HIP Rochdale Cleaners
Remedial Action Work Plan

169-55 137th Street, Jamaica
Block 12495, Lot 2
BCP Site # C241166

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
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May 2020

CERTIFICATIONS

I, Matthew M. Carroll, certify that I am currently a registered professional engineer licensed by the State of New York and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

091629	05/15/2020	
NYS Professional Engineer #	Date	Matthew M. Carroll, P.E. Signature

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LIST OF ACRONYMS

AGV	NYSDOH Air Guidance Value
AOC	area of concern
AS	air sparging
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
ECL	Environmental Conservation Law
BTEX	benzene, toluene, ethylbenzene and xylenes
CAMP	Community Air Monitoring Program
C&D	construction and demolition
CDS	construction dewatering system
Class GA Standards	NYSDEC TOGS 1.1.1 Class GA Ambient Water Quality Standards and Guidance Values
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CPP	Citizen Participation Plan
COC	Certificate of Completion
DCE	dichloroethylene
DER-10	NYSDEC Division of Environmental Remediation (DER), DER-10 / Technical Guidance for Site Investigation and Remediation
DRO	diesel range organics
DOC	dissolved organic carbon
DUSR	Data Usability Summary Report
EC	engineering control
ESA	Environmental Site Assessment
EZ	exclusion zone
FB	field blanks
FER	Final Engineering Report
ft-bs	feet below building slab
ft-bg	feet below sidewalk grade
ft-msl	feet above mean sea level
GPM	Gallons per minute
HASP	Health and Safety Plan
HSA	Hollow Stem Auger
HSO	Health and Safety Officer
IC	institutional control
ISCO	in-situ chemical oxidation
IRM	Interim Remedial Measure
MW	monitoring well
NAVD	North American Vertical Datum of 1988
NGVD	National Geodetic Vertical Datum of 1929
NIOSH	National Institute for Occupational Safety and Health
NYCDEP	New York City Department of Environmental Protection
NYCDEP Limits	NYCDEP Limitations for Effluent to Sanitary or Combined Sewers
NYCDOB	New York City Department of Buildings

NYCDOT	New York City Department of Transportation
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOH-ELAP	NYSDOH Environmental Laboratory Approval Program
O&M Plan	Operations and Maintenance Plan
OSHA	Occupational Safety and Health Association
PCB	polychlorinated biphenyl
PCE	perchloroethylene, aka tetrachloroethylene
PID	photoionization detector
PGWSCOs	6 NYCRR 375-6.8(b) and CP-51 Protection of Groundwater Soil Cleanup Objectives
PP Metals	Priority Pollutant Metals
PPE	personal protective equipment
QA/QC	quality assurance / quality control
QAPP	Quality Assurance Project Plan
RAWP	Remedial Action Plan
RCNY	Rules of the City of New York
RAO	Remedial Action Objective
RE	Remedial Engineer
RI	remedial investigation
RSCOs	Recommended Soil Cleanup Objectives
RUSCOs	6 NYCRR 375-6.8(b) and CP-51 Track 2 – Commercial Use Soil Cleanup Objectives
SB	soil boring
SCGs	Standards, Criteria and Guidance
SV	soil vapor
SMP	Site Management Plan
SMMP	Soil/Material Management Plan
SSDS	sub-slab depressurization system
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TAGM 4046	NYSDEC Technical and Administrative Guidance Memorandum #4046
TB	trip blanks
TCE	trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCLP Limits	USEPA Maximum Concentrations of Contaminants for the Toxicity Characteristic
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank

UUSCOs	6 NYCRR 375-6.8(a) Track 1 Unrestricted Use Soil Cleanup Objectives
VOC	volatile organic compound

EXECUTIVE SUMMARY

SITE DESCRIPTION/PHYSICAL SETTING/SITE HISTORY

On February 5, 2015, Rochdale Village, Inc. (the Participant) entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) to investigate and remediate the property located at 169-47 137th in the Jamaica neighborhood of Queens, New York (the "Site"). The New York State Brownfield Cleanup Agreement Index Number is C241166-10-14 and the Site Number is C241166.

The Site is located at 169-47 137th Avenue, in the Jamaica neighborhood of Queens, NY. The Site is currently occupied by an active dry cleaner, HIP Cleaners, located within the Rochdale Village Mall (Mall #2), part of a larger community development and housing complex known as Rochdale Village.

Rochdale Mall #2 is a one-story retail and office building (approximately 50,000 gross square feet) with associated parking. Rochdale Village complex is bounded by Baisley Boulevard, Bedell Street, 137th Avenue and Guy R. Brewer Boulevard. Mall #2 is located in the southeast corner of Rochdale Village with associated parking spaces fronting 137th Avenue. The Site is a 2,800 square foot one-story retail space located in the northern end of Rochdale Mall #2. The Site is located in Queens Community Board 12 on a portion of Block 12495, Lot 2. A Site location map is provided as Figure 1. A map of the current Site layout is included as Figure 2.

