anthracene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.112	JD	0.0653	U	0.0679	U	0.448	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Dibenzofuran	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Diethyl phthalate	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Dimethyl phthalate	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Di-n-butyl phthalate	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Di-n-octyl phthalate	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Diphenylamine	0.110	U	0.0976	U	NT		0.0987	U	NT		0.0958	U	NT		0.114	U	0.130	U	NT		0.109	U	0.128	U	NT		0.136	U	0.126	U	NT		0.123	U
Fluoranthene	0.0551	U	0.204	D	0.0513	U	0.175	D	0.186	D	0.318	D	0.0494	U	1.180	D	0.0653	U	0.0679	U	5.420	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Fluorene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0648	JD	0.0653	U	0.0679	U	0.0868	JD	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Hexachlorobenzene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Hexachlorobutadiene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Hexachlorocyclopentadiene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Hexachloroethane	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Indeno(1,2,3-cd)pyrene	0.0551	U	0.0827	JD	0.0513	U	0.0560	JD	0.0638	U	0.113	D	0.0494	U	0.387	D	0.0653	U	0.0679	U	1.150	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Isophorone	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Naphthalene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Nitrobenzene	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
N-Nitrosodimethylamine	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
N-nitroso-di-n-propylamine	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
N-Nitrosodiphenylamine	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Parathion	0.0551	U	0.0489	U	NT		0.0495	U	NT		0.0480	U	NT		0.0572	U	0.0653	U	NT		0.0544	U	0.0642	U	NT		0.0682	U	0.0631	U	NT		0.0616	U
Pentachloronitrobenzene	0.110	U	0.0976	U	NT		0.0987	U	NT		0.0958	U	NT		0.114	U	0.130	U	NT		0.109	U	0.128	U	NT		0.136	U	0.126	U	NT		0.123	U
Pentachlorophenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Phenanthrene	0.0551	U	0.130	D	0.0513	U	0.107	D	0.119	JD	0.181	D	0.0494	U	0.657	D	0.0653	U	0.0679	U	1.380	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Phenol	0.0551	U	0.0489	U	0.0513	U	0.0495	U	0.0638	U	0.0480	U	0.0494	U	0.0572	U	0.0653	U	0.0679	U	0.0544	U	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Propargite	0.220	U	0.195	U	NT		0.198	U	NT		0.192	U	NT		0.229	U	0.261	U	NT		0.217	U	0.256	U	NT		0.273	U	0.252	U	NT		0.246	U
Pyrene	0.0551	U	0.193	D	0.0513	U	0.166	D	0.173	D	0.301	D	0.0494	U	0.982	D	0.0653	U	0.0679	U	4.370	D	0.0642	U	0.0648	U	0.0682	U	0.0631	U	0.0583	U	0.0616	U
Pyridine	0.220	U	0.195	U	NT		0.198	U	NT		0.192	U	NT		0.229	U	0.261	U	NT		0.217	U	0.256	U	NT		0.273	U	0.252	U	NT		0.246	U
Resorcinol	0.220	U	0.195	U	NT		0.198	U	NT		0.192	U	NT		0.229	U	0.261	U	NT		0.217	U	0.256	U	NT		0.273	U	0.252	U	NT		0.246	U

Location	Build Area at Lot 160 - Building A																										UUSCOs	RRSCOs
Sample ID	EP-19		EP-19 a		EP-19 b		EP-20		EP-20 a		EP-21		EP-21 a		EP-22		EP-22 a		EP-23		EP-23 a		EP-24		EP-24 a			
Sample Depth **	-12.53		-12.52		-13.27		-13.10		-13.10		-15.57		-15.57		10.77		-13.05		-13.05		-13.05		-15.57		-15.57			
Sampling Date	6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
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		
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
1,1-Biphenyl	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
1,2,4,5-Tetrachlorobenzene	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
1,2,4-Trichlorobenzene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
1,2-Dichlorobenzene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	1.1	100
phenylhydrazine (as Azober	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
1,3-Dichlorobenzene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	2.4	49
1,4-Dichlorobenzene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	1.8	13
1-Methylnaphthalene	NT		0.0895	U	0.138	U	NT		0.0957	U	NT		0.0881	U	NT		0.0882	U	NT		0.0903	U	NT		0.0900	U	NS	NS
2,3,4,6-Tetrachlorophenol	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
2,4,5-Trichlorophenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2,4,6-Trichlorophenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2,4-Dichlorophenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2,4-Dimethylphenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2,4-Dinitrophenol	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
2,4-Dinitrotoluene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2,6-Dinitrotoluene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2-Chloronaphthalene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2-Chlorophenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2-Methylnaphthalene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
2-Methylphenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	0.33	100
2-Nitroaniline	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
2-Nitrophenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
3- & 4-Methylphenols	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
3,3-Dichlorobenzidine	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
3-Nitroaniline	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
4,6-Dinitro-2-methylphenol	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
4-Bromophenyl phenyl ether	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
4-Chloro-3-methylphenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
4-Chloroaniline	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
4-Chlorophenyl phenyl ether	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
4-Nitroaniline	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
4-Nitrophenol	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
Acenaphthene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	20	100
Acenaphthylene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	100	100
Acetophenone	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Aniline	0.360	U	0.179	U	0.276	U	0.467	U	0.192	U	0.457	U	0.176	U	0.257	U	0.177	U	0.261	U	0.181	U	0.220	U	0.180	U	NS	NS
Anthracene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0581	JD	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	100	100
Atrazine	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Benzaldehyde	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Benzidine	0.360	U	0.179	U	0.276	U	0.467	U	0.192	U	0.457	U	0.176	U	0.257	U	0.177	U	0.261	U	0.181	U	0.220	U	0.180	U	NS	NS
Benzo(a)anthracene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.262	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	1	1
Benzo(a)pyrene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.321	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	1	1
Benzo(b)fluoranthene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.198	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	1	1
Benzo(g,h,i)perylene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.166	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	100	100
Benzo(k)fluoranthene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.210	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	0.8	3.9
Benzoic acid	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Benzyl alcohol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Benzyl butyl phthalate	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Bis(2-chloroethoxy)methane	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Bis(2-chloroethyl)ether	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Bis(2-chloroisopropyl)ether	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Bis(2-ethylhexyl)phthalate	0.0900	U	0.0959	D	0.0691	U	0.117	U	0.0604	JD	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Caprolactam	0.180	U	0.0895	U	0.138	U	0.233	U	0.0957	U	0.228	U	0.0881	U	0.128	U	0.0882	U	0.130	U	0.0903	U	0.110	U	0.0900	U	NS	NS
Carbazole	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Chrysene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.255	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	1	3.9
Cresols, total	NT		0.0895	U	0.138	U	NT		0.0957	U	NT		0.0881	U	NT		0.0882	U	NT		0.0903	U	NT		0.0900	U	NS	NS
Dibenzo(a,h)anthracene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	0.33	0.33
Dibenzofuran	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	7	59
Diethyl phthalate	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Dimethyl phthalate	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Di-n-butyl phthalate	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Di-n-octyl phthalate	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Diphenylamine	NT		0.0895	U	0.138	U	NT		0.0957	U	NT		0.0881	U	NT		0.0882	U	NT		0.0903	U	NT		0.0900	U	NS	NS
Fluoranthene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.473	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	100	100
Fluorene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	30	100
Hexachlorobenzene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	0.33	1.2
Hexachlorobutadiene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Hexachlorocyclopentadiene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Hexachloroethane	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Indeno(1,2,3-cd)pyrene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.136	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	0.5	0.5
Isophorone	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Naphthalene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	12	100
Nitrobenzene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
N-Nitrosodimethylamine	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
N-nitroso-di-n-propylamine	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
N-Nitrosodiphenylamine	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	NS	NS
Parathion	NT		0.0449	U	0.0691	U	NT		0.0480	U	NT		0.0442	U	NT		0.0442	U	NT		0.0453	U	NT		0.0451	U	NS	NS
Pentachloronitrobenzene	NT		0.0895	U	0.138	U	NT		0.0957	U	NT		0.0881	U	NT		0.0882	U	NT		0.0903	U	NT		0.0900	U	NS	NS
Pentachlorophenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	0.8	6.7
Phenanthrene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.215	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	100	100
Phenol	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.0480	U	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	0.33	100
Propargite	NT		0.179	U	0.276	U	NT		0.192	U	NT		0.176	U	NT		0.177	U	NT		0.181	U	NT		0.180	U	NS	NS
Pyrene	0.0900	U	0.0449	U	0.0691	U	0.117	U	0.582	D	0.114	U	0.0442	U	0.0643	U	0.0442	U	0.0653	U	0.0453	U	0.0550	U	0.0451	U	100	100
Pyridine	NT		0.179	U	0.276	U	NT		0.192	U	NT		0.176	U		NT	0.177	U		NT	0.181	U		NT	0.180	U	NS	NS
Resorcinol	NT		0.179	U	0.276	U	NT		0.192	U	NT		0.176	U		NT	0.177	U		NT	0.181	U		NT	0.180	U	NS	NS

NOTES:
Any Regulatory Exceedences are color coded by Regulation
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NS=No Standard exists for this analyte
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
**=Depth of surveyed floor of site excavation from established Site grade elevation by Perfect Point Land Surveying RT
NT=this indicates the analyte was not a target for this sample
UUSCOS=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCOs=NYSDEC Part 375 Restricted Use Soil Cleanup Objectives -Restricted Residential
sample exceeds UUSCOs
sample exceeds RRSCOs

Table 4 (Cont.)
End Point Samples Analytical Results for Pesticides and PCBs
198 East 135th Street, Bronx , NY

Location	Build Area at Lot 160 - Building A																			
Sample ID	EP-2		EP-3		EP-4		EP-4 a		EP-5		EP-5 a		EP-11		EP-11 a		EP-11 b		EP-12	
Sample Depth **	-11.72		-13.37		-13.44		-11.40		-13.41		-12.06		-10.88		-13.59		-14.59		-10.88	
Sampling Date	10/10/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018	
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Pesticides, 8081 target list																				
4,4'-DDD	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
4,4'-DDE	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
4,4'-DDT	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Aldrin	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
alpha-BHC	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
alpha-Chlordane	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
beta-BHC	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Chlordane, total	0.0434	U	0.0386	U	0.0404	U	0.0390	U	0.0506	U	0.0377	U	0.0391	U	0.0452	U	0.0516	U	0.0534	U
delta-BHC	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Dieldrin	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Endosulfan I	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Endosulfan II	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Endosulfan sulfate	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Endrin	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Endrin aldehyde	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Endrin ketone	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
gamma-BHC (Lindane)	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
gamma-Chlordane	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Heptachlor	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Heptachlor epoxide	0.00217	U	0.00193	U	0.00202	U	0.00195	U	0.00253	U	0.00188	U	0.00196	U	0.00226	U	0.00258	U	0.00267	U
Methoxychlor	0.0108	U	0.00965	U	0.0101	U	0.00974	U	0.0126	U	0.00941	U	0.00978	U	0.0113	U	0.0129	U	0.0134	U
Toxaphene	0.110	U	0.0977	U	0.102	U	0.0986	U	0.128	U	0.0953	U	0.0989	U	0.114	U	0.131	U	0.135	U
Polychlorinated Biphenyls (PCB)																				
Aroclor 1016	0.0219	U	0.0195	U	0.0204	U	0.0197	U	0.0255	U	0.0190	U	0.0197	U	0.0228	U	0.0260	U	0.0270	U
Aroclor 1221	0.0219	U	0.0195	U	0.0204	U	0.0197	U	0.0255	U	0.0190	U	0.0197	U	0.0228	U	0.0260	U	0.0270	U
Aroclor 1232	0.0219	U	0.0195	U	0.0204	U	0.0197	U	0.0255	U	0.0190	U	0.0197	U	0.0228	U	0.0260	U	0.0270	U
Aroclor 1242	0.0219	U	0.0195	U	0.0204	U	0.0197	U	0.0255	U	0.0190	U	0.0197	U	0.0228	U	0.0260	U	0.0270	U
Aroclor 1248	0.0219	U	0.0195	U	0.0204	U	0.0197	U	0.0255	U	0.0190	U	0.0197	U	0.0228	U	0.0260	U	0.0270	U
Aroclor 1254	0.0219	U	0.0195	U	0.0204	U	0.0197	U	0.0255	U	0.0190	U	0.0197	U	0.0228	U	0.0260	U	0.0270	U
Aroclor 1260	0.0219	U	0.0195	U	0.0204	U	0.0197	U	0.0255	U	0.0190	U	0.0197	U	0.0228	U	0.0260	U	0.0270	U
Total PCBs	0.0219	U	0.0195	U	0.0204	U	0.0197	U	0.0255	U	0.0190	U	0.0197	U	0.0228	U	0.0260	U	0.0270	U

Location	Build Area at Lot 160 - Building A																					
Sample ID	EP-12 a		EP-12 b		EP-17		EP-17 a		EP-17 b		EP-18		EP-18 a		EP-19		EP-19 a		EP-19 b		EP-20	
Sample Depth **	-13.13		-14.13		-12.53		-14.45		-13.45		-13.29		-13.29		-12.53		-12.52		-13.27		-13.10	
Sampling Date	10/10/2018		10/29/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018	
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound	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		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Pesticides, 8081 target list																						
4,4'-DDD	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	**0.00356**	U	0.00177	U	0.00273	U	**0.00463**	U
4,4'-DDE	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	**0.00356**	U	0.00177	U	0.00273	U	**0.00463**	U
4,4'-DDT	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	**0.00356**	U	0.00177	U	0.00273	U	**0.00463**	U
Aldrin	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
alpha-BHC	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
alpha-Chlordane	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
beta-BHC	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Chlordane, total	0.0431	U	0.0507	U	0.0512	U	0.0537	U	0.0496	U	0.0460	U	0.0483	U	0.0712	U	0.0354	U	0.0546	U	0.0925	U
delta-BHC	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Dieldrin	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Endosulfan I	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Endosulfan II	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Endosulfan sulfate	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Endrin	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Endrin aldehyde	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Endrin ketone	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
gamma-BHC (Lindane)	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
gamma-Chlordane	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Heptachlor	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Heptachlor epoxide	0.00215	U	0.00253	U	0.00256	U	0.00269	U	0.00248	U	0.00230	U	0.00242	U	0.00356	U	0.00177	U	0.00273	U	0.00463	U
Methoxychlor	0.0108	U	0.0127	U	0.0128	U	0.0134	U	0.0124	U	0.0115	U	0.0121	U	0.0178	U	0.00885	U	0.0136	U	0.0231	U
Toxaphene	0.109	U	0.128	U	0.129	U	0.136	U	0.126	U	0.116	U	0.122	U	0.180	U	0.0895	U	0.138	U	0.234	U
Polychlorinated Biphenyls (PCB)																						
Aroclor 1016	0.0217	U	0.0256	U	0.0258	U	0.0273	U	0.0251	U	0.0232	U	0.0246	U	0.0359	U	0.0178	U	0.0276	U	0.0467	U
Aroclor 1221	0.0217	U	0.0256	U	0.0258	U	0.0273	U	0.0251	U	0.0232	U	0.0246	U	0.0359	U	0.0178	U	0.0276	U	0.0467	U
Aroclor 1232	0.0217	U	0.0256	U	0.0258	U	0.0273	U	0.0251	U	0.0232	U	0.0246	U	0.0359	U	0.0178	U	0.0276	U	0.0467	U
Aroclor 1242	0.0217	U	0.0256	U	0.0258	U	0.0273	U	0.0251	U	0.0232	U	0.0246	U	0.0359	U	0.0178	U	0.0276	U	0.0467	U
Aroclor 1248	0.0217	U	0.0256	U	0.0258	U	0.0273	U	0.0251	U	0.0232	U	0.0246	U	0.0359	U	0.0178	U	0.0276	U	0.0467	U
Aroclor 1254	0.0217	U	0.0256	U	0.0258	U	0.0273	U	0.0251	U	0.0232	U	0.0246	U	0.0359	U	0.0178	U	0.0276	U	0.0467	U
Aroclor 1260	0.0217	U	0.0256	U	0.0258	U	0.0273	U	0.0251	U	0.0232	U	0.0246	U	0.0359	U	0.0178	U	0.0276	U	0.0467	U
Total PCBs	0.0217	U	0.0256	U	0.0258	U	0.0273	U	0.0251	U	0.0232	U	0.0246	U	0.0359	U	0.0178	U	0.0276	U	0.0467	U

Location	Build Area at Lot 160 - Building A																		UUSCOs	RRSCOs
Sample ID	EP-20 a		EP-21		EP-21 a		EP-22		EP-22 a		EP-23		EP-23 a		EP-24		EP-24 a			
Sample Depth **	-13.10		-15.57		-15.57		10.77		-13.05		-13.05		-13.05		-15.57		-15.57			
Sampling Date	10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
Pesticides, 8081 target list																				
4,4'-DDD	0.00189	U	**0.00452**	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.0033	13
4,4'-DDE	0.00189	U	**0.00452**	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.0033	8.9
4,4'-DDT	0.00252	D	**0.00452**	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.0033	7.9
Aldrin	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.005	0.097
alpha-BHC	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.02	0.48
alpha-Chlordane	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.094	4.2
beta-BHC	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.036	0.36
Chlordane, total	0.0378	U	0.0904	U	0.0348	U	0.0509	U	0.0349	U	0.0515	U	0.0356	U	0.0432	U	0.0355	U	ND	NS
delta-BHC	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.04	100
Dieldrin	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.005	0.2
Endosulfan I	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	2.4	24
Endosulfan II	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	2.4	24
Endosulfan sulfate	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	2.4	24
Endrin	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.014	11
Endrin aldehyde	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	NS	NS
Endrin ketone	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	NS	NS
gamma-BHC (Lindane)	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.1	1.3
gamma-Chlordane	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	NS	NS
Heptachlor	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	0.042	2.1
Heptachlor epoxide	0.00189	U	0.00452	U	0.00174	U	0.00254	U	0.00175	U	0.00258	U	0.00178	U	0.00216	U	0.00178	U	NS	NS
Methoxychlor	0.00946	U	0.0226	U	0.00870	U	0.0127	U	0.00873	U	0.0129	U	0.00890	U	0.0108	U	0.00888	U	NS	NS
Toxaphene	0.0957	U	0.229	U	0.0880	U	0.129	U	0.0884	U	0.130	U	0.0900	U	0.109	U	0.0899	U	NS	NS
Polychlorinated Biphenyls (PCB)																				
Aroclor 1016	0.0191	U	0.0456	U	0.0175	U	0.0257	U	0.0177	U	0.0260	U	0.0180	U	0.0218	U	0.0179	U	NS	NS
Aroclor 1221	0.0191	U	0.0456	U	0.0175	U	0.0257	U	0.0177	U	0.0260	U	0.0180	U	0.0218	U	0.0179	U	NS	NS
Aroclor 1232	0.0191	U	0.0456	U	0.0175	U	0.0257	U	0.0177	U	0.0260	U	0.0180	U	0.0218	U	0.0179	U	NS	NS
Aroclor 1242	0.0191	U	0.0456	U	0.0175	U	0.0257	U	0.0177	U	0.0260	U	0.0180	U	0.0218	U	0.0179	U	NS	NS
Aroclor 1248	0.0191	U	0.0456	U	0.0175	U	0.0257	U	0.0177	U	0.0260	U	0.0180	U	0.0218	U	0.0179	U	NS	NS
Aroclor 1254	0.0191	U	0.0456	U	0.0175	U	0.0257	U	0.0177	U	0.0260	U	0.0180	U	0.0218	U	0.0179	U	NS	NS
Aroclor 1260	0.0191	U	0.0456	U	0.0175	U	0.0257	U	0.0177	U	0.0260	U	0.0180	U	0.0218	U	0.0179	U	NS	NS
Total PCBs	0.0191	U	0.0456	U	0.0175	U	0.0257	U	0.0177	U	0.0260	U	0.0180	U	0.0218	U	0.0179	U	0.1	1

NOTES:
Any Regulatory Exceedences are color coded by Regulation
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NS=No Standard exists for this analyte
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
**=Depth of surveyed floor of site excavation from established Site grade elevation by Perfect Point Land Surveying RT
UUSCOS=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCOs=NYSDEC Part 375 Restricted Use Soil Cleanup Objectives -Restricted Residential
(green) sample exceeds UUSCOs

Table 4 (Cont.)
End Point Samples Analytical Results for Metals
198 East 135th Street, Bronx , NY

Location: Build Area at Lot 160 - Building A

Sample ID	EP-2		EP-3		EP-4		EP-4 a		EP-5		EP-5 a		EP-11		EP-11 a		EP-11 b	
Sample Depth **	-11.72		-13.37		-13.44		-11.40		-13.41		-12.06		-10.88		-13.59		-14.59	
Sampling Date	10/10/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		10/29/2018	
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Aluminum	5,190		7,760		7,210		6,730		6,680		6,560		7,170		8,610		16,900	
Antimony	3.290	U	2.930	U	0.614	U	2.960	U	0.768	U	2.870	U	0.594	U	3.430	U	3.910	U
Arsenic	1.980	U	1.760	U	1.520		1.780	U	2.710		1.720	U	1.670		3.940		4.190	
Barium	7.670		47.600		8.020		34.800		22.400		36.200		11.900		44.600		38.500	
Beryllium	0.137		0.0590	U	0.188		0.0590	U	0.154	U	0.0570	U	0.119	U	0.0690	U	0.161	
Cadmium	0.395	U	0.351	U	0.369	U	0.355	U	0.461	U	0.344	U	0.356	U	0.412	U	0.469	U
Calcium	1,720		12,300		482		24,000		7,810		13,900		572		8,120		2,360	
Chromium	7.640		12.800		8.970		12.100		10.900		12.500		10.700		18.100		30.500	
Chromium, Hexavalent	0.659	U	0.585	U	0.614	U	0.592	U	0.768	U	0.574	U	0.594	U	0.687	U	0.782	U
Chromium, Trivalent	7.640		12.800		8.970		12.100		10.900		12.500		10.700		18.100		30.500	
Cobalt	2.910		7.370		3.220		5.390		4.310		5.430		4.350		9.800		11.800	
Copper	4.570		19.200		3.390		15.600		9.480		14.500		11.300		44.600		14.600	
Iron	5,970		15,800		8,640		10,100		12,500		10,800		11,300		27,800		32,100	
Lead	2.570		25.500		2.310		20.800		19.300		30.900		3.150		35.800		14.900	
Magnesium	1,430		7,460		1,560		9,230		4,440		6,090		2,420		5,930		6,820	
Manganese	95.600		175		47.600		152		122		152		83.600		338		406	
Mercury	0.0395	U	0.0590		0.0369	U	0.0465		0.0461	U	0.0877		0.0356	U	0.128		0.0469	U
Nickel	7.470		15		8.600		11.700		12.100		12.600		10.500		38.800		29.300	
Potassium	446		1,470		420		1,100		806		1,090		749		1,480		3,470	
Selenium	3.290	U	2.930	U	1.230	U	2.960	U	1.540	U	2.870	U	1.190	U	3.430	U	3.910	U
Silver	0.659	U	0.585	U	0.614	U	0.592	U	0.768	U	0.574	U	0.594	U	0.687	U	0.782	U
Sodium	98.200		335		171		537		246		209		292		257		1,450	
Thallium	3.290	U	2.930	U	1.230	U	2.960	U	1.540	U	2.870	U	1.190	U	3.430	U	3.910	U
Vanadium	9.540		17		11.200		14.700		19.100		16.100		13.900		26		39.100	
Zinc	17.200		74.700		18.900		37.200		30.700		42.400		19.600		108		68.700	

Sample ID	EP-12		EP-12 a		EP-12 b		EP-17		EP-17 a		EP-17 b		EP-18		EP-18 a		EP-19	
Sample Depth **	-10.88		-13.13		-14.13		-12.53		-14.45		-13.45		-13.29		-13.29		-12.53	
Sampling Date	6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		10/29/2018		6/8/2018		10/10/2018		6/8/2018	
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Aluminum	16,300		13,400		16,400		16,500		16,800		17,400		11,800		14,700		19,400	
Antimony	0.813	U	3.260	U	3.840	U	0.777	U	4.090	U	3.770	U	0.699	U	3.690	U	1.080	U
Arsenic	4.610		3.450		4.310		4.170		6.340		2.380		4.320		9.850		5.170	
Barium	38.500		122		38.900		39.400		38.200		40.100		23.800		32.400		41.500	
Beryllium	0.163	U	0.0650	U	0.133		0.155	U	0.401		0.169		0.140	U	0.352		0.216	U
Cadmium	0.488	U	0.511		0.460	U	0.466	U	0.491	U	0.453	U	0.419	U	0.442	U	0.648	U
Calcium	2,950		10,200		3,470		2,620		2,140		1,970		2,170		2,550		3,410	
Chromium	29.700		31.900		30.800		29.900		33.100		29.500		19.300		29		33.400	
Chromium, Hexavalent	0.813	U	0.653	U	0.767	U	0.777	U	0.819	U	0.755	U	0.699	U	0.737	U	1.080	U
Chromium, Trivalent	29.700		31.900		30.800		29.900		33.100		29.500		19.300		29		33.400	
Cobalt	11.700		12.500		12.400		12		13.100		11.500		7.980		12.300		13.300	
Copper	14.100		49		15.600		12.600		14.600		17.600		10.700		12.300		15.900	
Iron	32,900		31,400		33,800		32,800		34,400		30,500		23,700		33,600		40,800	
Lead	15.300		94.100		15.100		11.500		12.700		19.300		9.200		11		13.400	
Magnesium	7,250		8,010		6,920		6,970		7,120		6,510		4,500		6,800		7,160	
Manganese	426		283		354		423		484		371		239		416		477	
Mercury	0.0488	U	0.229		0.0460	U	0.0466	U	0.0491	U	0.0812		0.158		0.0442	U	0.0648	U
Nickel	25.600		31		29.600		25.800		32.900		28.700		17.500		29.200		29.600	
Potassium	2,720		4,180		3,440		2,860		3,340		3,510		1,720		2,910		3,350	
Selenium	1.630	U	3.260	U	3.840	U	1.550	U	4.090	U	3.770	U	1.400	U	3.690	U	2.160	U
Silver	0.813	U	0.653	U	0.767	U	0.777	U	0.819	U	0.755	U	0.699	U	0.737	U	1.080	U
Sodium	1,470		397		1,490		560		2,030		1,610		571		1,290		553	
Thallium	1.630	U	3.260	U	3.840	U	1.550	U	4.090	U	3.770	U	1.400	U	3.690	U	2.160	U
Vanadium	38.200		40.700		38.700		36.700		37.200		35.500		24.300		37.300		47.600	
Zinc	75.100		238		78.600		70.100		79.400		67.800		47.200		73.400		75.800	

Sample ID	EP-19 a		EP-19 b		EP-20		EP-20 a		EP-21		EP-21 a		EP-22		EP-22 a		EP-23		EP-23 a		EP-24		EP-24 a		UUSCOs	RRSCOs
Sample Depth **	-12.52		-13.27		-13.10		-13.10		-15.57		-15.57		10.77		-13.05		-13.05		-13.05		-15.57		-15.57			
Sampling Date	10/10/2018		10/29/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018		6/8/2018		10/10/2018			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
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		
Units	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	4,810		18,200		8,270		6,920		15,700		5,070		16,200		5,220		15,700		5,510		7,080		3,470		NS	NS
Antimony	2.680	U	4.140	U	1.410	U	2.870	U	1.370	U	2.640	U	0.772	U	2.650	U	0.782	U	2.710	U	0.659	U	2.700	U	NS	NS
Arsenic	1.610	U	2.850		6.460		1.720	U	3.190		1.580	U	3.140		1.590	U	4.680		1.620	U	3.290		1.620	U	13	16
Barium	15.300		50.100		16.900		31.100		28.500		5.910		33.300		4.970		65		5.610		7.560		3.540		350	400
Beryllium	0.0540	U	0.139		0.281	U	0.0710		0.274	U	0.142		0.154	U	0.143		0.161		0.151		0.132	U	0.130		7.2	72
Cadmium	0.322	U	0.496	U	0.844	U	0.344	U	0.823	U	0.317	U	0.463	U	0.318	U	0.469	U	0.325	U	0.395	U	0.324	U	2.5	4.3
Calcium	24,900		3,130		5,140		9,780		6,780		381		2,800		376		2,930		589		755		411		NS	NS
Chromium	8.780		30.800		16.500		12.300		23.300		6.560		26.900		6.580		23.400		7.430		8.210		4.790		NS	NS
Chromium, Hexavalent	0.537	U	0.827	U	2.810	U	0.574	U	2.740	U	0.528	U	1.540	U	0.531	U	1.560	U	0.542	U	0.659	U	0.540	U	1	110
Chromium, Trivalent	8.780		30.800		16.500		12.300		23.300		6.560		26.900		6.580		23.400		7.430		8.210		4.790		30	180
Cobalt	3.690		12		3.170		4.830		7.360		3.240		10.200		2.820		10.400		3.570		3.500		2.110		NS	NS
Copper	15.300		20.400		5.460		15.100		3.390		7.710		14.400		7.310		21.300		7.630		4.340		5.990		50	270
Iron	6,040		36,100		8,040		9,220		17,600		7,350		29,200		9,170		31,100		6,420		8,530		4,860		NS	NS
Lead	3.060		34.800		1.670		31.700		3.120		2.490		13.600		3.500		42.700		3.380		3.120		2.900		63	400
Magnesium	13,800		6,620		2,250		5,170		4,720		1,800		5,950		1,780		5,560		1,480		1,770		1,110		NS	NS
Manganese	79.200		436		172		128		294		57.500		412		59		380		50.200		50.200		35.100		1600	2000
Mercury	0.0322	U	0.113		0.0844	U	0.0715		0.0823	U	0.0317	U	0.0628		0.0318	U	0.103		0.0325	U	0.0395	U	0.0324	U	0.18	0.81
Nickel	8.050		31.800		10.300		11.200		20.300		9.280		23.800		8.900		24.200		9.300		9.970		6.560		30	310
Potassium	939		3,460		1,740		917		2,850		478		2,560		513		2,250		526		517		331		NS	NS
Selenium	8.730		4.140	U	2.810	U	2.870	U	2.740	U	2.640	U	1.540	U	2.650	U	1.560	U	2.710	U	1.320	U	2.700	U	3.9	180
Silver	0.537	U	0.827	U	1.410	U	0.574	U	1.370	U	0.528	U	0.772	U	0.531	U	0.782	U	0.542	U	0.659	U	0.540	U	2	180
Sodium	527		627		375		335		433		215		396		284		477		134		177		88.100		NS	NS
Thallium	2.680	U	4.140	U	2.810	U	2.870	U	2.740	U	2.640	U	1.540	U	2.650	U	1.560	U	2.710	U	1.320	U	2.700	U	NS	NS
Vanadium	10.300		38.700		33.900		14.300		38.900		9.700		38.800		9.960		40.500		10.200		11.500		8.180		NS	NS
Zinc	18.300		72.400		11.400		34.900		34.500		18.200		66.200		17		65.100		15.600		19.300		9.730		109	10000

NOTES:
Any Regulatory Exceedences are color coded by Regulation
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NS=No Standard exists for this analyte
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
**=Depth of surveyed floor of site excavation from established Site grade elevation by Perfect Point Land Surveying RT
UUSCOS=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCOs=NYSDEC Part 375 Restricted Use Soil Cleanup Objectives -Restricted Residential
(green) sample exceeds UUSCOs

Table 4
End Point Samples Analytical Results for VOCs
198 East 135th Street, Bronx , NY

Location	Build Area at Lot 60 - Building B																		Con Edison Easement																Gas and Sewer Easement								UUSCOs	RRSCOs
Sample ID	EP-13		EP-14		EP-15		EP-16		EP-25		EP-26		EP-27		EP-28		EP-29		EP-30		EP-1		EP-6		EP-7		EP-8		EP-9		EP-10		EP-31		EP-32		EP-33		EP-34			
Sample Depth **	-13.56		-13.99		-13.80		-13.80		-13.72		-13.66		-13.38		-13.36		-22.19		-13.56		-3.70		-2.37		-3.82		-2.13		-1.99		-1.62		-2.15		-2.88		-2.29		-3.12			
Sampling Date	7/2/2018		7/2/2018		7/2/2018		7/2/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
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	Result	Q	Result	Q	Result	Q		
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
1,1,1,2-Tetrachloroethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,1,1-Trichloroethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.68	100
1,1,2,2-Tetrachloroethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,1,2-Trichloro-1,2,2-trifluor	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,1,2-Trichloroethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,1-Dichloroethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.27	26
1,1-Dichloroethylene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.33	100
1,2,3-Trichlorobenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,2,3-Trichloropropane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,2,4-Trichlorobenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,2,4-Trimethylbenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00430	J	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	3.6	52
1,2-Dibromo-3-chloropropar	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,2-Dibromoethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,2-Dichlorobenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	1.1	100
1,2-Dichloroethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.02	3.1
1,2-Dichloropropane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
1,3,5-Trimethylbenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	8.4	52
1,3-Dichlorobenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	2.4	49
1,4-Dichlorobenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	1.8	13
1,4-Dioxane	0.0690	U	0.0540	U	0.0970	U	0.0450	U	0.0420	U	0.0490	U	0.0760	U	0.0620	U	0.0830	U	0.0680	U	0.0510	U	0.0640	U	0.0210	U	0.0700	U	0.0520	U	0.0680	U	0.0430	U	0.0510	U	0.0500	U	0.0280	U	0.1	13
2-Butanone	**0.0340**		0.00270	U	**0.0110**		0.00220	U	0.00210	U	0.00270	J	**0.0580**		0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00340		0.00520	J	**0.00570**		0.00340	U	0.00210	U	**0.0110**		0.00250	U	0.00140	U	0.12	100
2-Hexanone	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
4-Methyl-2-pentanone	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Acetone	**0.120**		**0.0230**		**0.0800**		0.00730	J	**0.0180**		**0.0260**		**0.130**		0.0160		**0.150**		0.0230		**0.110**		**0.0220**		**0.0420**		**0.0390**		**0.120**		**0.110**		**0.0440**		**0.140**		**0.0420**		0.00280	U	0.05	100
Acrolein	0.00690	U	0.00540	U	0.00970	U	0.00450	U	0.00420	U	0.00490	U	0.00760	U	0.00620	U	0.00830	U	0.00680	U	0.00510	U	0.00640	U	0.00210	U	0.00700	U	0.00520	U	0.00680	U	0.00430	U	0.00510	U	0.00500	U	0.00280	U	NS	NS
Acrylonitrile	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Benzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.06	4.8
Bromochloromethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Bromodichloromethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Bromoform	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Bromomethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Carbon disulfide	0.00480	J	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	**0.0100**		0.00310	U	0.00520	J	0.00550	J	0.00260	U	0.00320	U	0.00200	J	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Carbon tetrachloride	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.76	2.4
Chlorobenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	1.1	100
Chloroethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Chloroform	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.37	49
Chloromethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
cis-1,2-Dichloroethylene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.25	100
cis-1,3-Dichloropropylene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Cyclohexane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Dibromochloromethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Dibromomethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Dichlorodifluoromethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Ethyl Benzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00460	J	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	1	41
Hexachlorobutadiene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Isopropylbenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Methyl acetate	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Methyl tert-butyl ether (MT	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.93	100
Methylcyclohexane	**0.00710**		0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00420	J	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Methylene chloride	0.00690	U	0.00540	U	0.00970	U	0.00450	U	0.00420	U	0.00490	U	0.00760	U	0.00620	U	0.00830	U	0.00680	U	0.00910	J	0.00830	J	0.00330	J	0.0110	J	0.00880	J	0.00970	J	0.00700	J	**0.0110**		0.00830	J	0.00370	J	0.05	100
n-Butylbenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	12	100
n-Propylbenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	3.9	100
o-Xylene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00450	J	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
p- & m- Xylenes	0.00690	U	0.00540	U	0.00970	U	0.00450	U	0.00420	U	0.00490	U	0.00760	U	0.00620	U	0.0140	J	0.00680	U	0.00510	U	0.00640	U	0.00210	U	0.00700	U	0.00520	U	0.00680	U	0.00430	U	0.00510	U	0.00500	U	0.00280	U	NS	NS
p-Isopropyltoluene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	**0.00650**		**0.0150**		**0.0280**		**0.0270**		**0.0520**		0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
sec-Butylbenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	11	100
Styrene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
tert-Butyl alcohol (TBA)	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
tert-Butylbenzene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	5.9	100
Tetrachloroethylene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	1.3	19
Toluene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.7	100
trans-1,2-Dichloroethylene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.19	100
trans-1,3-Dichloropropylene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
trans-1,4-dichloro-2-butene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Trichloroethylene	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.47	21
Trichlorofluoromethane	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	NS	NS
Vinyl Chloride	0.00350	U	0.00270	U	0.00490	U	0.00220	U	0.00210	U	0.00250	U	0.00380	U	0.00310	U	0.00420	U	0.00340	U	0.00260	U	0.00320	U	0.00110	U	0.00350	U	0.00260	U	0.00340	U	0.00210	U	0.00260	U	0.00250	U	0.00140	U	0.02	0.9
Xylenes, Total	0.0100	U	0.00810	U	0.0150	U	0.00670	U	0.00630	U	0.00740	U	0.0110	U	0.00930	U	0.0180	J	0.0100	U	0.00770	U	0.00970	U	0.00320	U	0.0100	U	0.00780	U	0.0100	U	0.00640	U	0.00770	U	0.00750	U	0.00420	U	0.26	100

NOTES
Any Regulatory Exceedences are color coded by Regulation
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NS=No Standard exists for this analyte
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
NS=No Standard exists for this analyte
NT=this indicates the analyte was not a target for this sample
**=Depth of surveyed floor of site excavation from established Site grade elevation by Perfect Point Land Surveying RT
UUSCOS=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCOs=NYSDEC Part 375 Restricted Use Soil Cleanup Objectives -Restricted Residential
sample exceeds UUSCOs

Table 4 (Cont.)
End Point Samples Analytical Results for SVOCs
198 East 135th Street, Bronx , NY