SUMMARY OF THE REMEDIAL INVESTIGATION

A Remedial Investigation Report (RIR) dated January 2018, was prepared by Tenen Environmental, LLC (Tenen).

The investigation consisted of installation of soil borings and collection of soil samples, installation and sampling of groundwater monitoring wells, installation and sampling of sub-slab vapor points, soil vapor points and sampling of indoor and ambient air. Based on the results of the RI and previous investigations, the following summary has been prepared:

Site History

- A dry cleaning facility has occupied the Site property for a period of approximately 43 years. HIP Cleaners was identified as a Small Quantity Generator of Hazardous Wastes on the regulatory database, with no violations. At least one, and potentially two, USTs were identified at the rear of the property. The assumed tank(s) capacity was approximately 275-gallons. No petroleum-related impacts were detected in soil within this area.

Geology/Hydrogeology

- Based on boring logs, the Site is underlain by historic fill material (silty sands mixed with anthropogenic materials) and fine to medium sand and silts to a depth of approximately ten ft-bg, above medium to coarse grain sand and gravel to depths of up to 50 ft-bg. Soil boring HIP-SB-3D was advanced to a depth of 50 ft-bg to investigate the presence of a confining

layer; no clay layer was encountered. The approximate depth to bedrock (Ravenswood Granodiorite) is 800 ft-bg.

- Groundwater was encountered between 6.48 to 8.25 ft-bg. The measured groundwater flow direction for the most recent sampling event is toward the northeast, consistent with the overall northerly flow of groundwater beneath the Site.

Chlorinated Solvents

- PCE was detected in soil above the Protection of Groundwater SCO of 1.3 mg/kg in soil samples within the shallow interval in the area adjacent to the location of the dry cleaning equipment, at a maximum concentration of 79 mg/kg.
- PCE was detected in groundwater at concentrations of up to 52 ug/L in shallow samples, above the Class GA Standard, with lower concentrations detected at downgradient locations. The highest concentration was in the sample collected on-Site near the former dry cleaner.
- PCE was the only VOC detected in groundwater and soil samples above regulatory levels, with the exception of metals in groundwater.
- PCE was detected in sub-slab, soil vapor and indoor air at concentrations above those detected in the ambient air. PCE was detected in the sub-slab soil vapor at concentrations up to 1,140,000 ug/m^3. TCE was detected in sub-slab at concentrations up to 2,790 ug/m^3.
- PCE was detected in soil vapor at lower concentrations outside of Mall #2's footprint, specifically at locations in the direction of the neighboring public school, residential building and office spaces.

Historic Fill-Related Impacts

- One pesticide was detected in the fill material at concentrations above the Unrestricted Use SCOs.

Qualitative Environmental Assessment

- The following potential exposure routes were identified: direct contact with surface soils, inhalation and incidental ingestion, ingestion of groundwater, direct contact with groundwater and inhalation of vapors.
- Potential impacts from these exposure routes can be mitigated through the implementation of HASP and CAMP during ground-intrusive activities and installation of an SSDS.

SUMMARY OF THE PLANNED INTERIM REMEDIAL MEASURES

Based on the elevated off-Site indoor air and sub-slab soil vapor concentrations, the Participant will depressurize beneath the entire footprint of Mall #2 outside of the Site footprint by installing an active sub-slab depressurization system (SSDS) as an Interim Remedial Measure (IRM). The IRM Work Plan was approved by NYSDEC on August 17, 2017. Implementation of the IRM Work Plan commenced in August 2018.

A blower test will be completed after installation of the SSDS suction pits to adequately size the fans. The blower test has not been completed as of the date of this Remedial Action Work Plan

(RAWP). The installation of the SSDS components within Mall #2 is being completed in conjunction with the installation of the on-site SSDS components as described in this RAWP.

QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

The results of the remedial investigations provided sufficient data to complete a Qualitative Human Health Exposure Assessment, which identified several complete exposure pathways that include:

- direct contact with subsurface soils (and incidental ingestion);
- direct contact with groundwater;
- inhalation of volatile groundwater constituents; and,
- inhalation of vapors.

The potential exposure pathways associated with the remediation phase of the renovation are temporary and of limited duration. Worker exposure to impacted groundwater, soil vapor and particulates will be addressed by adherence to health and safety protocols. Potential exposure of neighborhood residents and other off-site populations during the remediation will be addressed through compliance with the CAMP. The CAMP is included in Appendix A.

Based on the measured sub-slab and indoor air concentrations at off-site locations, the potential for exposure exists within the footprint of Mall #2. Off-site locations within Mall #2 will be depressurized in accordance with the approved IRM Work Plan.

SUMMARY OF THE REMEDIAL ACTIONS

The proposed Track 4 remedy, intended to address all environmental issues associated with the Site, consists of the following:

- All on-site soils meet Commercial Use SCOs. All soil left on-site that do not meet the Protection of Groundwater SCOs will be capped;
- Installation of four vertical SVE extraction wells within the area of documented PCE soil contamination. An SVE Design Document will be provided to NYSDEC following completion of the effluent sampling and will include the final SVE layout and potential air cleaning requirements;
- Installation of an active SSDS at the Site to minimize vapor intrusion;
- Completion of ISCO treatment via an encapsulated reactant cylinder emplaced into the existing on-site groundwater monitoring well. Encapsulated reactant technology enables the oxidant, solid form potassium permanganate, to provide years of controlled oxidant release in saturated soils and groundwater;
- Maintenance of the existing composite cover system at the Site;
- Post-remedial groundwater monitoring;
- Preparation of a Final Engineering Report (FER) to document the implemented remedial actions; and,

- Development of a Site Management Plan (SMP) for long term management of remaining contamination as required by an Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, and (3) reporting.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP. Any deviations from the RAWP will be promptly reported to NYSDEC for approval and detailed in the FER.

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

Rochdale Village, Inc. has entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) on February 5, 2015 to investigate and remediate an approximately 2,800 square feet (SF) (0.0642-acre) property located at 169-47 137th Avenue in the Jamaica neighborhood of Queens, New York (the "Site"). Rochdale Village, Inc. is a Participant in the Brownfield Cleanup Program.

The Site is currently occupied by an active dry cleaner, HIP Cleaners, located within the Rochdale Village Mall (Mall #2), part of a larger community development and housing complex known as Rochdale Village.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination, as determined by data gathered from the Remedial Investigation (RI), the Supplemental RI (SRI), sampling completed for emerging contaminants and pre-design sampling activities performed between November 2015 and August 2018. An Interim Remedial Measures Work Plan (IRMWP) was accepted by NYSDEC on August 17, 2017 to address off-site remediation within Mall #2.

The RAWP provides an evaluation of Track 1 and Track 4 remedies, as well as other applicable remedial measure alternatives, their associated costs, and the recommended and preferred remedy to address on-Site contamination. The remedy described in this document is consistent with the procedures defined in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (DER-10) and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements.

1.1 Site Location and Description

The Site is located at 169-47 137th Avenue, in the Jamaica neighborhood of Queens, NY. The Site is currently occupied by an active dry cleaner, HIP Cleaners. The Site is located within the Rochdale Village Mall (Mall #2), part of a larger community development and housing complex known as Rochdale Village.

Rochdale Mall #2 is a one-story retail and office building (approximately 50,000 gross square feet) with associated parking. Rochdale Village complex is bounded by Baisley Boulevard, Bedell Street, 137th Avenue and Guy R. Brewer Boulevard. Mall #2 is located in the southeast corner of Rochdale Village with associated parking spaces fronting 137th Avenue. The Site is a 2,800 square foot one-story retail space located in the northern end of Rochdale Mall #2. The Site is located in Queens Community Board 12 and is generally identified as a portion of Block 12495, Lot 2. A Site location map is provided as Figure 1. A map of the current Site layout is included as Figure 2.

1.2 Proposed Site Plan

The Remedial Actions being performed under the RAWP are intended to make the Site protective of human health and the environment consistent with the New York State Department of Health

(NYSDOH) Soil Vapor Intrusion Decision Matrices and the contemplated end use of the Site. At this time, the Participant is not proposing to change the future use of the Site and is not contemplating redevelopment of the Site.

1.3 Description of Surrounding Property

The surrounding properties area includes commercial properties within the Rochdale Village Mall and associated parking. The Site is located less than 300 feet from a residential housing complex to the northeast and less than 500 feet from a residential housing complex to the southwest. The adjacent and surrounding area includes predominantly residential and commercial areas within Rochdale Village. The properties across 137th Avenue to the south are residential dwellings.

The Site is located in an R6 zoning district; a designation which denotes a built-up, medium density area; however, the zoning district has a C2-2 overlay, allowing for commercial uses to meet local retail needs and allows for commercial and residential uses in the same building.

Based on a review of the New York City Office of Environmental Remediation (OER) Searchable Property Environmental E-Database (SPEED), no hospitals or day care centers are present within 500 feet of the Site. One public school, PS 080 Thurgood Marshall Magnet, is located at 171-05 137th Avenue, approximately 400 feet to the east of the Site. Soil vapor sampling, described in Section 4.2 of this report, was completed adjacent to the above-mentioned public school as part of the SRI.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work described in the September 2015 Remedial Investigation Work Plan (RIWP) and September 2016 Supplemental Remedial Investigation Work Plan (SRIWP), which were reviewed by NYSDEC. Subsequent email communication confirmed groundwater sampling required for emerging contaminants (EC sampling), completed in August 2018. A draft RIR dated January 2019 has been submitted to NYSDEC for review.