Location	Build Area at Lot 60 - Building B																			
Sample ID	EP-13		EP-14		EP-15		EP-16		EP-25		EP-26		EP-27		EP-28		EP-29		EP-30	
Sample Depth **	-13.56		-13.99		-13.80		-13.80		-13.72		-13.66		-13.38		-13.36		-22.19		-13.56	
Sampling Date	7/2/2018		7/2/2018		7/2/2018		7/2/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018	
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
1,1-Biphenyl	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0515	JD	0.0670	U	0.0556	U
1,2,4,5-Tetrachlorobenzene	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
1,2,4-Trichlorobenzene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
1,2-Dichlorobenzene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
iphenylhydrazine (as Azober	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
1,3-Dichlorobenzene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
1,4-Dichlorobenzene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
1-Methylnaphthalene	NT		NT		NT		NT		0.110	U	0.0933	U	0.101	U	0.166	JD	0.168	JD	0.111	U
2,3,4,6-Tetrachlorophenol	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
2,4,5-Trichlorophenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2,4,6-Trichlorophenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2,4-Dichlorophenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2,4-Dimethylphenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2,4-Dinitrophenol	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
2,4-Dinitrotoluene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2,6-Dinitrotoluene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2-Chloronaphthalene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2-Chlorophenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2-Methylnaphthalene	0.160	D	0.0646	JD	0.0769	U	0.116	D	0.0549	U	0.0768	JBD	0.0508	U	0.284	BD	0.268	D	0.0556	U
2-Methylphenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
2-Nitroaniline	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
2-Nitrophenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
3- & 4-Methylphenols	0.0703	JD	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
3,3-Dichlorobenzidine	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
3-Nitroaniline	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
4,6-Dinitro-2-methylphenol	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
4-Bromophenyl phenyl ether	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
4-Chloro-3-methylphenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
4-Chloroaniline	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
4-Chlorophenyl phenyl ether	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
4-Nitroaniline	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
4-Nitrophenol	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
Acenaphthene	0.443	D	0.198	D	0.0769	U	0.101	D	0.0549	U	0.249	D	0.0972	JD	0.455	D	0.374	D	0.135	D
Acenaphthylene	0.669	D	0.105	D	0.0769	U	0.0501	U	0.0549	U	0.0768	JD	0.0891	JD	0.129	D	0.789	D	0.129	D
Acetophenone	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Aniline	0.263	U	0.207	U	0.307	U	0.200	U	0.219	U	0.187	U	0.203	U	0.190	U	0.268	U	0.222	U
Anthracene	1.210	D	0.646	D	0.0769	U	0.185	D	0.0549	U	0.547	D	0.269	D	1.160	D	1.280	D	0.393	D
Atrazine	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Benzaldehyde	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Benzidine	0.263	U	0.207	U	0.307	U	0.200	U	0.219	U	0.187	U	0.203	U	0.190	U	0.268	U	0.222	U
Benzo(a)anthracene	**2.780**	D	**1.540**	D	0.185	D	0.296	D	0.0850	JD	**1.120**	D	0.523	D	**1.400**	D	**3.240**	DE	0.828	D
Benzo(a)pyrene	**2.770**	D	**1.350**	D	0.157	D	0.279	D	0.0788	JD	0.990	D	0.501	D	**1.160**	D	**2.970**	D	0.778	D
Benzo(b)fluoranthene	**2.270**	D	**1.140**	D	0.143	JD	0.230	D	0.0666	JD	0.831	D	0.399	D	0.872	D	**1.990**	D	0.556	D
Benzo(g,h,i)perylene	1.390	D	0.701	D	0.108	JD	0.172	D	0.0549	U	0.559	D	0.254	D	0.512	D	1.350	D	0.373	D
Benzo(k)fluoranthene	**2.190**	D	**0.955**	D	0.131	JD	0.248	D	0.0613	JD	**0.803**	D	0.363	D	**0.912**	D	**1.900**	D	0.568	D
Benzoic acid	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Benzyl alcohol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Benzyl butyl phthalate	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Bis(2-chloroethoxy)methane	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Bis(2-chloroethyl)ether	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Bis(2-chloroisopropyl)ether	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Bis(2-ethylhexyl)phthalate	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Caprolactam	0.131	U	0.104	U	0.153	U	0.100	U	0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
Carbazole	0.122	JD	0.115	D	0.0769	U	0.0727	JD	0.0549	U	0.145	D	0.0721	JD	0.418	D	0.108	JD	0.0957	JD
Chrysene	**2.790**	D	**1.470**	D	0.134	JD	0.300	D	0.0885	JD	**1.130**	D	0.532	D	**1.300**	D	**3.450**	DE	0.828	D
Cresols, total	NT		NT		NT		NT		0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
Dibenzo(a,h)anthracene	**0.411**	D	0.220	D	0.0769	U	0.0501	U	0.0549	U	0.212	D	0.0689	JD	0.154	D	**0.480**	D	0.0992	JD
Dibenzofuran	0.132	D	0.0679	JD	0.0769	U	0.0647	JD	0.0549	U	0.151	D	0.0508	U	0.410	D	0.0994	JD	0.0556	U
Diethyl phthalate	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Dimethyl phthalate	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Di-n-butyl phthalate	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Di-n-octyl phthalate	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Diphenylamine	NT		NT		NT		NT		0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
Fluoranthene	7.440	D	4.040	D	0.240	D	0.663	D	0.183	D	2.860	D	1.120	D	3.250	D	5.420	D	1.680	D
Fluorene	0.561	D	0.226	D	0.0769	U	0.122	D	0.0549	U	0.274	D	0.116	D	0.606	D	0.383	D	0.166	D
Hexachlorobenzene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Hexachlorobutadiene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Hexachlorocyclopentadiene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Hexachloroethane	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Indeno(1,2,3-cd)pyrene	**1.270**	D	**0.618**	D	0.0944	JD	0.148	D	0.0549	U	**0.521**	D	0.240	D	**0.504**	D	**1.190**	D	0.351	D
Isophorone	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Naphthalene	0.244	D	0.0613	JD	0.0769	U	0.116	D	0.0549	U	0.101	D	0.0567	JD	0.581	D	0.200	D	0.0744	JD
Nitrobenzene	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
N-Nitrosodimethylamine	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
N-nitroso-di-n-propylamine	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
N-Nitrosodiphenylamine	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Parathion	NT		NT		NT		NT		0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Pentachloronitrobenzene	NT		NT		NT		NT		0.110	U	0.0933	U	0.101	U	0.0947	U	0.134	U	0.111	U
Pentachlorophenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Phenanthrene	4.010	D	2.880	D	0.0895	JD	0.666	D	0.131	D	1.950	D	0.817	D	3.680	D	1.890	D	1.360	D
Phenol	0.0658	U	0.0519	U	0.0769	U	0.0501	U	0.0549	U	0.0468	U	0.0508	U	0.0475	U	0.0670	U	0.0556	U
Propargite	NT		NT		NT		NT		0.219	U	0.187	U	0.203	U	0.190	U	0.268	U	0.222	U
Pyrene	6.510	D	4.220	D	0.271	D	0.630	D	0.133	D	2.300	D	0.971	D	2.580	D	6.790	D	1.530	D
Pyridine	NT		NT		NT		NT		0.219	U	0.187	U	0.203	U	0.190	U	0.268	U	0.222	U
Resorcinol	NT		NT		NT		NT		0.219	U	0.187	U	0.203	U	0.190	U	0.268	U	0.222	U

Location	Con Edison Easement												Gas and Sewer Easement								UUSCOs	RRSCOs
Sample ID	EP-1		EP-6		EP-7		EP-8		EP-9		EP-10		EP-31		EP-32		EP-33		EP-34			
Sample Depth **	-3.70		-2.37		-3.82		-2.13		-1.99		-1.62		-2.15		-2.88		-2.29		-3.12			
Sampling Date	5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Units	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-Biphenyl	0.0465	U	0.0455	U	0.0470	U	0.0886	JD	0.0460	U	0.0720	JD	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
1,2,4,5-Tetrachlorobenzene	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
1,2,4-Trichlorobenzene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
1,2-Dichlorobenzene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	1.1	100
iphenylhydrazine (as Azober	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
1,3-Dichlorobenzene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	2.4	49
1,4-Dichlorobenzene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	1.8	13
1-Methylnaphthalene	0.119	JD	0.0907	U	0.0938	U	0.247	D	0.0917	U	0.0910	U	0.0931	U	0.142	JD	0.163	JD	0.0913	U	NS	NS
2,3,4,6-Tetrachlorophenol	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
2,4,5-Trichlorophenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
2,4,6-Trichlorophenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
2,4-Dichlorophenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
2,4-Dimethylphenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
2,4-Dinitrophenol	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
2,4-Dinitrotoluene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
2,6-Dinitrotoluene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
2-Chloronaphthalene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
2-Chlorophenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
2-Methylnaphthalene	0.145	D	0.0455	U	0.0473	JD	0.305	D	0.0460	U	0.0589	JD	0.0466	U	0.155	D	0.191	D	0.0458	U	NS	NS
2-Methylphenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	0.33	100
2-Nitroaniline	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
2-Nitrophenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
3- & 4-Methylphenols	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
3,3-Dichlorobenzidine	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
3-Nitroaniline	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
4,6-Dinitro-2-methylphenol	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
4-Bromophenyl phenyl ether	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
4-Chloro-3-methylphenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
4-Chloroaniline	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
4-Chlorophenyl phenyl ether	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
4-Nitroaniline	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
4-Nitrophenol	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
Acenaphthene	0.837	D	0.0455	U	0.142	D	1.440	D	0.133	D	0.300	D	0.0466	U	1.210	D	0.299	D	0.113	D	20	100
Acenaphthylene	0.367	D	0.0522	JD	0.170	D	0.241	D	0.163	D	0.277	D	0.0677	JD	0.181	D	0.0880	JD	0.0475	JD	100	100
Acetophenone	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Aniline	0.186	U	0.182	U	0.188	U	0.191	U	0.184	U	0.182	U	0.186	U	0.186	U	0.195	U	0.183	U	NS	NS
Anthracene	2.350	D	0.125	D	0.473	D	2.940	D	0.509	D	0.948	D	0.440	D	5.450	D	0.684	D	0.359	D	100	100
Atrazine	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Benzaldehyde	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Benzidine	0.186	U	0.182	U	0.188	U	0.191	U	1.840	U	0.182	U	0.186	U	0.186	U	0.195	U	0.183	U	NS	NS
Benzo(a)anthracene	**6.950**	DE	0.461	D	**1.710**	D	**5.040**	D	**1.910**	D	**3.530**	D	0.375	D	0.582	U	**1.390**	D	0.605	D	1	1
Benzo(a)pyrene	**6.460**	DE	0.511	D	**1.790**	D	**4.770**	D	**2.260**	D	**3.680**	D	0.453	D	**7.320**	D	**1.340**	D	0.568	D	1	1
Benzo(b)fluoranthene	**5.650**	D	0.431	D	**1.710**	D	**4.020**	D	**1.910**	D	**3.150**	D	0.348	D	**7.010**	D	**1.130**	D	0.487	D	1	1
Benzo(g,h,i)perylene	3.430	D	0.329	D	1.100	D	2.810	D	1.340	D	2.220	D	0.267	D	2.560	D	0.781	D	0.337	D	100	100
Benzo(k)fluoranthene	**5.100**	D	0.396	D	**1.340**	D	**3.460**	D	**1.780**	D	**2.720**	D	0.326	D	**6.260**	D	**1.040**	D	0.447	D	0.8	3.9
Benzoic acid	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Benzyl alcohol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Benzyl butyl phthalate	0.297	D	0.0455	U	0.323	D	0.140	D	0.0460	U	0.127	D	0.0466	U	0.106	D	0.0488	U	0.0458	U	NS	NS
Bis(2-chloroethoxy)methane	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Bis(2-chloroethyl)ether	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Bis(2-chloroisopropyl)ether	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Bis(2-ethylhexyl)phthalate	7.280	D	0.139	D	0.434	D	9.140	D	0.213	D	0.175	D	0.0466	U	0.0817	JD	0.0996	D	0.109	D	NS	NS
Caprolactam	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
Carbazole	0.565	D	0.0455	U	0.175	D	1.160	D	0.195	D	0.325	D	0.0466	U	1.230	D	0.262	D	0.135	D	NS	NS
Chrysene	**6.280**	DE	0.426	D	**1.550**	D	**4.410**	D	**1.760**	D	**2.900**	DE	0.363	D	0.582	U	**1.340**	D	0.548	D	1	3.9
Cresols, total	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
Dibenzo(a,h)anthracene	**1.460**	D	0.114	D	**0.435**	D	**1.200**	D	**0.574**	D	**0.863**	D	0.102	D	**1.310**	D	**0.343**	D	0.0964	D	0.33	0.33
Dibenzofuran	0.338	D	0.0455	U	0.0540	JD	0.618	D	0.0587	JD	0.127	D	0.0466	U	0.0466	U	0.248	D	0.0781	JD	7	59
Diethyl phthalate	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Dimethyl phthalate	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Di-n-butyl phthalate	0.0465	U	0.0455	U	0.0470	U	2.010	D	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Di-n-octyl phthalate	0.0465	U	0.0455	U	0.138	D	0.192	D	0.0460	U	0.0524	JD	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Diphenylamine	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
Fluoranthene	13.800	D	0.845	D	3.860	D	11.100	D	3.060	D	7.150	D	0.736	D	27.700	D	4.110	D	1.580	D	100	100
Fluorene	0.717	D	0.0455	U	0.143	D	1.250	D	0.128	D	0.282	D	0.0580	JD	1.530	D	0.367	D	0.156	D	30	100
Hexachlorobenzene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	0.33	1.2
Hexachlorobutadiene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Hexachlorocyclopentadiene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Hexachloroethane	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Indeno(1,2,3-cd)pyrene	**4.440**	D	0.294	D	**1.040**	D	**2.750**	D	**1.660**	D	**2.750**	D	0.315	D	**4.210**	D	**0.953**	D	0.401	D	0.5	0.5
Isophorone	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Naphthalene	0.165	D	0.0455	U	0.0470	U	0.515	D	0.0460	U	0.0822	JD	0.0466	U	0.143	D	0.358	D	0.0458	U	12	100
Nitrobenzene	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
N-Nitrosodimethylamine	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
N-nitroso-di-n-propylamine	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
N-Nitrosodiphenylamine	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Parathion	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	NS	NS
Pentachloronitrobenzene	0.0928	U	0.0907	U	0.0938	U	0.0955	U	0.0917	U	0.0910	U	0.0931	U	0.0930	U	0.0974	U	0.0913	U	NS	NS
Pentachlorophenol	0.226	D	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	0.8	6.7
Phenanthrene	7.320	DE	0.378	D	1.500	D	7.440	DE	1.610	D	3.290	D	0.449	D	24.100	D	3.980	D	1.250	D	100	100
Phenol	0.0465	U	0.0455	U	0.0470	U	0.0479	U	0.0460	U	0.0456	U	0.0466	U	0.0466	U	0.0488	U	0.0458	U	0.33	100
Propargite	0.186	U	0.182	U	0.188	U	0.191	U	0.184	U	0.182	U	0.186	U	0.186	U	0.195	U	0.183	U	NS	NS
Pyrene	11.400	D	0.789	D	2.800	D	8.830	D	2.740	D	5.810	D	0.586	D	18.800	D	2.610	D	1.060	D	100	100
Pyridine	0.186	U	0.182	U	0.188	U	0.191	U	0.184	U	0.182	U	0.186	U	0.186	U	0.195	U	0.183	U	NS	NS
Resorcinol	0.186	U	0.182	U	0.188	U	0.191	U	0.184	U	0.182	U	0.186	U	0.186	U	0.195	U	0.183	U	NS	NS

NOTES:
Any Regulatory Exceedences are color coded by Regulation
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NS=No Standard exists for this analyte
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
NS=No Standard exists for this analyte
NT=this indicates the analyte was not a target for this sample
**=Depth of surveyed floor of site excavation from established Site grade elevation by Perfect Point Land Surveying RT
UUSCOS=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCOs=NYSDEC Part 375 Restricted Use Soil Cleanup Objectives -Restricted Residential
(green) sample exceeds UUSCOs
(gray) sample exceeds RRSCOs

Table 4 (Cont.)
End Point Samples Analytical Results for Pesticides and PCBs
198 East 135th Street, Bronx , NY

Location	Build Area at Lot 60 - Building B																																UUSCOs	RRSCOs
Sample ID	EP-13		EP-14		EP-15		EP-16		EP-25		EP-26		EP-27		EP-28		EP-29		EP-30		EP-1		EP-6		EP-7		EP-8		EP-9		EP-10		EP-31		EP-32		EP-33		EP-34			
Sample Depth **	-13.56		-13.99		-13.80		-13.80		-13.72		-13.66		-13.38		-13.36		-22.19		-13.56		-3.70		-2.37		-3.82		-2.13		-1.99		-1.62		-2.15		-2.88		-2.29		-3.12			
Sampling Date	7/2/2018		7/2/2018		7/2/2018		7/2/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
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	Result	Q	Result	Q		
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
Pesticides, 8081 target list																																								
4,4'-DDD	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	**0.0482**	DP	**0.0191**	D	0.00189	U	0.00182	U	**0.0182**	D	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.0033	13
4,4'-DDE	0.00260	U	0.00205	U	0.00303	U	0.00279	D	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.0033	8.9
4,4'-DDT	**0.0124**	D	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	**0.366**	D	**0.0296**	D	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.0033	7.9
Aldrin	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.005	0.097
alpha-BHC	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.02	0.48
alpha-Chlordane	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.094	4.2
beta-BHC	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.036	0.36
Chlordane, total	0.0519	U	0.0410	U	0.0607	U	0.0396	U	0.0434	U	0.0369	U	0.0401	U	0.0375	U	0.0531	U	0.0439	U	0.0366	U	0.0360	U	0.0371	U	0.0378	U	0.0364	U	0.0361	U	0.0369	U	0.0368	U	0.0381	U	0.0359	U	ND	NS
delta-BHC	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.04	100
Dieldrin	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.005	0.2
Endosulfan I	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	2.4	24
Endosulfan II	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	2.4	24
Endosulfan sulfate	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	2.4	24
Endrin	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.014	11
Endrin aldehyde	0.00815	DP	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	NS	NS
Endrin ketone	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	NS	NS
gamma-BHC (Lindane)	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.1	1.3
gamma-Chlordane	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	NS	NS
Heptachlor	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	0.042	2.1
Heptachlor epoxide	0.00260	U	0.00205	U	0.00303	U	0.00198	U	0.00217	U	0.00185	U	0.00201	U	0.00187	U	0.00266	U	0.00219	U	0.00183	U	0.00180	U	0.00186	U	0.00189	U	0.00182	U	0.00181	U	0.00185	U	0.00184	U	0.00191	U	0.00180	U	NS	NS
Methoxychlor	0.0130	U	0.0102	U	0.0152	U	0.00989	U	0.0108	U	0.00923	U	0.0100	U	0.00937	U	0.0133	U	0.0110	U	0.00915	U	0.00901	U	0.00928	U	0.00945	U	0.00910	U	0.00904	U	0.00924	U	0.00919	U	0.00954	U	0.00898	U	NS	NS
Toxaphene	0.131	U	0.104	U	0.154	U	0.100	U	0.110	U	0.0934	U	0.101	U	0.0948	U	0.134	U	0.111	U	0.0926	U	0.0911	U	0.0939	U	0.0956	U	0.0921	U	0.0914	U	0.0935	U	0.0931	U	0.0965	U	0.0909	U	NS	NS
Polychlorinated Biphenyls (PCB)																																								
Aroclor 1016	0.0262	U	0.0207	U	0.0306	U	0.0200	U	0.0219	U	0.0186	U	0.0202	U	0.0189	U	0.0268	U	0.0221	U	0.0185	U	0.0182	U	0.0187	U	0.0191	U	0.0184	U	0.0182	U	0.0186	U	0.0186	U	0.0193	U	0.0181	U	NS	NS
Aroclor 1221	0.0262	U	0.0207	U	0.0306	U	0.0200	U	0.0219	U	0.0186	U	0.0202	U	0.0189	U	0.0268	U	0.0221	U	0.0185	U	0.0182	U	0.0187	U	0.0191	U	0.0184	U	0.0182	U	0.0186	U	0.0186	U	0.0193	U	0.0181	U	NS	NS
Aroclor 1232	0.0262	U	0.0207	U	0.0306	U	0.0200	U	0.0219	U	0.0186	U	0.0202	U	0.0189	U	0.0268	U	0.0221	U	0.0185	U	0.0182	U	0.0187	U	0.0191	U	0.0184	U	0.0182	U	0.0186	U	0.0186	U	0.0193	U	0.0181	U	NS	NS
Aroclor 1242	0.0262	U	0.0207	U	0.0306	U	0.0200	U	0.0219	U	0.0186	U	0.0202	U	0.0189	U	0.0268	U	0.0221	U	0.0185	U	0.0182	U	0.0187	U	0.0191	U	0.0184	U	0.0182	U	0.0186	U	0.0186	U	0.0193	U	0.0181	U	NS	NS
Aroclor 1248	0.0262	U	0.0207	U	0.0306	U	0.0200	U	0.0219	U	0.0186	U	0.0202	U	0.0189	U	0.0268	U	0.0221	U	0.0185	U	0.0182	U	0.0187	U	0.0191	U	0.0184	U	0.0182	U	0.0186	U	0.0186	U	0.0193	U	0.0181	U	NS	NS
Aroclor 1254	0.0262	U	0.0207	U	0.0306	U	0.0200	U	0.0219	U	0.0186	U	0.0202	U	0.0189	U	0.0268	U	0.0221	U	0.0185	U	0.0182	U	0.0187	U	0.0191	U	0.0184	U	0.0182	U	0.0186	U	0.0186	U	0.0193	U	0.0181	U	NS	NS
Aroclor 1260	0.0420	P	0.0207	U	0.0306	U	0.0200	U	0.0219	U	0.0186	U	0.0202	U	0.0189	U	0.0268	U	0.0221	U	**0.0612**		0.0182	U	0.0187	U	0.0191	U	0.0184	U	0.0520		0.0186	U	0.0186	U	0.0193	U	0.0181	U	NS	NS
Total PCBs	**0.0871**		0.0207	U	0.0306	U	0.0200	U	0.0219	U	0.0186	U	0.0202	U	0.0189	U	0.0268	U	0.0221	U	**0.0612**		0.0182	U	0.0187	U	0.0191	U	0.0184	U	0.0520		0.0186	U	0.0186	U	0.0193	U	0.0181	U	0.1	1

NOTES:
Any Regulatory Exceedences are color coded by Regulation
Q is the Qualifier Column with definitions as follows:
D=result is from an analysis that required a dilution
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U=analyte not detected at or above the level indicated
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NS=No Standard exists for this analyte
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
NS=No Standard exists for this analyte
NT=this indicates the analyte was not a target for this sample
**=Depth of surveyed floor of site excavation from established Site grade elevation by Perfect Point Land Surveying, RT
UUSCOS=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCOs=NYSDEC Part 375 Restricted Use Soil Cleanup Objectives -Restricted Residential
sample exceeds UUSCOs

Table 4 (Cont.)
End Point Samples Analytical Results for Metals
198 East 135th Street, Bronx , NY

Location	Build Area at Lot 60 - Building B																				Con Edison Easement																Gas and Sewer Easement								UUSCOs	RRSCOs
Sample ID	EP-13		EP-14		EP-15		EP-16		EP-25		EP-26		EP-27		EP-28		EP-29		EP-30		EP-1		EP-6		EP-7		EP-8		EP-9		EP-10		EP-31		EP-32		EP-33		EP-34			
Sample Depth **	-13.56		-13.99		-13.80		-13.80		-13.72		-13.66		-13.38		-13.36		-22.19		-13.56		-3.70		-2.37		-3.82		-2.13		-1.99		-1.62		-2.15		-2.88		-2.29		-3.12			
Sampling Date	7/2/2018		7/2/2018		7/2/2018		7/2/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		12/14/2018		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019		5/10/2019			
Client Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil			
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	Result	Q	Result	Q	Result	Q		
Units	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	mg/Kg
Aluminum	**13,800**		**2,620**		**14,800**		**3,250**		**9,290**		**9,140**		**9,490**		**8,480**		**14,900**		**9,980**		**9,610**		**13,300**		**8,850**		**10,700**		**11,300**		**8,500**		**7,600**		**8,030**		**6,990**		**7,200**		NS	NS
Antimony	2.890		0.621	U	0.919	U	0.599	U	3.280	U	2.800	U	3.040	U	2.840	U	4.020	U	3.320	U	2.790	U	2.740	U	2.820	U	2.870	U	2.770	U	2.760	U	2.810	U	2.800	U	2.930	U	2.750	U	NS	NS
Arsenic	**22.900**		**15.400**		**19.400**		**1.490**		**2.250**		**2.630**		**2.340**		**2.330**		**21.100**		**5.100**		**2.590**		1.640	U	**2.890**		**4.280**		**3.170**		**4.120**		**2.960**		**6.130**		**4.180**		**3.800**		13	16
Barium	**296**		**107**		**84.200**		**88.500**		**74.400**		**132**		**71**		**64.900**		**252**		**161**		**347**		**179**		**201**		**245**		**264**		**218**		**72.400**		**147**		**762**		**75.700**		350	400
Beryllium	**0.231**		0.124	U	**0.204**		0.120	U	0.0660	U	0.0560	U	0.0610	U	0.0570	U	**0.212**		0.0660	U	0.0560	U	0.0550	U	0.0560	U	0.0570	U	0.0550	U	0.0550	U	0.0560	U	0.0560	U	0.0590	U	0.0550	U	7.2	72
Cadmium	**3.150**		**1.560**		**0.866**		**4.560**		0.394	U	**0.581**		0.365	U	0.341	U	**2.820**		**0.972**		**0.915**		**0.550**		**0.603**		**0.697**		**0.855**		**0.664**		0.337	U	0.562		**0.741**		0.330	U	2.5	4.3
Calcium	**7,900**		**1,310**		**6,400**		**10,800**		**20,900**		**45,400**		**18,600**		**22,500**		**6,440**		**32,500**		**25,000**		**20,500**		**38,400**		**33,400**		**32,000**		**33,300**		**23,100**		**30,700**		**29,300**		**15,900**		NS	NS
Chromium	**76.800**		**24.400**		**37.500**		**17.400**		**24.600**		**21**		**17.900**		**16.100**		**78.900**		**28.400**		**23.700**		**30.700**		**25.400**		**29.400**		**39**		**22.200**		**16.100**		**23.200**		**24.400**		**15.400**		NS	NS
Chromium, Hexavalent	0.787	U	0.621	U	0.919	U	0.599	U	0.657	U	0.559	U	0.608	U	0.568	U	0.805	U	0.665	U	0.558	U	0.548	U	0.564	U	0.575	U	0.554	U	0.551	U	0.562	U	0.559	U	0.586	U	0.549	U	1	110
Chromium, Trivalent	**50.700**		**24.400**		**37.500**		**17.400**		**24.600**		**21**		**17.900**		**16.100**		**78.900**		**28.400**		**23.700**		**30.700**		**25.400**		**29.400**		**39**		**22.200**		**16.100**		**23.200**		**16.100**		**15.400**		30	180
Cobalt	**14.100**		**15.800**		**18**		**7.620**		**7.600**		**8.400**		**8.500**		**7.390**		**12.700**		**8.440**		**9.930**		**16.400**		**8.480**		**11.200**		**13.200**		**8.570**		**6.580**		**7.280**		**7.340**		**6.640**		NS	NS
Copper	**221**		**130**		**46**		**20.100**		**43.900**		**33.500**		**36.700**		**32.500**		**302**		**89.400**		**149**		**60.800**		**60**		**61.900**		**92.800**		**73.900**		**34.900**		**55.900**		**92.400**		**23.200**		50	270
Iron	**30,700**		**13,200**		**26,300**		**6,820**		**19,400**		**16,600**		**16,400**		**15,700**		**35,200**		**18,900**		**19,500**		**24,100**		**15,900**		**20,800**		**28,500**		**18,400**		**14,100**		**18,300**		**16,700**		**16,100**		NS	NS
Lead	**361**		**191**		**126**		**76.800**		**54.200**		**86.800**		**63.400**		**54.800**		**452**		**139**		**305**		**69.900**		**124**		**142**		**182**		**182**		**54.100**		**152**		**1,120**		**52.700**		63	400
Magnesium	**7,970**		**6,410**		**8,230**		**13,100**		**6,800**		**22,600**		**10,100**		**11,000**		**7,550**		**13,800**		**6,980**		**8,070**		**7,110**		**6,640**		**7,480**		**10,900**		**11,400**		**7,180**		**6,760**		**4,590**		NS	NS
Manganese	**332**		**368**		**572**		**237**		**266**		**299**		**204**		**180**		**388**		**278**		**248**		**236**		**231**		**250**		**315**		**312**		**261**		**292**		**298**		**340**		1600	2000
Mercury	**2.260**		**0.785**		**0.628**		0.0360	U	**0.125**		**0.291**		**0.215**		**0.207**		**4.750**		**0.569**		**0.367**		**0.0808**		**0.214**		**0.240**		**0.214**		**0.245**		**0.226**		**0.166**		**0.133**		**0.0823**		0.18	0.81
Nickel	**41.200**		**66.900**		**41.600**		**21**		**26.400**		**17.900**		**22.800**		**16.400**		**42.600**		**21.400**		**24**		**32.800**		**21**		**25.600**		**34.100**		**22.700**		**16.900**		**19.200**		**19.300**		**14.100**		30	310
Potassium	**2,590**		**1,170**		**2,840**		**1,070**		1,820	B	2,790	B	2,010	B	1,840	B	**2,970**		2,660	B	3,250	B	7,930	B	3,730	B	5,240	B	5,430	B	2,530	B	1,860	B	2,060	B	1,650	B	1,730	B	NS	NS
Selenium	1.570	U	1.240	U	1.840	U	**13.100**		3.280	U	2.800	U	3.040	U	2.840	U	**4.020**	U	3.320	U	2.790	U	2.740	U	2.820	U	2.870	U	2.770	U	2.760	U	2.810	U	2.800	U	2.930	U	2.750	U	3.9	180
Silver	1.070		0.621	U	0.919	U	0.599	U	0.657	U	0.559	U	0.608	U	0.568	U	**3.440**		0.665	U	0.558	U	0.548	U	0.564	U	0.575	U	0.554	U	0.551	U	0.562	U	0.559	U	0.586	U	0.549	U	2	180
Sodium	**2,230**		**448**		**731**		**280**		**428**		**375**		**453**		**415**		**1,650**		**897**		**349**		**429**		**359**		**235**		**283**		**552**		**269**		**327**		**251**		**201**		NS	NS
Thallium	1.570	U	1.240	U	1.840	U	1.200	U	3.280	U	2.800	U	3.040	U	2.840	U	4.020	U	3.320	U	2.790	U	2.740	U	2.820	U	2.870	U	2.770	U	2.760	U	2.810	U	2.800	U	2.930	U	2.750	U	NS	NS
Vanadium	**39.100**		**34.600**		**53.800**		**25.500**		**23.100**		**26.400**		**21.400**		**21.200**		**37.400**		**27.100**		**41**		**47.300**		**34.600**		**44.100**		**47.600**		**37.100**		**20.900**		**39.100**		**28.900**		**22.900**		NS	NS
Zinc	**490**		**654**		**136**		**325**		**79.600**		**123**		**87.700**		**84.600**		**626**		**215**		**390**		**127**		**181**		**259**		**277**		**251**		**84**		**211**		**267**		**67**		109	10000

NOTES:
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J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
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E=result is estimated and cannot be accurately reported due to levels encountered or interferences
NS=No Standard exists for this analyte
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
NS=No Standard exists for this analyte
NT=this indicates the analyte was not a target for this sample
**=Depth of surveyed floor of site excavation from established Site grade elevation by Perfect Point Land Surveying RT
UUSCOS=NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
RRSCOs=NYSDEC Part 375 Restricted Use Soil Cleanup Objectives -Restricted Residential
sample exceeds UUSCOs
sample exceeds RRSCOs

Table 4 (Cont.)
Trip Blanks Analytical Results for VOCs
198 East 135th Street, Bronx , NY

Sample ID	Trip Blank		Trip Blank		Trip Blank		Trip Blank		Trip Blank	
Sampling Date	10/10/2018		6/8/2018		10/29/2018		7/2/2018		12/14/2018	
Client Matrix	DI Water		DI Water		DI Water		DI Water		DI Water	
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,1,1-Trichloroethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,1,2,2-Tetrachloroethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 11	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,1,2-Trichloroethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,1-Dichloroethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,1-Dichloroethylene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2,3-Trichlorobenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2,3-Trichloropropane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2,4-Trichlorobenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2,4-Trimethylbenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2-Dibromo-3-chloropropane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2-Dibromoethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2-Dichlorobenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2-Dichloroethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,2-Dichloropropane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,3,5-Trimethylbenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,3-Dichlorobenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,4-Dichlorobenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
1,4-Dioxane	40	U	40	U	40	U	40	U	40	U
2-Butanone	0.200	U	0.200	U	**0.640**		0.200	U	0.200	U
2-Hexanone	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
4-Methyl-2-pentanone	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Acetone	**19.100**		**1.200**	J	**3.170**		1	U	**3.310**	
Acrolein	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Acrylonitrile	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Benzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Bromochloromethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Bromodichloromethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Bromoform	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Bromomethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Carbon disulfide	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Carbon tetrachloride	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Chlorobenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Chloroethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Chloroform	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Chloromethane	0.200	U	0.200	U	**0.260**	J	0.200	U	**1.610**	
cis-1,2-Dichloroethylene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
cis-1,3-Dichloropropylene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Cyclohexane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Dibromochloromethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Dibromomethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Dichlorodifluoromethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Ethyl Benzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Hexachlorobutadiene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Isopropylbenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Methyl acetate	**0.250**	J	0.200	U	0.200	U	0.200	U	0.200	U
Methyl tert-butyl ether (MTBE)	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Methylcyclohexane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Methylene chloride	1	U	1	U	1	U	1	U	1	U
n-Butylbenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
n-Propylbenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
o-Xylene	**0.340**	J	0.200	U	0.200	U	0.200	U	0.200	U
p- & m- Xylenes	**0.540**	J	0.500	U	0.500	U	0.500	U	0.500	U
p-Isopropyltoluene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
sec-Butylbenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Styrene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
tert-Butyl alcohol (TBA)	**7.080**		0.500	U	**3.510**		0.500	U	**2.470**	J
tert-Butylbenzene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Tetrachloroethylene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Toluene	**0.380**	J	0.200	U	0.200	U	0.200	U	0.200	U
trans-1,2-Dichloroethylene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
trans-1,3-Dichloropropylene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
trans-1,4-dichloro-2-butene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Trichloroethylene	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Trichlorofluoromethane	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vinyl Chloride	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Xylenes, Total	**0.880**	J	0.600	U	0.600	U	0.600	U	0.600	U

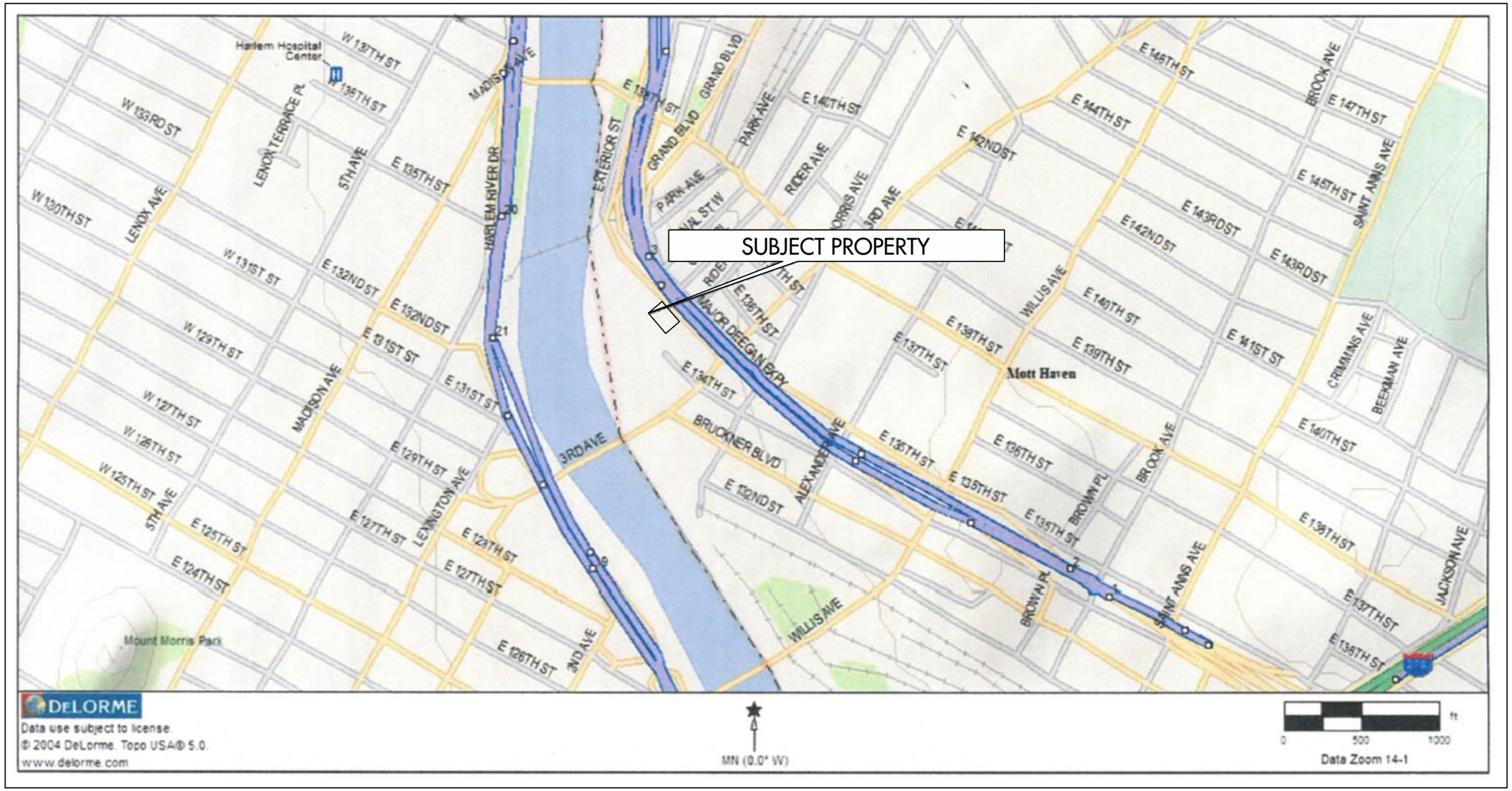
NOTES:

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

Figures



N

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
HAUPPAUGE, NY 11788

15 OCEAN AVENUE, SUITE 2B BROOKLYN, NY 11225

TEL: (631) 462-5866

FAX: (631) 462-5877

BASE DRAWING PREPARED BY

PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

FIGURE 1: SITE LOCATION MAP

PROJECT NO.	DATE
170339	09/09/19
DRAWN BY: G.T.	REVIEWED BY: P.M.
SCALE (11X17): NOT TO SCALE	APPROVED BY: P.M.