2.1 Site History

In 2010, a Phase I Environmental Site Assessment (ESA) for the Site was performed in accordance with ASTM E-1527-05, Standard Practice for Environmental Site Assessments. The Phase I ESA addressed the entire village community, of which the Site is only a portion. Based on a review of the Phase I ESA, the historic and present uses of the Site as a dry cleaner were identified as a recognized environmental condition (REC). Based on the information included in the ESA, the duration of the dry cleaning activities was approximately 43 years. HIP Cleaners was identified as a Small Quantity Generator of Hazardous Wastes on the regulatory database, with no violations. At least one, and potentially two, underground storage tanks (USTs) were identified at the rear of the property. The assumed tank(s) capacity was approximately 275-gallons. No documentation or additional information was provided regarding the tank(s).

Several environmental investigations have been conducted at the Rochdale Village Community, including the Site, and are summarized in the following reports:

- *Phase I Environmental Site Assessment, Rochdale Village, 169-55 137th Avenue, Queens, NY 11434, May 25, 2010, GRS Group*
- *Phase II Environmental Assessment Limited Subsurface Investigation, Rochdale Village, 169-55 137th Avenue, Queens, NY 11434, September 17, 2010, GRS Group*
- *Soil Vapor Investigation, HIP Cleaners, 169-47 137th Avenue, Queens, NY, 11434, December 2013, Jet Environmental*
- *Remedial Investigation Report, HIP Cleaners, 169-55 137th Avenue, Queens, NY, 11434, January 2019, Tenen Environmental*

2.2 Geology / Hydrogeology

Site Topography

The surface topography slopes down to the southeast towards Jamaica Bay and the Atlantic Ocean. Based on the U.S. Geological Survey (Brooklyn-NY and Coney Island-NY Quadrangles) topographic map, the property lies at an elevation of approximately 16 feet above the National Geodetic Vertical Datum of 1929 (an approximation of mean sea level).

Site Geology and Hydrogeology

Based on the 2015 RI sampling, the Site is underlain by shallow soils including historic fill material (silty sands mixed with anthropogenic materials) and fine to medium sand and silts to a depth of approximately ten feet below grade (ft-bg). The lithology below the shallow soils consists of medium to coarse grain sand and gravel to depths of up to 50 ft-bg. One soil boring was advanced

to 50 ft-bg to investigate the potential presence of a confining layer; no clay layer was encountered. The approximate depth to bedrock (Ravenswood Granodiorite) is 800 ft-bg.

Groundwater was encountered between 6.48 to 8.25 feet below grade. The groundwater flow direction measured in the most recent rounds of gauging is generally to the northeast.

Investigations at the Site have documented contaminants levels above the NYSDEC Technical and Operation Guidance Series for Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS 1.1.1 AWQS). There are no known wellhead protection areas or specifically designated groundwater recharge areas in the vicinity of the site. Groundwater in this area is not used as a source of potable water.

2.3 Identification of Standards, Criteria and Guidance

The following standards, criteria, and guidance were used during the evaluation of Site data for the purpose of remedy selection.

Soil
6 NYCRR Part 375-6(a) Unrestricted Use Soil Cleanup Objectives (SCOs) for a Track 1 remedy, as presented in Table 1.

6 NYCRR Part 375-6(b) Commercial Use and Protection of Groundwater SCOs for a Track 4 Site specific remedy, as presented in Table 2. The Commercial Use SCOs are appropriate given the proposed future use of the Site and the commercial zoning overlay.

Groundwater
Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations – Class GA (Class GA Standards). The Class GA Standards are presented in Table 3.

Soil Vapor
Ambient air concentrations as measured during the Remedial Investigation and the NYSDOH Guidance for Evaluating Soil Vapor Intrusions in the State of New York.

Sub-slab Soil Vapor and Co-Located Indoor Air Samples
NYSDOH Decision Matrices (May 2017).

2.4 Soil/Fill Contamination

This section summarizes the analytical results for soil samples collected between 2010 and 2018 for the Site. Historic soil concentrations are included in Tables 4 through 7.

2.4.1 Summary of Soil/Fill Data and Comparison with SCGs

2010 Phase II, GRS Group
The investigation included the advancement of five borings advanced to depths of up to eight feet below grade (ft-bg). Two borings (SB7 and SB8) were advanced within the Site, to the south and east just outside of the containment room. Three borings (SB6, SB9 and SB10) were advanced on the exterior of the Site to the west and south sides of the UST. Boring SB6 was converted into a temporary well (TW2). Each boring was field-screened for organic vapors using a photoionization detector (PID); the highest PID reading was 416 parts per million (ppm), at SB8 at 6.0 ft. below grade.

The results of the soil sampling were compared to the NYSDEC Unrestricted SCO provided in 6 NYCRR Part 375. Tetrachloroethene (PCE) was detected in SB7 (1.5-2.0') at a concentration of 64.4 milligrams per kilogram (mg/kg) and in SB8 (5.5-6.0') at a concentration of 1.89 mg/kg, above the NYSDEC Unrestricted Use SCO of 1.3 mg/kg.

2015 RI and 2016 SRI, Tenen
As part of the RI, a total of a total of five soil borings (two interior and three exterior) were advanced at the Site. Soil samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs) and target analyte list (TAL) metals. One additional off-Site, exterior soil boring (HIP-SB-6) was advanced during the SRI and a sample analyzed for TCL VOCs plus 10 tentatively identified compounds (TICs) to evaluate the horizontal extents of elevated chlorinated volatile organic compounds (cVOCs).

PCE was detected in one sample, HIP-SB-1 (0-2), in the shallow interval at a concentration of 79 mg/kg, above the Unrestricted Use and Protection of Groundwater SCO of 1.3 mg/kg, but below the Restricted Commercial Use SCO of 150 mg/kg.

No other VOCs were detected above the Unrestricted Use or Protection of Groundwater SCOs. No VOCs were detected above the Commercial Use SCOs. No SVOCs, PCBs or metals were detected above the Unrestricted Use SCOs.

The following pesticide was detected above Unrestricted Use SCOs at two locations, but below the Restricted Commercial Use and Protection of Groundwater:

- 4,4'-DDT was detected in sample HIP-SB-3D (1-3) at a concentration of .00525 mg/kg and in sample HIP-SB-1 (0-2) at a concentration of 0.00801 mg/kg, above the Unrestricted Use SCO of 0.0033 mg/kg.

Soil boring location HIP-SB-6 was advanced as part of the SRI in order to evaluate the horizontal contamination of cVOCs at the Site with respect to the surrounding area. No VOCs were detected above the Unrestricted Use SCOs in samples collected at this location.

2.5 Groundwater Contamination

This section summarizes the groundwater analytical results for samples collected between 2010 and 2018 for the Site. Historic groundwater concentrations are included in Tables 8 through 11.

2.5.1 Summary of Groundwater Data and Comparison with SCGs

2010 Phase II, GRS Group
The investigation involved the collection of one groundwater sample from a temporary groundwater monitoring well. Boring SB6 was installed off-site to the east of the UST to a depth of 16 ft-bg, and subsequently converted to temporary well TW2. PCE was detected in TW2 at a concentration of 12.3 micrograms per liter (ug/L) exceeding the NYSDEC Class GA Standard of 5 ug/L.

2015 RI and 2016 SRI, Tenen
Groundwater samples were collected from the six monitoring wells, including two cluster wells. Cluster wells at locations HIP-SB-2 and HIP-SB-3 included co-located shallow and deep wells to evaluate the horizontal and vertical extent of contamination in groundwater. As part of the SRI, one on-Site exterior soil boring (HIP-GW-6) was converted to a monitoring well. Sample HIP-GW-6 was analyzed for TCL VOCs plus 10 TICs to evaluate horizontal cVOC contamination in the direction of the neighboring office spaces.

PCE was the only VOC detected above the Class GA Standards. PCE was detected above the Class GA Standard of 5 ug/L in three shallow wells at concentrations ranging from 6 ug/L at HIP-GW-6 DUP to 52 ug/L at HIP-GW-1. PCE was detected in the shallow well installed as part of the SRI at a concentration of 6 ug/L, above the Class GA Standard. PCE was detected below the Class GA standard in both deep wells. The highest PCE detection (52 ug/L) was at HIP-GW-1, adjacent to the approximate location of the dry cleaning equipment. This location also corresponds with the location of the highest PCE concentrations in soil.

TCE was detected in HIP-GW-1, HIP-GW-3S and HIP-GW-2S at concentrations below the Class GA Standard of 5 ug/L.

No other VOCs were detected in groundwater samples. No SVOCs were detected above Class GA Standards. No pesticides or PCBs were detected above Class GA Standards.

Several common naturally occurring metals were detected in groundwater samples, including iron, magnesium, manganese and sodium. The shallow groundwater well HIP-GW-2S exhibited the highest concentrations of total metals above Class GA Standards, including total aluminum, total chromium, total and dissolved iron, total lead and total thallium.

The results of the RI and SRI adequately delineated the horizontal and vertical extent of PCE contamination in groundwater to concentrations below the Class GA Standards.