LEGEND

- C50 Condo Flag/Condo Nunber
- A50 Air Right Flag/Lot Number
- S50 Subterranean Right Flag/Lot Number
- R REUC Flag
- Under Water Tax Lot Boundary
- Other Boundary
- Possession Hook
- Misc Miscelaneous Text
- Small Tax Lot Dimension
- Surface Water
- Borough Boundary
- Tax Block Boundary
- 50 Tax Block Number
- Tax Lot Boundary
- 50 Tax Lot Number
- ~~50~~ Condo FKA Tax Lot Number
- 50.5 Tax Lot Dimension
- +/-5.5 Approximate Tax Lot Dimension
- 1500 - 1550 Condo Units Range Label
- Building Footprint

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HydroTech

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
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BASE DRAWING PREPARED BY

PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

FIGURE 2A: LOT 160 DIGITAL TAX MAP- NEW YORK CITY DEPARTMENT OF FINANCE (6/10/2019)

PROJECT NO. 170339	DATE
DRAWN BY A.D.	REVIEWED BY
SCALE (11X17) NOT TO SCALE	APPROVED BY

LEGEND

- C50 Condo Flag/Condo Nunber
- A50 Air Right Flag/Lot Number
- S50 Subterranean Right Flag/Lot Number
- R REUC Flag
- Under Water Tax Lot Boundary
- Other Boundary
- Possession Hook
- Misc Miscelaneous Text
- Small Tax Lot Dimension
- Surface Water
- Borough Boundary
- Tax Block Boundary
- 50 Tax Block Number
- Tax Lot Boundary
- 50 Tax Lot Number
- ~~50~~ Condo FKA Tax Lot Number
- 50.5 Tax Lot Dimension
- +/-5.5 Approximate Tax Lot Dimension
- 1500 - 1550 Condo Units Range Label
- Building Footprint

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HydroTech

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

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TEL: (631) 462-5866

FAX: (631) 462-5877

BASE DRAWING PREPARED BY

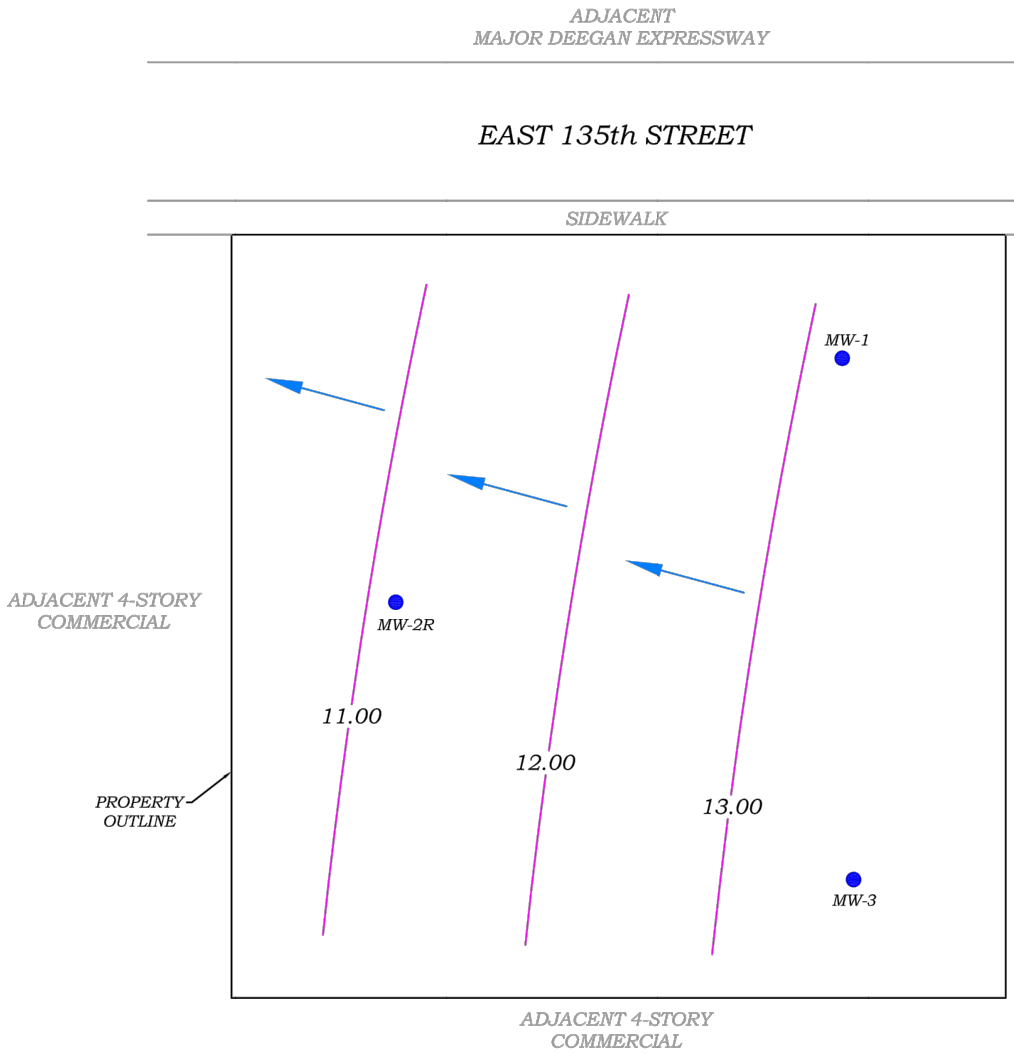
PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

FIGURE 2B: LOT 60 DIGITAL TAX MAP- NEW YORK CITY DEPARTMENT OF FINANCE (6/10/2019)

PROJECT NO. 170339	DATE
DRAWN BY A.D.	REVIEWED BY
SCALE (11X17) NOT TO SCALE	APPROVED BY



LEGEND:

- MONITORING WELL LOCATIONS (MW)
- CONTOUR LINES
- C.I CONTOUR INTERVAL

GROUNDWATER FLOW

C.I. = 1.00 FEET	
Monitoring Well IDs	Groundwater Elevations
MW-1	13.48
MW-2R	11.09
MW-3	13.38

SCALE IN FEET (FT.)

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

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BASE DRAWING PREPARED BY

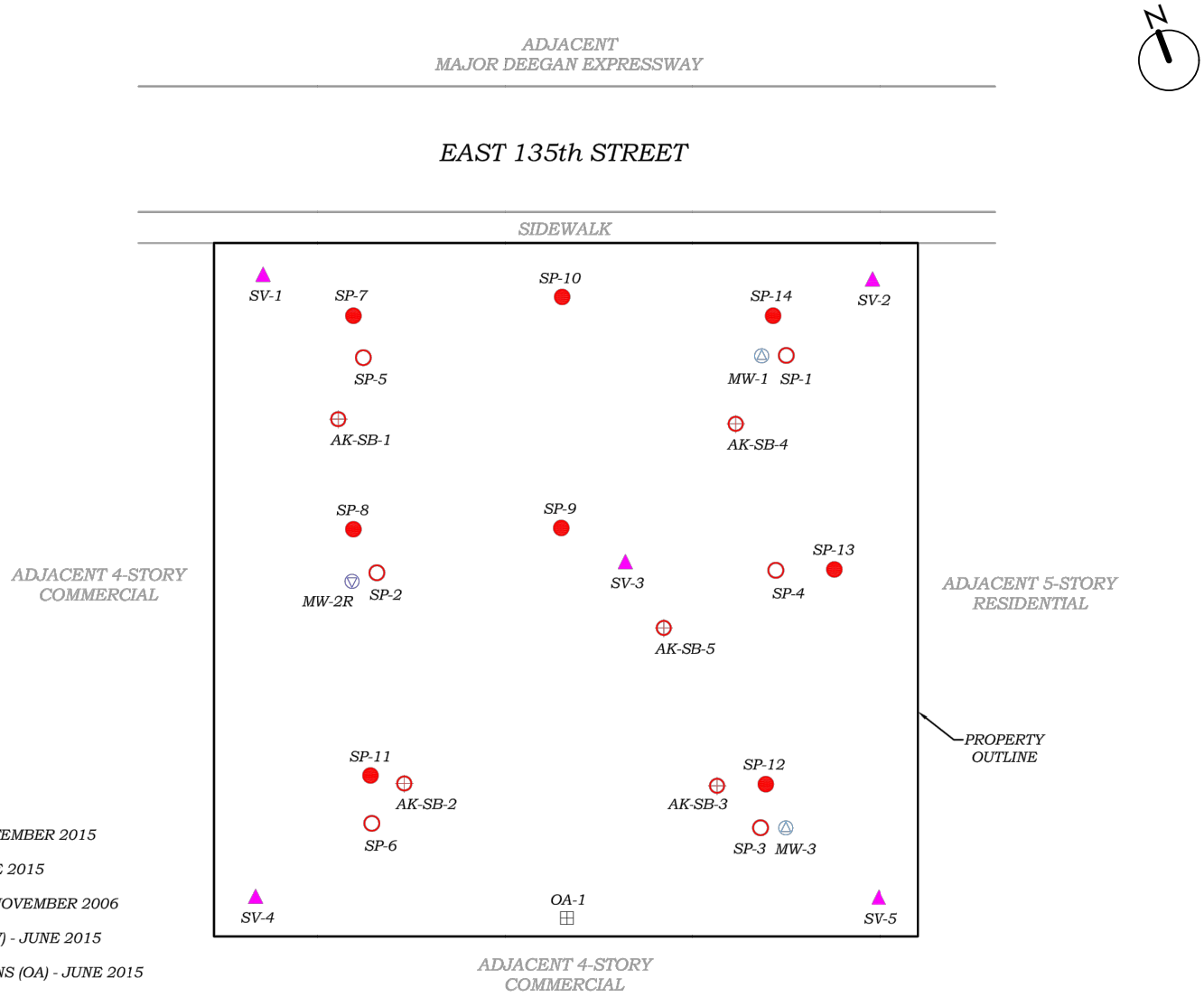
PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

FIGURE 3: GROUNDWATER FLOW CONTOUR MAP (MARCH 2017)

PROJECT NO. 170339	DATE
DRAWN BY A.D.	REVIEWED BY
SCALE (11X17) AS NOTED	APPROVED BY



LEGEND:

- SOIL PROBE LOCATIONS (SP) - SEPTEMBER 2015
- SOIL PROBE LOCATIONS (SP) - JUNE 2015
- SOIL PROBE LOCATIONS (AK-SB) - NOVEMBER 2006
- SOIL VAPOR PROBE LOCATIONS (SV) - JUNE 2015
- OUTDOOR AIR SAMPLING LOCATIONS (OA) - JUNE 2015
- MONITORING WELL LOCATIONS (MW) - JUNE 2015
- MONITORING WELL LOCATIONS - RE-INSTALLED FEBRUARY 2017

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

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BASE DRAWING PREPARED BY

PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

FIGURE 4: SAMPLING MAP OF SOIL PROBE, SOIL VAPOR, AND MONITORING WELLS

PROJECT NO. 170339	DATE
DRAWN BY A.D.	REVIEWED BY
SCALE (11X17) AS NOTED	APPROVED BY

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
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BASE DRAWING PREPARED BY

PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

FIGURE 5A: MAP OF SOIL EXCEEDANCE OF RRSCOs FOR SVOCs

PROJECT NO.	DATE
170339	09/09/2019
DRAWN BY G.T.	REVIEWED BY P.M.
SCALE (11X17) NOT TO SCALE	APPROVED BY P.M.

MAJOR DEEGAN EXPRESSWAY
EAST 135TH STREET

PARK AVENUE

THIRD AVENUE

LOT 60

LOT 160

	EP-32	UUSCOs	RRSCOs
Depth (ft)	-2.88		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)pyrene	7.32	1	1
Benzo(b)fluoranthene	7.01	1	1
Benzo(k)fluoranthene	6.26	0.8	3.9
Dibenzo(a,h)anthracene	1.31	0.33	0.33
Indeno(1,2,3-cd)pyrene	4.21	0.5	0.5

	EP-33	UUSCOs	RRSCOs
Depth (ft)	-2.29		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	1.39	1	1
Benzo(a)pyrene	1.34	1	1
Benzo(b)fluoranthene	1.13	1	1
Benzo(k)fluoranthene	1.04	0.8	3.9
Chrysene	1.34	1	3.9
Dibenzo(a,h)anthracene	0.343	0.33	0.33
Indeno(1,2,3-cd)pyrene	0.953	0.5	0.5

	EP-31
Depth (ft)	-2.15
SVOCs	NAS

	EP-34
Depth (ft)	-3.12
SVOCs	NAS

	EP-27
Depth (ft)	-13.38
SVOCs	NAS

	EP-1	UUSCOs	RRSCOs
Depth (ft)	-3.70		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	6.95	1	1
Benzo(a)pyrene	6.46	1	1
Benzo(b)fluoranthene	5.65	1	1
Benzo(k)fluoranthene	5.1	0.8	3.9
Chrysene	6.28	1	3.9
Dibenzo(a,h)anthracene	1.46	0.33	0.33
Indeno(1,2,3-cd)pyrene	4.44	0.5	0.5

	EP-28	UUSCOs	RRSCOs
Depth (ft)	-13.36		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	1.4	1	1
Benzo(a)pyrene	1.16	1	1
Benzo(k)fluoranthene	0.912	0.8	3.9
Chrysene	1.3	1	3.9
Indeno(1,2,3-cd)pyrene	0.504	0.5	0.5

	EP-6
Depth (ft)	-2.37
SVOCs	NAS

	EP-26	UUSCOs	RRSCOs
Depth (ft)	-13.66		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	1.12	1	1
Benzo(k)fluoranthene	0.803	0.8	3.9
Chrysene	1.13	1	3.9
Indeno(1,2,3-cd)pyrene	0.521	0.5	0.5

	EP-7	UUSCOs	RRSCOs
Depth (ft)	-3.82		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	1.71	1	1
Benzo(a)pyrene	1.79	1	1
Benzo(b)fluoranthene	1.71	1	1
Benzo(k)fluoranthene	1.34	0.8	3.9
Chrysene	1.55	1	3.9
Dibenzo(a,h)anthracene	0.435	0.33	0.33
Indeno(1,2,3-cd)pyrene	1.04	0.5	0.5

	EP-29	UUSCOs	RRSCOs
Depth (ft)	-22.19		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	3.24	1	1
Benzo(a)pyrene	2.97	1	1
Benzo(b)fluoranthene	1.99	1	1
Benzo(k)fluoranthene	1.9	0.8	3.9
Chrysene	3.45	1	3.9
Dibenzo(a,h)anthracene	0.48	0.33	0.33
Indeno(1,2,3-cd)pyrene	1.19	0.5	0.5

	EP-8	UUSCOs	RRSCOs
Depth (ft)	-2.13		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	5.04	1	1
Benzo(a)pyrene	4.77	1	1
Benzo(b)fluoranthene	4.02	1	1
Benzo(k)fluoranthene	3.46	0.8	3.9
Chrysene	4.41	1	3.9
Dibenzo(a,h)anthracene	1.2	0.33	0.33
Indeno(1,2,3-cd)pyrene	2.75	0.5	0.5

	EP-30
Depth (ft)	-13.56
SVOCs	NAS

	EP-25
Depth (ft)	-13.72
SVOCs	NAS

	EP-9	UUSCOs	RRSCOs
Depth (ft)	-1.99		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	1.91	1	1
Benzo(a)pyrene	2.26	1	1
Benzo(b)fluoranthene	1.91	1	1
Benzo(k)fluoranthene	1.78	0.8	3.9
Chrysene	1.76	1	3.9
Dibenzo(a,h)anthracene	0.574	0.33	0.33
Indeno(1,2,3-cd)pyrene	1.66	0.5	0.5

	EP-15
Depth (ft)	-13.54
SVOCs	NAS

	EP-16
Depth (ft)	-13.71
SVOCs	NAS

	EP-10	UUSCOs	RRSCOs
Depth (ft)	-1.62		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	3.53	1	1
Benzo(a)pyrene	3.68	1	1
Benzo(b)fluoranthene	3.15	1	1
Benzo(k)fluoranthene	2.72	0.8	3.9
Chrysene	2.9	1	3.9
Dibenzo(a,h)anthracene	0.863	0.33	0.33
Indeno(1,2,3-cd)pyrene	2.75	0.5	0.5

	EP-14	UUSCOs	RRSCOs
Depth (ft)	-13.99		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	1.54	1	1
Benzo(a)pyrene	1.35	1	1
Benzo(b)fluoranthene	1.14	1	1
Benzo(k)fluoranthene	0.955	0.8	3.9
Chrysene	1.47	1	3.9
Indeno(1,2,3-cd)pyrene	0.618	0.5	0.5

	EP-13	UUSCOs	RRSCOs
Depth (ft)	-13.56		
SVOCs	mg/Kg	mg/Kg	mg/Kg
Benzo(a)anthracene	2.78	1	1
Benzo(a)pyrene	2.77	1	1
Benzo(b)fluoranthene	2.27	1	1
Benzo(k)fluoranthene	2.19	0.8	3.9
Chrysene	2.79	1	3.9
Dibenzo(a,h)anthracene	0.411	0.33	0.33
Indeno(1,2,3-cd)pyrene	1.27	0.5	0.5

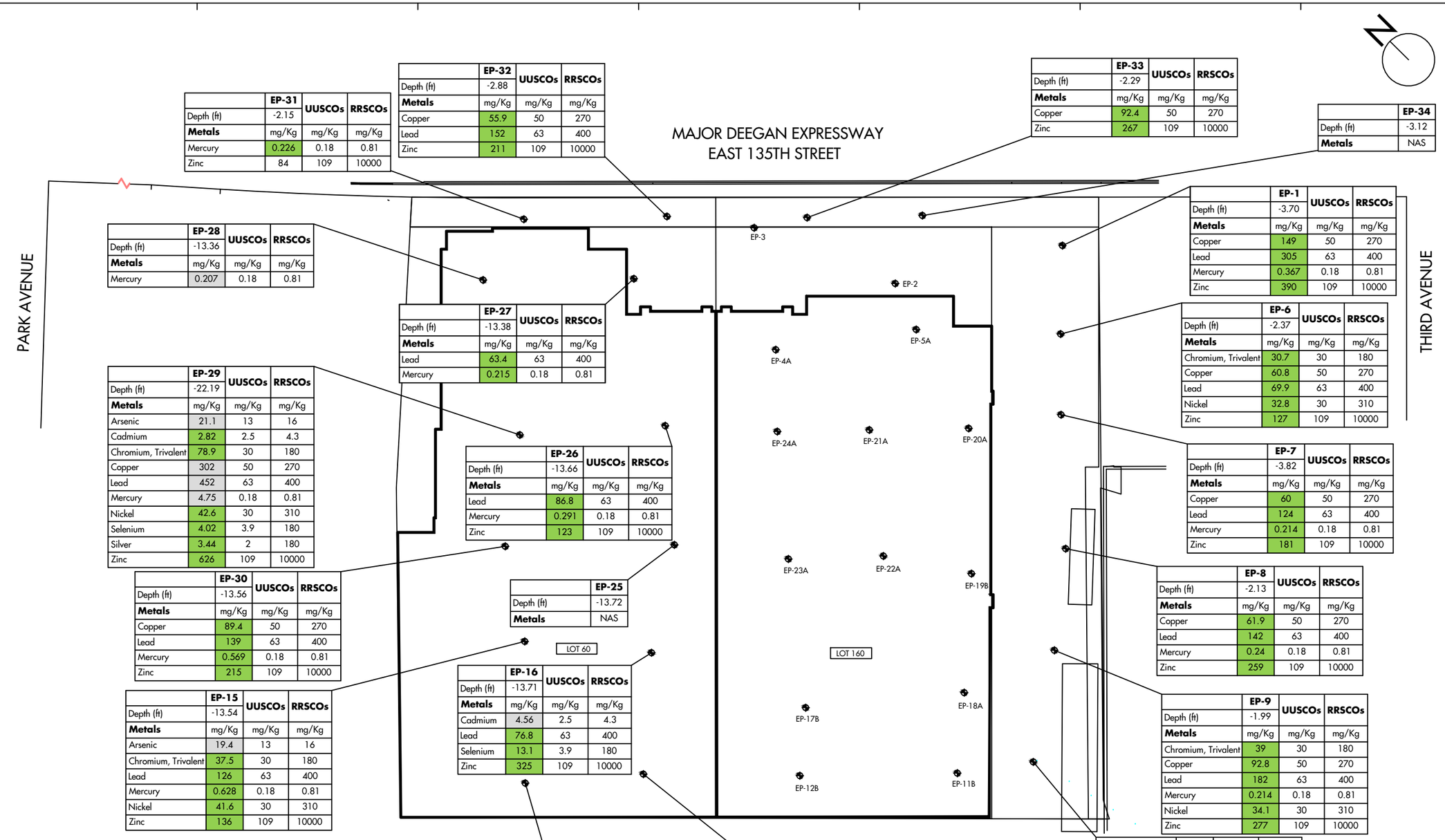
EP-2
EP-3
EP-4A
EP-5A
EP-24A
EP-21A
EP-20A
EP-23A
EP-22A
EP-19B
EP-18A
EP-17B
EP-12B
EP-11B

LEGEND:

SVOCs	SEMIVOLATILE ORGANIC COMPOUNDS
⊕	ENDPOINT SAMPLE LOCATIONS
NAS	NOT ABOVE STANDARD
mg/Kg	MILLIGRAMS PER KILOGRAM
UUSCO	UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
RRSCO	RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVES
	VALUES EXCEED UUSCO STANDARDS
	VALUES EXCEED RRSCO STANDARDS

NOTE:

DEPTH IN FEET OF SURVEYED FLOOR OF SITE EXCAVATION FROM ESTABLISHED SITE GRADE ELEVATION BY PERFECT POINT LAND SURVEYING RT



	EP-31	UUSCOs	RRSCOs
Depth (ft)	-2.15		
Metals	mg/Kg	mg/Kg	mg/Kg
Mercury	0.226	0.18	0.81
Zinc	84	109	10000

	EP-32	UUSCOs	RRSCOs
Depth (ft)	-2.88		
Metals	mg/Kg	mg/Kg	mg/Kg
Copper	55.9	50	270
Lead	152	63	400
Zinc	211	109	10000

	EP-33	UUSCOs	RRSCOs
Depth (ft)	-2.29		
Metals	mg/Kg	mg/Kg	mg/Kg
Copper	92.4	50	270
Zinc	267	109	10000

	EP-34
Depth (ft)	-3.12
Metals	NAS

	EP-28	UUSCOs	RRSCOs
Depth (ft)	-13.36		
Metals	mg/Kg	mg/Kg	mg/Kg
Mercury	0.207	0.18	0.81

	EP-27	UUSCOs	RRSCOs
Depth (ft)	-13.38		
Metals	mg/Kg	mg/Kg	mg/Kg
Lead	63.4	63	400
Mercury	0.215	0.18	0.81

	EP-1	UUSCOs	RRSCOs
Depth (ft)	-3.70		
Metals	mg/Kg	mg/Kg	mg/Kg
Copper	149	50	270
Lead	305	63	400
Mercury	0.367	0.18	0.81
Zinc	390	109	10000

	EP-6	UUSCOs	RRSCOs
Depth (ft)	-2.37		
Metals	mg/Kg	mg/Kg	mg/Kg
Chromium, Trivalent	30.7	30	180
Copper	60.8	50	270
Lead	69.9	63	400
Nickel	32.8	30	310
Zinc	127	109	10000

	EP-29	UUSCOs	RRSCOs
Depth (ft)	-22.19		
Metals	mg/Kg	mg/Kg	mg/Kg
Arsenic	21.1	13	16
Cadmium	2.82	2.5	4.3
Chromium, Trivalent	78.9	30	180
Copper	302	50	270
Lead	452	63	400
Mercury	4.75	0.18	0.81
Nickel	42.6	30	310
Selenium	4.02	3.9	180
Silver	3.44	2	180
Zinc	626	109	10000

	EP-26	UUSCOs	RRSCOs
Depth (ft)	-13.66		
Metals	mg/Kg	mg/Kg	mg/Kg
Lead	86.8	63	400
Mercury	0.291	0.18	0.81
Zinc	123	109	10000

	EP-7	UUSCOs	RRSCOs
Depth (ft)	-3.82		
Metals	mg/Kg	mg/Kg	mg/Kg
Copper	60	50	270
Lead	124	63	400
Mercury	0.214	0.18	0.81
Zinc	181	109	10000

	EP-30	UUSCOs	RRSCOs
Depth (ft)	-13.56		
Metals	mg/Kg	mg/Kg	mg/Kg
Copper	89.4	50	270
Lead	139	63	400
Mercury	0.569	0.18	0.81
Zinc	215	109	10000

	EP-25
Depth (ft)	-13.72
Metals	NAS

	EP-8	UUSCOs	RRSCOs
Depth (ft)	-2.13		
Metals	mg/Kg	mg/Kg	mg/Kg
Copper	61.9	50	270
Lead	142	63	400
Mercury	0.24	0.18	0.81
Zinc	259	109	10000

	EP-15	UUSCOs	RRSCOs
Depth (ft)	-13.54		
Metals	mg/Kg	mg/Kg	mg/Kg
Arsenic	19.4	13	16
Chromium, Trivalent	37.5	30	180
Lead	126	63	400
Mercury	0.628	0.18	0.81
Nickel	41.6	30	310
Zinc	136	109	10000

	EP-16	UUSCOs	RRSCOs
Depth (ft)	-13.71		
Metals	mg/Kg	mg/Kg	mg/Kg
Cadmium	4.56	2.5	4.3
Lead	76.8	63	400
Selenium	13.1	3.9	180
Zinc	325	109	10000

	EP-9	UUSCOs	RRSCOs
Depth (ft)	-1.99		
Metals	mg/Kg	mg/Kg	mg/Kg
Chromium, Trivalent	39	30	180
Copper	92.8	50	270
Lead	182	63	400
Mercury	0.214	0.18	0.81
Nickel	34.1	30	310
Zinc	277	109	10000

	EP-14	UUSCOs	RRSCOs
Depth (ft)	-13.99		
Metals	mg/Kg	mg/Kg	mg/Kg
Arsenic	15.4	13	16
Copper	130	50	270
Lead	191	63	400
Mercury	0.785	0.18	0.81
Nickel	66.9	30	310
Zinc	654	109	10000

	EP-13	UUSCOs	RRSCOs
Depth (ft)	-13.56		
Metals	mg/Kg	mg/Kg	mg/Kg
Arsenic	22.9	13	16
Cadmium	3.15	2.5	4.3
Chromium, Trivalent	50.7	30	180
Copper	221	50	270
Lead	361	63	400
Mercury	2.26	0.18	0.81
Nickel	41.2	30	310
Zinc	490	109	10000

	EP-10	UUSCOs	RRSCOs
Depth (ft)	-1.62		
Metals	mg/Kg	mg/Kg	mg/Kg
Copper	73.9	50	270
Lead	182	63	400
Mercury	0.245	0.18	0.81
Zinc	251	109	10000

LEGEND:

⊕	ENDPOINT SAMPLE LOCATIONS
NS	NO STANDARD
mg/Kg	MILLIGRAMS PER KILOGRAM
UUSCO	UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
RRSCO	RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVES
	VALUES EXCEED UUSCO STANDARDS
	VALUES EXCEED RRSCO STANDARDS

NOTE:

DEPTH IN FEET OF SURVEYED FLOOR OF SITE EXCAVATION FROM ESTABLISHED SITE GRADE ELEVATION BY PERFECT POINT LAND SURVEYING RT

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

STATE OF NEW YORK
TAREK ZAKI KHOURI
LICENSED PROFESSIONAL ENGINEER
086611

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
HAUPPAUGE, NY 11788

15 OCEAN AVENUE, SUITE 2B BROOKLYN, NY 11225

TEL: (631) 462-5866

FAX: (631) 462-5877

BASE DRAWING PREPARED BY

PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

FIGURE 5B: MAP OF SOIL EXCEEDANCE OF RRSCOs FOR METALS

PROJECT NO. 170339	DATE 09/09/2019
DRAWN BY G.T.	REVIEWED BY P.M.
SCALE (11X17) NOT TO SCALE	APPROVED BY P.M.

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
HAUPPAUGE, NY 11788

15 OCEAN AVENUE, SUITE 2B BROOKLYN, NY 11225

TEL: (631) 462-5866

FAX: (631) 462-5877

BASE DRAWING PREPARED BY

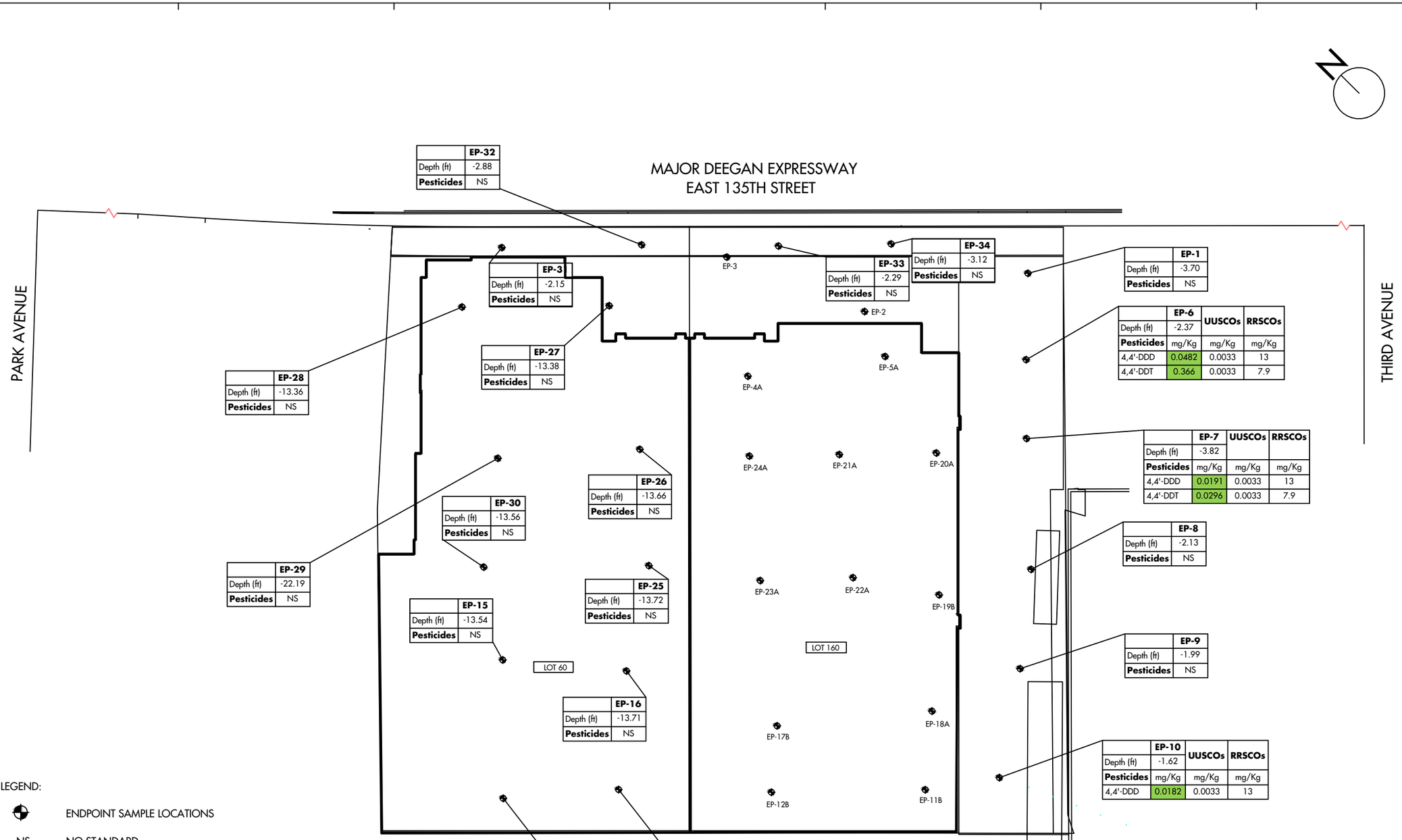
PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

FIGURE 5C: MAP OF SOIL EXCEEDANCE OF RRSCOs FOR PESTICIDES

PROJECT NO.	DATE
170339	09/09/2019
DRAWN BY G.T.	REVIEWED BY P.M.
SCALE (11X17) NOT TO SCALE	APPROVED BY P.M.

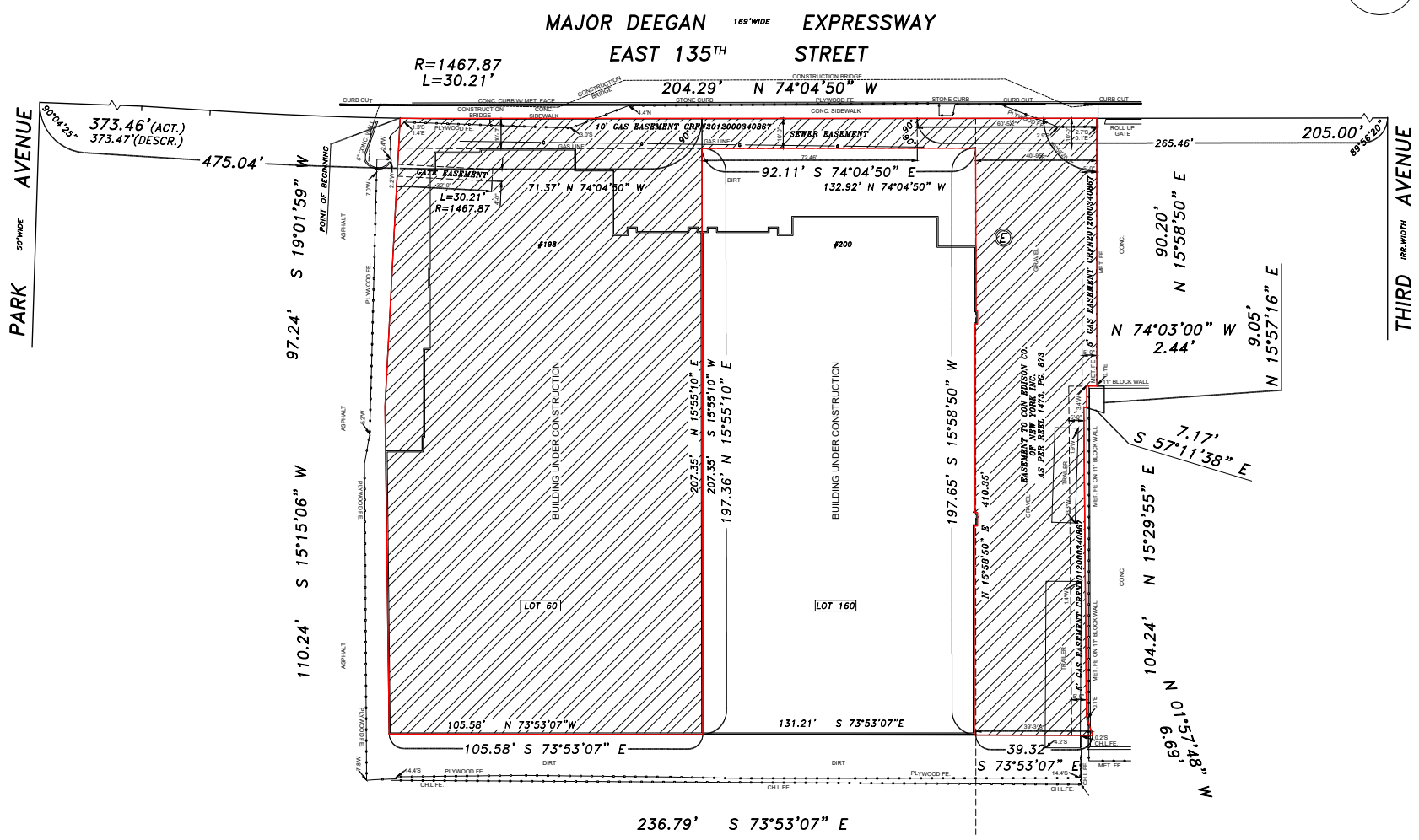


LEGEND:

⊕	ENDPOINT SAMPLE LOCATIONS
NS	NO STANDARD
mg/Kg	MILLIGRAMS PER KILOGRAM
UUSCO	UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
RRSCO	RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVES
	VALUES EXCEED UUSCO STANDARDS

NOTE:

DEPTH IN FEET OF SURVEYED FLOOR OF SITE EXCAVATION FROM ESTABLISHED SITE GRADE ELEVATION BY PERFECT POINT LAND SURVEYING RT



LEGEND

INSTITUTIONAL CONTROL BOUNDARIES

GRAPHIC SCALE

ALL WRITTEN MEASUREMENTS AND OFFSETS NOTED ON THIS SURVEY SUPERSEDE MEASUREMENTS SCALED OF THIS PLOT.

SCALE 1:20

3.05 m 6.10 m 9.14 m 12.20 m 15.24 m 30.48 meters

5 f 10 f 15 f 20 f 25 f 30 f 35 f 40 f 45 f 50 f 100 feet

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
HAUPPAUGE, NY 11788

15 OCEAN AVENUE, SUITE 2B BROOKLYN, NY 11225

TEL: (631) 462-5866

FAX: (631) 462-5877

BASE DRAWING PREPARED BY

PERFECT POINT LAND SURVEYING RT

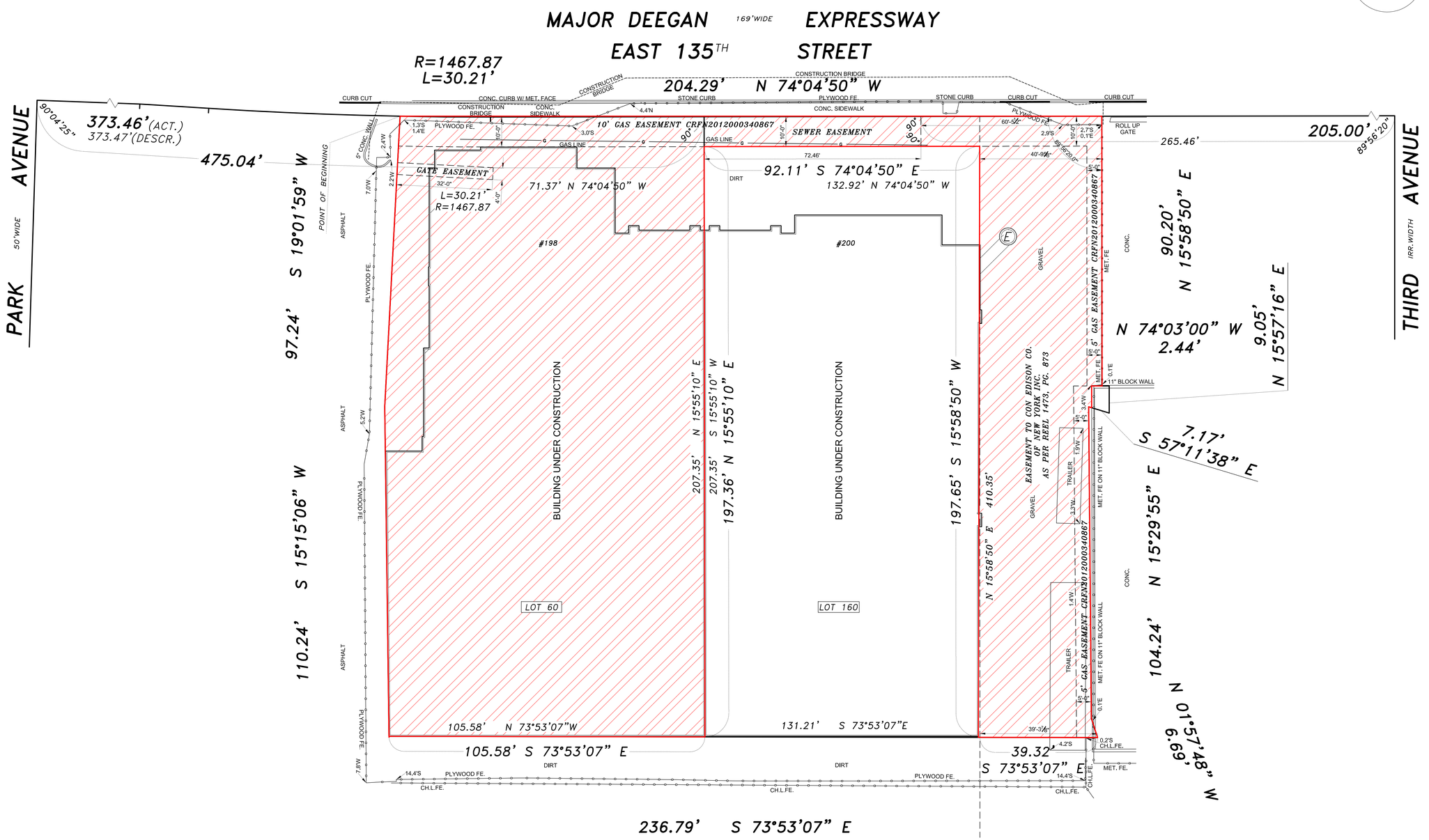
PROJECT NAME AND ADDRESS

198 EAST 135 STREET
BRONX, NEW YORK

PROJECT FIGURE

FIGURE 6: INSTITUTIONAL CONTROL BOUNDARIES

PROJECT NO. 170339	DATE 07/18/2019
DRAWN BY G.T.	REVIEWED BY P.M.
SCALE (11X17) AS NOTED	APPROVED BY P.M.



LEGEND

AREA OF ENGINEERING CONTROLS

GRAPHIC SCALE

ALL WRITTEN MEASUREMENTS AND OFFSETS NOTED ON THIS SURVEY SUPERSEDE MEASUREMENTS SCALED OF THIS PLOT.

SCALE 1:20

3.05 m 6.10 m 9.14 m 12.20 m 15.24 m 30.48 meters

5 f 15 f 25 f 35 f 45 f

0 10 f 20 f 30 f 40 f 50 f 100 feet

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

STATE OF NEW YORK
TAREK ZAKI KHOURI
LICENSED PROFESSIONAL ENGINEER
086611

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
HAUPPAUGE, NY 11788

15 OCEAN AVENUE, SUITE 2B BROOKLYN, NY 11225

TEL: (631) 462-5866

FAX: (631) 462-5877

BASE DRAWING PREPARED BY

PERFECT POINT LAND SURVEYING RT

PROJECT NAME AND ADDRESS

198 EAST 135 STREET
BRONX, NEW YORK

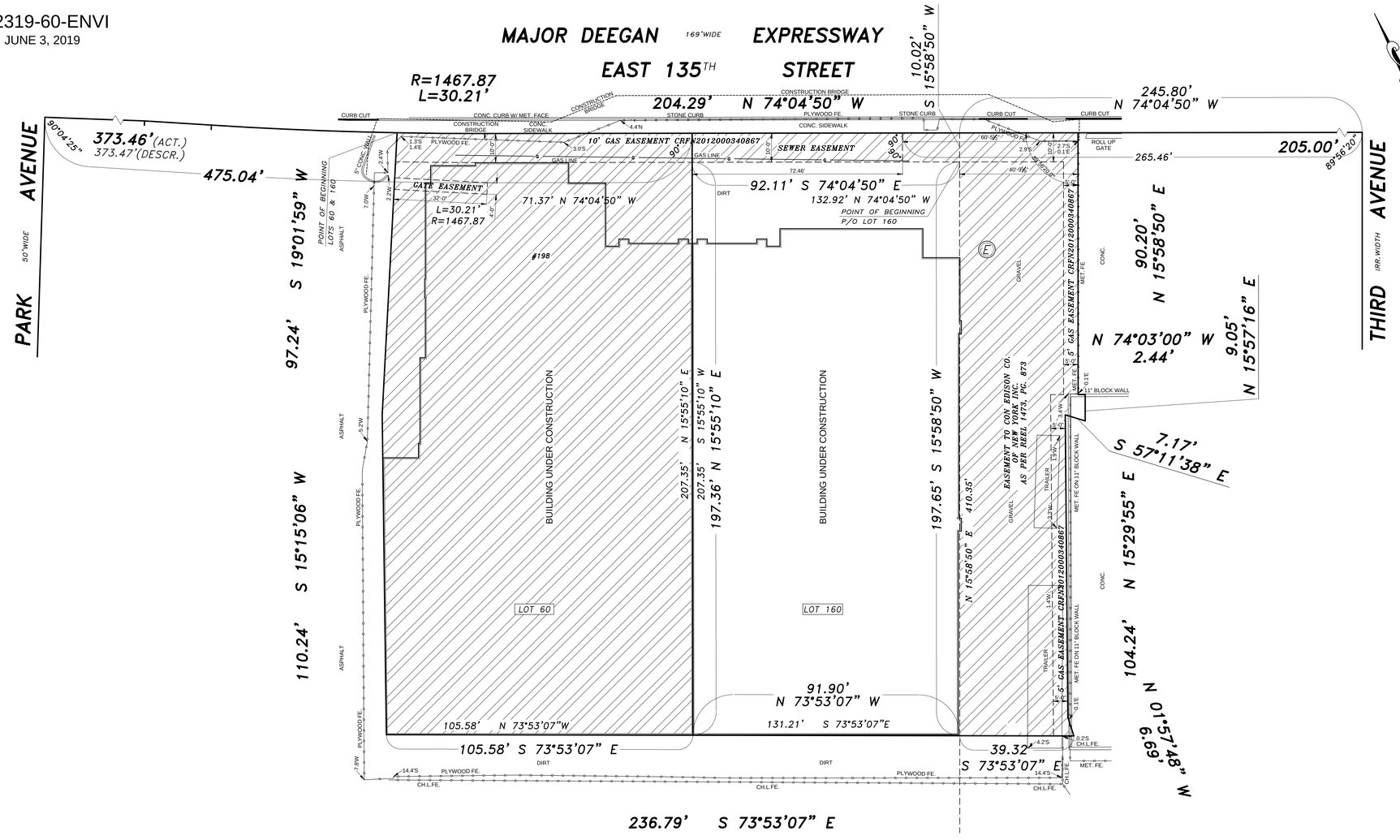
PROJECT FIGURE

FIGURE 7: ENGINEERING CONTROL LOCATIONS

PROJECT NO. 170339	DATE 07/18/2019
DRAWN BY G.T.	REVIEWED BY P.M.
SCALE (11X17) AS NOTED	APPROVED BY P.M.

Appendix 1
Environmental Easement

JOB NO. BX 2319-60-ENVI
SURVEYED ON: JUNE 3, 2019



SYMBOLS AND ABBREVIATIONS

FENCE	CH.L.FE. / WOOD FE.
UTILITY POLE	U.P.
PARKING METER	P.M.
OIL FILL	O.F.
MONITORING WELL	M.W.
TRAFFIC LIGHT	T.L.
LIGHT	
STREET LIGHT	L.P.
FIRE HYDRANT	HYD.
SIAMESE CONNECTION	SPR.
SHUT OFF VALVE	G.V. / W.V.
HANDICAPPED PARKING	
EXISTING TREE	ø12"
DRAINS	DR.
ROOF OVER	R.O.
EXISTING ELEVATIONS	×43.15 TOP OF CURB / ×42.93 BOTTOM OF CURB / ×43.78
CITY ESTABLISHED GRADES	L.G.7.52
CURB AND CURB CUT	CURB CUT
OVERHEAD SERVICE	OH S.W.
CABLE TV MANHOLE	CTV
MANHOLES	MH, E, T, W, S — RIM EL. INV.EL.
CATCH BASIN	C.B.
FIRE ESCAPE	F.E.
PLATFORM	PL. or PLTF.
BASEMENT ENTRANCE	B.E.
CELLAR ENTRANCE	C.E.
AIR WAY	A.W.
BAY WINDOW	B.W.
CONCRETE	CONC.
OVERHANG	O.H.
AIR CONDITION	AC
METAL	MET.
NORTH OF PROPERTY LINE	N
SOUTH OF PROPERTY LINE	S
EAST OF PROPERTY LINE	E
WEST OF PROPERTY LINE	W

GENERAL NOTES

SUBSURFACE UTILITIES ARE NOT GUARANTEED BY SURVEYOR. HIGH CAUTION RECOMMENDED AND VERIFICATION WITH PROPER CITY AGENCIES, IS MANDATORY BEFORE COMMENCING ALL NEW WORK.

ALL SUBSURFACE AND OVERHEAD UTILITIES (AS TO SIZE , TYPE AND DEPTH) SHOWN ON THIS SURVEY ARE TAKEN FROM RECORDS OF GOVERNMENTAL AGENCIES AND UTILITY COMPANIES, UNLESS OTHERWISE NOTED AND SHOWN.

COVER OR DEPTH OF UTILITIES WHICH DERIVED FROM FIELD MEASUREMENTS SHOWN ON THIS SURVEY SHOULD BE VERIFIED WITH PROPER AGENCY PRIOR TO CONSTRUCTION OF PROJECT. INVERT ELEVATIONS ARE DERIVED FROM CITY AGENCY RECORDS WHEN NOT AVAILABLE BY FIELD SURVEY AND NOTED AS "PER RECORD" ON THE SURVEY.

ALL SUBSURFACE UTILITY AS TO LOCATION AND DEPTH, SHOULD BE RECHECKED AND LEGAL GRADES SHOULD BE VERIFIED WITH THE TOPOGRAPHICAL BUREAU, PREFERABLY IN WRITING BEFORE COMMENCING CONSTRUCTION.

THIS IS TO CERTIFY THAT THERE ARE NO STREAMS OR NATURAL WATER COURSES ON THE SURVEYED PROPERTY EXCEPT AS SHOWN AND/OR DESCRIBED ON THIS SURVEY.

ALL OPERATIONS OF UNDERGROUND FACILITIES AND ALL EXCAVATORS ARE OBLIGATED TO COMPLY WITH ARTICLE 36 OF THE GENERAL BUSINESS LAW AND WITH PROVISIONS OF INDUSTRIAL CODE PART (RULE NO.35) BEFORE ANY EXCAVATION OR DEMOLITION IS COMMENCED. EVERY EXCAVATOR IS REQUIRED BY THESE LAWS TO GIVE ADVANCE NOTICE TO EVERY OPERATOR OF UNDERGROUND FACILITIES OF HIS INTENT TO PERFORM EXCAVATION OR DEMOLITION WORK IN THE SPECIFIED AREA.

ALL ELEVATIONS SHOWN REFER TO THE **NAVD 1988** DATUM. TO OBTAIN:
- NGVD 1929 DATUM - ADD 1.098 FEET
- BRONX BOROUGH DATUM - SUBTRACT 1.508 FEET

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

UNDERGROUND UTILITIES NOTES

UNDERGROUND, OVERHEAD AND GROUND LEVEL UTILITIES ARE NOT GUARANTEED AS TO ACCURACY, EXACT LOCATION, TYPE OR USE. ACTIVE OR INACTIVE. VERIFICATION IS MANDATORY WITH MUNICIPAL AGENCIES, PUBLIC AND PRIVATE UTILITY COMPANIES PRIOR TO TAKING TITLE AND OR DESIGN WORK. BOUNDARIES ARE NOT GUARANTEED UNLESS SO NOTED.

PROFESSIONAL LAND SURVEYOR
RICHARD TOM
N.Y.S. L.L.S. 049844
8629 BAY PARKWAY, UNIT CFU
BROOKLYN, NY 11214
TEL. 718-474-7700

NOTE:
This property is subject to an environmental easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law. The engineering and institutional controls for this Easement are set forth in the Site Management Plan (SMP). A copy of the SMP must be obtained by any party with an interest in the property. The SMP can be obtained from NYS Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov

– *ENVIRONMENTAL EASEMENT*

GRAPHIC SCALE
ALL WRITTEN MEASUREMENTS AND OFFSETS NOTED ON THIS SURVEY SUPERSEDE MEASUREMENTS SCALED OF THIS PLOT.
SCALE 1:20
3.05 m 6.10 m 9.14 m 12.20 m 15.24 m 30.48 meters
0 5 f 10 f 15 f 20 f 25 f 30 f 35 f 40 f 45 f 50 f 100 feet

LEGAL DESCRIPTION
BLOCK 2319, LOTS 60 AND 160

All that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of the Bronx, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of Major Deegan Expressway, (169 feet wide) distant 373.47 feet easterly from the corner formed by the intersection of the easterly side of Park Avenue, (50 feet wide) with the southerly side of Major Deegan Expressway;

RUNNING THENCE South 19 degrees 01 minute 59 seconds West, 97.24 feet to a point;
THENCE South 15 degrees 15 minutes 06 seconds West, 110.24 feet to a point;
THENCE South 73 degrees 53 minutes 07 seconds East, 236.79 feet to a point;
THENCE North 01 degrees 57 minutes 48 seconds West, 6.69 feet to a point;
THENCE North 15 degrees 29 minutes 55 seconds East, 104.24 feet to a point;
THENCE South 57 degrees 11 minutes 38 seconds East, 7.17 feet to a point;
THENCE North 15 degrees 57 minutes 16 seconds East, 9.05 feet to a point;
THENCE North 74 degrees 03 minutes 00 seconds West, 2.44 feet to a point;
THENCE North 15 degrees 58 minutes 50 seconds East, 90.20 feet to the southerly side of Major Deegan Expressway;
THENCE North 74 degrees 04 minutes 50 seconds West, along the southerly side of Major Deegan Expressway, 204.29 feet to a point of curvature;
THENCE along the southerly side of Major Deegan Expressway, along a curve bearing to the right having a radius of 1467.87 feet, an arc length of 30.20 feet to the point or place of BEGINNING.

LOT 60 AREA = 21817.41 sq.ft. = 0.5009 acre
LOT 160 AREA = 27159.35 sq.ft. = 0.6235 acre
LOTS 60 AND 160 AREA = 48976.76 sq.ft. = 1.1124 acre

LEGAL DESCRIPTION OF ENVIRONMENTAL EASEMENT

All that certain plot, piece or parcel of land with the buildings and improvements thereon erected, situate, lying and being in the Borough of Bronx, City and State of New York, commonly known as Block 2319, Lot 60 and p/o Lot 160 on the tax map of the City of New York bounded and described as follows:
BEGINNING at a point on the southerly side of Major Deegan Expressway, (169 feet wide) distant 373.46 feet easterly from the corner formed by the intersection of the easterly side of Park Avenue, (50 feet wide) with the southerly side of Major Deegan Expressway;

RUNNING THENCE South 19 degrees 01 minute 59 seconds West, 97.24 feet to a point;
THENCE South 15 degrees 15 minutes 06 seconds West, 110.24 feet to a point;
THENCE South 73 degrees 53 minutes 07 seconds East, 105.58 feet to a point;
THENCE North 15 degrees 55 minutes 10 seconds East, 197.36 feet to a point;
THENCE South 74 degrees 04 minutes 50 seconds East, 92.11 feet to a point;
THENCE South 15 degrees 58 minutes 50 seconds West, 197.65 feet to a point;
THENCE South 73 degrees 53 minutes 07 seconds East, 39.32 feet to a point;
THENCE North 01 degrees 57 minutes 48 seconds West, 6.69 feet to a point;
THENCE North 15 degrees 29 minutes 55 seconds East, 104.24 feet to a point;
THENCE South 57 degrees 11 minutes 38 seconds East, 7.17 feet to a point;
THENCE North 15 degrees 57 minutes 16 seconds East, 9.05 feet to a point;
THENCE North 74 degrees 03 minutes 00 seconds West, 2.44 feet to a point;
THENCE North 15 degrees 58 minutes 50 seconds East, 90.20 feet to the southerly side of Major Deegan Expressway;
THENCE North 74 degrees 04 minutes 50 seconds West, along the southerly side of Major Deegan Expressway, 204.29 feet to a point of curvature;
THENCE along the southerly side of Major Deegan Expressway, along a curve bearing to the right having a radius of 1467.87 feet, an arc length of 30.21 feet to the point or place of BEGINNING.

ENVIRONMENTAL EASEMENT AREA = 30806.55 sq.ft. = 0.7072 acre

GUARANTEED TO:	Deegan 135 LLC
COUNTY: BRONX	CITY: BRONX
SECTION:	BLOCK: 2319 LOT(S): 60 AND 160
PROPERTY ADDRESS:	198 EAST 135th STREET

ENVIRONMENTAL EASEMENT SURVEY

PREPARED BY
PERFECT POINT
LAND SURVEYING RT
brooklyn - queens - manhattan - bronx
staten island - nassau
phone: (718) 474-7700
fax: (718) 872-9699
info@ppsurveying.com
www.ppsurveying.com

STATE OF NEW YORK · RICHARD TOM · 049844 · LICENSED LAND SURVEYOR

DATE: JUNE 3, 2019

N.Y.S. L.L.S. 049844

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

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2019111201019001006EA80D

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 10**

Document ID: 2019111201019001 Document Date: 10-02-2019 Preparation Date: 12-03-2019
Document Type: EASEMENT
Document Page Count: 9

PRESENTER:
EXECUTIVE ABSTRACT GROUP, INC.
16 ISRAEL ZUPNICK DRIVE, SUITE 117
EAG-2953-CTSY
MONROE, NY 10950
845-782-2400
MAIL@EXECUTIVE-ABSTRACT.COM

RETURN TO:
BROWN DUKE & FOGEL, P.C.
ATTENTION: JAMES K. WARD, ESQ.
350 FIFTH AVE, SUITE 4640
NEW YORK, NY 10118

PROPERTY DATA

Borough	Block	Lot		Unit	Address
BRONX	2319	60	Entire Lot		198 EAST 135 STREET

Property Type: OTHER Easement

Borough	Block	Lot		Unit	Address
BRONX	2319	160	Partial Lot		198 EAST 135 STREET

Property Type: OTHER Easement

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year____ Reel____ Page_____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
DEEGAN 135 REALTY LLC
199 LEE AVENUE, PMB 103
BROOKLYN, NY 11211

GRANTEE/BUYER:
NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 BROADWAY
ALBANY, NY 12233

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	85.00
Affidavit Fee:	$	0.00

Filing Fee: $ 100.00

NYC Real Property Transfer Tax: $ 0.00

NYS Real Estate Transfer Tax: $ 0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 12-03-2019 10:23
City Register File No.(CRFN): **2019000393433**

City Register Official Signature

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 2nd day of October, 2019, between Owner(s), Deegan 135 Realty LLC, having an office at 199 Lee Avenue, PMB 103, Bronx, New York 11211 (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 198 East 135th Street in the City of New York, County of Bronx and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel numbers: Block 2319 Lot 60 and 160, being a portion of the property conveyed to Grantor by deed dated May 12, 2015 and recorded in the City Register of the City of New York as CRFN # 2015000176329. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.7072 +/- acres, and is hereinafter more fully described in the Land Title Survey dated June 3, 2019 prepared by Richard Tom, L.L.S. of Perfect Point Land Surveying RT, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation

established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C203084-03-16 as amended August 15, 2019, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled

Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held

by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee

interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C203084
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Deegan 135 Realty LLC:

By: _____

Print Name: Shesiel Schwimmer

Title: Member Date: 9/16/2019

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Kings)

On the 16 day of Sep, in the year 20 19, before me, the undersigned, personally appeared Shesiel Schwimmer, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

DAVID SALAMON
Notary Public, State of New York
Registration #01SA6243212
Qualified In Kings County
Commission Expires June 20, 2015

2of3

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Michael J. Ryan, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 2nd day of October, in the year 2019 before me, the undersigned, personally appeared Michael J. Ryan, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2022

SCHEDULE "A" PROPERTY DESCRIPTION

LEGAL DESCRIPTION ENVIRONMENTAL EASEMENT

All that certain plot, piece or parcel of land with the buildings and improvements thereon erected, situate, lying and being in the Borough of Bronx, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of Major Deegan Expressway, (169 feet wide) distant 373.46 feet easterly from the corner formed by the intersection of the easterly side of Park Avenue, (50 feet wide) with the southerly side of Major Deegan Expressway;

RUNNING THENCE South 19 degrees 01 minute 59 seconds West, 97.24 feet to a point;

THENCE South 15 degrees 15 minutes 06 seconds West, 110.24 feet to a point;

THENCE South 73 degrees 53 minutes 07 seconds East, 105.58 feet to a point;

THENCE North 15 degrees 55 minutes 10 seconds East, 197.36 feet to a point;

THENCE South 74 degrees 04 minutes 50 seconds East, 92.11 feet to a point;

THENCE South 15 degrees 58 minutes 50 seconds West, 197.65 feet to a point;

THENCE South 73 degrees 53 minutes 07 seconds East, 39.32 feet to a point;

THENCE North 01 degrees 57 minutes 48 seconds West, 6.69 feet to a point;

THENCE North 15 degrees 29 minutes 55 seconds East, 104.24 feet to a point;

THENCE South 57 degrees 11 minutes 38 seconds East, 7.17 feet to a point;

THENCE North 15 degrees 57 minutes 16 seconds East, 9.05 feet to a point;

THENCE North 74 degrees 03 minutes 00 seconds West, 2.44 feet to a point;

THENCE North 15 degrees 58 minutes 50 seconds East, 90.20 feet to the southerly side of Major Deegan Expressway;

THENCE North 74 degrees 04 minutes 50 seconds West, along the southerly side of Major Deegan Expressway, 204.29 feet to a point of curvature;

THENCE along the southerly side of Major Deegan Expressway, along a curve bearing to the right having a radius of 1467.87 feet, an arc length of 30.21 feet to the point or place of BEGINNING.

LOT AREA = 30806.55 sq.ft. = 0.7072 acre

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

2019111201019001006S668C

SUPPORTING DOCUMENT COVER PAGE **PAGE 1 OF 1**

Document ID: 2019111201019001 Document Date: 10-02-2019 Preparation Date: 12-03-2019
Document Type: EASEMENT

SUPPORTING DOCUMENTS SUBMITTED:

	Page Count
DEP CUSTOMER REGISTRATION FORM FOR WATER AND SEWER BILLING	2
SMOKE DETECTOR AFFIDAVIT	2

The City of New York
Department of Environmental Protection
Bureau of Customer Services
59-17 Junction Boulevard
Flushing, NY 11373-5108

Customer Registration Form for Water and Sewer Billing

Property and Owner Information:

(1) Property receiving service: BOROUGH: BRONX BLOCK: 2319 LOT: 60

(2) Property Address: 198 EAST 135 STREET, BRONX, NY 10451

(3) Owner's Name NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Additional Name:

Affirmation:

☑ Your water & sewer bills will be sent to the property address shown above.

Customer Billing Information:

Please Note:

A. Water and sewer charges are the legal responsibility of the owner of a property receiving water and/or sewer service. The owner's responsibility to pay such charges is not affected by any lease, license or other arrangement, or any assignment of responsibility for payment of such charges. Water and sewer charges constitute a lien on the property until paid. In addition to legal action against the owner, a failure to pay such charges when due may result in foreclosure of the lien by the City of New York, the property being placed in a lien sale by the City or Service Termination.

B. Original bills for water and/or sewer service will be mailed to the owner, **at the property address or to an alternate mailing address**. DEP will provide a duplicate copy of bills to one other party (such as a managing agent), however, any failure or delay by DEP in providing duplicate copies of bills shall in no way relieve the owner from his/her liability to pay all outstanding water and sewer charges. Contact DEP at (718) 595-7000 during business hours or visit www.nyc.gov/dep to provide us with the other party's information.

Owner's Approval:

The undersigned certifies that he/she/it is the owner of the property receiving service referenced above; that he/she/it has read and understands Paragraphs A & B under the section captioned "Customer Billing Information"; and that the information supplied by the undersigned on this form is true and complete to the best of his/her/its knowledge.

Print Name of Owner:

Signature: _____ Date (mm/dd/yyyy)

Name and Title of Person Signing for Owner, if applicable:

SEE ATTACHED PAGE FOR ADDITIONAL APPLICABLE PROPERTIES

2019052800102101

The City of New York
Department of Environmental Protection
Bureau of Customer Services
59-17 Junction Boulevard
Flushing, NY 11373-5108

Customer Registration Form for Water and Sewer Billing

Borough	Block	Lot	Street	City	State	Zip
BRONX	2319	166	198 EAST 135 STREET	NY	NY	10451

20190528001021010 3

AFFIDAVIT OF COMPLIANCE
WITH SMOKE DETECTOR REQUIREMENT FOR ONE- AND TWO-FAMILY DWELLINGS

State of New York }
County of } SS.:

The undersigned, being duly sworn, depose and say under penalty of perjury that they are the grantor and grantee of the real property or of the cooperative shares in a cooperative corporation owning real property located at

198 EAST 135 STREET
Street Address Unit/Apt.

BRONX, New York, 2319, 60 (the "Premises");
Borough Block Lot

That the Premises is a one or two family dwelling, or a cooperative apartment or condominium unit in a one- or two-family dwelling, and that installed in the Premises is an approved and operational smoke detecting device in compliance with the provisions of Article 6 of Subchapter 17 of Chapter 1 of Title 27 of the Administrative Code of the City of New York concerning smoke detecting devices;

That they make affidavit in compliance with New York City Administrative Code Section 11-2105 (g). (The signatures of at least one grantor and one grantee are required, and must be notarized).

Name of Grantor (Type or Print)	Name of Grantee (Type or Print)
Signature of Grantor	Signature of Grantee
Sworn to before me this ____ day of ____ 20__	Sworn to before me this ____ day of ____ 20__

These statements are made with the knowledge that a willfully false representation is unlawful and is punishable as a crime of perjury under Article 210 of the Penal Law.

NEW YORK CITY REAL PROPERTY TRANSFER TAX RETURNS FILED ON OR AFTER FEBRUARY 6th, 1990, WITH RESPECT TO THE CONVEYANCE OF A ONE- OR TWO-FAMILY DWELLING, OR A COOPERATIVE APARTMENT OR A CONDOMINIUM UNIT IN A ONE- OR TWO-FAMILY DWELLING, WILL NOT BE ACCEPTED FOR FILING UNLESS ACCOMPANIED BY THIS AFFIDAVIT.

SEE ATTACHED PAGE FOR ADDITIONAL APPLICABLE PROPERTIES

2019052800102101

Applicable properties compliant with the Smoke Detector requirement

Street Address	Unit/Apt	Borough	Block	Lot
198 EAST 135 STREET		BRONX	2319	160

TRACK 1 LEGAL DESCRIPTION

Block 2319, p/o Lot 160
ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Borough and County of Bronx, City and State of New York, bounded and described as follows:
BEGINNING at a point on the southerly side of Gas Easement, distant 255.82 feet from the corner formed by the intersection of the southerly side of East 135th Street with the westerly side of Third Avenue, along the following courses and distances:
1. N 74 degrees 04 minutes 50 seconds W along the southerly side of East 135th Street, 245.80 feet;
2. S 15 degrees 58 minutes 50 seconds W, 10.02 feet;
RUNNING THENCE, S 15 degrees 58 minutes 50 seconds W along the westerly side of Con Edison Co. Easement, 197.65 feet;
THENCE, N 73 degrees 53 minutes 07 seconds W, 91.90 feet;
THENCE, N 15 degrees 55 minutes 10 seconds E, 197.36 feet; and
THENCE, S 74 degrees 04 minutes 50 seconds E, along the southerly side of Gas Easement, 92.11 feet to
the point or place of **BEGINNING**.

TRACK 4 LEGAL DESCRIPTION

All that certain plot, piece or parcel of land with the buildings and improvements thereon erected, situate, lying and being in the Borough of Bronx, City and State of New York, commonly known as Block 2319, Lots 60 and 160 on the tax map of the City of New York bounded and described as follows:

BEGINNING at a point on the southerly side of Major Deegan Expressway, (169 feet wide) distant 373.46 feet easterly from the corner formed by the intersection of the easterly side of Park Avenue, (50 feet wide) with the southerly side of Major Deegan Expressway;

RUNNING THENCE South 19 degrees 01 minute 59 seconds West, 97.24 feet to a point; **THENCE** South 15 degrees 15 minutes 06 seconds West, 110.24 feet to a point;

THENCE South 73 degrees 53 minutes 07 seconds East, 105.58 feet to a point; THENCE North 15 degrees 55 minutes 10 seconds East, 197.36 feet to a point;

THENCE South 74 degrees 04 minutes 50 seconds East, 92.11 feet to a point;

THENCE South 15 degrees 58 minutes 50 seconds West, 197.65 feet to a point; THENCE South 73 degrees 53 minutes 07 seconds East, 39.32 feet to a point;

THENCE North 01 degrees 57 minutes 48 seconds West, 6.69 feet to a point; THENCE North 15 degrees 29 minutes 55 seconds East, 104.24 feet to a point;

THENCE South 57 degrees 11 minutes 38 seconds East, 7.17 feet to a point; THENCE North 15 degrees 57 minutes 16 seconds East, 9.05 feet to a point; THENCE North 74 degrees 03 minutes 00 seconds West, 2.44 feet to a point;

THENCE North 15 degrees 58 minutes 50 seconds East, 90.20 feet to the southerly side of Major Deegan Expressway; THENCE North 74 degrees 04 minutes 50 seconds West, along the southerly side of Major Deegan Expressway, 204.29 feet to a point of curvature;

THENCE along the southerly side of Major Deegan Expressway, along a curve bearing to the right having a radius of 1467.87 feet, an arc length of 30.21 feet to the point or place of **BEGINNING**.

Appendix 2
List of Site Contacts

LIST OF SITE CONTACTS

198 East 135th Street
Block 2319; Lot 60 & 160
Bronx, New York
NYSDEC Site Number: C203084

Name	**Phone/Email Address**
Site Owner and Remedial Party Deegan 135th Realty LLC Cheskel Schwimmer	(718) 522-5452 cschwimmer@chessbuilders.com
Hydro Tech Project Manager Hydro Tech Environmental Paul I. Matli	(718) 636-0800 pmatli@hydrotechenvironmental.com
NYSDEC DER Project Manager Kyle Forster	(518) 402-8644 kyle.forster@dec.ny.gov
NYSDEC Regional DER Contact Jane O'Connell	(718) 482-4599 Jane.oconnell@dec.ny.gov
NYSDEC Site Control Contact Kelly Lewandowski	(518) 402-9553 kelly.lewandowski@dec.ny.gov
NYSDOH Project Manager Steven G. Berninger	Steven.Berninger@health.ny.gov

Appendix 3
Excavation Work Plan

EXCAVATION WORK PLAN (EWP)

198 East 135th Street
Block 2319; Lot 60 & 160
Bronx, New York
NYSDEC Site Number: C203084

1. NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix 2.

Table 1: Notifications*

NYSDEC Project Manager Kyle Forster	(518) 402-8644. kyle.forster@dec.ny.gov
NYSDEC Regional DER Contact Jane O'Connell	(718) 482-4599. jane.oconnell@dec.ny.gov
NYSDEC Site Control Contact Kelly Lewandowski	(518) 402-9553. kelly.Lewandowski@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;

- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix 4 of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

2. SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section 4 of this Appendix.

3. SOIL STAGING METHODS

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

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.

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 the NYSDEC.

4. MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP 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, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete Truck wash waters will be collected and disposed of off-site in an appropriate manner.

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

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

5. 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.

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.

Attachment 1 provides a map showing Truck transport routes. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes 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; (g) community input [where necessary].

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.

6. MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

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

7. MATERIALS REUSE ON-SITE

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

8. FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

9. COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the COC. The existing cover system is comprised of a minimum of 12 inches concrete slabs beneath the Building B at Lot 60 and also in open utility gas and sewer easement in the northern portion and in the Con Edison Co. easement located along the far eastern portion. A demarcation layer, consisting of black geotextile will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., concrete slab shown in Figure 7 of this SMP) this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

10. BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

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

All imported soils will meet the backfill and cover soil quality standards for the protection of groundwater and protection of ecological resources criteria established in 6NYCRR 375-6.7(d). 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. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

11. 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 the 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 SMP 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 construction area.

12. EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

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. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

13. COMMUNITY AIR MONITORING PLAN

Location of air sampling stations will be based on the location of invasive action at the Site and also on generally prevailing wind conditions. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations. If a sensitive receptor, such as a school, day care or residential area is developed in the future adjacent to the site, a fixed monitoring station should be located at that site perimeter, regardless of wind direction, and discussed in the text.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

14. 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 the application of spraying of an odor-suppressing agent, brand name Biosolve. If nuisance odors are identified at the site boundary, or if odor complaints are received, 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 any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; (c) application of Biosolve and if necessary and (d) 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.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

15. 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.

16. 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.

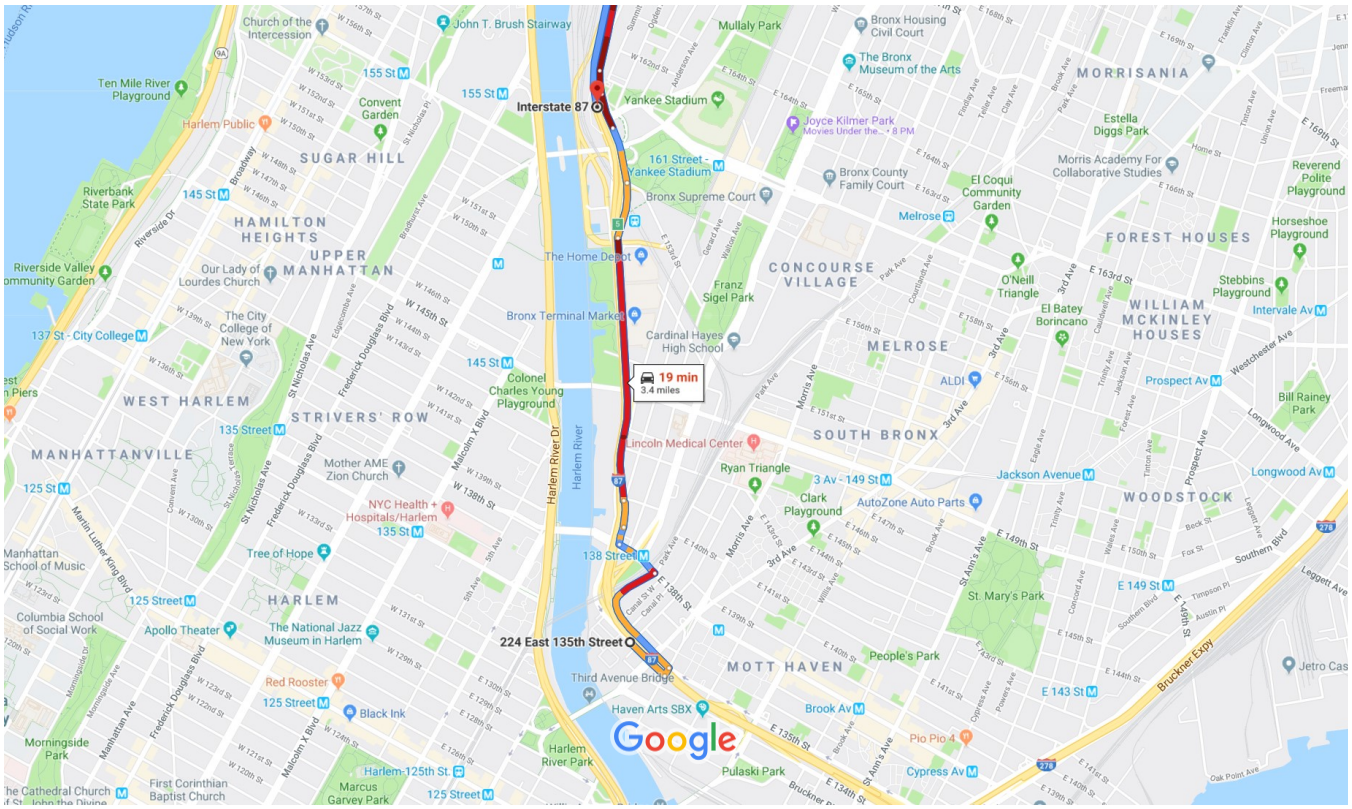
A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

Attachment 1
Truck Transport Routes

Google Maps

224 E 135th St, The Bronx, NY 10451 to I-87, New York

Drive 3.4 miles, 19 min



via Sedgwick Ave — 19 min

Fastest route, lighter traffic than usual — 3.4 miles

Explore I-87

Restaurants Hotels Gas stations Parking Lots More

Appendix 4
Health and Safety Plan

HEALTH & SAFETY PLAN

198 East 135th Street
Block 2319; Lot 60 & 160
Bronx, New York
NYSDEC Site Number: C203084

Table of Content

Figures

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). 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:

- Installation of soil probes for waste characterization;
- Dewatering;
- 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
Lincoln Medical Center	718-579-5016
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	Paul I. Matli	(718) 636-0800	(631) 241-7165
CSO	Paul I. Matli	(718) 636-0800	(631) 241-7165
PM/SSO	Ruijie Xiu	(718) 636-0800	(631) 229-7090

Directions to Lincoln Medical Center *(See Figure 1)*
Upon leaving the Site, make a U-turn on Third Avenue to head northeast towards East 134th Street. Turn right onto East 134th Street and make first left onto Lincoln Avenue. Continue straight on Lincoln Avenue to merge onto Morris Avenue. Continue on Morris Avenue for approximately 0.5 miles; Lincoln Medical Center will be on the left.

2.0 Health and Safety Staff

This section briefly describes the personnel and their health and safety responsibilities for the:

PROJECT MANAGER (PM)
- Has 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:

- SVOCs, TAL metals, pesticides

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

5.4 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:

- Dewatering activities
- Removal of contaminated materials during and end point smpling

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. Geoprobe® Drill Rig	Diesel Engine
B. Excavator/backhoe	Diesel Engine

5.5 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.

5.6 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 (1980). 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.

5.7 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

5.8 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

5.9 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.

5.10 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.

5.11 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

5.12 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.

5.13 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.

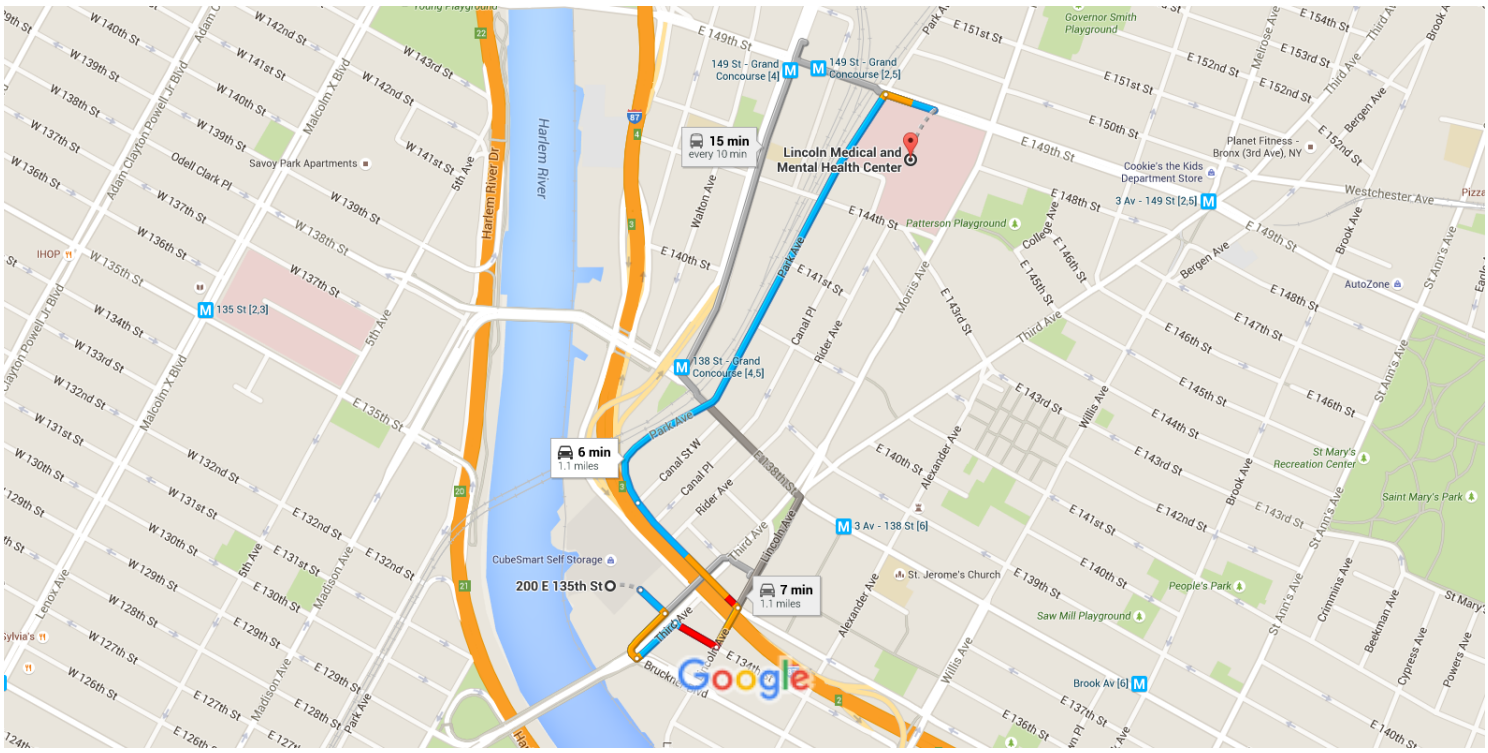
If a commercial/industrial laundry is used to clean or launder clothing that is potentially contaminated, they shall be informed of the potential harmful effects of exposure to hazardous substances related to the affected clothing.