2018 Confirmatory VOC and Initial Emerging Contaminant Sampling Event, Tenen
As part of emerging contaminant sampling event, one off-site exterior permanent groundwater monitoring well was installed (HIP-GW-7). Sample HIP-GW-7 was analyzed for TCL VOCs and HIP-GW-3S and HIP-GW-7 were resampled for VOCs during this event. PCE was detected at a maximum concentration of 26 ug/L in the shallow on-site well, HIP-GW-1. PCE was detected above the Class GA Standard in the newly installed HIP-GW-7 at a concentration of 14 ug/L.

As of January 1, 2017 NYSDEC requires that emerging contaminant sampling be performed on sites participating in State remedial programs. This sampling protocol includes sampling groundwater for 1,4-dioxane, perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA) and other associated perfluorinated compounds (PFCs). One round of groundwater sampling for emerging contaminants was completed on August 15, 2018. Monitoring wells HIP-GW-1, HIP -GW-3S and HIP -GW-7 were sampled for emerging contaminants. 1,4-dioxane was detected in one groundwater well, HIP -GW-3S, at a low concentration of 0.0721 ug/l, below the EPA Cancer Reference Concentration of 0.35 ug/l. Various PFCs were detected at very low concentrations in all three samples collected. No concentrations were detected above the EPA Drinking Water Health Advisory level of 70 nanograms per liter (ng/l).

2.6 Soil Vapor, Sub-Slab Soil Vapor and Indoor Air Samples Contamination

This section summarizes the soil vapor, sub-slab soil vapor, indoor and ambient air analytical results collected between 2013 and 2016 for the Site. A summary of soil vapor concentrations compared to ambient air is included as Figure 5A. A summary of soil vapor concentrations compared to NYSDOH Air Guidance Values (AGVs) is included as Figure 5B.

2.6.1 Summary of Sub-Slab Soil Vapor, Co-Located Indoor Air and Ambient Air Data

2013 SVI, Jet Environmental

The investigation included the collection of two sub-slab soil vapor samples, and one ambient indoor air sample. The soil vapor investigation report has not been provided to Tenen; the laboratory analytical results from the investigation were provided. As such, these sample locations are not shown on Figure 5B.

The results from the soil vapor investigation indicate that PCE was detected in the ambient indoor air sample at a concentration of 48.7 micrograms per cubic meter (ug/m^3). The sub-slab soil vapor sample concentrations were 1,140,000 ug/m^3 and 57.6 ug/m^3.

2015 RI and 2016 SRI, Tenen

Sub-slab samples were collected at six locations within the footprint of Mall #2, including one location on-Site, adjacent to the dry cleaning machine (HIP-SS-1). Four exterior and off-Site soil vapor sample points were installed to confirm and delineate previously identified impacts. Six soil vapor points were installed at off-Site locations; three sample points were installed within the courtyard space of Mall #2 and three installed as part of the SRI and placed adjacent to the office space, residential building and public school within the neighboring community. One indoor air sample was collected as part of the SRI in the adjacent commercial space, co-located with sub-slab soil vapor point HIP-SS-3. One ambient air sample (HIP-AA) was collected from breathing height at an upwind location, based on field observations. All samples were analyzed for VOCs using USEPA method TO-15, and the results compared to the ambient air concentrations in the sample collected on November 23, 2015.

One on-Site interior sub-slab soil vapor point (HIP-SS-1) was installed in the vicinity of the dry cleaning machine. PCE was detected at this location at a concentration of 403,000 ug/m^3 above the ambient air concentration of 4.24 ug/m^3 and NYSDOH AGV of 30 ug/m^3. TCE was detected

at this location at a concentration of 1,240 ug/m^3 above the non-detect ambient air concentration and NYSDOH AGV of 2 ug/m^3. Ethanol was detected at a concentration of 4,940 ug/m^3 above the ambient air concentration of 10.4 ug/m^3.

Elevated (above ambient air) concentrations of PCE were detected throughout the sub-slab samples within Mall #2. The highest concentration of PCE was detected in the adjacent commercial space at sub-slab location HIP-SS-3 at a concentration of 780,000 ug/m^3 above the ambient air concentration of 4.24 ug/m^3. TCE was detected at this location at a concentration of 2,790 ug/m^3. The indoor air sample HIP-IA-1 was co-located with this sub-slab location as part of the SRI. This indoor air sample identified PCE at a concentration of 37.1 ug/m^3 and TCE at a low concentration (0.274 ug/m^3). The commercial space is currently used as an active nail salon, with various inventory including ethanols, ethyl acetate and acetone. Ethanol was detected in indoor air at a concentration of 9,070 ug/m^3 above the ambient air concentration of 4.11 ug/m^3.