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

200 E 135th St, Bronx, NY 10451 to Lincoln Medical and Mental Health Center

Drive 1.1 miles, 6 min



Map data ©2015 Google 500 ft

200 E 135th St

Bronx, NY 10451

Take Third Ave to E 135th St

2 min (0.3 mi)

1. Head southeast on E 134th St toward Third Ave

217 ft

2. Turn right onto Third Ave

390 ft

3. Turn left to stay on Third Ave

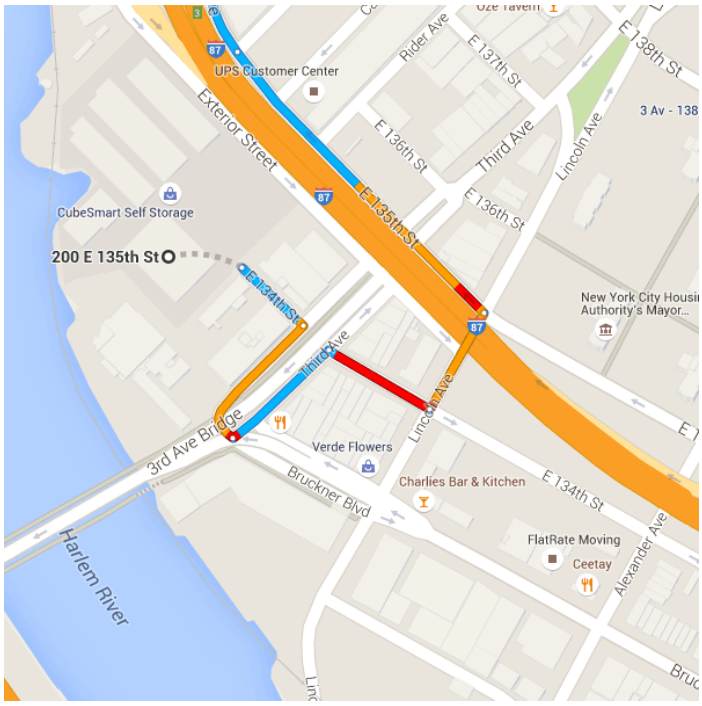
335 ft

4. Turn right onto E 134th St

299 ft

5. Turn left at the 1st cross street onto Lincoln Ave

282 ft



Turn left onto E 135th St

44 s (0.2 mi)

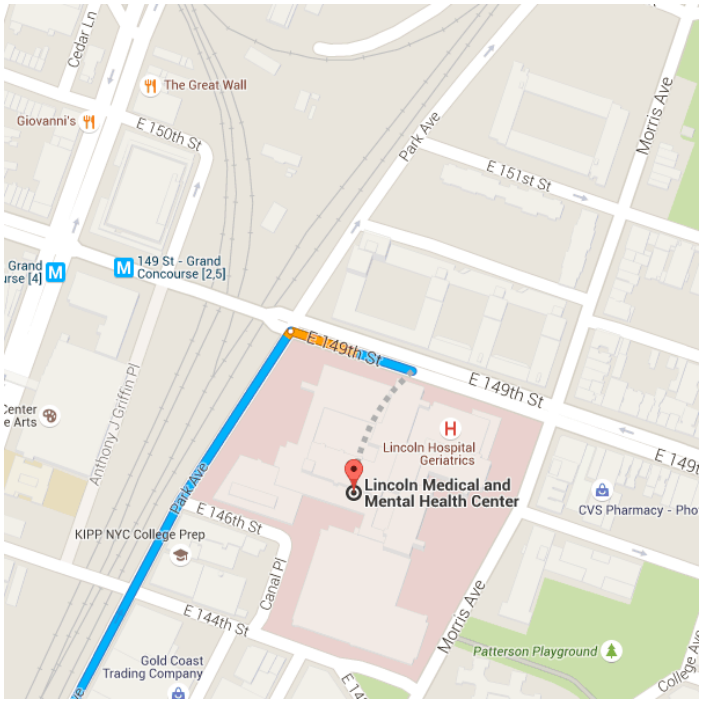
Continue onto Park Ave

3 min (0.6 mi)

Turn right onto E 149th St

Destination will be on the right

45 s (328 ft)



Lincoln Medical and Mental Health Center

234 East 149th Street, Bronx, NY 10451

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

SAFETY DATA SHEET

Creation Date 03-Feb-2010 **Revision Date** 23-Jan-2018 **Revision Number** 4

1. Identification

Product Name **Trichloroethylene**

Cat No. : **AC421520000; AC421520025; AC421525000**

CAS-No 79-01-6
Synonyms Triclene; Trichloroethene; Ethylene trichloride

Recommended Use Laboratory chemicals.
Uses advised against

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Heart, spleen, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness

Suspected of causing genetic defects
May cause cancer
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Harmful to aquatic life with long lasting effects
WARNING. Cancer and Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Trichloroethylene	79-01-6	>95

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Move to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms and effects May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature 410 °C / 770 °F

Explosion Limits
Upper 44.8 vol %
Lower 8 vol %

Oxidizing Properties Not oxidising

Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Hydrogen chloride gas Chlorine Phosgene Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

Environmental Precautions Should not be released into the environment. Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe vapors or spray mist. Do not ingest.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from light. Do

not store in aluminum containers.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Trichloroethylene	TWA: 10 ppm STEL: 25 ppm	(Vacated) TWA: 50 ppm (Vacated) TWA: 270 mg/m^3 Ceiling: 200 ppm (Vacated) STEL: 200 ppm (Vacated) STEL: 1080 mg/m^3 TWA: 100 ppm	IDLH: 1000 ppm	TWA: 100 ppm TWA: 535 mg/m^3 STEL: 200 ppm STEL: 1080 mg/m^3

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection 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 and body protection Long sleeved clothing.

Respiratory Protection 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.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-85 °C / -121 °F
Boiling Point/Range	87 °C / 188.6 °F
Flash Point	No information available
Evaporation Rate	0.69 (Carbon Tetrachloride = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	44.8 vol %
Lower	8 vol %
Vapor Pressure	77.3 mbar @ 20 °C
Vapor Density	4.5 (Air = 1.0)
Specific Gravity	1.460
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	410 °C / 770 °F
Decomposition Temperature	> 120°C

Viscosity	0.55 mPa.s (25°C)
Molecular Formula	C2 H Cl3
Molecular Weight	131.39

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Light sensitive.

Conditions to Avoid Incompatible products. Excess heat. Exposure to light. Exposure to moist air or water.

Incompatible Materials Strong oxidizing agents, Strong bases, Amines, Alkali metals, Metals,

Hazardous Decomposition Products Hydrogen chloride gas, Chlorine, Phosgene, Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Trichloroethylene	LD50 = 4920 mg/kg (Rat) LD50 = 4290 mg/kg (Rat)	LD50 = 29000 mg/kg (Rabbit) LD50 > 20 g/kg (Rabbit)	LC50 = 26 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization May cause sensitization by skin contact

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Trichloroethylene	79-01-6	Group 1	Known Reasonably Anticipated	A2	X	Not listed

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

ACGIH: (American Conference of Governmental Industrial Hygienists)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects Mutagenic effects have occurred in humans.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Heart spleen Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Do not empty into drains. The product contains following substances which are hazardous for the environment. Contains a substance which is:. Harmful to aquatic organisms. Toxic to aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Trichloroethylene	EC50: = 175 mg/L, 96h (Pseudokirchneriella subcapitata) EC50: = 450 mg/L, 96h (Desmodesmus subspicatus)	LC50: 31.4 - 71.8 mg/L, 96h flow-through (Pimephales promelas) LC50: 39 - 54 mg/L, 96h static (Lepomis macrochirus)	EC50 = 0.81 mg/L 24 h EC50 = 115 mg/L 10 min EC50 = 190 mg/L 15 min EC50 = 235 mg/L 24 h EC50 = 410 mg/L 24 h EC50 = 975 mg/L 5 min	EC50: = 2.2 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Trichloroethylene	2.4

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Trichloroethylene - 79-01-6	U228	-

14. Transport information

DOT

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Trichloroethylene	X	X	-	201-167-4	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

Component	TSCA 12(b)
Trichloroethylene	Section 5 Section 6

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Trichloroethylene	79-01-6	>95	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Trichloroethylene	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Trichloroethylene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability

Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Trichloroethylene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Trichloroethylene	79-01-6	Carcinogen Developmental Male Reproductive	14 µg/day 50 µg/day	Developmental Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Trichloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 03-Feb-2010
Revision Date 23-Jan-2018
Print Date 23-Jan-2018
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Creation Date 10-Dec-2009 **Revision Date** 23-Jan-2018 **Revision Number** 5

1. Identification

Product Name **Tetrachloroethylene**

Cat No. : **AC445690000; ACR445690010; AC445690025; AC445691000**

CAS-No 127-18-4
Synonyms Perchloroethylene

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects	None reasonably foreseeable. May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

Hazardous Combustion Products
Chlorine Hydrogen chloride gas Phosgene
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment. Ensure adequate ventilation.
Environmental Precautions	Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling	Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Ensure adequate ventilation. Avoid ingestion and inhalation.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m^3 Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm	TWA: 100 ppm TWA: 670 mg/m^3 TWA: 200 ppm TWA: 1250 mg/m^3 STEL: 200 ppm STEL: 1340 mg/m^3

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection 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 and body protection Long sleeved clothing.

Respiratory Protection 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.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Density	1.619
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C
Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C2 Cl4
Molecular Weight	165.83

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Exposure to moist air or water.

Incompatible Materials Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines, Aluminium

Hazardous Decomposition Products Chlorine, Hydrogen chloride gas, Phosgene

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrachloroethylene	LD50 = 2629 mg/kg (Rat)	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)

STOT - repeated exposure Kidney Liver Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrachloroethylene	2.53 - 2.88

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetrachloroethylene - 127-18-4	U210	-

14. Transport information

DOT

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1897

Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA
UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IMDG/IMO
UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Subsidiary Hazard Class P
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Tetrachloroethylene	X	X	-	204-825-9	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Tetrachloroethylene	127-18-4	>95	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Tetrachloroethylene	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Tetrachloroethylene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Tetrachloroethylene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Tetrachloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant Y
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 10-Dec-2009
Revision Date 23-Jan-2018
Print Date 23-Jan-2018
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Creation Date 31-May-2018 **Revision Date** 04-Jun-2018 **Revision Number** 7

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identification

Product Description:	**Xylenes, mixture of isomers**
Cat No. :	**383940000; 383940010; 383940050**
CAS-No	1330-20-7
EC-No.	215-535-7
Molecular Formula	C8 H10

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use	Laboratory chemicals.
Sector of use	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites
Product category	PC21 - Laboratory chemicals
Process categories	PROC15 - Use as a laboratory reagent
Environmental release category	ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)
Uses advised against	No Information available

1.3. Details of the supplier of the safety data sheet

Company	Acros Organics BVBA Janssen Pharmaceuticalaan 3a 2440 Geel, Belgium
E-mail address	begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards

Flammable liquids	Category 3 (H226)

Health hazards

Aspiration Toxicity	Category 1 (H304)
Acute dermal toxicity	Category 4 (H312)
Acute Inhalation Toxicity - Vapors	Category 4 (H332)
Skin Corrosion/irritation	Category 2 (H315)
Serious Eye Damage/Eye Irritation	Category 2 (H319)
Specific target organ toxicity - (single exposure)	Category 3 (H335)
Specific target organ toxicity - (repeated exposure)	Category 2 (H373)

Environmental hazards	
Chronic aquatic toxicity	Category 3 (H412)

2.2. Label elements

Signal Word **Danger**

Hazard Statements

H226 - Flammable liquid and vapor
H304 - May be fatal if swallowed and enters airways
H312 - Harmful in contact with skin
H332 - Harmful if inhaled
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
H373 - May cause damage to organs through prolonged or repeated exposure
H412 - Harmful to aquatic life with long lasting effects

Precautionary Statements

P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P303 + P361 + P353 - IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician
P331 - Do NOT induce vomiting
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P264 - Wash face, hands and any exposed skin thoroughly after handling
P337 + P313 - If eye irritation persists: Get medical advice/ attention
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P332 + P313 - If skin irritation occurs: Get medical advice/ attention

2.3. Other hazards

No information available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Component	CAS-No	EC-No.	Weight %	CLP Classification - Regulation (EC) No 1272/2008
Xylenes (o-, m-, p- isomers)	1330-20-7	EEC No. 215-535-7	>95	Flam. Liq. 3 (H226) Asp. Tox. 1 (H304) Acute Tox. 4 (H312) Acute Tox. 4 (H332)

				Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) STOT SE 3 (H335) STOT RE 2 (H373) Aquatic Chronic 3 (H412)

Full text of Hazard Statements: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Ingestion Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting. Call a physician or Poison Control Center immediately. If vomiting occurs naturally, have victim lean forward.

Inhalation Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur. Risk of serious damage to the lungs.

Self-Protection of the First Aider Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

4.2. Most important symptoms and effects, both acute and delayed

Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically. Symptoms may be delayed.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
Cool closed containers exposed to fire with water spray.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products
None under normal use conditions.

5.3. Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges.

6.2. Environmental precautions

Do not flush into surface water or sanitary sewer system.

6.3. Methods and material for containment and cleaning up

Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharges.

Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing before re-use. Wash hands before breaks and at the end of workday.

7.2. Conditions for safe storage, including any incompatibilities

Keep away from heat and sources of ignition. Flammables area. Keep container tightly closed in a dry and well-ventilated place.

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits
List source(s): **EU** - Commission Directive 2006/15/EC of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC on the protection of the health and safety of workers from the risks related to chemical agents at work. **UK** - EH40/2005 Containing the workplace exposure limits (WELs) for use with the Control of Substances Hazardous to Health Regulations (COSHH) 2002 (as amended). Updated by September 2006 official press release and October 2007 Supplement. **IRE -** 2010 Code of Practice for the

Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001. Published by the Health and Safety Authority.

Component	The United Kingdom	European Union	Ireland
Xylenes (o-, m-, p- isomers)	STEL: 100 ppm 15 min STEL: 441 mg/m³ 15 min TWA: 50 ppm 8 hr TWA: 220 mg/m³ 8 hr Skin	TWA: 50 ppm 8 hr TWA: 221 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 442 mg/m³ 15 min Possibility of significant uptake through the skin	TWA: 50 ppm 8 hr. TWA: 221 mg/m³ 8 hr. STEL: 100 ppm 15 min STEL: 442 mg/m³ 15 min Skin

Biological limit values
List source(s): **UK** - Biological Monitoring Guidance Values provided by the UK's Health and Safety Executive (HSE) Control of Substances Hazardous to Health Regulations (COSHH) 2002 (as amended) and EH40/2005.

Component	United Kingdom	European Union
Xylenes (o-, m-, p- isomers)	Methyl hippuric acid: 650 mmol/mol creatinine urine post shift	

Monitoring methods
BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.
MDHS70 General methods for sampling airborne gases and vapours
MDHS 88 Volatile organic compounds in air. Laboratory method using diffusive samplers, solvent desorption and gas chromatography
MDHS 96 Volatile organic compounds in air - Laboratory method using pumped solid sorbent tubes, solvent desorption and gas chromatography

Derived No Effect Level (DNEL) No information available

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				
Inhalation				

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

Engineering Measures
Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.
Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment

Eye Protection Goggles (European standard - EN 166)

Hand Protection Protective gloves

Glove material	Breakthrough time	Glove thickness	EU standard	Glove comments
Viton (R)	See manufacturers recommendations	-	EN 374	(minimum requirement)

Skin and body protection Long sleeved clothing

Inspect gloves before use.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)

Ensure gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.
Remove gloves with care avoiding skin contamination.

Respiratory Protection	When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly
Large scale/emergency use	Use a NIOSH/MSHA or European Standard EN 136 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced **Recommended Filter type:** Organic gases and vapours filter Type A Brown conforming to EN14387
Small scale/Laboratory use	Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. **Recommended half mask:-** Valve filtering: EN405; or; Half mask: EN140; plus filter, EN 141 When RPE is used a face piece Fit Test should be conducted
Environmental exposure controls	Prevent product from entering drains. Do not allow material to contaminate ground water system. Local authorities should be advised if significant spillages cannot be contained.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance		
Physical State	Liquid	
Odor	No information available	
Odor Threshold	No data available	
pH	No information available	
Melting Point/Range	-34 °C / -29.2 °F	
Softening Point	No data available	
Boiling Point/Range	136 - 140 °C / 276.8 - 284 °F	@ 760 mmHg
Flash Point	23 °C / 73.4 °F	**Method -** No information available
Evaporation Rate	No data available	
Flammability (solid,gas)	Not applicable	Liquid
Explosion Limits	No data available	
Vapor Pressure	No data available	
Vapor Density	No data available	(Air = 1.0)
Specific Gravity / Density	0.865	
Bulk Density	Not applicable	Liquid
Water Solubility	Insoluble	
Solubility in other solvents	No information available	
Partition Coefficient (n-octanol/water)		
Component	**log Pow**	
Xylenes (o-, m-, p- isomers)	3.15	
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
Viscosity	No data available	
Explosive Properties	No information available	explosive air/vapour mixtures possible
Oxidizing Properties	No information available	

9.2. Other information

Molecular Formula	C8 H10

Molecular Weight 106.17

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

None known, based on information available

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Hazardous Polymerization No information available.
Hazardous Reactions None under normal processing.

10.4. Conditions to avoid

Keep away from open flames, hot surfaces and sources of ignition.

10.5. Incompatible materials

None known.

10.6. Hazardous decomposition products

None under normal use conditions.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

(a) acute toxicity;
Oral Based on available data, the classification criteria are not met
Dermal Category 4
Inhalation Category 4

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Xylenes (o-, m-, p- isomers)	LD50 = 3500 mg/kg (Rat)		29.08 mg/L [MOE Risk Assessment Vol.1, 2002]

(b) skin corrosion/irritation; Category 2

(c) serious eye damage/irritation; Category 2

(d) respiratory or skin sensitization;
Respiratory Based on available data, the classification criteria are not met
Skin Based on available data, the classification criteria are not met

(e) germ cell mutagenicity; Based on available data, the classification criteria are not met

(f) carcinogenicity; Based on available data, the classification criteria are not met

There are no known carcinogenic chemicals in this product

(g) reproductive toxicity; Based on available data, the classification criteria are not met

(h) STOT-single exposure; Category 3

Results / Target organs Respiratory system.

(i) STOT-repeated exposure; Category 2

Target Organs No information available.

(j) aspiration hazard; Category 1

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects The product contains following substances which are hazardous for the environment. Contains a substance which is:. Very toxic to aquatic organisms.

Component	Freshwater Fish	Water Flea	Freshwater Algae	Microtox
Xylenes (o-, m-, p- isomers)	LC50: 13.1 - 16.5 mg/L, 96h flow-through (Lepomis macrochirus) LC50: = 19 mg/L, 96h (Lepomis macrochirus) LC50: 7.711 - 9.591 mg/L, 96h static (Lepomis macrochirus) LC50: 23.53 - 29.97 mg/L, 96h static (Pimephales promelas) LC50: = 780 mg/L, 96h semi-static (Cyprinus carpio) LC50: > 780 mg/L, 96h (Cyprinus carpio) LC50: 30.26 - 40.75 mg/L, 96h static (Poecilia reticulata) LC50: 13.5 - 17.3 mg/L, 96h (Oncorhynchus mykiss) LC50: = 13.4 mg/L, 96h flow-through (Pimephales promelas) LC50: 2.661 - 4.093 mg/L, 96h static (Oncorhynchus mykiss)	EC50: = 3.82 mg/L, 48h (water flea) LC50: = 0.6 mg/L, 48h (Gammarus lacustris)		EC50 = 0.0084 mg/L 24 h

12.2. Persistence and degradability

Persistence Persistence is unlikely.

Degradation in sewage treatment plant Contains substances known to be hazardous to the environment or not degradable in waste water treatment plants.

12.3. Bioaccumulative potential Bioaccumulation is unlikely

Component	log Pow	Bioconcentration factor (BCF)
Xylenes (o-, m-, p- isomers)	3.15	0.6 - 15

12.4. Mobility in soil Spillage unlikely to penetrate soil The product is insoluble and floats on water Is not likely mobile in the environment due its low water solubility.

12.5. Results of PBT and vPvB assessment No data available for assessment.

12.6. Other adverse effects

Endocrine Disruptor Information This product does not contain any known or suspected endocrine disruptors
Persistent Organic Pollutant This product does not contain any known or suspected substance
Ozone Depletion Potential This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues / Unused Products Waste is classified as hazardous. Dispose of in accordance with the European Directives on waste and hazardous waste. Dispose of in accordance with local regulations.

Contaminated Packaging Dispose of this container to hazardous or special waste collection point. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep product and empty container away from heat and sources of ignition.

European Waste Catalogue (EWC) According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.

Other Information Do not dispose of waste into sewer. Waste codes should be assigned by the user based on the application for which the product was used. Can be incinerated, when in compliance with local regulations. Do not let this chemical enter the environment. Do not empty into drains.

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

14.1. UN number UN1307
14.2. UN proper shipping name XYLENES
14.3. Transport hazard class(es) 3
14.4. Packing group III

ADR

14.1. UN number UN1307
14.2. UN proper shipping name XYLENES
14.3. Transport hazard class(es) 3
14.4. Packing group III

IATA

14.1. UN number UN1307
14.2. UN proper shipping name XYLENES
14.3. Transport hazard class(es) 3
14.4. Packing group III

14.5. Environmental hazards No hazards identified

14.6. Special precautions for user No special precautions required

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code Not applicable, packaged goods

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories X = listed.

Component	EINECS	ELINCS	NLP	TSCA	DSL	NDSL	PICCS	ENCS	IECSC	AICS	KECL
Xylenes (o-, m-, p- isomers)	215-535-7	-		X	X	-	X	X	X	X	X

National Regulations

Component	Germany - Water Classification (VwVwS)	Germany - TA-Luft Class
Xylenes (o-, m-, p- isomers)	WGK 2	

Component	France - INRS (Tables of occupational diseases)
Xylenes (o-, m-, p- isomers)	Tableaux des maladies professionnelles (TMP) - RG 4bis,RG 84

Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment.

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has not been conducted

SECTION 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3

H304 - May be fatal if swallowed and enters airways
H312 - Harmful in contact with skin
H332 - Harmful if inhaled
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
H373 - May cause damage to organs through prolonged or repeated exposure
H412 - Harmful to aquatic life with long lasting effects
H226 - Flammable liquid and vapor

Legend

CAS - Chemical Abstracts Service

EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

IECSC - Chinese Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

ENCS - Japanese Existing and New Chemical Substances

AICS - Australian Inventory of Chemical Substances

NZIoC - New Zealand Inventory of Chemicals

WEL - Workplace Exposure Limit

ACGIH - American Conference of Governmental Industrial Hygienists

DNEL - Derived No Effect Level

RPE - Respiratory Protective Equipment

LC50 - Lethal Concentration 50%

NOEC - No Observed Effect Concentration

PBT - Persistent, Bioaccumulative, Toxic

TWA - Time Weighted Average

IARC - International Agency for Research on Cancer

PNEC - Predicted No Effect Concentration

LD50 - Lethal Dose 50%

EC50 - Effective Concentration 50%

POW - Partition coefficient Octanol:Water

vPvB - very Persistent, very Bioaccumulative

ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
OECD - Organisation for Economic Co-operation and Development
BCF - Bioconcentration factor
ICAO/IATA - International Civil Aviation Organization/International Air Transport Association
MARPOL - International Convention for the Prevention of Pollution from Ships
ATE - Acute Toxicity Estimate
VOC - Volatile Organic Compounds

Key literature references and sources for data
Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice
Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.
Use of personal protective equipment, covering appropriate selection, compatibility, breakthrough thresholds, care, maintenance, fit and standards.
First aid for chemical exposure, including the use of eye wash and safety showers.
Chemical incident response training.
Fire prevention and fighting, identifying hazards and risks, static electricity, explosive atmospheres posed by vapours and dusts.

Creation Date	31-May-2018
Revision Date	04-Jun-2018
Revision Summary	SDS sections updated, 2, 3.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of Safety Data Sheet

SAFETY DATA SHEET

Creation Date 26-Sep-2009 **Revision Date** 23-Jan-2018 **Revision Number** 4

1. Identification

Product Name **m-Xylene**

Cat No. : **AC610470000; AC610471000**

CAS-No 108-38-3
Synonyms 1,3-Dimethylbenzene

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Acute dermal toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2

Label Elements

Signal Word
Warning

Hazard Statements
Flammable liquid and vapor
Harmful in contact with skin
Causes skin irritation
Causes serious eye irritation
Harmful if inhaled

Precautionary Statements
Prevention
Wear protective gloves/protective clothing/eye protection/face protection
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wash face, hands and any exposed skin thoroughly after handling
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
Call a POISON CENTER or doctor/physician if you feel unwell
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store in a well-ventilated place. Keep cool
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
m-Xylene	108-38-3	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Move to fresh air. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required. If not breathing, give artificial respiration.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms and effects Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media No information available

Flash Point 25 °C / 77 °F

Method - No information available

Autoignition Temperature 465 °C / 869 °F

Explosion Limits

Upper 7.0%

Lower 1.1%

Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO_2)

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
2	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Take precautionary measures against static discharges.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Flammables area. Keep away from heat and sources of ignition.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
m-Xylene	TWA: 100 ppm STEL: 150 ppm		IDLH: 900 ppm TWA: 100 ppm TWA: 435 mg/m³ STEL: 150 ppm STEL: 655 mg/m³	TWA: 100 ppm TWA: 435 mg/m³ STEL: 150 ppm STEL: 655 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

Personal Protective Equipment

Eye/face Protection 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 and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection 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.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-48 °C / -54.4 °F
Boiling Point/Range	139 - 139 °C / 282.2 - 282.2 °F
Flash Point	25 °C / 77 °F
Evaporation Rate	0.7
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	7.0%
Lower	1.1%
Vapor Pressure	8 mbar @ 20 °C
Vapor Density	3.66
Specific Gravity	0.864
Solubility	slightly soluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	465 °C / 869 °F
Decomposition Temperature	No information available
Viscosity	0.62 mPa.s at 20 °C
Molecular Formula	C8 H10
Molecular Weight	106.17

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents, Strong acids

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
m-Xylene	LD50 = 5 g/kg (Rat)	LD50 = 12.18 g/kg (Rabbit) LD50 = 14100 µL/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
m-Xylene	108-38-3	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Contains a substance which is:. Toxic to aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
m-Xylene	EC50: = 4.9 mg/L, 72h static (Pseudokirchneriella subcapitata)	LC50: = 8.4 mg/L, 96h semi-static (Oncorhynchus mykiss) LC50: 14.3 - 18 mg/L, 96h flow-through (Pimephales promelas) LC50: = 12.9 mg/L, 96h semi-static (Poecilia reticulata)	EC50 = 0.0084 mg/L 24 h	EC50: 2.81 - 5.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Persistence is unlikely

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility. Is not likely mobile in the environment due its low water solubility.

Component	log Pow
m-Xylene	3.2

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN1307
Proper Shipping Name XYLENES
Hazard Class 3
Packing Group III

TDG

UN-No UN1307
Proper Shipping Name XYLENES
Hazard Class 3
Packing Group III

IATA

UN-No UN1307
Proper Shipping Name XYLENES
Hazard Class 3
Packing Group III

IMDG/IMO

UN-No UN1307
Proper Shipping Name XYLENES
Hazard Class 3
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
m-Xylene	X	X	-	203-576-3	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated

polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
m-Xylene	108-38-3	>95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
m-Xylene	X	-	-	-

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
m-Xylene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
m-Xylene	1000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
m-Xylene	X	X	X	X	-

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	26-Sep-2009
Revision Date	23-Jan-2018
Print Date	23-Jan-2018
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

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End of SDS

SAFETY DATA SHEET

Creation Date 26-Sep-2009 **Revision Date** 26-Jan-2018 **Revision Number** 6

1. Identification

Product Name **Mesitylene**

Cat No. : **AC125580000; AC125580010; AC125580025; AC125580050; AC125582500**

CAS-No 108-67-8
Synonyms 1,3,5-Trimethylbenzene

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Flammable liquid and vapor
May be fatal if swallowed and enters airways
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation
May cause drowsiness or dizziness

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Response
Get medical attention/advice if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
1,3,5-Trimethylbenzene	108-67-8	97-99

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get

	medical attention.
Skin Contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention. Risk of serious damage to the lungs.
Ingestion	Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting. Call a physician or Poison Control Center immediately. If vomiting occurs naturally, have victim lean forward.
Most important symptoms and effects	. Breathing difficulties. Vapors may cause drowsiness and dizziness: Symptoms may be delayed: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media	No information available
Flash Point	44 °C / 111.2 °F
Method -	No information available
Autoignition Temperature	550 °C / 1022 °F
Explosion Limits	
Upper	6.00%
Lower	1.00%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	2	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

7. Handling and storage

Handling

Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Take precautionary measures against static discharges. Use explosion-proof equipment.

Storage

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
1,3,5-Trimethylbenzene			TWA: 25 ppm TWA: 125 mg/m^3	

Legend

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures

Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment.

Personal Protective Equipment

Eye/face Protection

Tightly fitting safety goggles. Face-shield.

Skin and body protection

Long sleeved clothing.

Respiratory Protection

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.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-45 °C / -49 °F
Boiling Point/Range	163 - 166 °C / 325.4 - 330.8 °F @ 760 mmHg
Flash Point	44 °C / 111.2 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.00%
Lower	1.00%
Vapor Pressure	2.5 mbar @ 20 °C
Vapor Density	4.1 (Air = 1.0)
Specific Gravity	0.868
Solubility	slightly soluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	550 °C / 1022 °F
Decomposition Temperature	No information available

Viscosity	No information available
Molecular Formula	C9 H12
Molecular Weight	120.19

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents, Nitric acid

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
1,3,5-Trimethylbenzene	LD50 = 5000 mg/kg (Rat)	Not listed	LC50 = 24 g/m³ (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
1,3,5-Trimethylbenzene	108-67-8	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system Central nervous system (CNS)

STOT - repeated exposure None known

Aspiration hazard Category 1

Symptoms / effects,both acute and delayed Vapors may cause drowsiness and dizziness: Symptoms may be delayed: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
1,3,5-Trimethylbenzene	Not listed	LC50: = 3.48 mg/L, 96h (Pimephales promelas)	Not listed	EC50: = 50 mg/L, 24h (Daphnia magna)

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

- **UN-No** UN2325
- **Proper Shipping Name** 1,3,5-TRIMETHYLBENZENE
- **Hazard Class** 3
- **Packing Group** III

TDG

- **UN-No** UN2325
- **Proper Shipping Name** 1,3,5-TRIMETHYLBENZENE
- **Hazard Class** 3
- **Packing Group** III

IATA

- **UN-No** UN2325
- **Proper Shipping Name** 1,3,5-TRIMETHYLBENZENE
- **Hazard Class** 3
- **Packing Group** III

IMDG/IMO

- **UN-No** UN2325
- **Proper Shipping Name** 1,3,5-TRIMETHYLBENZENE
- **Hazard Class** 3
- **Packing Group** III

15. Regulatory information

All of the components in the product are on the following Inventory lists: Australia Complete Regulatory Information contained in following SDS's X = listed China Canada The product is classified and labeled according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC Europe TSCA Korea Philippines Japan U.S.A. (TSCA) Canada (DSL/NDSL) Europe (EINECS/ELINCS/NLP) Australia (AICS) Korea (ECL) China (IECSC) Japan (ENCS) Philippines (PICCS)

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
1,3,5-Trimethylbenzene	X	X	-	203-604-4	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
1,3,5-Trimethylbenzene	X	-	-	-	-

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Moderate risk, Grade 2

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 26-Sep-2009
Revision Date 26-Jan-2018
Print Date 26-Jan-2018
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Safety Data Sheet

Prepared in accordance with Commission Regulation (EU) 2015/830

Stock Number: 31275
Revision Date: 24-04-2018
This document replaces SDS dated: 06-01-2017
2 Letter ISO country code/language code: UK/EN

Chrysene Standard

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier: **Chrysene Standard**
Stock Number: 31275

Other means of identification:
Synonyms: None Known
REACH Registration No.: None Known

1.2 Relevant identified uses of the substance or mixture and uses advised against:
Relevant identified uses: For Laboratory use only
Uses advised against: Uses other than recommended use.

1.3 Details of the Supplier of the Safety Data Sheet:	**Manufacturer**	**Supplier**
	Restek Corporation 110 Benner Circle Bellefonte, Pa. 16823 USA 00 1 814-353-1300 00 1 814-353-1309 sds@restek.com	Thames Restek UK LTD Units 8-16, Ministry Wharf Wycombe Road, Saunderton Buckinghamshire United Kingdom HP14 4HW 01494 563377 sales@thamesrestek.co.uk
1.4 Emergency telephone number:	00 1 800-424-9300 (CHEMTREC within the US) 00 1 703-741-5970 (Outside USA)	0870-8200418 (CHEMTREC within the UK) +1 703-741-5970 (CHEMTREC International)

Poison Centre contact information: National Poisons Information Service (NPIS)
Email: director.birmingham.unit@npis.org
Website: http://www.npis.org/

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture:

Classification according to Regulation (EC) No 1272/2008 [CLP]:
Carcinogenicity Category 1B
Flammable Liquid Category 2
Serious Eye Damage/Eye Irritation Category 2

Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3

2.2 Label elements:

Labelling according to Regulation (EC) No 1272/2008 [CLP]:

Hazard pictograms:

Signal Word:	Danger
Hazard Statements:	H225 - Highly flammable liquid and vapour H319 - Causes serious eye irritation H336 - May cause drowsiness or dizziness H350 - May cause cancer.
Precautionary Statements:	P201 - Obtain special instructions before use. P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P280 - Wear protective gloves/protective clothing/eye protection/face protection. P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Supplemental Hazard information (EU):	None Known
2.3 Other hazards:	This substance does not meet the PBT or vPvB criteria of REACH, Annex XIII

SECTION 3: Composition/information on ingredients

3.1 Substances:
Not applicable

3.2 Mixtures:

Chemical Name	%	CAS #	EC No. REACH Registration No.	Classification (EC) No 1272/2008	M Factor	SCL	Acute Toxicity Estimates
chrysene	0.1	218-01-9	205-923-4 None Known	Aquatic Acute 1; H400 Aquatic Chronic 1; H410 Carc. 1B; H350 Muta. 2; H341	No data available	No data available	Not determined
Acetone	99.9	67-64-1	200-662-2 None Known	Eye Irrit. 2; H319 Flam. Liq. 2; H225 STOT SE 3; H336 EUH066	No data available	No data available	Not determined

For full text of H-statements see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures:

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eye contact: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

Self protection of the first aider: No data available

4.2 Most important symptoms and effects, both acute and delayed: Causes serious eye irritation May cause drowsiness or dizziness

4.3 Indication of any immediate medical attention and special treatment needed: No additional first aid information available

SECTION 5: Firefighting measures

5.1 Extinguishing media:

Suitable extinguishing media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire.

Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Unsuitable extinguishing media: None Known

5.2 Special hazards arising from the substance or mixture: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

5.3 Advice for firefighters: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Non-emergency personnel: Non-emergency personnel should be kept clear of the area

Emergency responders: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

6.2 Environmental precautions: No data available

6.3 Methods and material for containment and cleaning up:

Small spills: Refer to information provided for large spills

Large spills: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike

with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

6.4 Reference to other sections: Refer to section 13 for disposal information

SECTION 7: Handling and storage

7.1 Precautions for safe handling: Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

7.2 Conditions for safe storage, including any incompatibilities:

Conditions for safe storage: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

Materials to Avoid/Chemical Incompatibility: Strong oxidizing agents, Strong acids

7.3 Specific end use(s): For Laboratory use only

SECTION 8: Exposure controls/personal protection

8.1 Control parameters:

Occupational Exposure limit values:

Chemical Name	United Kingdom - Workplace Exposure Limits (WELs) - TWAs	United Kingdom - Workplace Exposure Limits (WELs) - STELs	United Kingdom - Biological Monitoring Guidance Values
Acetone	500 ppm TWA; 1210 mg/m3 TWA	1500 ppm STEL; 3620 mg/m3 STEL	No data available

DNEL: None Known

PNEC: None Known

8.2 Exposure controls:

Appropriate engineering controls: Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.

Individual protection measures, such as personal protective equipment:

Eye and face protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection:

Hand protection: Nitrile Neoprene

Other skin protection: Wear protective gloves. Inspect gloves for chemical break-through and

	replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work
Respiratory Protection:	No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.
Respirator Type(s):	Not normally required.
Thermal Hazards:	Not applicable
Environmental exposure controls:	No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties:

Appearance:	No data available
Colour:	Depends upon product selection
Odour:	Strong
Odour threshold:	ND
pH:	Not applicable
Melting Point/Freezing Point (°C):	
Melting point (°C):	-95
Freezing point (°C):	No data available
Initial boiling point and boiling range (°C):	56
Flash point (°C):	-20
Evaporation Rate (water = 1):	No data available
Flammability (solid, gas):	No data available
Upper/lower flammability or explosive limits:	
Upper flammable or explosive limit, % in air:	No data available
Lower flammable or explosive limit, % in air:	No data available
Vapour pressure:	No data available
Vapor Density (Air=1):	2
Relative density (water = 1):	0.791
Solubility(ies):	Complete; 100%

Partition coefficient: n-octanol/water:	No data available
Auto-ignition temperature (°C):	465
Decomposition temperature (°C):	No data available
Viscosity:	No data available
Explosive properties:	No data available
Oxidizing properties:	No data available

9.2 Other information:

Volatile Organic Chemicals:	0
Bulk density:	6.601

SECTION 10: Stability and reactivity

10.1 Reactivity:	Not expected to be reactive
10.2 Chemical stability:	Stable under normal conditions.
10.3 Possibility of hazardous reactions:	None expected under standard conditions of storage
10.4 Conditions to avoid:	No data available
10.5 Incompatible materials:	Strong oxidizing agents, Strong acids
10.6 Hazardous decomposition products:	Carbon dioxide, Carbon monoxide

SECTION 11: Toxicological information

11.1 Information on toxicological effects:

Acute toxicity:

Chemical Name	ORAL LD50 (rat)	DERMAL LD50 (rabbit)	INHALATION LC50 (rat)
Acetone	ORAL LD50 Rat 5800 mg/kg	DERMAL LD50 Rabbit > 15700 mg/kg	INHALATION LC50-8H Rat 50100 MG/M3

Based on available data, the classification criteria are not met.

Skin corrosion/irritation:
Based on available data, the classification criteria are not met.

Serious eye damage/irritation:

pH	Not applicable

Classification is based on pH and the components listed in Section 3.

Respiratory or skin sensitisation:
Based on available data, the classification criteria are not met.

Germ cell mutagenicity:
Based on available data, the classification criteria are not met.

Carcinogenicity:
Classification has been based on toxicological information of the components in Section 3.

Reproductive toxicity:
Based on available data, the classification criteria are not met.

STOT-single exposure:
Classification has been based on toxicological information of the components in Section 3.

STOT-repeated exposure:
Based on available data, the classification criteria are not met.

Aspiration hazard:
Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1 Toxicity: This material is not expected to be harmful to the ecology.

Ecological Toxicity Data:

Chemical Name	CAS #	Aquatic EC50 Crustacea	Aquatic ERC50 Algae	Aquatic LC50 Fish
No data available				

12.2 Persistence and degradability: No data
No data

12.3 Bioaccumulative potential: No data

12.4 Mobility in soil: No data

12.5 Results of PBT and vPvB assessment: No data available

12.6 Other adverse effects: None Known

12.7 Additional information: No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods:

Disposal methods: Spent or discarded material is a hazardous waste.
Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Waste codes / waste designations according to LoW: No data available

SECTION 14: Transport information

International carriage of dangerous goods by road (ADR), rail or inland waterways:

14.1 UN number: UN1090

14.2 UN proper shipping name: Acetone

14.3 Transport hazard class(es): 3

14.4 Packing group: II

International carriage of dangerous goods by air (IATA):

14.1 UN number: UN1090

14.2 UN proper shipping name: Acetone

14.3 Transport hazard class(es): 3

14.4 Packing group: II

14.5 Environmental hazards: No

14.6 Special precautions for user: No data available

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

Chemical Name	EINECS	SVHC
Acetone	Yes	No
chrysene	Yes	No

15.2 Chemical Safety Assessment No Chemical Safety Assessment has been carried out for this

substance/mixture by the supplier.

SECTION 16: Other information

Revision Date:	24-04-2018
Indication of changes:	Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
Abbreviations and acronyms:	CAS = Chemical Abstract Service DNEL= Derivative No Effect Level EC= European Community EINECS = European Inventory of Existing Chemical Substances MSHA = Mine Safety Health Administration NIOSH = National Institute of Occupational Safety & Health OEL = Occupational Exposure Limit PBT= Persistent, Bioaccumulative, Toxic PNEC= Predicted No Effect Concentration SCOEL= Scientific Committee on Occupational Exposure Limits TLV = Threshold Limit Value TWA= Time Weighted Average vPvB= Very Persistent, Very Bioaccumulative Wt.% = Weight Percent
Key literature references and sources for data:	No data available
Hazard phrase(s) referenced in section 3	H341 - Suspected of causing genetic defects. H350 - May cause cancer. H225 - Highly flammable liquid and vapour H319 - Causes serious eye irritation H336 - May cause drowsiness or dizziness H410 - Very toxic to aquatic life with long lasting effects
Precautionary Statements:	
Prevention:	P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood. P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

	P240 - Ground/bond container and receiving equipment.
	P241 - Use explosion-proof electrical/ventilating/lighting equipment.
	P242 - Use only non-sparking tools.
	P243 - Take precautionary measures against static discharge.
	P261 - Avoid breathing dust/fume/gas/mist/vapours/spray.
	P264 - Wash thoroughly after handling.
	P271 - Use only outdoors or in a well-ventilated area.
	P280 - Wear protective gloves/protective clothing/eye protection/face protection.
Response:	P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
	P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
	P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
	P308+P313 - IF exposed or concerned: Get medical advice/ attention.
	P312 - Call a POISON CENTER/doctor if you feel unwell.
	P337+P313 - If eye irritation persists: Get medical advice/attention.
	P370+P378 - In case of fire: Use an appropriate extinguisher (see section 5) to extinguish.
Storage:	P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
	P403+P235 - Store in a well-ventilated place. Keep cool.
	P405 - Store locked up.
Disposal:	P501 - Dispose of contents/container to a suitable disposal site in accordance with local/national/international regulations.