The concentrations of PCE in soil vapor and indoor air should be mitigated at the Site based on the NYSDOH Matrix B.

2.6.2 Summary of Off-Site Exterior Soil Vapor

2015 RI and 2016 SRI, Tenen

Three soil vapor samples were collected as part of the RI to evaluate contaminants within the courtyard space of Mall #2, to determine if impacts potentially extended to occupied spaces on the other side of the courtyard. PCE was detected at a maximum concentration of 1,340 ug/m^3 at soil vapor location HIP-SV-3, above the ambient air concentration of 4.24 ug/m^3.

Three soil vapor samples were collected as part of the SRI to evaluate horizontal contamination with respect to the neighboring community. Soil vapor point HIP-SV-4 was advanced to delineate contaminants adjacent to the office spaces located approximately 85-feet to the north. PCE was detected at this location with a concentration of 4.75 ug/m^3, slightly above the ambient air concentration of 4.24 ug/m^3. The compound 1,2,4-trichlorobenzene, a derivative of benzene, was detected at this location with a concentration of 33 ug/m^3, above the ambient air concentration of 1.48 ug/m^3. Soil vapor point HIP-SV-5 was advanced to delineate impacts in the direction of the residential building located approximately 500-feet to the west. No VOCs were detected at this location above ambient air concentrations. Soil vapor point HIP-SV-6 was advanced to delineate impacts in the direction of the public school located approximately 265-feet to the east. PCE was not detected above ambient air concentrations at this location.

2.7 Summary of Remedial Investigations

This section presents the findings the previous investigations conducted on-Site.

Site History

- A dry cleaning facility has occupied the Site property for a period of approximately 43 years. HIP Cleaners was identified as a Small Quantity Generator of Hazardous Wastes on the regulatory database, with no violations. At least one, and potentially two, USTs were

identified at the rear of the property. The assumed tank(s) capacity was approximately 275-gallons. No petroleum-related impacts were detected in soil within this area.

Geology/Hydrogeology

- Based on boring logs, the Site is underlain by historic fill material (silty sands mixed with anthropogenic materials) and fine to medium sand and silts to a depth of approximately ten ft-bg, above medium to coarse grain sand and gravel to depths of up to 50 ft-bg. Soil boring HIP-SB-3D was advanced to a depth of 50 ft-bg to investigate the presence of a confining layer; no clay layer was encountered. The approximate depth to bedrock (Ravenswood Granodiorite) is 800 ft-bg.
- Groundwater was encountered between 6.48 to 8.25 ft-bg. The measured groundwater flow direction for the most recent sampling event is toward the northeast, consistent with the overall northerly flow of groundwater beneath the Site.

Chlorinated Solvents

- PCE was detected in soil above the Protection of Groundwater SCO of 1.3 mg/kg in soil samples within the shallow interval in the area adjacent to the location of the dry cleaning equipment, at a maximum concentration of 79 mg/kg.
- PCE was detected in groundwater at concentrations of up to 52 ug/L in shallow samples, above the Class GA Standard, with lower concentrations detected at downgradient locations. The highest concentration was in the sample collected on-Site near the former dry cleaner.
- PCE was the only VOC detected in groundwater and soil samples above regulatory levels, with the exception of metals in groundwater.
- PCE was detected in sub-slab, soil vapor and indoor air at concentrations above those detected in the ambient air. PCE was detected in the sub-slab soil vapor at concentrations up to 1,140,000 ug/m^3. TCE was detected in sub-slab at concentrations up to 2,790 ug/m^3.
- PCE was detected in soil vapor at lower concentrations outside of Mall #2's footprint, specifically at locations in the direction of the neighboring public school, residential building and office spaces.

Historic Fill-Related Impacts

- One pesticide was detected in the fill material at concentrations above the Unrestricted Use SCOs.

Qualitative Environmental Assessment

- The following potential exposure routes were identified: direct contact with surface soils, inhalation and incidental ingestion, ingestion of groundwater, direct contact with groundwater and inhalation of vapors.
- Potential impacts from these exposure routes can be mitigated through the implementation of HASP and CAMP during ground-intrusive activities and installation of an SSDS.

2.8 Significant Threat

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

3.0 DESCRIPTION OF THE INTERIM REMEDIAL MEASURES

The Interim Remedial Measures Work Plan (IRM Work Plan) includes depressurization beneath the entire footprint of Mall #2 outside of the Site footprint by installing an active SSDS. The IRM Work Plan was approved by NYSDEC on August 17, 2017. Implementation of the IRM commenced in August 2018 and the remedial measures are expected to be functioning in May 2019.

The approved interim remedial measures consist of the following:

- Installation of an active SSDS to depressurize below the entire footprint of Mall #2, outside of the Site footprint; and,
- Preparation of an IRM Construction Completion Report (IRMCCR) to document the implemented interim remedial measures.