Disclaimer of Liability:

Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding products described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are

assumed. All such being given and accepted at your risk.

Safety Data Sheet

Revision Date: 08/13/18
www.restek.com

2 Letter ISO country code/language code: US/EN

1. IDENTIFICATION

Catalog Number / Product Name:	**31272 / Benzo(b)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	10
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:

GHS Classification:
Carcinogenicity Category 1B
Flammable Liquid Category 2
Serious Eye Damage/Eye Irritation Category 2
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3

GHS Signal Word:
Danger

GHS Hazard:
Highly flammable liquid and vapour.
Causes serious eye irritation.
May cause drowsiness or dizziness.
May cause cancer.

GHS Precautions:

Safety Precautions:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Wash hands and skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed or concerned: Get medical advice/attention.
Call a POISON CENTER or doctor/physician if you feel unwell.
If eye irritation persists: Get medical advice/attention.
In case of fire: Use extinguishing media in section 5 for extinction.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: Specific target organ toxicity - Single exposure - STOT SE 3: H336 May cause drowsiness or dizziness.

Repeated Exposure Target Organs: No data available

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.9
benzo (b) fluoranthene	205-99-2	205-911-9	0.1

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal

evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions:	Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment
Storage Technical Measures and Conditions:	Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	750 ppm STEL; 1782 mg/m3 STEL	500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (b) fluoranthene	205-99-2	Not established	None Known	Not established	No data available

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.
Respiratory Protection:	No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.
Skin Protection:	Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work
Medical Conditions Aggravated By Exposure:	Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	Depends upon product selection
Odor:	Strong
Physical State:	No data available
pH:	Not applicable
Vapor Pressure:	No data available
Vapor Density:	2.0 (air = 1)
Boiling Point (°C):	56.05 °C at 1013.25 hPa
Melting Point (°C):	-95.4 °C Melting Point
Flash Point (°F):	39
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	No data available
Lower Flammable/Explosive Limit, % in air:	No data available
Autoignition Temperature (°C):	465 deg C
Decomposition Temperature (°C):	No data available
Specific Gravity:	0.7845 g/cm3 at 25 °C
Evaporation Rate:	No data available
Odor Threshold:	ND
Solubility:	Complete; 100%
Partition Coefficient: n-octanol in water:	No data available
VOC % by weight:	0
Molecular Weight:	58.08

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	None known.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents Strong acids
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion

Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Respiratory Tract, Skin

Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation: Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.

Skin Contact: Can cause minor skin irritation, defatting, and dermatitis.

Eye Contact: Can cause minor irritation, tearing and reddening.

Ingestion Irritation: May be harmful if swallowed.

Ingestion Toxicity: Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity: Contains a probable or known human carcinogen.

Reproductive and Developmental Toxicity: No data available to indicate product or any components present at greater than 0.1% may cause birth defects.

Inhalation: Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.

Skin Contact: Upon prolonged or repeated contact, can cause minor skin irritation, defatting, and dermatitis.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Acetone	67-64-1	Dermal LD50 Rabbit >15700 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h; Oral LD50 Rat 5800 mg/kg

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
Benzo(b)fluoranthene	205-99-2	Present

ACGIH:

Chemical Name	CAS No.	
Benzo[b]fluoranthene	205-99-2	A2 - Suspected Human Carcinogen
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen

NIOSH:

Chemical Name	CAS No.
No data available	

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.
Monograph 92 [2010]; Supplement 7 [1987]; Monograph 32 [1983]	205-99-2	Group 2B

12. ECOLOGICAL INFORMATION

Overview: This material is not expected to be harmful to the ecology.

Mobility: No data

Persistence: No data

Bioaccumulation: No data

Degradability: No data

Ecological Toxicity Data: No data available

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.Mixing spent or discarded material with other materials may render the mixture hazardous. Perform a hazardous waste determination on mixtures.

Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:

DOT Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

International:

IATA Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (b) fluoranthene	205-99-2	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[b]fluoranthene	205-99-2	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (b) fluoranthene	205-99-2	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 12/08/16

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available

Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding products described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

SAFETY DATA SHEET

Version 4.7
Revision Date 12/28/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Lead

Product Number : 695912
Brand : Aldrich

CAS-No. : 7439-92-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.
H351 Suspected of causing cancer.
H361 Suspected of damaging fertility or the unborn child.
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Pb
Molecular weight	:	207.20 g/mol
CAS-No.	:	7439-92-1
EC-No.	:	231-100-4

Hazardous components

Component	Classification	Concentration
Lead		
	Acute Tox. 4; Carc. 2; Repr. 2; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H351, H361, H373, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Lead oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	See 1910.1025		
Lead	7439-92-1	TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		

		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		See Appendix C		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Lead	7439-92-1	Lead	30µg/ 100 ml	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Not critical			
		Lead	30µg/ 100 ml	In blood	ACGIH - Biological Exposure Indices (BEI)
		Not critical			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Shot
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 327.4 °C (621.3 °F) - lit.
f)	Initial boiling point and boiling range	1,740 °C (3,164 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong acids

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

Rat
Cytogenetic analysis

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Lead)

NTP: Reasonably anticipated to be a human carcinogen (Lead)

Reasonably anticipated to be a human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Lead)

OSHA: 1910.1025 (Lead)

OSHA specifically regulated carcinogen (Lead)

Reproductive toxicity
Suspected human reproductive toxicant

Reproductive toxicity - Rat - Inhalation
Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Rat - Oral
Effects on Newborn: Behavioral.

Reproductive toxicity - Mouse - Oral
Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated). Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Developmental Toxicity - Rat - Inhalation
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Developmental Toxicity - Rat - Oral
Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Developmental Toxicity - Rat - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - Mouse - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OF7525000

anemia

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 1.19 mg/l - 96.0 h
	LC50 - Micropterus dolomieui - 2.2 mg/l - 96.0 h
	mortality NOEC - Salvelinus fontinalis - 1.7 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	mortality LOEC - Daphnia (water flea) - 0.17 mg/l - 24 h
	mortality NOEC - Daphnia (water flea) - 0.099 mg/l - 24 h
Toxicity to algae	mortality EC50 - Skeletonema costatum - 7.94 mg/l - 10 d

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation: Oncorhynchus kisutch - 2 Weeks - 150 µg/l

Bioconcentration factor (BCF): 12

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Lead)
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead)
Marine pollutant:yes
IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Lead	CAS-No. 7439-92-1	Revision Date 1989-07-10
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Lead	CAS-No. 7439-92-1	Revision Date 1989-07-10

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.

H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 12/28/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Version 3.12
Revision Date 12/02/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Mercury

Product Number : 215457
Brand : Sigma-Aldrich
Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Inhalation (Category 2), H330
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - repeated exposure (Category 1), H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H330 Fatal if inhaled.
H360 May damage fertility or the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.

P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Hg
Molecular weight	:	200.59 g/mol
CAS-No.	:	7439-97-6
EC-No.	:	231-106-7
Index-No.	:	080-001-00-0

Hazardous components

Component	Classification	Concentration
Mercury		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Mercury/mercury oxides.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method.Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		

		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Mercury	7439-97-6	Mercury	0.0400 mg/g	In urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to shift (16 hours after exposure ceases)			
		Mercury	15.0000 µg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: silver, white
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C (673.9 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) 1 hPa (1 mmHg) at 126 °C (259 °F)
l)	Vapour density	6.93 - (Air = 1.0)
m)	Relative density	13.55 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.00006 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapour density	6.93 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Mercury)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Presumed human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OV4550000

Mercury accumulates in almost all tissues, especially in the:, Kidney, Effects due to ingestion may include:, Nausea, Vomiting, Diarrhoea, intestinal bleeding

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Carassius auratus (goldfish) - 1,789 d - 0.25 µg/l
	Bioconcentration factor (BCF): 155,986

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: A,W Mercury
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 2809 Class: 8 (6.1) Packing group: III EMS-No: F-A, S-B
Proper shipping name: MERCURY
Marine pollutant:yes

IATA
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Mercury	7439-97-6	2013-12-20

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.12 Revision Date: 12/02/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Version 4.7
Revision Date 05/23/2016
Print Date 06/23/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Arsenic

Product Number : 202657
Brand : Aldrich
Index-No. : 033-001-00-X

CAS-No. : 7440-38-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H331 Toxic if inhaled.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.

P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	As
Molecular weight	:	74.92 g/mol
CAS-No.	:	7440-38-2
EC-No.	:	231-148-6
Index-No.	:	033-001-00-X

Hazardous components

Component	Classification	Concentration
Arsenic		
	Acute Tox. 4; Acute Tox. 3; Aquatic Acute 1; Aquatic Chronic 1; H302, H331, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen		
		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 15 minute ceiling value		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Arsenic	7440-38-2	inorganic arsenic plus methylated metabolites	35µg As/l	In urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of the workweek (After four or five consecutive working days			

		with exposure)			
		inorganic arsenic plus methylated metabolites	35µg As/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of the workweek (After four or five consecutive working days with exposure)			

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Pieces Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available

d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 817 °C (1,503 °F) - lit.
f)	Initial boiling point and boiling range	613 °C (1,135 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	5.727 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat Exposure to air may affect product quality.

10.5 Incompatible materials
Oxidizing agents, Halogens, Palladium undergoes a violent reaction with arsenic, Zinc, Platinum oxide, Nitrogen trichloride, Bromine azide

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Arsenic oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 763 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

IARC:	1 - Group 1: Carcinogenic to humans (Arsenic)
NTP:	Known to be human carcinogen (Arsenic)
	Known to be human carcinogen (Arsenic)
OSHA:	OSHA specifically regulated carcinogen (Arsenic)

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CG0525000

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 9.9 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 3.8 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant:yes

IATA
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Arsenic	7440-38-2	2008-10-10

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H302	Harmful if swallowed.
H331	Toxic if inhaled.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 05/23/2016 Print Date: 06/23/2016

SAFETY DATA SHEET

Version 4.7
Revision Date 12/28/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Nickel

Product Number : 268259
Brand : Aldrich
Index-No. : 028-002-00-7

CAS-No. : 7440-02-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure if inhaled.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Ni
Molecular weight	:	58.69 g/mol
CAS-No.	:	7440-02-0
EC-No.	:	231-111-4
Index-No.	:	028-002-00-7

Hazardous components

Component	Classification	Concentration
Nickel		
	Skin Sens. 1; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; H317, H351, H372, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nickel/nickel oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Nickel	7440-02-0	TWA	1.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Dermatitis Pneumoconiosis Not suspected as a human carcinogen		
		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	1.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Pneumoconiosis Not suspected as a human carcinogen		
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Foil Colour: white, silver, metallic
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,453 °C (2,647 °F) - lit.
f)	Initial boiling point and boiling range	2,732 °C (4,950 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	1 hPa (1 mmHg) at 1,810 °C (3,290 °F)
l)	Vapour density	No data available
m)	Relative density	8.9 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
acids, Oxidizing agents, Sulphur compounds, Hydrogen gas, Oxygen, Methanol, organic solvents, Aluminium, Fluorine, Ammonia

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
May cause sensitisation by skin contact.

Germ cell mutagenicity
No data available

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
	1 - Group 1: Carcinogenic to humans (Nickel)
	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
	1 - Group 1: Carcinogenic to humans (Nickel)
	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
NTP:	Reasonably anticipated to be a human carcinogen (Nickel)
	Reasonably anticipated to be a human carcinogen (Nickel)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Inhalation - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: QR5950000

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 1.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1 mg/l - 48 h

12.2 Persistence and degradability
Not applicable

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Nickel	7440-02-0	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 12/28/2015 Print Date: 05/01/2016

SAFETY DATA SHEET
Calcium Standard

Revision: 04/16/2015
Supersedes Revision: 06/09/2011

according to Regulation (EC) No. 1907/2006 as amended by (EC) No. 1272/2008

Section 1. Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Code: 700552
Product Name: Calcium Standard

1.2 Relevant identified uses of the substance or mixture and uses advised against:
Relevant identified uses: For research use only, not for human or veterinary use.

1.3 Details of the Supplier of the Safety Data Sheet:

Company Name: Cayman Chemical Company
1180 E. Ellsworth Rd.
Ann Arbor, MI 48108
Web site address: www.caymanchem.com
Information: Cayman Chemical Company +1 (734)971-3335

1.4 Emergency telephone number:
Emergency Contact: CHEMTREC Within USA and Canada: +1 (800)424-9300
CHEMTREC Outside USA and Canada: +1 (703)527-3887

Section 2. Hazards Identification

2.1 Classification of the Substance or Mixture:
2.1.1 Classification according to Regulation (EC) No 1272/2008 [CLP]:
Skin Corrosion/Irritation, Category 3
2.2 Label Elements:
2.2.1 Labeling according to Regulation (EC) No 1272/2008 [CLP]:

GHS Signal Word: **Warning**

GHS Hazard Phrases:
H316: Causes mild skin irritation.

GHS Precaution Phrases:
No phrases apply.

GHS Response Phrases:
P332+313: If skin irritation occurs, get medical advice/attention.

GHS Storage and Disposal Phrases:
Please refer to Section 7 for Storage and Section 13 for Disposal information.

2.3 Adverse Human Health Effects and Symptoms: Causes mild skin irritation.
Material may be irritating to the mucous membranes and upper respiratory tract.
May be harmful by inhalation, ingestion, or skin absorption.
May cause eye or respiratory system irritation.
To the best of our knowledge, the toxicological properties have not been thoroughly investigated.

Section 3. Composition/Information on Ingredients

CAS # / RTECS #	Hazardous Components (Chemical Name)/ REACH Registration No.	Concentration	EC No./ EC Index No.	GHS Classification
471-34-1 FF9335000	Calcium carbonate	2.0 %	207-439-9 NA	No data available.
77-86-1 TY2900000	Trizma base	1.21 %	201-064-4 NA	Skin Corr. 2: H315 Eye Damage 2: H319 STOT (SE) 3: H335 H336
7732-18-5	Water	96.79 %	231-791-2	No data available.

ZC0110000			NA	

Section 4. First Aid Measures

4.1 Description of First Aid Measures: No data available.

In Case of Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Get immediate medical attention.

In Case of Skin Contact: Immediately wash skin with soap and plenty of water for at least 15 minutes. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

In Case of Eye Contact: Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Have eyes examined and tested by medical personnel.

In Case of Ingestion: Wash out mouth with water provided person is conscious. Never give anything by mouth to an unconscious person. Get medical attention. Do NOT induce vomiting unless directed to do so by medical personnel.

Section 5. Fire Fighting Measures

5.1 Suitable Extinguishing Media: Use alcohol-resistant foam, carbon dioxide, water, or dry chemical spray.
Use water spray to cool fire-exposed containers.

Unsuitable Extinguishing Media: A solid water stream may be inefficient.

5.2 Flammable Properties and Hazards: No data available.

Flash Pt: No data.

Explosive Limits: LEL: No data. UEL: No data.

Autoignition Pt: No data.

5.3 Fire Fighting Instructions: As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.

Section 6. Accidental Release Measures

6.1 Protective Precautions, Protective Equipment and Emergency Procedures: Avoid breathing vapors and provide adequate ventilation.
As conditions warrant, wear a NIOSH approved self-contained breathing apparatus, or respirator, and appropriate personal protection (rubber boots, safety goggles, and heavy rubber gloves).

6.2 Environmental Precautions: Take steps to avoid release into the environment, if safe to do so.

6.3 Methods and Material For Containment and Cleaning Up: Contain spill and collect, as appropriate.
Transfer to a chemical waste container for disposal in accordance with local regulations.

Section 7. Handling and Storage

7.1 Precautions To Be Taken in Handling: Avoid breathing dust/fume/gas/mist/vapours/spray.
Avoid prolonged or repeated exposure.

7.2 Precautions To Be Taken in Storing: Keep container tightly closed.
Store in accordance with information listed on the product insert.

Section 8. Exposure Controls/Personal Protection

8.1 Exposure Parameters:

CAS #	Partial Chemical Name	Britain EH40	France VL	Europe
471-34-1	Calcium carbonate	No data.	TWA: 10 mg/m3	No data.
77-86-1	Trizma base	No data.	No data.	No data.
7732-18-5	Water	No data.	No data.	No data.

CAS #	Partial Chemical Name	OSHA TWA	ACGIH TWA	Other Limits
471-34-1	Calcium carbonate	No data.	TLV: 10 mg/m3 (E)	No data.
77-86-1	Trizma base	No data.	No data.	No data.
7732-18-5	Water	No data.	No data.	No data.

8.2 Exposure Controls:

8.2.1 Engineering Controls (Ventilation etc.): Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

8.2.2 Personal protection equipment:

Eye Protection: Safety glasses

Protective Gloves: Compatible chemical-resistant gloves

Other Protective Clothing: Lab coat

Respiratory Equipment (Specify Type): NIOSH approved respirator, as conditions warrant.

Work/Hygienic/Maintenance Practices: Do not take internally.
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Wash thoroughly after handling.
No data available.

Section 9. Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Properties

Physical States: [ ] Gas [X] Liquid [ ] Solid

Appearance and Odor: Solution

pH: 7.0

Melting Point: No data.

Boiling Point: No data.

Flash Pt: No data.

Evaporation Rate: No data.

Explosive Limits: LEL: No data. UEL: No data.

Vapor Pressure (vs. Air or mm Hg): No data.

Vapor Density (vs. Air = 1): No data.

Specific Gravity (Water = 1): No data.

Solubility in Water: No data.

Autoignition Pt: No data.

9.2 Other Information

Percent Volatile: No data.

Section 10. Stability and Reactivity

10.1 Reactivity: No data available.

10.2 Stability: Unstable [ ] Stable [X]

10.3 Stability Note(s): Stable if stored in accordance with information listed on the product insert.

Polymerization: Will occur [ ] Will not occur [X]

10.4 Conditions To Avoid: No data available.

10.5 Incompatibility - Materials To Avoid: No data available.

10.6 Hazardous Decomposition Or Byproducts: No data available.

Section 11. Toxicological Information

11.1 Information on Toxicological Effects: The toxicological effects of this product have not been thoroughly studied.

Carcinogenicity: NTP? No IARC Monographs? No OSHA Regulated? No

CAS #	Hazardous Components (Chemical Name)	NTP	IARC	ACGIH	OSHA
471-34-1	Calcium carbonate	n.a.	n.a.	n.a.	n.a.
77-86-1	Trizma base	n.a.	n.a.	n.a.	n.a.
7732-18-5	Water	n.a.	n.a.	n.a.	n.a.

Section 12. Ecological Information

12.1 Toxicity: Avoid release into the environment.
Runoff from fire control or dilution water may cause pollution.

12.2 Persistence and Degradability: No data available.

12.3 Bioaccumulative Potential: No data available.

12.4 Mobility in Soil: No data available.

12.5 Results of PBT and vPvB assessment: No data available.

12.6 Other adverse effects: No data available.

Section 13. Disposal Considerations

13.1 Waste Disposal Method: Dispose in accordance with local, state, and federal regulations.

Section 14. Transport Information

14.1 LAND TRANSPORT (US DOT):

DOT Proper Shipping Name: Not dangerous goods.

DOT Hazard Class:

UN/NA Number:

14.1 LAND TRANSPORT (European ADR/RID):

ADR/RID Shipping Name: Not dangerous goods.

UN Number:

Hazard Class:

14.3 AIR TRANSPORT (ICAO/IATA):

ICAO/IATA Shipping Name: Not dangerous goods.

Additional Transport Information: Transport in accordance with local, state, and federal regulations.

Section 15. Regulatory Information

EPA SARA (Superfund Amendments and Reauthorization Act of 1986) Lists

CAS #	Hazardous Components (Chemical Name)	S. 302 (EHS)	S. 304 RQ	S. 313 (TRI)
471-34-1	Calcium carbonate	No	No	No
77-86-1	Trizma base	No	No	Yes-Cat. N106
7732-18-5	Water	No	No	No

CAS #	Hazardous Components (Chemical Name)	Other US EPA or State Lists
471-34-1	Calcium carbonate	CAA HAP,ODC: No; CWA NPDES: No; TSCA: Yes - Inventory; CA PROP.65: No
77-86-1	Trizma base	CAA HAP,ODC: HAP; CWA NPDES: No; TSCA: Yes - Inventory; CA PROP.65: No
7732-18-5	Water	CAA HAP,ODC: No; CWA NPDES: No; TSCA: Yes - Inventory; CA PROP.65: No

Regulatory Information Statement: This SDS was prepared in accordance with 29 CFR 1910.1200 and Regulation (EC) No.1272/2008.

Section 16. Other Information

Revision Date: 04/16/2015

Additional Information About This Product: No data available.

Company Policy or Disclaimer: DISCLAIMER: This information 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.

SAFETY DATA SHEET

Version 4.10
Revision Date 12/29/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Cadmium

Product Number : 414891
Brand : Aldrich
Index-No. : 048-002-00-0

CAS-No. : 7440-43-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Inhalation (Category 2), H330
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure (Category 1), H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H330 Fatal if inhaled.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H361 Suspected of damaging fertility or the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Cd
Molecular weight	:	112.41 g/mol
CAS-No.	:	7440-43-9
EC-No.	:	231-152-8
Index-No.	:	048-002-00-0

Hazardous components

Component	Classification	Concentration
Cadmium Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Acute Tox. 2; Muta. 2; Carc. 1B; Repr. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H341, H350, H361, H372, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Cadmium/cadmium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Air sensitive.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Cadmium	7440-43-9	TWA	0.010000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		

		Suspected human carcinogen		
		TWA	0.002000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		Substance listed; for more information see OSHA document 1910.1027		
		TWA	0.100000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		CEIL	0.300000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		CEIL	0.600000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		TWA	0.100000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		CEIL	0.300000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		Potential Occupational Carcinogen See Appendix A		
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		CEIL	0.600000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		PEL	0.005000 mg/m3	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1027 This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, and in all industries covered by the Occupational Safety and Health Act, except the construction-related industries, which are covered under 29 CFR 1926.63. OSHA specifically regulated carcinogen		

		Potential Occupational Carcinogen See Appendix A		
		Potential Occupational Carcinogen See Appendix A		
		TWA	0.010000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen varies		
		TWA	0.002000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen varies		
		PEL	0.005000 mg/m3	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1027 This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, and in all industries covered by the Occupational Safety and Health Act, except the construction-related industries, which are covered under 29 CFR 1926.63. OSHA specifically regulated carcinogen		
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		CEIL	0.3 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		CEIL	0.6 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		Substance listed; for more information see OSHA document 1910.1027		
		Potential Occupational Carcinogen See Appendix A		
		TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen varies		

		TWA	0.002 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen varies		
		PEL	0.005 mg/m3	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1027 This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, and in all industries covered by the Occupational Safety and Health Act, except the construction-related industries, which are covered under 29 CFR 1926.63. OSHA specifically regulated carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Cadmium	7440-43-9	cadmium	0.0050 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Not critical			
		cadmium	5.0000 µg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Not critical			
		cadmium	5 µg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Not critical			
		cadmium	5µg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		Not critical			

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: granular Colour: light grey
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 320.9 °C (609.6 °F) - lit.
f)	Initial boiling point and boiling range	765 °C (1,409 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	8.65 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.0023 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Oxidizing agents, acids

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 2,330 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	1 - Group 1: Carcinogenic to humans (Cadmium)
NTP:	Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Cadmium)
OSHA:	OSHA specifically regulated carcinogen (Cadmium)

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: EU9800000

Damage to the lungs., Kidney injury may occur., prolonged or repeated exposure can cause:, Vomiting, Diarrhoea, Lung irritation

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 0.001 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.024 mg/l - 48 h
Toxicity to algae	static test EC50 - Selenastrum capricornutum (green algae) - 0.023 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation: Oncorhynchus mykiss (rainbow trout) - 72 d - 1.27 µg/l

Bioconcentration factor (BCF): 55

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3288 Class: 6.1 Packing group: II
Proper shipping name: Toxic solid, inorganic, n.o.s. (Cadmium)
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3288 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, INORGANIC, N.O.S. (Cadmium)
Marine pollutant:yes

IATA
UN number: 3288 Class: 6.1 Packing group: II

Proper shipping name: Toxic solid, inorganic, n.o.s. (Cadmium)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Cadmium	7440-43-9	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Cadmium	CAS-No. 7440-43-9	Revision Date 2009-02-01
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Cadmium	CAS-No. 7440-43-9	Revision Date 2009-02-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H330	Fatal if inhaled.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	4
Fire Hazard:	0

Reactivity Hazard: 0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 12/29/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Version 4.7
Revision Date 02/27/2015
Print Date 05/24/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Copper

Product Number : 12816
Brand : Aldrich

CAS-No. : 7440-50-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Cu
Molecular weight : 63.55 g/mol
CAS-No. : 7440-50-8
EC-No. : 231-159-6

Hazardous components

Component	Classification	Concentration
Copper		
		<= 100 %

4. FIRST AID MEASURES

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Copper oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store under inert gas. Air sensitive.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Copper	7440-50-8	TWA	1.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Irritation Gastrointestinal metal fume fever		
		TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Irritation Gastrointestinal metal fume fever		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.100000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Foil Colour: light red
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,083.4 °C (1,982.1 °F)
f)	Initial boiling point and boiling range	2,567 °C (4,653 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	8.940 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents, Acid chlorides, Halogens

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - 3.5 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GL5325000

Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Copper)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Copper	7440-50-8	1989-08-11

New Jersey Right To Know Components

	CAS-No.	Revision Date
Copper	7440-50-8	1989-08-11

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 02/27/2015 Print Date: 05/24/2016

SAFETY DATA SHEET

Version 5.8
Revision Date 10/12/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Zinc

Product Number : 96454
Brand : Sigma-Aldrich

CAS-No. : 7440-66-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Combustible dust,
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

May form combustible dust concentrations in air
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P391 Collect spillage.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Zn
Molecular weight : 65.39 g/mol

Hazardous components

Component		Classification	Concentration
Zinc powder (stabilized)			
CAS-No. EC-No. Index-No.	7440-66-6 231-175-3 030-001-01-9	Aquatic Acute 1; Aquatic Chronic 1; H410	<= 100 %
Zinc oxide			
CAS-No. EC-No. Index-No.	1314-13-2 215-222-5 030-013-00-7	Aquatic Acute 1; Aquatic Chronic 1; H410	>= 5 - < 10 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Special powder against metal fire Dry sandUse water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media
Water

5.2 Special hazards arising from the substance or mixture

Zinc/zinc oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Zinc oxide	1314-13-2	TWA	2.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	metal fume fever		
		STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		metal fume fever		

		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	15.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	15.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	Not applicable
e)	Melting point/freezing point	Melting point/range: 420 °C (788 °F) - lit.
f)	Initial boiling point and boiling range	907 °C (1,665 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	Not applicable
l)	Vapour density	No data available
m)	Relative density	7.133 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable
p)	Auto-ignition temperature	does not ignite
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	During processing, dust may form explosive mixture in air.
t)	Oxidizing properties	No data available

9.2 Other safety information

Bulk density	1.8 - 3.2 kg/m3

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Dust may form explosive mixture in air.

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Acids and bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available (Zinc powder (stabilized))

Inhalation: No data available (Zinc powder (stabilized))

Dermal: No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

Skin corrosion/irritation
No data available (Zinc powder (stabilized))

Serious eye damage/eye irritation
No data available (Zinc powder (stabilized))

Respiratory or skin sensitisation
Did not cause sensitisation on laboratory animals. (Zinc powder (stabilized))

Germ cell mutagenicity
No data available (Zinc powder (stabilized))

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

Specific target organ toxicity - single exposure
No data available (Zinc powder (stabilized))

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available (Zinc powder (stabilized))

Additional Information
RTECS: ZG8600000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Effects due to ingestion may include:, chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness, Contact with eyes or skin may cause:, Irritation (Zinc powder (stabilized))

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 450 µg/l - 96 h (Zinc powder (stabilized))
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h (Zinc powder (stabilized))
	mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d (Zinc powder (stabilized))

12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation	Algae - 7 d at 16 °C - 5 µg/l (Zinc powder (stabilized))
	Bioconcentration factor (BCF): 466

12.4 Mobility in soil

No data available (Zinc powder (stabilized))

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Zinc powder (stabilized))
Reportable Quantity (RQ): 1020 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc powder (stabilized))
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Zinc powder (stabilized))

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Zinc oxide	1314-13-2	2007-03-01
Zinc powder (stabilized)	7440-66-6	1993-04-24

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

	May form combustible dust concentrations in air
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.8 Revision Date: 10/12/2015 Print Date: 05/01/2016

Safety Data Sheet

Revision Date: 08/13/18
www.restek.com

2 Letter ISO country code/language code: US/EN

1. IDENTIFICATION

Catalog Number / Product Name:	**31272 / Benzo(b)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	10
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:

GHS Classification:
Carcinogenicity Category 1B
Flammable Liquid Category 2
Serious Eye Damage/Eye Irritation Category 2
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3

GHS Signal Word:
Danger

GHS Hazard:
Highly flammable liquid and vapour.
Causes serious eye irritation.
May cause drowsiness or dizziness.
May cause cancer.

GHS Precautions:

Safety Precautions:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Wash hands and skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed or concerned: Get medical advice/attention.
Call a POISON CENTER or doctor/physician if you feel unwell.
If eye irritation persists: Get medical advice/attention.
In case of fire: Use extinguishing media in section 5 for extinction.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: Specific target organ toxicity - Single exposure - STOT SE 3: H336 May cause drowsiness or dizziness.

Repeated Exposure Target Organs: No data available

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.9
benzo (b) fluoranthene	205-99-2	205-911-9	0.1

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal

evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions:	Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment
Storage Technical Measures and Conditions:	Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	750 ppm STEL; 1782 mg/m3 STEL	500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (b) fluoranthene	205-99-2	Not established	None Known	Not established	No data available

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.
Respiratory Protection:	No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.
Skin Protection:	Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work
Medical Conditions Aggravated By Exposure:	Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	Depends upon product selection
Odor:	Strong
Physical State:	No data available
pH:	Not applicable
Vapor Pressure:	No data available
Vapor Density:	2.0 (air = 1)
Boiling Point (°C):	56.05 °C at 1013.25 hPa
Melting Point (°C):	-95.4 °C Melting Point
Flash Point (°F):	39
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	No data available
Lower Flammable/Explosive Limit, % in air:	No data available
Autoignition Temperature (°C):	465 deg C
Decomposition Temperature (°C):	No data available
Specific Gravity:	0.7845 g/cm3 at 25 °C
Evaporation Rate:	No data available
Odor Threshold:	ND
Solubility:	Complete; 100%
Partition Coefficient: n-octanol in water:	No data available
VOC % by weight:	0
Molecular Weight:	58.08

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	None known.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents Strong acids
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion

Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Respiratory Tract, Skin

Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation: Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.

Skin Contact: Can cause minor skin irritation, defatting, and dermatitis.

Eye Contact: Can cause minor irritation, tearing and reddening.

Ingestion Irritation: May be harmful if swallowed.

Ingestion Toxicity: Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity: Contains a probable or known human carcinogen.

Reproductive and Developmental Toxicity: No data available to indicate product or any components present at greater than 0.1% may cause birth defects.

Inhalation: Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.

Skin Contact: Upon prolonged or repeated contact, can cause minor skin irritation, defatting, and dermatitis.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Acetone	67-64-1	Dermal LD50 Rabbit >15700 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h; Oral LD50 Rat 5800 mg/kg

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
Benzo(b)fluoranthene	205-99-2	Present

ACGIH:

Chemical Name	CAS No.	
Benzo[b]fluoranthene	205-99-2	A2 - Suspected Human Carcinogen
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen

NIOSH:

Chemical Name	CAS No.
No data available	

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.
Monograph 92 [2010]; Supplement 7 [1987]; Monograph 32 [1983]	205-99-2	Group 2B

12. ECOLOGICAL INFORMATION

Overview: This material is not expected to be harmful to the ecology.

Mobility: No data

Persistence: No data

Bioaccumulation: No data

Degradability: No data

Ecological Toxicity Data: No data available

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.Mixing spent or discarded material with other materials may render the mixture hazardous. Perform a hazardous waste determination on mixtures.

Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:

DOT Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

International:

IATA Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (b) fluoranthene	205-99-2	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[b]fluoranthene	205-99-2	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (b) fluoranthene	205-99-2	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 12/08/16

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available

Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding products described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

Safety Data Sheet

Revision Date: 06/15/18
www.restek.com

2 Letter ISO country code/language code: US/EN

1. IDENTIFICATION

Catalog Number / Product Name:	**31274 / Benzo(k)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	11
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:

GHS Classification:
Carcinogenicity Category 1B
Flammable Liquid Category 2
Serious Eye Damage/Eye Irritation Category 2
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3

GHS Signal Word:
Danger

GHS Hazard:
Highly flammable liquid and vapour.
Causes serious eye irritation.
May cause drowsiness or dizziness.
May cause cancer.

GHS Precautions:

Safety Precautions:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Wash hands and skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed or concerned: Get medical advice/attention.
Call a POISON CENTER or doctor/physician if you feel unwell.
If eye irritation persists: Get medical advice/attention.
In case of fire: Use extinguishing media in section 5 for extinction.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: Specific target organ toxicity - Single exposure - STOT SE 3: H336 May cause drowsiness or dizziness.

Repeated Exposure Target Organs: No data available

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.9
benzo (k) fluoranthene	207-08-9	205-916-6	0.1

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal

evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	750 ppm STEL; 1782 mg/m3 STEL	500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (k) fluoranthene	207-08-9	Not established	None Known	Not established	No data available

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.

Respiratory Protection: No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

Medical Conditions Aggravated By Exposure: Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color: Depends upon product selection
Odor: Strong
Physical State: No data available
pH: Not applicable
Vapor Pressure: No data available
Vapor Density: 2.0 (air = 1)
Boiling Point (°C): 480 °C 56.05 °C at 1013.25 hPa
Melting Point (°C): -95.4 °C Melting Point
Flash Point (°F): 39
Flammability: Highly Flammable
Upper Flammable/Explosive Limit, % in air: No data available
Lower Flammable/Explosive Limit, % in air: No data available
Autoignition Temperature (°C): 465 deg C
Decomposition Temperature (°C): No data available
Specific Gravity: 0.7845 g/cm3 at 25 °C
Evaporation Rate: No data available
Odor Threshold: ND
Solubility: Complete; 100%
Partition Coefficient: n-octanol in water: No data available
VOC % by weight: 0
Molecular Weight: 58.08

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
Conditions to Avoid: None known.
Materials to Avoid / Chemical Incompatiability: Strong oxidizing agents Strong acids
Hazardous Decomposition Products: Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Skin Contact, Eye Contact, Ingestion

Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Respiratory Tract, Skin

Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation: Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.

Skin Contact: Can cause minor skin irritation, defatting, and dermatitis.

Eye Contact: Can cause minor irritation, tearing and reddening.

Ingestion Irritation: May be harmful if swallowed.

Ingestion Toxicity: Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity: Contains a probable or known human carcinogen.

Reproductive and Developmental Toxicity: No data available to indicate product or any components present at greater than 0.1% may cause birth defects.

Inhalation: Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.

Skin Contact: Upon prolonged or repeated contact, can cause minor skin irritation, defatting, and dermatitis.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Acetone	67-64-1	Dermal LD50 Rabbit >15700 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h; Oral LD50 Rat 5800 mg/kg

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
Benzo(k)fluoranthene	207-08-9	Present

ACGIH:

Chemical Name	CAS No.	
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen

NIOSH:

Chemical Name	CAS No.
No data available	

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.
Monograph 92 [2010]; Supplement 7 [1987]; Monograph 32 [1983]	207-08-9	Group 2B

12. ECOLOGICAL INFORMATION

Overview: This material is not expected to be harmful to the ecology.

Mobility: No data

Persistence: No data

Bioaccumulation: No data

Degradability: No data

Ecological Toxicity Data: No data available

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.Mixing spent or discarded material with other materials may render the mixture hazardous. Perform a hazardous waste determination on mixtures.

Disposal Methods: Dispose of by incineration following Federal, State, Local,

or Provincial regulations.

Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:

DOT Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

International:

IATA Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (k) fluoranthene	207-08-9	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[k]fluoranthene	207-08-9	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (k) fluoranthene	207-08-9	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 12/30/16

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available

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Material Safety Data Sheet

Benzo[a]pyrene, 98%

MSDS# 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 BVBA Janssen Pharmaceuticalaan 3a 2440 Geel, Belgium
Company Identification: (USA)	Acros Organics One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	800-ACROS-01
For information in Europe, call:	+32 14 57 52 11
Emergency Number, Europe:	+32 14 57 52 99
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300
CHEMTREC Phone Number, Europe:	703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#:	50-32-8
Chemical Name:	Benzo[a]pyrene
%:	>96
EINECS#:	200-028-5

Hazard Symbols: T N

Risk Phrases: 45 46 60 61 43 50/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! May cause allergic skin reaction. Cancer hazard. 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. 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:

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.

Autoignition Temperature: Not available.

Flash Point: Not available

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: 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

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	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Benzo[a]pyrene: 0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches)

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

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
Color:	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 (923.00°F)
Freezing/Melting Point:	175 - 179 deg C
Decomposition Temperature:	Not available
Solubility in water:	1.60x10-3 mg/l @25°C
Specific Gravity/Density:	
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:	RTECS: Not available.
Carcinogenicity:	Benzo[a]pyrene - ACGIH: A1 - Confirmed Human Carcinogen (Coal tar pitches). California: carcinogen, initial date 7/1/87 NTP: Suspect carcinogen IARC: Group 1 carcinogen
Other:	The toxicological properties have not been fully investigated.

Section 12 - Ecological Information

Not available

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL (Benzo{a} pyrene)
Hazard Class: 9
UN Number: UN3077
Packing Group: III
Canada TDG
Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

USA RQ: CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T N

Risk Phrases:

R 45 May cause cancer.

R 46 May cause heritable genetic damage.

R 61 May cause harm to the unborn child.

R 43 May cause sensitization by skin contact.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R 60 May impair fertility.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 50-32-8: Not available

Canada

CAS# 50-32-8 is listed on Canada's DSL List

Canadian WHMIS Classifications: D2A, 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.

CAS# 50-32-8 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 50-32-8 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 9/02/1997

Revision #8 Date 7/20/2009

Safety Data Sheet

Prepared in accordance with Commission Regulation (EU) 2015/830

Stock Number: 31270
Revision Date: 13-08-2018
This document replaces SDS dated: 08-12-2016
2 Letter ISO country code/language code: UK/EN

Benzo(a)anthracene Standard

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier: **Benzo(a)anthracene Standard**

Stock Number: 31270

Other means of identification:

Synonyms: None Known

REACH Registration No.: None Known

Molecular formula: CH3OH

1.2 Relevant identified uses of the substance or mixture and uses advised against:

Relevant identified uses: For Laboratory use only

Uses advised against: Uses other than recommended use.

1.3 Details of the Supplier of the Safety Data Sheet:	**Manufacturer**	**Supplier**
	Restek Corporation 110 Benner Circle Bellefonte, Pa. 16823 USA 00 1 814-353-1300 00 1 814-353-1309 sds@restek.com	Thames Restek UK LTD Units 8-16, Ministry Wharf Wycombe Road, Saunderton Buckinghamshire United Kingdom HP14 4HW 01494 563377 sales@thamesrestek.co.uk
1.4 Emergency telephone number:	00 1 800-424-9300 (CHEMTREC within the US) 00 1 703-741-5970 (Outside USA)	0870-8200418 (CHEMTREC within the UK) +1 703-741-5970 (CHEMTREC International)

Poison Centre contact information: National Poisons Information Service (NPIS)
Email: director.birmingham.unit@npis.org
Website: http://www.npis.org/

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture:

Classification according to Regulation (EC) No 1272/2008 [CLP]: Carcinogenicity Category 1B
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1

Flammable Liquid Category 2
Hazardous to the aquatic environment - Chronic Category 2
Acute Toxicity - Dermal Category 3
Acute Toxicity - Oral Category 3

2.2 Label elements:

Labelling according to Regulation (EC) No 1272/2008 [CLP]:

Hazard pictograms:

Signal Word: Danger

Hazard Statements:
H225 - Highly flammable liquid and vapour
H301+H311 - Toxic if swallowed or in contact with skin
H350 - May cause cancer.
H370 - Causes damage to organs
H411 - Toxic to aquatic life with long lasting effects

Precautionary Statements:
P201 - Obtain special instructions before use.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 - Keep container tightly closed.
P260 - Do not breathe dust/fume/gas/mist/vapours/spray.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER/doctor.

Supplemental Hazard information (EU): None Known

2.3 Other hazards: This substance does not meet the PBT or vPvB criteria of REACH, Annex XIII

SECTION 3: Composition/information on ingredients

3.1 Substances:
Not applicable

3.2 Mixtures:

Chemical Name	%	CAS #	EC No. REACH Registration No.	Classification (EC) No 1272/2008	M Factor	SCL	Acute Toxicity Estimates
benz (a) anthracene	0.1	56-55-3	200-280-6 None Known	Aquatic Acute 1; H400 Aquatic Chronic 1; H410 Carc. 1B; H350	AQUATIC CHRONIC 1: M = 100 AQUATIC ACUTE 1: M = 100	No data available	Not determined
methanol	99.9	67-56-1	200-659-6 None Known	Acute Tox. 3 (Dermal); H311 Acute Tox. 3 (Inh Dust/Mist); H331 Acute Tox. 3 (Oral); H301 Flam. Liq. 2; H225 STOT SE 1; H370	No data available	STOT SE 2: 3%<10% STOT SE 1: 10%	Not determined

For full text of H-statements see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures:

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eye contact: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

Self protection of the first aider: No data available

4.2 Most important symptoms and Coma and death

effects, both acute and delayed:

4.3 Indication of any immediate medical attention and special treatment needed: IF exposed or concerned: Get medical advice/ attention. IF exposed or concerned: Call a POISON CENTER/doctor. Call a POISON CENTER/doctor if you feel unwell.

SECTION 5: Firefighting measures

5.1 Extinguishing media:

Suitable extinguishing media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.

Unsuitable extinguishing media: None Known

5.2 Special hazards arising from the substance or mixture: Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

5.3 Advice for firefighters: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Non-emergency personnel: Non-emergency personnel should be kept clear of the area

Emergency responders: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

6.2 Environmental precautions: No data available

6.3 Methods and material for containment and cleaning up:

Small spills: Refer to information provided for large spills

Large spills: Prevent the spread of any spill to minimize harm to human health and the

environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

6.4 Reference to other sections: Refer to section 13 for disposal information

SECTION 7: Handling and storage

7.1 Precautions for safe handling: Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

7.2 Conditions for safe storage, including any incompatibilities:

Conditions for safe storage: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

Materials to Avoid/Chemical Incompatibility: Strong oxidizing agents

7.3 Specific end use(s): For Laboratory use only

SECTION 8: Exposure controls/personal protection

8.1 Control parameters:

Occupational Exposure limit values:

Chemical Name	United Kingdom - Workplace Exposure Limits (WELs) - TWAs	United Kingdom - Workplace Exposure Limits (WELs) - STELs	United Kingdom - Biological Monitoring Guidance Values
methanol	200 ppm TWA; 266 mg/m3 TWA	250 ppm STEL; 333 mg/m3 STEL	No data available

DNEL: None Known

PNEC: None Known

8.2 Exposure controls:

Appropriate engineering controls: Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.

Individual protection measures, such as personal protective equipment:

Eye and face protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection:

Hand protection: No information available

Other skin protection:	Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work
Respiratory Protection:	If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection. Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.
Respirator Type(s):	None required where adequate ventilation is provided. If airborne concentrations are above the applicable exposure limits, use NIOSH/MSHA approved respiratory protection.
Thermal Hazards:	Not applicable
Environmental exposure controls:	No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties:

Appearance:	No data available
Colour:	No data available
Odour:	Mild
Odour threshold:	No data available
pH:	Not applicable
Melting Point/Freezing Point (°C):	
Melting point (°C):	No data available
Freezing point (°C):	No data available
Initial boiling point and boiling range (°C):	65
Flash point (°C):	11
Evaporation Rate (water = 1):	No data available
Flammability (solid, gas):	No data available
Upper/lower flammability or explosive limits:	
Upper flammable or explosive limit, % in air:	36
Lower flammable or explosive limit, %	6

in air:

Vapour pressure:	No data available
Vapor Density (Air=1):	1.1
Relative density (water = 1):	0.800
Solubility(ies):	Moderate; 50-99%
Partition coefficient: n-octanol/water:	No data available
Auto-ignition temperature (°C):	464
Decomposition temperature (°C):	No data available
Viscosity:	No data available
Explosive properties:	No data available
Oxidizing properties:	No data available

9.2 Other information:

Volatile Organic Chemicals:	0
Bulk density:	6.676

SECTION 10: Stability and reactivity

10.1 Reactivity:	Not expected to be reactive
10.2 Chemical stability:	Stable under normal conditions.
10.3 Possibility of hazardous reactions:	None expected under standard conditions of storage
10.4 Conditions to avoid:	No data available
10.5 Incompatible materials:	Strong oxidizing agents
10.6 Hazardous decomposition products:	Carbon dioxide, Carbon monoxide

SECTION 11: Toxicological information

11.1 Information on toxicological effects:

Acute toxicity:

Chemical Name	ORAL LD50 (rat)	DERMAL LD50 (rabbit)	INHALATION LC50 (rat)
methanol	No data available	No data available	INHALATION LC50-8H Rat 22500 ppm

Classification has been based on toxicological information of the components in Section 3.

Skin corrosion/irritation:
Based on available data, the classification criteria are not met.

Serious eye damage/irritation:
Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation:
Based on available data, the classification criteria are not met.

Germ cell mutagenicity:
Based on available data, the classification criteria are not met.

Carcinogenicity:
Classification has been based on toxicological information of the components in Section 3.

Reproductive toxicity:
Based on available data, the classification criteria are not met.

STOT-single exposure:
Classification has been based on toxicological information of the components in Section 3.

STOT-repeated exposure:
Based on available data, the classification criteria are not met.

Aspiration hazard:
Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1 Toxicity: Moderate ecological hazard. This product may be dangerous to plants and/or wildlife.

Ecological Toxicity Data:

Chemical Name	CAS #	Aquatic EC50 Crustacea	Aquatic ERC50 Algae	Aquatic LC50 Fish
No data available				

12.2 Persistence and degradability: Biodegrades slowly.
12.3 Bioaccumulative potential: No data available
12.4 Mobility in soil: No data available
12.5 Results of PBT and vPvB assessment: No data available

12.6 Other adverse effects: None Known

12.7 Additional information: No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods:

Disposal methods: Spent or discarded material is a hazardous waste.
Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Waste codes / waste designations according to LoW: No data available

SECTION 14: Transport information

International carriage of dangerous goods by road (ADR), rail or inland waterways:

14.1 UN number: UN1230

14.2 UN proper shipping name: Methanol

14.3 Transport hazard class(es): 3(6.1)

14.4 Packing group: II

International carriage of dangerous goods by air (IATA):

14.1 UN number: UN1230

14.2 UN proper shipping name: Methanol

14.3 Transport hazard class(es): 3(6.1)

14.4 Packing group: II

14.5 Environmental hazards: Yes

14.6 Special precautions for user: No data available

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

Chemical Name	EINECS	SVHC
methanol	Yes	No

benz (a) anthracene	Yes	No

15.2 Chemical Safety Assessment No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

SECTION 16: Other information

Revision Date: 13-08-2018

Indication of changes: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

Abbreviations and acronyms:

CAS = Chemical Abstract Service
DNEL= Derivative No Effect Level
EC= European Community
EINECS = European Inventory of Existing Chemical Substances
MSHA = Mine Safety Health Administration
NIOSH = National Institute of Occupational Safety & Health
OEL = Occupational Exposure Limit
PBT= Persistent, Bioaccumulative, Toxic
PNEC= Predicted No Effect Concentration
SCOEL= Scientific Committee on Occupational Exposure Limits
TLV = Threshold Limit Value
TWA= Time Weighted Average
vPvB= Very Persistent, Very Bioaccumulative
Wt.% = Weight Percent

Key literature references and sources for data: No data available

Hazard phrase(s) referenced in section 3

H350 - May cause cancer.
H225 - Highly flammable liquid and vapour
H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
H370 - Causes damage to organs
H410 - Very toxic to aquatic life with long lasting effects

Precautionary Statements:

Prevention:

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.

	P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
	P233 - Keep container tightly closed.
	P240 - Ground/bond container and receiving equipment.
	P241 - Use explosion-proof electrical/ventilating/lighting equipment.
	P242 - Use only non-sparking tools.
	P243 - Take precautionary measures against static discharge.
	P260 - Do not breathe dust/fume/gas/mist/vapours/spray.
	P264 - Wash thoroughly after handling.
	P270 - Do not eat, drink or smoke when using this product.
	P273 - Avoid release to the environment.
	P280 - Wear protective gloves/protective clothing/eye protection/face protection.
Response:	P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER/doctor.
	P302+P352 - If on skin: Wash with plenty of water.
	P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
	P308+P311 - IF exposed or concerned: Call a POISON CENTER/doctor.
	P308+P313 - IF exposed or concerned: Get medical advice/ attention.
	P312 - Call a POISON CENTER/doctor if you feel unwell.
	P321 - Specific treatment (see Sections 4 to 8 on this SDS and any additional information on this label).
	P330 - Rinse mouth.
	P361+P364 - Take off immediately all contaminated clothing and wash it before reuse.
	P370+P378 - In case of fire: Use an appropriate extinguisher (see section 5) to extinguish.
	P391 - Collect spillage.
Storage:	P233 - Keep container tightly closed.
	P403+P235 - Store in a well-ventilated place. Keep cool.
	P405 - Store locked up.
Disposal:	P501 - Dispose of contents/container to a suitable disposal site in accordance with local/national/international regulations.

Disclaimer of Liability: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only.

Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding products described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

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 thoroughly after handling. 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 (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:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	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 hazardous 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 #5 Date: 11/20/2008

SAFETY DATA SHEET (SDS)

MSDS: Magnesium WIRE AND RODS
REVISED 5-2018
SDS Number: 014- MAG

For Welding Consumables and Related Products
Conforms to the criteria of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS),
OSHA Hazard Communication Standard 29CFR 1910.1200
Standard Must Be Consulted for Specific Requirements

SECTION I – IDENTIFICATION of Product and Company

Manufacturer/Supplier: Washington Alloy Company	Recommended use:	Restriction on use:	Telephone No: 704-598-1325
Address: 7010-G Reames Rd, Charlotte, NC 28216	Welding, Filler Metal, Brazing	Not Known	Emergency No: 704-598-1325
Trade Name of Magnesium: AZ61A, AZ92A, AZ101A			Specification: AWS A5.19

SECTION II – COMPOSITION / INFORMATION ON INGREDIENTS

GHS Hazard Classification: STOT SE 3 (H336, H335), (H372), Aquatic Acute 1 (H400)/ **Label Elements** - Hazard symbol and Signal word =

Danger

Hazard statement and Precautionary statement =

Very toxic to aquatic life, Causes damage to organs through prolonged or repeated exposure, May cause drowsiness or dizziness, May cause respiratory irritation.; Wash thoroughly after handling. Do not eat, drink or smoke when using this product Do not breathe dust/fume/gas/mist/vapors/spray. Avoid breathing dust/fume/gas/mist/vapor/spray.. Use only outdoors or in a well-ventilated area. Avoid release to the environment. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. Get medical advice and attention if you feel unwell. Collect spillage. Store in a well-ventilated place; Keep container tightly closed. Store locked up. Dispose of contents/container in accordance with local/ regional/ national/ international regulations. Manganese and Manganese compounds above safe exposure limits can affect or cause irreversible damage to the central nervous system, including the brain: symptoms may result in impaired speech and movement, lack of energy, stiffness in legs, feet, toes, muscular weakness as well as psychological disturbances. Reports of bronchitis and lung fibrosis have also been noted.

Other Hazards which do not result in GHS classification and Overview: Electric shock can kill. Wear approved head, hand and body protection, which help to prevent injury from radiation, sparks and electrical shock. Welding arc and sparks can ignite combustibles or flammable materials. See ANSI Z-49.1. This would include wearing welder's gloves and a protective face shield and may include arm protectors, apron, hats, shoulder protection, as well as dark substantial clothing. Welders should be trained not to allow electrically live parts to contract the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground. Arc Rays can injure eyes and burn skin. Read and understand the manufacturer's instructions and precautionary label on this product and your employer's safety practices. See Section XIII.

As shipped these are odorless, solid rods that are nonflammable, non-explosive, non-reactive and non –hazardous with a metallic luster.

Substance: Welding fumes and gases cannot be classified simply. The composition and quantity of these fumes and gases are dependent upon the metal being welded, the procedures followed, and the electrodes used. Fumes may affect eyes, skin, respiratory system as well as pancreas and liver.

Workers should be aware that the composition and quantity of fumes and gases to which they may be exposed, are influenced by: coatings which may be present on the metal being welded (such as paint, plating, or galvanizing), the number of welders in operation and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing procedure). When the electrode is consumed, the fumes and gas decomposition products generated are different in percent and form from the ingredients listed in Section III, The composition of these fumes and gases are the concerning matter and not the composition of the electrode itself. Decomposition products include those originating from the volatilization, reaction, or oxidation of the ingredients shown in Section III, plus those from the base metal, coating and the other factors noted above. Reasonable expected fume constituents of this product would include: Complex oxides or compounds of chromium, magnesium, manganese, silicon, copper, aluminum, zinc and may be present. (Other complex oxides may be present when using fluxes).

Ingredients listed in Section III

Chemical Identity	CAS No.	EINECS#
Carbon dioxide	124-38-9	204-696-9
Carbon monoxide	630-8-0	211-128-3
Nitrogen dioxide	10102-44-0	-
Ozone	10028-15-6	233-069-2
Manganese (Mn)	7439-96-5	231-105-1

SECTION III – COMPOSITION / INFORMATION ON INGREDIENTS

*The term "HAZARDOUS MATERIALS" should be interpreted as a term required and defined in OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 however the use of this term does not necessarily imply the existence of any hazard.

Chemical Identity Ingredients	CAS No.	EINECS#	Composition percent in Weight (%)		
			AZ61A	AZ92A	AZ101A
Aluminum	7429-90-5	231-072-3	5.8-7.2	8.3-9.7	9.5-10.5
Zinc (Zn) Fume[(1)]	7440-66-6	231-175-3	0.40-1.5	1.7-2.3	0.75-1.25
Beryllium	7440-41-7	231-150-7	0.0002-0.0008		
Copper	7440-50-8	231-159-6	0.05		
Manganese (Mn) (limits as fume) [(1)]	7439-96-5	231-105-1	0.15-0.5		
Iron	7439-89-6	231-096-4	0.005		
Silicon (Si)	7440-21-3	231-130-8	0.05		
Magnesium (Mg)	7439-95-4	231-104-6	Balance		
Nickel (Ni)	7440-02-0	231-111-4	0.005		

Other elements or ingredients may be present but in quantities much less than 1%. [(1)] Subject to reporting requirements of Section 302, 304, 311, 312, and 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and 40CFR 370 and 372; (Resp) = Respiratory/ Respiration: Welding and cutting of products that contain Chromium may produce hexavalent chromium and YOU should read and follow OSHA's final rules Fed Register #:71:10099-10385 dated 02-28-2006. Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV[R]). *Ceiling Limit **Short Term Exposure Limit Single values are maximum

SECTION IV – FIRST AID MEASURES

Contact with skin, eyes, ingestion or injection should not be a source for exposure with proper protection.

Ingestion: Avoid contact with metal fume or powers which may lead to ingestion which may be harmful. Do not induce vomiting unless directed by medical personnel. Rinse mouth with water if conscious. Call a physician or poison control center immediately.

Inhalation: If breathing has stop or difficult move to fresh air and as needed perform artificial respiration. Call medical assistance or physician.

Skin Contact: Remove any contaminated clothing, gloves or other personnel equipment and promptly wash/flush with mild soap and water. For reddish or blistered skin from thermal/arc radiation promptly wash/flush with water. Get medical assistance or physician help as needed.

Eye Contact: Arc radiation can injure eyes and cause an arc flash – if this occurs, move to dark room removing lenses as required and get rest and cover eyes with non-stick dressings (padded dressing) Removal of dust and fumes requires flushing with abundant amounts of clean water for at least 15 minutes. Get medical assistance or physician help as needed or if issues persist.

Most important symptoms/effects, acute and delayed:

Symptoms: Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, dryness or irritation of nose, throat, or eyes. Pre-existing respiratory issues may be aggregated. Long-term (chronic) over-exposure to welding fumes can lead to siderosis (iron deposits in lung) and is believed to affect pulmonary function. Manganese and Manganese compounds above safe exposure limits can affect or cause irreversible damage to the central nervous system, including the brain: symptoms may result in impaired speech and movement, lack of energy, stiffness in legs, feet, toes, muscular weakness as well as psychological disturbances. Reports of bronchitis and lung fibrosis have also been noted.

Hazards: Welding fumes and gases cannot be classified simply. Refer to Section II under Substance and Section VIII

SECTION V – FIRE-FIGHTING MEASURES

As shipped these are odorless, solid rods that are nonflammable, non-explosive, non-reactive and non –hazardous. Welding arcs and sparks can ignite combustibles or flammable materials Read and understand the manufacturer's instructions and precautionary label on this product and your employer's safety practices. Read and understand: American National Standard ANSI Z49.1 *Safety in Welding, Cutting and Allied Processes*, published by the AMERICAN WELDING SOCIETY, 550 N.W. LeJeune Road, Miami, Florida 33126; OSHA *Safety and Health Standards* are published by the U.S. Government Printing Office, 732 North Capitol Street NW, Washington, DC 20401. Also, National Fire Protection Association NFPA 51B, *Standard for Fire Prevention During Welding, Cutting and other Hot Work; Also See NFPA 651*

Suitable (and unsuitable) extinguishing media: As shipped these items will not burn however in the event use media recommended for the burning materials and fire situation and surroundings. No unsuitable media known at this time. Do not use water or halogenated on molten metals.

Specific hazards arising from the chemicals: Welding arcs and sparks can ignite combustibles or flammable materials

Specific protective equipment and precautions for firefighters: Wear self-contained breathing apparatus and full protective clothing in case of fire or when fumes and vapors are present. Follow general fire-fighting precautions as in the workplace. Do not allow run off to enter drains or water sources.

SECTION VI – ACCIDENTAL RELEASE MEASURES

Personal Precautions, protective equipment and emergency procedures: With airborne dust and fumes, be sure to use adequate engineering ventilation controls and personal protection to prevent overexposure limits recommendations found in Section VIII.

Environment precautions: Control work practices to eliminate environmental release. These products are solid metal rods, with no spill or leak hazards as shipped. If product becomes molten dam up with sand type media until it cools back to a solid and reuse/recycle as scrap.

Methods and Materials for containment and cleaning up: Solid rods can be picked up and placed back in the original container. Clean up immediately while following all safety guidelines as well as using all personal protection safety listed in section VIII. Avoid generating dust and prevent materials from entering and drains, sewers or water sources. Disposal considerations found in Section XIII. When fumes and vapors are present follow general fire-fighting precautions as in the workplace and all applicable regulations

SECTION VII – HANDLING AND STORAGE

Precautions for safe handling: Handle with care wearing gloves and keep formation of airborne dust and fumes to a minimum. If needed use adequate engineering ventilation controls and personal protection to prevent overexposure limits recommendations found in Section VIII. Also read American National Standard ANSI Z49.1 *Safety in Welding, Cutting and Allied Processes*, published by the AMERICAN WELDING SOCIETY, 550 N.W. LeJeune Road, Miami, Florida 33126; OSHA *Safety and Health Standards* are published by the U.S. Government Printing Office, 732 North Capitol Street NW, Washington, DC 20401. Do not eat or drink while using these products and ensure proper ventilation is used. Wash hands after use. **Conditions for safe storage, including any incompatibilities:** All employees who handle these products should be trained to handle it safely. Open packages of these products/containers on a safe stable surface and must be properly labeled at all times. Store products in original closed packages, cool dry place, while avoiding extreme temperatures or incompatible items such as acids, strong bases, oxidizers and halogens. Always follow all regulations in accordance with local/regional/state/national guidelines.

SECTION VIII – EXPOSURE CONTOLS/PERSONAL PROTECTION

Control parameters

Flux or other ingredients	CAS No.	EINECS#	Exposure Limit (mg/m^3)	
			OSHA PEL	ACGIH TLV
Iron (Fe) (limits as oxide fume)	7439-89-6	231-096-4	10	5 (Resp)
Manganese (Mn) (limits as fume) [(1)]	7439-96-5	231-105-1	1 , 3.0** , 5*	0.02 (Resp) 0.1***
Silicon (Si)	7440-21-3	231-130-8	15 (dust) 5 (Resp)	WITHDRAWN
Nickel (Ni) [(1)]	7440-02-0	231-111-4	1	1.5 (inhalable fraction)
Copper (Cu) [(A) (1)]	7440-50-8	231-159-6	1 (dust) 0.1(fume)	1 (dust) 0.2 (fume)
Magnesium (Mg)	7439-95-4	231-105-1	15 (total particulate)	10
Zinc (Zn) Fume[(1)]	7440-66-6	231-175-3	5 mg/m3 5 mg/m3 (Resp) 15 mg/m3 (total dust)	2 (Resp)10**
Beryllium	7440-41-7	239-981-7	0.002, 0.005 Ceiling, 0.025 for 30 minutes	0.00005***
Aluminum (Al) [(1) (2)]	7429-90-5	231-072-3	15 (total dust) 5 (Resp)	10 (dust)1 (Resp)

Other elements or ingredients may be present but in quantities much less than 1%.[(1)] Subject to reporting requirements of Section 302, 304, 311, 312, and 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and 40CFR 370 and 372; (Resp) = Respiratory/ Respiration: Welding and cutting of products that contain Chromium may produce hexavalent chromium and YOU should read and follow OSHA's final rules Fed Register #:71:10099-10385 dated 02-28-2006. Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV[R]). *Ceiling Limit **Short Term Exposure Limit ***Inhalable fraction **ACGIH** - **A**merican **C**onference of **G**overnmental **I**ndustrial **H**ygienists, a professional association which establishes exposure limits used a guideline in control for health hazards but not an indication of safe and dangerous exposure limits **TLV - Threshold Limit Value** - an airborne concentration of a substance, which represents conditions under which it is generally believed that nearly all workers, may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour & **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. **OSHA** - U.S. Occupational Safety and Health Administration. **PEL - Permissible Exposure Limit** - this exposure value means the same as a TLV, except that it is limits guideline by OSHA. **Eye Protection:** Wear a helmet or face shield with a filter lens shade number 12-14 or darker for arc welding. Shield other workers by providing screens and flash goggles. Use face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting"). **Protective Clothing:** Wear approved head, hand and body protection, which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. This would include wearing welder's gloves and a protective face shield and may include arm protectors, apron, hats, shoulder protection, as well as dark substantial clothing. Welders should be trained not to allow electrically live parts to contract the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground. **Ventilation:** Use plenty of ventilation and/or local exhaust at the arc, to keep the fumes and gases below the threshold limit value within the worker's breathing zone and the general work area. Welders should be advised to keep their head out of the fumes.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in a confined space or general work area where local exhaust and/or ventilation does not keep exposure below the threshold limit value.

HYGIENE/ WORK PRACTICES: With all chemicals/materials, avoid getting these products ON YOU or IN YOU. Wash hands after handling these products. Do not eat or drink while handling these products. Use ventilation and other engineering controls to minimize potential exposure to these products.

SECTION IX – PHYSICAL AND CHEMICAL PROPERTIES

Appearance / Color / Odor / Physical state / Form: Solid rods that are nonflammable, non-explosive, non-reactive and non –hazardous with a metallic luster. **Odor Threshold / pH / Flash Point / Evaporation Rate / Flammability (Solid, Gas) / Upper & Lower Flammability or Explosive Limits:** No data available **Vapor Pressure & Density / Relative Density / / Partition coefficient (n-octanol/water) / Auto-ignition Decomposition temperature:** No data available **MELTING POINT**: 1112°F (600 °C) SPECIFIC GRAVITY N/A **Solubility(water/other); Insoluble**

SECTION X – STABILITY and REACTIVITY

Chemical stability: These products are considered stable as shipped and under normal conditions
Possibility of hazard reactions: No data and will not occur
Conditions to avoid: Avoid exposure to extreme temperatures, Incompatible materials
Incompatible materials: Incompatible items such as acids, oxidizers, halogens, Strong bases, mineral acids, and halogens.
Hazardous decomposition products: Read Substance in Section II. Welding and cutting of products that contain Chromium may produce hexavalent chromium and YOU should read and follow OSHA's final rules Fed Register #:71:10099-10385 dated 02-28-2006. Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). The best method to determine the actual composition of generated fumes and gases is to take an air sample from inside the welder's helmet if worn or in breathing zone. For additional information, refer to the American Welding Society Publication, "Fumes and Gases in the Welding Environment".

SECTION XI- TOXICOLOGICAL INFORMATION

Oral/Dermal/inhalation: **Acute oral toxicity;** Iron: (Human-child); TDLo: 77 mg/kg. Oral (rat); LD50:30 gm/kg. Intraperitoneal (rabbit); LDLo: 20 mg/kg. Oral (guinea pig); LD50:20 gm/kg. Oral (rat); TDLo: 63 gm/kg/6W-C. Inhalation (rat); 250 mg/m3/6H/4W-I. Intratracheal (rat); TDLo: 450 mg/kg/15W-I. Silicon: Acute oral toxicity (LD50): 3160 mg/kg [Rat]. Manganese: Acute oral toxicity (LD50): 9000 mg/kg [Rat].; TCLo 2300 mg/m3 (inhalation human central nervous); Silicon : Acute oral toxicity (LD50): 3160 mg/kg [Rat].; Copper: Acute oral toxicity (TDLo): 12 mg/kg, gastrointestinal effects; Zinc: (TDLo): 124 mg//m3/50mins, pulmonary effects of skin; **Skin corrosion or irritation / Serious eye damage or irritation / Respiratory or skin sensitization / Germ cell mutagenicity / Reproductive toxicity / Specific target organ toxicity – single exposure / Specific target organ toxicity – repeated exposure**: Not classified **Carcinogenicity:** Overall Evaluation of welding fume and Nickel is listed by IARC as possibly carcinogenic to humans (Group 2B). **National Toxicology Program** (NTP) list Nickel with Reasonably Anticipated to be a Human Carcinogen; Nickel and compounds pose a respiratory cancer risk, and may give skin itch to dermatitis Arc Rays can injure eyes and burn skin. Skin cancer has been reported **Information on the likely routes of exposures: Ingestion** is not a likely route of exposure for this product or expected under normal use. If swallowed call physician immediately! Do not induce vomiting unless directed by medical personnel. Rinse mouth with water if person is conscious. Never give fluids or induce vomiting if person is unconscious, having convulsions, or not breathing. **Inhalation** of welding fumes and gases can be dangerous to your health. **Skin/Eye Contact:** Arc Rays can injure eyes and burn skin. Skin cancer has been reported. **IARC**- has classified welding fumes as a possible carcinogenic to humans (Group 2B) **Symptoms related to physical, chemical and toxicological characteristics: Inhalation:** Short-term(acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, dryness or irritation of nose, throat, or eyes. Pre-existing respiratory issues may be aggregated. Long-term (chronic) over-exposure to welding fumes can lead to siderosis (iron deposits in lung) and is believed to affect pulmonary function. Manganese and Manganese compounds above safe exposure limits can affect or cause irreversible damage to the central nervous system, including the brain: symptoms may result in impaired speech and movement, lack of energy, stiffness in legs, feet, toes, muscular weakness as well as psychological disturbances. Reports of bronchitis and lung fibrosis have also been noted. **Delayed and immediate effects and also chronic effects from short and long-term exposure:** There are no immediate health hazards associated with the wire or rod form of this product. Skin, respiratory, pancreas, and liver disorders may be aggravated by prolonged over-exposures to the dusts or fumes generated by these products. Pre-existing respiratory issues may be aggregated. Long-term (chronic) over-exposure to welding fumes can lead to siderosis (iron deposits in lung) and is believed to affect pulmonary function. Manganese and Manganese compounds above safe exposure limits can affect or cause irreversible damage to the central nervous system, including the brain: symptoms may result in impaired speech and movement, lack of energy, stiffness in legs, feet, toes, muscular weakness as well as psychological disturbances. Reports of bronchitis and lung fibrosis have also been noted. Treat symptoms and eliminate overexposure.
Other information during use: **Inhalation acute toxicity**: Carbon dioxide LC Lo (Human, 5 min): 90000 ppm Carbon monoxide LC 50 (Rat, 4 h): 1,300 mg/l Nitrogen dioxide LC 50 (Rat, 4 h): 88 ppm

SECTION XII- TOXICOLOGICAL INFORMATION

Ecotoxicity: Iron = LC50 Channel catfish (Ictalurus punctatus) > 500 mg/l, 96 hours**; Manganese** = EC 50 (Water flea (Daphnia magna), 48 h): 40 mg/l; **Nickel** LC50 Fathead minnows (Pimephales promelas) 2.916 mg/l, 96 hours**,** *EC50 Water flea* (Daphnia obtusa) 1 mg/l, 48 hours **; Aluminum** (Al) LC 50 (Grass carp, white amur (Ctenopharyngodon idella) 96 h): 0.21-0.31 mg/l**: Copper** LC50 Fathead minnows (Pimephales promelas) 1.6 mg/l, 96 hours**,** *EC50 Water flea* (Daphnia obtusa) 0.102 mg/l, 48 hours **; Specified substance(s):** Nickel Zebra mussel (Dreissana polymorpha), Bioconcentration Factor (BCF): 5,000 – 10,000 (lotic) Biocencentration factor calculated using dry weight tissue concentration: Copper and/or copper alloys and compounds (as Cu) Blue-green algae (Anacystis nidulans), Bioconcentration Factor (BCF): 36.01 (Static); **Persistence and Degradability / Bioaccumulative Potential / Mobility in Soil:** No data

Other Adverse Effects: Possibly harmful to aquatic life. Do not allow material to be released to the environment without proper governmental permits. No further relevant information available.

SECTION XIII- DISPOSAL CONCIDERATIONS

Disposal Methods: Avoid or minimize generating waste**.** When possible collect scrap and by-products with proper id for recycling. Waste disposal must be in accordance with appropriate Federal, National, Provincial, State, and local regulations. These products, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

SECTION XIV- TRANSPORT INFORMATION

UN Number / UN Proper shipping name / Transport Hazard class (es)/ Packing group / Marine pollutant / Special Precautions: Not Regulated as Dangerous Good or Not Regulated, No international regulations

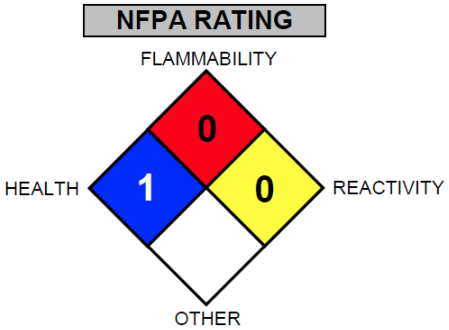
SECTION XV- REGULATORY INFORMATION

United States: TSCA INVENTORY STATUS: The components of these products are listed on the TSCA Inventory; **CERCLA REPORTABLE QUANTITY (RQ):** Beryllium, Nickel, Copper, Manganese, Zinc, Manganese = Reportable quantity: Included in the regulation but with no data values. See regulation (40 CFR 302.4). **EPCRA/SARA Title III 313 Toxic Chemicals** The following metallic components are listed as SARA 313 "Toxic Chemicals" and potential subject to annual SARA 313 reporting. See Section III for weight percent. Ingredient & Disclosure threshold: Aluminum, Chromium, Copper, Manganese, Vanadium, Zinc all @ 1.0% de minimis concentration: Hexavalent chromium compounds 0.1% de minimis concentration N090; Zinc oxide 1.0% de minimis concentration N982
Superfund Amendments and Reauthorization Act 1986 (SARA): As shipped: Immediate (Acute) In use: Immediate delayed (Delayed)

California Proposition 65: **WARNING**: This product may expose you to chemicals including [Cobalt (II) Oxide, Titanium dioxide (airborne, unbound particles of respirable size), Chromium (hexavalent compounds), Nickel, Lead and Lead Compounds, Carbon Black, Cadmium, Beryllium and Beryllium Compounds] which are known to the State of California to cause cancer, and [Chromium (hexavalent compounds), Nickel, Lead and Lead Compounds, Cadmium] which are known to the State of California to cause birth defects and/or other reproductive harm. For more information go to https://www.p65warnings.ca.gov/
Beryllium and Nickel, is on the California Proposition 65 lists. Hexavalent chromium compounds, Beryllium, Nickel, listed in the following- Carcinogens & Reproductive Toxic Listed Substance, Carcinogenic Substance 2/27/1987, Developmental Toxin 12/19/2008, Female Reproductive Toxin 12/19/2008, Male Reproductive Toxin 12/19/2008
US State Regulations list: See Section III for contents and weight percent
Alaska-Designated Toxic and Hazardous Substances: Aluminum Welding Fumes, Manganese,
California-Permissible Exposure Limits for Chemical Contaminants: Aluminum, Aluminum oxide, Beryllium, Nickel, Manganese, Silicon, Magnesium, Magnesium Oxide, Copper, Iron, Iron oxide, Zinc and Zinc oxide
Florida-Substance List: Aluminum, Manganese,
Illinois-Toxic Substance List: Aluminum, Copper, Manganese, and Silicon.
Kansas-Section 302/313 List: Aluminum, Copper, and Manganese.
Massachusetts-Substance List: Aluminum, Aluminum oxide, Beryllium, Nickel, Copper, Magnesium, Magnesium Oxide, Manganese, Iron oxide, Silicon, Zinc, Zinc oxide
Michigan - Critical Materials Register: Copper.
Minnesota-List of Hazardous Substances: Aluminum Welding Fumes, Beryllium, Nickel, Copper, Manganese, and Silicon.
Missouri-Employer Information/Toxic Substance List: Aluminum, Copper, Manganese, Molybdenum, Silicon,
New Jersey-Right to Know Hazardous Substance List Aluminum, Aluminum oxide, Copper, Iron oxide, Magnesium, Magnesium Oxide, Manganese, Silicon, Beryllium, Nickel, Zinc oxide
North Dakota-List of Hazardous Chemicals, Reportable Quantities: Copper.
Pennsylvania-Hazardous Substance List: Aluminum, Aluminum oxide, Copper, Iron oxide, Iron oxide, Magnesium, Manganese, Silicon, Welding Fume, Zinc oxide Beryllium, Nickel,
Rhode Island-Hazardous Substance List: Aluminum Welding Fumes, Manganese, Silicon, and Zirconium.
Texas-Hazardous Substance List: Manganese,
West Virginia-Hazardous Substance List: Manganese,
Wisconsin-Toxic and Hazardous Substances: Manganese,

SECTION XVI- OTHER INFORMATION

Approval Date:5-29-2018 NEW SDS Number: 014-MAG
NFPA CODES: FIRE: 0 HEALTH: 1 REACTIVITY: 0
U.S. DOT = Material is not hazardous and is not considered as a dangerous item.
Washington Alloy Co. Believes that the information contained in this (SDS) Safety Data Sheet is accurate. However, Washington Alloy Co. does not express or implies any warranty with respect to this information.
Download the most current SDS and product information @ www.weldingwire.com



SAFETY DATA SHEET

Creation Date 08-Nov-2010 **Revision Date** 16-Jan-2019 **Revision Number** 6

1. Identification

Product Name **Fluoranthene**

Cat No. : **AC119170000; AC119170250; AC119171000; AC119175000**

CAS-No 206-44-0
Synonyms Benzo[j,k]fluorene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 4

Label Elements

Signal Word
Warning

Hazard Statements
Harmful if swallowed

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Fluoranthene	206-44-0	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.

Most important symptoms and effects None reasonably foreseeable.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point Not applicable
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO_2)

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Ensure adequate ventilation. Wear personal protective equipment. Avoid dust formation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection 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 and body protection Long sleeved clothing.

Respiratory Protection 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.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Light green
Odor	Odorless
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	109 - 111 °C / 228.2 - 231.8 °F
Boiling Point/Range	384 °C / 723.2 °F
Flash Point	Not applicable
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	

Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Specific Gravity	No information available
Solubility	insoluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C16 H10
Molecular Weight	202.25

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Fluoranthene	LD50 = 2 g/kg (Rat)	LD50 = 3180 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Fluoranthene	206-44-0	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Fluoranthene	Not listed	Oncorhynchus mykiss: LC50=0.0077 mg/L 96h	Not listed	EC50: 0.78 mg/L 20h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility .

Component	log Pow
Fluoranthene	5.1

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Fluoranthene - 206-44-0	U120	-

14. Transport information

DOT

UN-No	UN3077
Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Proper technical name	Fluoranthene
Hazard Class	9
Packing Group	III

TDG

UN-No	UN3077
Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class	9
Packing Group	III

IATA

UN-No	UN3077
Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class	9
Packing Group	III

IMDG/IMO

UN-No	UN3077
Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class	9
Packing Group	III

15. Regulatory information

All of the components in the product are on the following Inventory lists: The product is classified and labeled according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC Europe China Canada TSCA Japan X = listed Australia U.S.A. (TSCA) Canada (DSL/NDSL) Europe (EINECS/ELINCS/NLP) Australia (AICS) Korea (ECL) China (IECSC) Japan (ENCS) Philippines (PICCS) Complete Regulatory Information contained in following SDS's

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Fluoranthene	X	-	X	205-912-4	-		-	X	X	X	-

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Fluoranthene	206-44-0	>95	1.0 0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Fluoranthene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Fluoranthene	100 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Fluoranthene	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date	08-Nov-2010
Revision Date	16-Jan-2019
Print Date	16-Jan-2019
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Material Safety Data Sheet
Phenanthrene, 98+%

ACC# 96981

Section 1 - Chemical Product and Company Identification

MSDS Name: Phenanthrene, 98+%
Catalog Numbers: AC130090000, AC130090050, AC130090500, AC130091000, AC130095000
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	>98.0	201-581-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: brown.
Warning! Harmful if swallowed. May cause allergic skin reaction. May cause eye, skin, and respiratory tract irritation. Cancer suspect agent.
Target Organs: 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: Harmful if swallowed. May cause irritation of the digestive tract.
Inhalation: May be harmful if inhaled. Inhalation of dust may cause respiratory tract irritation.
Chronic: Limited evidence of a carcinogenic effect.

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 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. 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: 2; Flammability: 1; 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. 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: 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
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 (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 (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 information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
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: 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, >98.0%),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:

XN N

Risk Phrases:

R 22 Harmful if swallowed.
R 40 Limited evidence of a carcinogenic effect.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 29 Do not empty into drains.
S 36/37 Wear suitable protective clothing and gloves.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 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 #5 Date: 5/05/2009

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.

The ToxGuide™ is developed to be used as a pocket guide. Tear off at perforation and fold along lines.

Sources of Exposure

General Populations

- The most likely source of exposure is ingestion of contaminated food and drinking water. Exposure can also occur via inadvertent ingestion of contaminated soil/dust or lead-based paint.
- Lead can leach into drinking water from lead-soldered joints or leaded pipes in water distribution systems or individual houses. Lead may also enter foods if they are put into improperly glazed pottery or ceramic dishes.
- Some non-Western folk remedies may contain substantial amounts of lead. Some types of hair dyes and cosmetics may contain lead compounds.
- Other potential sources of exposure are hobbies that use lead: casting ammunition and m fishing weights; soldering with lead solder; making stained glass; using firing ranges. Leaded gasoline is still used in some race cars, airplanes, and off-road vehicles.

Occupational Populations

- Potentially high levels of lead may occur in the following industries: lead smelting and refining industries, battery manufacturing plants, steel welding or cutting operations, construction, rubber products and plastics industries, printing industries, firing ranges, radiator repair shops and other industries requiring flame soldering of lead solder.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- Approximately 95% of deposited inorganic lead that is inhaled is absorbed.
- The extent and rate of gastrointestinal absorption of inorganic lead are influenced by the physiological state of the exposed individual and the species of the lead compound.
- Gastrointestinal absorption of lead is higher in children (40–50%) than in adults (3–10%). The presence of food in the gastrointestinal tract decreases absorption.
- Absorption of lead from soil is less than that of dissolved lead, but is similarly depressed by meals (26% fasted; 2.5% when ingested with a meal).
- In adults, about 94% of the total amount of lead in the body is contained in the bones and teeth versus about 73% in children.
- The elimination half-lives for inorganic lead in blood and bone are approximately 30 days and 27 years, respectively.
- Independent of the route of exposure, absorbed lead is excreted primarily in urine and feces.

Normal Human Levels

- Lead levels in blood (geometric mean, 1999-2002):

  1.9 µg/dL for children 1-5 years
  1.5 µg/dL for adults 20–59 years

- Lead levels in urine (geometric mean, 2001-2002):

  0.677 µg/L for ≥6 years of age

Biomarkers/Environmental Levels

Biomarkers

- Analysis of lead in whole blood is the most common and accurate method of assessing lead exposure. Erythrocyte protoporphyrin (EP) tests can also be used, but are not as sensitive at low blood lead levels (<20 µg/dL). Lead in blood reflects recent exposure.
- Bone lead measurements are an indicator of cumulative exposure.
- Measurements of urinary lead levels and hair have been used to assess lead exposure; however, they are not as reliable.

Environmental Levels

Air

- The concentration of lead in air samples (2002) is <0.05 µg/m^3.

Sediment and Soil

- The natural lead content of soil typically ranges from <10 to 30 µg/g. However, lead levels in the top layers of soil vary widely due to deposition and accumulation of atmospheric particulates from anthropogenic sources.

Water

- Levels of lead in surface water and groundwater in the U.S. range between 5 and 30 µg/L.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Lead

Pb

CAS# 7439-92-1

October 2007

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
www.atsdr.cdc.gov

Contact Information:
Division of Toxicology
and Environmental Medicine
Applied Toxicology Branch

1600 Clifton Road NE, F-32
Atlanta, GA 30333
1-800-CDC-INFO
1-800-232-4636

www.atsdr.cdc.gov/toxpro2.html

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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Chemical and Physical Information

Lead is a metal

- Lead is a naturally-occurring bluish-gray metal that is rarely found in its elemental form, but occurs in the Earth's crust primarily as the mineral galena (PbS), and to a lesser extent as anglesite ($PbSO_4$) and cerussite ($PbCO_3$).
- Lead is not a particularly abundant element, but its ore deposits are readily accessible and widely distributed throughout the world. Its properties, such as corrosion resistance, density, and low melting point, make it a familiar metal in pipes, solder, weights, and storage batteries.
- 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%). Lead isotopes are the stable decay product of three naturally radioactive elements: ^{205}Pb from uranium, ^{207}Pb from actinium, and ^{208}Pb from thorium.

Routes of Exposure

- Inhalation – Primary route for occupational exposure. Larger particles (>2.5 µm) that are deposited in the ciliated airways (nasopharyngeal and tracheobronchial regions) can be transferred by mucociliary transport into the esophagus and swallowed.
- Oral – Primary route of exposure for the general population.
- Dermal – Studies in animals have shown that organic lead is well absorbed through the skin.

Lead in the Environment

- Lead is dispersed throughout the environment primarily as the result of anthropogenic activities. In the air, lead is in the form of particles and is removed by rain or gravitational settling.
- The fate of lead in soil is affected by the adsorption at mineral interfaces, which are dependent upon physical and chemical characteristics of the soil (e.g., pH, soil type, particle size, organic matter content).
- Sources of lead in dust and soil can include lead from weathering and chipping of lead-based paint from buildings, bridges, and other structures.
- The solubility of lead compounds in water is a function of pH, hardness, salinity, and the presence of humic material. Solubility is highest in soft, acidic water.

Relevance to Public Health (Health Effects)

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

- MRLs were not derived for lead because a clear threshold for some of the more sensitive effects in humans has not been identified.
- In lieu of MRLs, ATSDR has developed a framework to guide decisions at lead sites. This approach utilizes site-specific exposure data to estimate internal doses as measured by blood lead levels (PbBs) (see Appendix D in the Toxicological Profile).

Health Effects

Hematological

- Decreased activity of several heme biosynthesis enzymes at PbB <10 µg/dL.

Gastrointestinal

- Colic in children – PbB 60–100 µg/dL.

Cardiovascular

- Elevated blood pressure – PbB<10 µg/dL.

Renal

- Decreased glomerular filtration rate at mean PbB <20 µg/dL.

Neurological

- Encephalopathy – PbB100–120 µg/dL (adults) 70–100 µg/dL (children).
- Peripheral neuropathy – PbB40 µg/dL.
- Neurobehavioral and neuropsychological effects in adults – PbB40–80 µg/dL.
- Cognitive and neurobehavioral effects in children at PbB <10 µg/dL.

Reproductive

- Reduced fertility – PbB>40 µg/dL.

Children's Health

- Children are more vulnerable to the effects of lead than adults.
- The most common source of lead exposure for children is lead-based paint.
- Lead exposures during infancy or childhood may result in anemia, neurological impairment, renal alterations, colic, and impaired metabolism of vitamin D.
- Lead exposures either *in utero*, during infancy, or during childhood may result in delays or impairment of neurological development, neurobehavioral deficits including IQ deficits, low birth weight, and low gestational age, growth retardation, and delayed sexual maturation in girls.
- Ensuring a diet that is nutritionally adequate in calcium and iron may decrease the absorbed dose of lead.

Mercury - ToxFAQs™

CAS # 7439-97-6

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the CDC 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's 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 mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is mercury?

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, some dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
- Methylmercury may be formed in water and soil by small organisms called bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- Eating fish or shellfish contaminated with methylmercury.
- Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fossil fuels.
- Release of mercury from dental work and medical treatments.
- Breathing contaminated workplace air or skin contact during use in the workplace.
- Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

Mercury

CAS # 7439-97-6

How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there, possibly causing damage to the developing nervous system. It can also pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may affect the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children.

Pregnant women and children should keep away from rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

Is there a medical test to determine whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m^3) and 0.05 mg/m^3 of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636.

ToxFAQs™ Internet address via WWW is http://www.atsdr.cdc.gov/toxfaqs/index.asp.

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.

Arsenic - ToxFAQs™

CAS # 7440-38-2

This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. For more information, call the CDC 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 (NPL) 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 nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the 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 in 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 cancer 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 Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans.

How can arsenic affect children?

There is some evidence that long-term exposure to arsenic in children may result in lower IQ scores. 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 females, can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal tissues. Arsenic is found at low levels in breast milk.

How can families reduce the risks of exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective 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 sources 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 your clothing, skin, hair, or tools. Be sure to shower and change clothes before going home.

Is there a medical test to determine whether I've been exposed to arsenic?

There are tests available to measure arsenic in your blood, urine, hair, and fingernails. The urine 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 arsenic 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 environment and has restricted or cancelled many of the uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration (OSHA) 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 the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636

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Polychlorinated Biphenyls - ToxFAQs™

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. For more information, call the CDC 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's 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: 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 (NPL) sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

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, and old microscope and hydraulic oils.

What happens to 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.

How might I be exposed to 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.

How can 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.

How likely are 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. PCBs have been classified as probably carcinogenic, and carcinogenic to humans (group 1) by the Environmental Protection Agency (EPA) and International Agency for Research on Cancer (IARC), respectively.

How can 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.

How can families reduce the risks of exposure to 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.

Is there a medical test to show whether I've been exposed to 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.

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.

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.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

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http://www.epa.gov/pesticides/factsheets/riskassess.htm
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Pesticides: Topical & Chemical Fact Sheets

Assessing Health Risks from Pesticides

Este Web page está disponible en español

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Questions on Pesticides?

- Contact the National Pesticide Information Center (NPIC) 1-800-858-7378

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 1055 active ingredients registered as pesticides, which are formulated into thousands of pesticide products that are available in the marketplace.

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." Read about how EPA evaluates cumulative risk for pesticides.
- **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 .

Español (https://www.atsdr.cdc.gov/es/index.html)

(https://atsdr.cdc.gov)

ATSDR Agency for Toxic Substances and Disease Registry

Substance Priority List

ATSDR's Substance Priority List

What is the Substance Priority List (SPL)?

2017 Substance Priority List

Click here to view the ATSDR 2017 Substance Priority List

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) section 104 (i), as amended by the Superfund Amendments and Reauthorization Act (SARA), requires ATSDR and the EPA to prepare a list, in order of priority, of substances that are most commonly found at facilities on the National Priorities List (NPL) and which are determined to pose the most significant potential threat to human health due to their known or suspected toxicity and potential for human exposure at these NPL sites. CERCLA also requires this list to be revised periodically to reflect additional information on hazardous substances. In CERCLA, it is called the priority list of hazardous substances that will be candidates for toxicological profiles.
This substance priority list is revised and published on a 2-year basis, with a yearly informal review and revision. (No list was published in 2009 while ATSDR transitioned to a new agency science database.) Each substance on the list is a candidate to become the subject of a toxicological profile prepared by ATSDR. The listing algorithm prioritizes substances based on frequency of occurrence at NPL sites, toxicity, and potential for human exposure to the substances found at NPL sites.

It should be noted that this priority list is not a list of "most toxic" substances, but rather a prioritization of substances based on a combination of their frequency, toxicity, and potential for human exposure at NPL sites.

Thus, it is possible for substances with low toxicity but high NPL frequency of occurrence and exposure to be on this priority list. The objective of this priority list is to rank substances across all NPL hazardous waste sites to provide guidance in selecting which substances will be the subject of toxicological profiles prepared by ATSDR.

Where can I find more information on the Substance Priority List?

Substantial additional information can be found on the SPL Resource page, including:

- Past Substance Priority Lists
- A Support Document describing the algorithm in detail
- A comprehensive SPL spreadsheet with data for all current and past lists, including candidate substances that did not make the top of the list

The ATSDR 2017 Substance Priority List

Hide/Show Table

2017 Rank	Substance Name	Total Points	CAS RN
1	ARSENIC	1674	7440-38-2
2	LEAD	1531	7439-92-1
3	MERCURY	1458	7439-97-6
4	VINYL CHLORIDE	1358	75-01-4
5	POLYCHLORINATED BIPHENYLS	1345	1336-36-3
6	BENZENE	1329	71-43-2
7	CADMIUM	1320	7440-43-9
8	BENZO(A)PYRENE	1306	50-32-8
9	POLYCYCLIC AROMATIC HYDROCARBONS	1279	130498-29-2
10	BENZO(B)FLUORANTHENE	1251	205-99-2
11	CHLOROFORM	1203	67-66-3
12	AROCLOR 1260	1191	11096-82-5
13	DDT, P,P'-	1183	50-29-3
14	AROCLOR 1254	1172	11097-69-1
15	DIBENZO(A,H)ANTHRACENE	1156	53-70-3
16	TRICHLOROETHYLENE	1155	79-01-6
17	CHROMIUM, HEXAVALENT	1148	18540-29-9
18	DIELDRIN	1144	60-57-1
19	PHOSPHORUS, WHITE	1141	7723-14-0
20	HEXACHLOROBUTADIENE	1130	87-68-3
21	DDE, P,P'-	1127	72-55-9
22	CHLORDANE	1126	57-74-9
23	AROCLOR 1242	1126	53469-21-9
24	COAL TAR CREOSOTE	1124	8001-58-9
25	ALDRIN	1116	309-00-2
26	DDD, P,P'-	1114	72-54-8
27	AROCLOR 1248	1105	12672-29-6
28	HEPTACHLOR	1102	76-44-8
29	AROCLOR	1101	12767-79-2

30	BENZIDINE	1093	92-87-5
31	ACROLEIN	1090	107-02-8
32	TOXAPHENE	1089	8001-35-2
33	TETRACHLOROETHYLENE	1078	127-18-4
34	HEXACHLOROCYCLOHEXANE, GAMMA-	1076	58-89-9
35	CYANIDE	1071	57-12-5
36	HEXACHLOROCYCLOHEXANE, BETA-	1054	319-85-7
37	DISULFOTON	1049	298-04-4
38	BENZO(A)ANTHRACENE	1047	56-55-3
39	1,2-DIBROMOETHANE	1043	106-93-4
40	ENDRIN	1039	72-20-8
41	DIAZINON	1038	333-41-5
42	HEXACHLOROCYCLOHEXANE, DELTA-	1036	319-86-8
43	BERYLLIUM	1031	7440-41-7
44	ENDOSULFAN	1029	115-29-7
45	AROCLOR 1221	1028	11104-28-2
46	1,2-DIBROMO-3-CHLOROPROPANE	1027	96-12-8
47	HEPTACHLOR EPOXIDE	1022	1024-57-3
48	ENDOSULFAN, ALPHA	1019	959-98-8
49	CIS-CHLORDANE	1017	5103-71-9
50	CARBON TETRACHLORIDE	1014	56-23-5
51	COBALT	1013	7440-48-4
52	AROCLOR 1016	1012	12674-11-2
53	DDT, O,P'-	1009	789-02-6
54	PENTACHLOROPHENOL	1008	87-86-5
55	METHOXYCHLOR	1007	72-43-5
56	ENDOSULFAN SULFATE	1005	1031-07-8
57	NICKEL	996	7440-02-0
58	DI-N-BUTYL PHTHALATE	995	84-74-2
59	ENDRIN KETONE	993	53494-70-5

60	DIBROMOCHLOROPROPANE	984	67708-83-2
61	BENZO(K)FLUORANTHENE	970	207-08-9
62	TRANS-CHLORDANE	969	5103-74-2
63	ENDOSULFAN, BETA	968	33213-65-9
64	CHLORPYRIFOS	965	2921-88-2
65	XYLENES, TOTAL	964	1330-20-7
66	CHROMIUM(VI) TRIOXIDE	961	1333-82-0
67	AROCLOR 1232	959	11141-16-5
68	ENDRIN ALDEHYDE	959	7421-93-4
69	METHANE	952	74-82-8
70	3,3′-DICHLOROBENZIDINE	942	91-94-1
71	2-HEXANONE	941	591-78-6
72	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	941	1746-01-6
73	BENZOFLUORANTHENE	937	56832-73-6
74	TOLUENE	917	108-88-3
75	ZINC	915	7440-66-6
76	PENTACHLOROBENZENE	907	608-93-5
77	DI(2-ETHYLHEXYL)PHTHALATE	906	117-81-7
78	CHROMIUM	895	7440-47-3
79	AROCLOR 1240	889	71328-89-7
80	2,4,6-TRINITROTOLUENE	879	118-96-7
81	NAPHTHALENE	877	91-20-3
82	1,1-DICHLOROETHENE	876	75-35-4
83	BROMODICHLOROETHANE	868	683-53-4
84	DDD, O,P'-	867	53-19-0
85	2,4,6-TRICHLOROPHENOL	867	88-06-2
86	BIS(2-CHLOROETHYL) ETHER	867	111-44-4
87	HYDRAZINE	862	302-01-2
88	METHYLENE CHLORIDE	860	75-09-2
89	2,4-DINITROPHENOL	859	51-28-5

90	4,4′-METHYLENEBIS(2-CHLOROANILINE)	859	101-14-4
91	1,2-DICHLOROETHANE	852	107-06-2
92	THIOCYANATE	847	302-04-5
93	HEXACHLOROBENZENE	844	118-74-1
94	ASBESTOS	841	1332-21-4
95	RDX (Cyclonite)	833	121-82-4
96	RADIUM-226	833	13982-63-3
97	URANIUM	832	7440-61-1
98	2,4-DINITROTOLUENE	832	121-14-2
99	ETHION	831	563-12-2
100	4,6-DINITRO-O-CRESOL	828	534-52-1
101	RADIUM	827	7440-14-4
102	THORIUM	824	7440-29-1
103	DIMETHYLARSINIC ACID	822	75-60-5
104	CHLORINE	821	7782-50-5
105	1,3,5-TRINITROBENZENE	820	99-35-4
106	RADON	818	10043-92-2
107	HEXACHLOROCYCLOHEXANE, ALPHA-	817	319-84-6
108	RADIUM-228	815	15262-20-1
109	THORIUM-230	813	14269-63-7
110	URANIUM-235	812	15117-96-1
111	THORIUM-228	810	14274-82-9
112	RADON-222	810	14859-67-7
113	URANIUM-234	809	13966-29-5
114	N-NITROSODI-N-PROPYLAMINE	808	621-64-7
115	COAL TARS	808	8007-45-2
116	METHYLMERCURY	808	22967-92-6
117	1,1,1-TRICHLOROETHANE	807	71-55-6
118	COPPER	807	7440-50-8
119	CHRYSOTILE ASBESTOS	806	12001-29-5

120	PLUTONIUM-239	806	15117-48-3
121	POLONIUM-210	805	13981-52-7
122	PLUTONIUM-238	805	13981-16-3
123	LEAD-210	805	14255-04-0
124	AMOSITE ASBESTOS	804	12172-73-5
124	PLUTONIUM	804	7440-07-5
124	STRONTIUM-90	804	10098-97-2
127	RADON-220	804	22481-48-7
128	CHLOROBENZENE	804	108-90-7
129	AMERICIUM-241	804	86954-36-1
130	HYDROGEN CYANIDE	803	74-90-8
131	AZINPHOS-METHYL	803	86-50-0
132	ETHYLBENZENE	802	100-41-4
133	CHLORDECONE	802	143-50-0
134	BARIUM	802	7440-39-3
135	NEPTUNIUM-237	802	13994-20-2
136	PLUTONIUM-240	801	14119-33-6
137	1,2,3-TRICHLOROBENZENE	801	87-61-6
138	FLUORANTHENE	800	206-44-0
139	S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	799	78-48-8
140	MANGANESE	798	7439-96-5
141	CHRYSENE	792	218-01-9
142	2,4,5-TRICHLOROPHENOL	792	95-95-4
143	PERFLUOROOCTANE SULFONIC ACID	788	1763-23-1
144	POLYBROMINATED BIPHENYLS	785	67774-32-7
145	DICOFOL	785	115-32-2
146	SELENIUM	776	7782-49-2
147	1,1,2,2-TETRACHLOROETHANE	776	79-34-5
148	PARATHION	774	56-38-2
149	HEPTACHLORODIBENZO-P-DIOXIN	774	37871-00-4

150	HEXACHLOROCYCLOHEXANE, TECHNICAL GRADE	774	608-73-1
151	TRICHLOROFLUOROETHANE	773	27154-33-2
152	BROMINE	771	7726-95-6
153	AROCLOR 1268	765	11100-14-4
154	1,3-BUTADIENE	762	106-99-0
155	PERFLUOROOCTANOIC ACID	758	335-67-1
156	HEPTACHLORODIBENZOFURAN	756	38998-75-3
157	TRIFLURALIN	755	1582-09-8
158	PERFLUOROHEXANESULFONIC ACID	749	355-46-4
159	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	743	39001-02-0
160	AMMONIA	742	7664-41-7
161	2-METHYLNAPHTHALENE	727	91-57-6
162	2,3,4,7,8-PENTACHLORODIBENZOFURAN	724	57117-31-4
163	1,4-DICHLOROBENZENE	724	106-46-7
164	1,1-DICHLOROETHANE	721	75-34-3
165	NALED	721	300-76-5
166	1,1,2-TRICHLOROETHANE	720	79-00-5
167	HEXACHLOROCYCLOPENTADIENE	719	77-47-4
168	1,2-DIPHENYLHYDRAZINE	718	122-66-7
169	PHORATE	716	298-02-2
170	TRICHLOROETHANE	713	25323-89-1
171	ACENAPHTHENE	710	83-32-9
172	TETRACHLOROBIPHENYL	710	26914-33-0
173	PALLADIUM	706	7440-05-3
174	OXYCHLORDANE	705	27304-13-8
175	CRESOL, PARA-	704	106-44-5
176	INDENO(1,2,3-CD)PYRENE	702	193-39-5
177	GAMMA-CHLORDENE	702	56641-38-4
178	TETRACHLOROPHENOL	699	25167-83-3
179	1,2-DICHLOROBENZENE	697	95-50-1

180	1,2-DICHLOROETHENE, TRANS-	691	156-60-5
181	CHLOROETHANE	687	75-00-3
182	P-XYLENE	687	106-42-3
183	ALUMINUM	687	7429-90-5
184	PHENOL	686	108-95-2
185	CARBON MONOXIDE	684	630-08-0
186	CARBON DISULFIDE	682	75-15-0
187	2,4-DIMETHYLPHENOL	680	105-67-9
188	DIBENZOFURAN	676	132-64-9
189	ACETONE	672	67-64-1
190	HEXACHLOROETHANE	671	67-72-1
191	BUTYL METHYL PHTHALATE	668	34006-76-3
192	CHLOROMETHANE	665	74-87-3
193	HEXACHLORODIBENZOFURAN	660	55684-94-1
194	BUTYL BENZYL PHTHALATE	658	85-68-7
195	HYDROGEN SULFIDE	658	7783-06-4
196	DICHLORVOS	656	62-73-7
197	DIBENZOFURANS, CHLORINATED	653	42934-53-2
198	CRESOL, ORTHO-	653	95-48-7
199	HEXACHLORODIBENZO-P-DIOXIN	652	34465-46-8
200	VANADIUM	650	7440-62-2
201	N-NITROSODIMETHYLAMINE	649	62-75-9
202	1,2,4-TRICHLOROBENZENE	647	120-82-1
203	PERFLUORONONANOIC ACID	647	375-95-1
204	ETHOPROP	644	13194-48-4
205	TETRACHLORODIBENZO-P-DIOXIN	641	41903-57-5
206	BROMOFORM	635	75-25-2
207	PENTACHLORODIBENZOFURAN	632	30402-15-4
208	1,3-DICHLOROBENZENE	628	541-73-1
209	PENTACHLORODIBENZO-P-DIOXIN	626	36088-22-9

210	N-NITROSODIPHENYLAMINE	625	86-30-6
211	2,4-DICHLOROPHENOL	619	120-83-2
212	2,3-DIMETHYLNAPHTHALENE	619	581-40-8
213	2,3,7,8-TETRACHLORODIBENZOFURAN	619	51207-31-9
214	1,4-DIOXANE	617	123-91-1
215	FLUORINE	613	7782-41-4
216	NITRITE	610	14797-65-0
217	CESIUM-137	610	10045-97-3
217	CHROMIC ACID	610	7738-94-5
219	2-BUTANONE	608	78-93-3
220	1,2-DICHLOROETHYLENE	608	540-59-0
221	POTASSIUM-40	608	13966-00-2
222	DINITROTOLUENE	607	25321-14-6
223	NITRATE	606	14797-55-8
224	FORMALDEHYDE	605	50-00-0
225	SILVER	605	7440-22-4
226	COAL TAR PITCH	605	65996-93-2
227	THORIUM-227	605	15623-47-9
228	ARSENIC ACID	604	7778-39-4
229	ARSENIC TRIOXIDE	604	1327-53-3
230	BENZOPYRENE	603	73467-76-2
231	CHLORDANE, TECHNICAL	602	12789-03-6
232	STROBANE	602	8001-50-1
233	4-AMINOBIPHENYL	602	92-67-1
233	PYRETHRUM	602	8003-34-7
235	ARSINE	602	7784-42-1
235	DIMETHOATE	602	60-51-5
237	BIS(CHLOROMETHYL) ETHER	602	542-88-1
237	CARBOPHENOTHION	602	786-19-6
239	ALPHA-CHLORDENE	601	56534-02-2

239	IODINE-131	601	10043-66-0
239	MERCURIC CHLORIDE	601	7487-94-7
239	SODIUM ARSENITE	601	7784-46-5
239	URANIUM-233	601	13968-55-3
244	ANTIMONY	601	7440-36-0
245	DIBROMOCHLOROMETHANE	601	124-48-1
246	CRESOLS	598	1319-77-3
247	DICHLOROBENZENE	596	25321-22-6
248	2,4-D	595	94-75-7
249	2-CHLOROPHENOL	591	95-57-8
250	BUTYLATE	591	2008-41-5
251	DIMETHYL FORMAMIDE	585	68-12-2
252	PHENANTHRENE	585	85-01-8
253	4-NITROPHENOL	580	100-02-7
254	DIURON	580	330-54-1
255	TETRACHLOROETHANE	577	25322-20-7
256	DICHLOROETHANE	568	1300-21-6
257	ETHYL ETHER	566	60-29-7
258	DIMETHYLANILINE	563	121-69-7
259	1,3-DICHLOROPROPENE, CIS-	561	10061-01-5
260	PYRENE	561	129-00-0
261	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	559	35822-46-9
262	PHOSPHINE	557	7803-51-2
263	TRICHLOROBENZENE	556	12002-48-1
264	2,6-DINITROTOLUENE	555	606-20-2
265	FLUORIDE ION	550	16984-48-8
266	PENTAERYTHRITOL TETRANITRATE	549	78-11-5
267	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	549	67562-39-4
268	1,3-DICHLOROPROPENE, TRANS-	548	10061-02-6
269	ACRYLONITRILE	544	107-13-1

270	BIS(2-ETHYLHEXYL)ADIPATE	543	103-23-1
271	CARBAZOLE	541	86-74-8
272	2-CHLOROANILINE	539	95-51-2
273	METOLACHLOR	539	51218-45-2
274	1,2-DICHLOROETHENE, CIS-	539	156-59-2
275	1,2,3-TRICHLOROPROPANE	537	96-18-4

Substances were assigned the same rank when two (or more) substances received equivalent total point scores.

CAS RN= Chemical Abstracts Service Registry Number

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Contact Information

Further information can be obtained by contacting the ATSDR Information Center at:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences
1600 Clifton Road NE, Mailstop F-57
Atlanta, GA 30329
Phone: 1-800-CDC-INFO 888-232-6348 (TTY)
Email: Contact CDC-INFO (https://www.cdc.gov/cdc-info/requestform.html)

Page last reviewed: August 10, 2017

Appendix 5
Community Air Monitoring Plan

COMMUNITY AIR MONITORING PLAN (CAMP)

198 East 135th Street
Block 2319; Lot 60 & 160
Bronx, New York
NYSDEC Site Number: C203084

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 that may be performed as part of a Site Management Plan (SMP) following closure of remedial activities at the property located at 224 and 228 East 135th Street in the Bronx, New York. 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.

Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during required 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 in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200-feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20-feet - is below 5 ppm over background for the 15-minute average.

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.

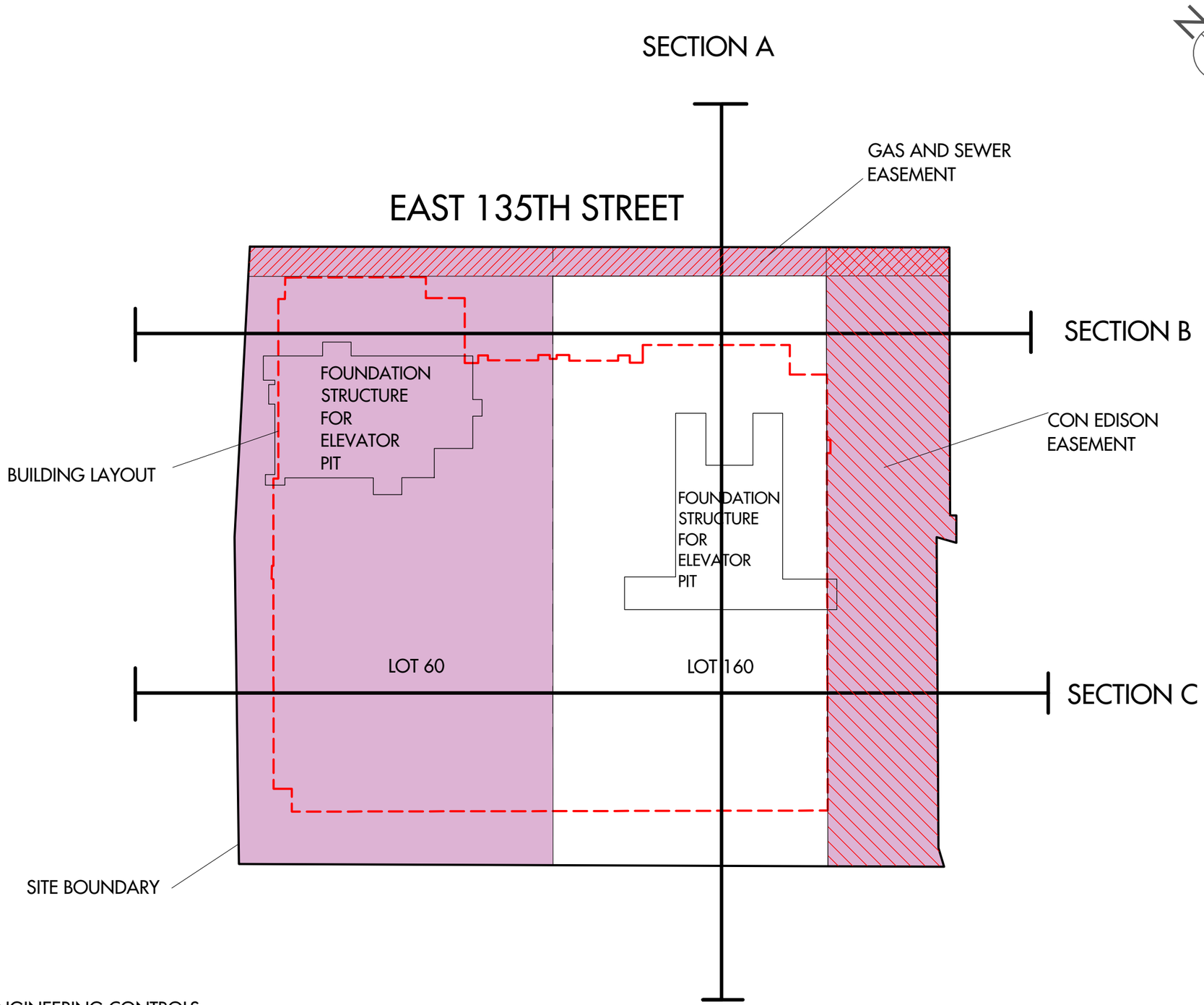
p3- PM Monitoring, Response Levels And Actions

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 provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration. All readings will be recorded in a daily field log.

Appendix 6
As-Built Drawings of ECs



DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

STATE OF NEW YORK
TAREK ZAKI KHOURI
086611
LICENSED PROFESSIONAL ENGINEER

HydroTech

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
HAUPPAUGE, NY 11788

15 OCEAN AVENUE, SUITE 2B BROOKLYN, NY 11225

TEL: (631) 462-5866

FAX: (631) 462-5877

BASE DRAWING PREPARED BY

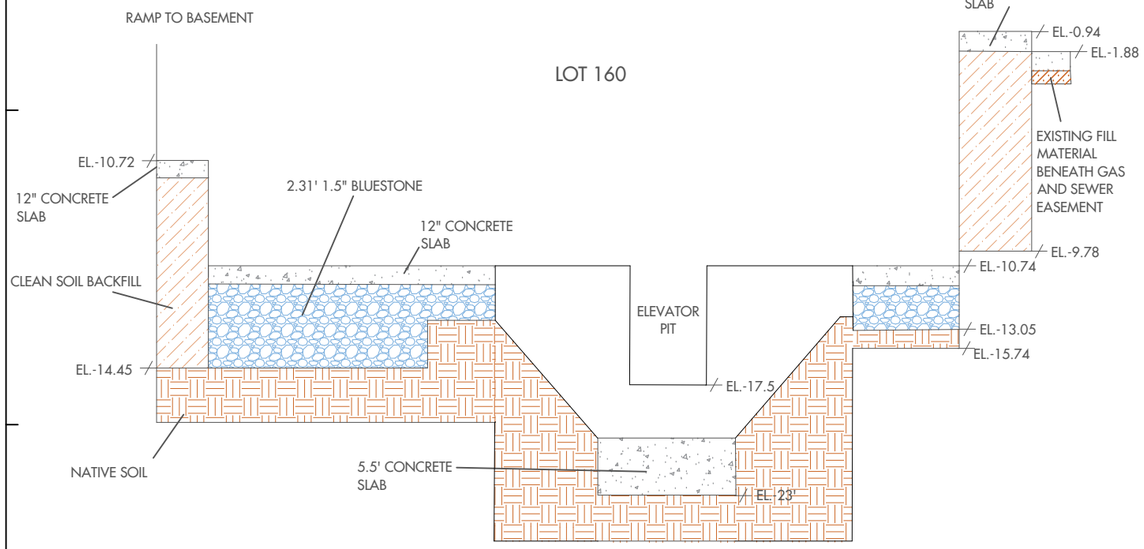
PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

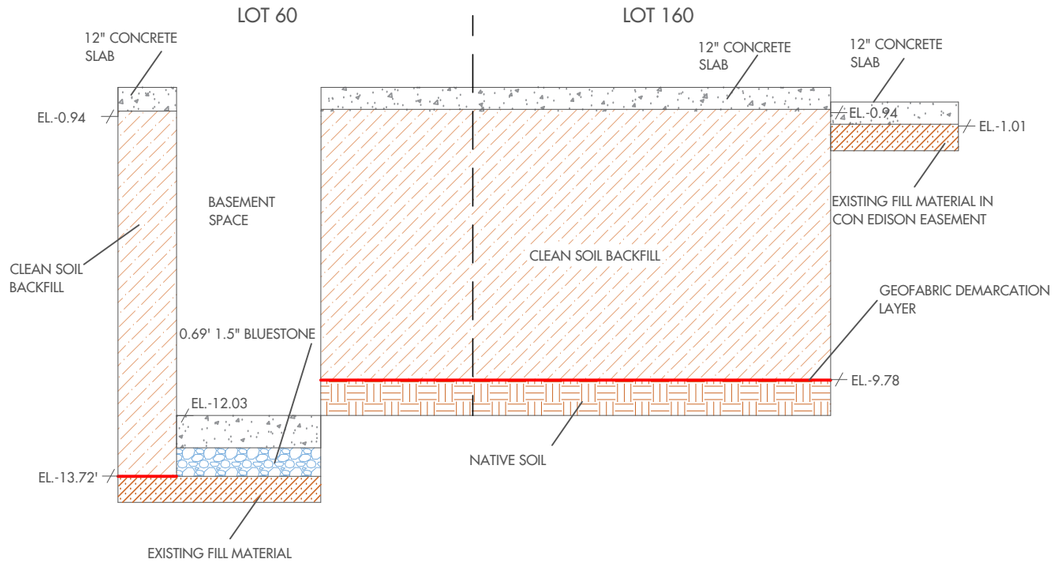
PROJECT FIGURE

AS-BUILT ENGINEERING CONTROLS
- PLAN VIEW

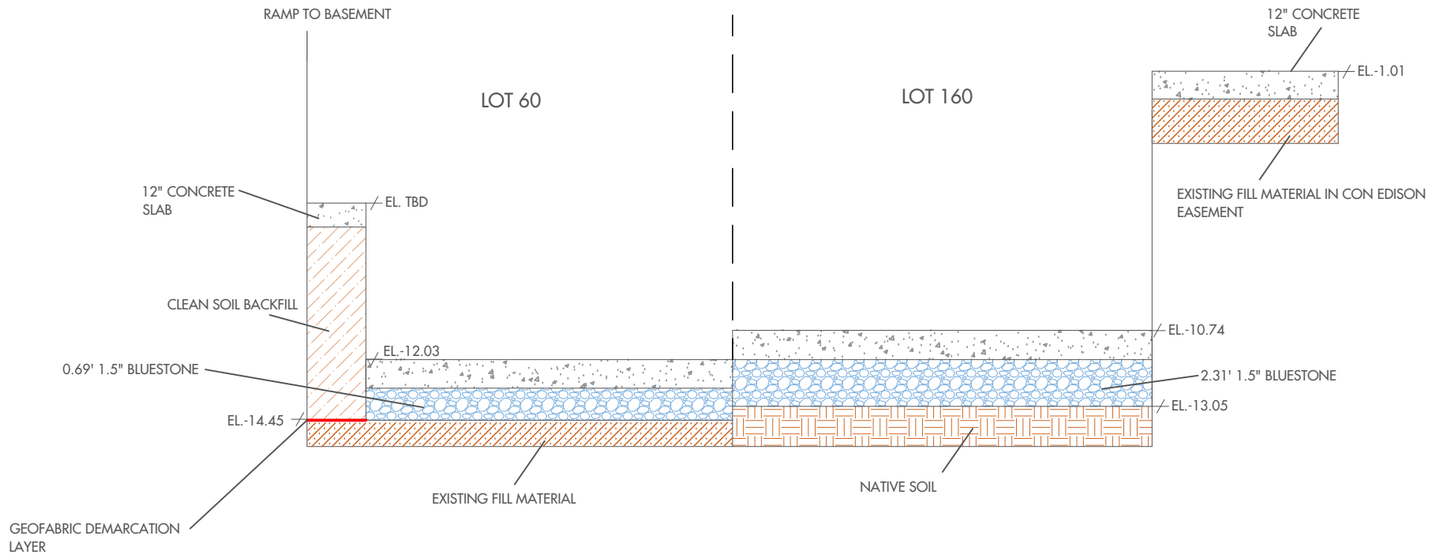
PROJECT NO.	DATE
170339	11/6/2019
DRAWN BY: G.T.	REVIEWED BY: P.M.
SCALE (11X17): NOT TO SCALE	APPROVED BY: P.M.



SECTION A



SECTION B



SECTION C

DATE	DESCRIPTION	CHK

SEAL & SIGNATURE

HYDROTECH ENVIRONMENTAL ENGINEERING AND GEOLOGY, DPC

77 ARKAY DRIVE, SUITE K
HAUPPAUGE, NY 11788

15 OCEAN AVENUE, SUITE 2B BROOKLYN, NY 11225

TEL: (631) 462-5866

FAX: (631) 462-5877

BASE DRAWING PREPARED BY

PROJECT NAME AND ADDRESS

198 EAST 135TH STREET
BRONX, NY

PROJECT FIGURE

AS-BUILT ENGINEERING CONTROLS - SECTION VIEW

PROJECT NO.	DATE
170339	11/6/2019
DRAWN BY: G.T.	REVIEWED BY: P.M.
SCALE (11X17): AS NOTED	APPROVED BY: P.M.

Appendix 7
Site Management Forms

Site Management Inspection Form
198 East 135th Street
Block 2319; Lot 60 & 160
Bronx, New York
NYSDEC Site Number: C203084

Name of Inspector:		**Inspection Date:**	
Construction Completion Date:		**Date of Last Periodic Compliance Inspection:**	
Name and Address Current Property Owner(s):			
Name of Site Contact:		**Telephone Number:**	
Operators Name: (if applicable)		**Telephone Number:**	

Persons Present During Inspection include Affiliations:

Remedy Description of Cover Systems

1. Review of the current remedy

Identify the current remedy: **Cover Slab**

2. Remedy Performance Assessment

When was the last repair performed?	
Did you observe any breaking of slab cover or evidnece cracks ?	□ Yes
	□ No

If yes describe the level of alteration needed for repairs and remedies?

Appendix 8
Remedial System Optimization Table of Contents

REMEDIAL SYSTEM OPTIMIZATION

198 East 135th Street
Block 2319; Lot 60 & 160
Bronx, New York
NYSDEC Site Number: C203084