4.0 CONTAMINATION CONDITIONS

4.1 Conceptual Model of Site Contamination

A conceptual site model is used to develop "a general understanding of the site and to evaluate potential human exposure pathways and impacts to the environment. This will assist in identifying and setting priorities for the activities to be conducted."[1] The model will continue to be updated as additional information is generated.

The Site is currently occupied by an active dry cleaner, HIP Cleaners. A dry cleaning facility has occupied the Site property for a period of approximately 43 years. Based upon the location and distribution of elevated PCE concentrations, these impacts are attributable to the dry cleaning operations involving the use, storage and disposal of PCE. The distribution of PCE in groundwater, soil and soil vapor supports HIP Cleaners as the source of the identified PCE impacts.

Chlorinated solvents and their breakdown products were detected at elevated levels in sub-slab and exterior soil vapor samples, indoor air, soil and groundwater during previous sampling events. Sampling identified PCE at elevated (above ambient level) soil vapor concentrations on- and off-Site below the sub-slab of Mall #2 and at lower concentrations at exterior off-Site soil vapor locations. PCE was detected in indoor air at a concentration above the NYSDEC AGV. PCE was also detected in on- and off-Site groundwater wells, with a concentration above the Class GA standard at one on-site and one off-site well adjacent to the dry cleaning equipment as well as one downgradient location, installed in August 2018. PCE was also detected in the soil at concentrations above the Protection of Groundwater SCO to depths above the groundwater interface.

One pesticide, 4,4'-DDT, was detected in the shallow interval, above Unrestricted Use SCOs in one sample.

[1] DER-10, 3.2.2, Remedial Investigation

5.0 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

5.1 Qualitative Human Health Exposure Assessment

A qualitative human health exposure assessment (QHHEA) has been completed in accordance with Section 3.3(c)4 of DER-10 and the NYSDOH guidance for performing a qualitative EA (NYSDEC DER-10; Technical Guidance for Site Investigation and Remediation; Appendix 3 B). The QHHEA evaluates the potential for populations to be exposed to Site contaminants. The QHHEA is included in Appendix C and summarized below.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: (1) a contaminant source; (2) contaminant release and transport mechanisms to an exposed population; (3) a receptor population; (4) a route of exposure; and (5) a point of exposure to a receptor population. Potential contaminant receptors include the following populations:

- Site workers (primarily environmental professionals and contractors)
- Construction workers, visitors or trespassers
- Future on-Site workers and utility workers
- On- and Off-Site residents/building occupants
- Off-Site maintenance workers

The following potential exposure routes are considered incomplete:

Groundwater Ingestion

New York City code prohibits the use of groundwater for potable purposes. Groundwater is not used for potable purposes in the vicinity of the Site and this pathway is incomplete.

Inhalation of Vapors by Future Building Employees and Maintenance Workers

Elevated indoor air concentrations were documented at the Site and may be related to soil vapor intrusion. Remediation will include the installation of an active SSDS and soil vapor extractor system to eliminate this pathway. A Site Management Plan (SMP) will include requirements for the active SSDS maintenance and upkeep.

The following potential exposure routes are considered potentially complete:

Inhalation of Vapors and Particulates by On-Site Environmental and Construction Workers (and incidental ingestion).

During slab penetrations, mainly as part of the RAWP implementation, on-Site personnel and construction workers may be exposed to dust and vapors via inhalation.

Dermal Contact with Soil by On-Site Environmental and Construction Workers, and Visitors

During slab penetrations, mainly as part of the RAWP implementation, on-Site personnel and construction workers may be exposed to contaminants in soil via dermal contact.

Dermal Contact with Groundwater by On-Site Environmental and Construction Workers

Dermal exposure to contaminants in the groundwater should be limited to environmental professionals' collection groundwater samples for environmental analysis, as excavation to depth and dewatering are not contemplated. This exposure would be mitigated by adherence to a HASP, included in Appendix C, during sampling activities.

Inhalation of Vapors and Particulates by Off-Site Residents/Building Occupants

Work during slab penetrations, mainly as part of the RAWP implementation, may generate dust and vapors that could be inhaled by off-Site residents/building occupants/Mall #2 visitors and maintenance personnel.

The above potential exposures are limited to the remediation/construction phase of the proposed remedial action. Adherence to health and safety protocols will address environmental and construction worker exposure to contaminated soil vapors, particulates and groundwater. Potential exposure of off-Site residents and building occupants will be addressed by implementation of the CAMP referenced in Section 7.1.4 of this RAWP and included as Appendix A.

5.2 Remedial Action Objectives

The goals of remediation are to remove the on-Site sources of chlorinated solvent impacts so as to allow for the Site's intended current and future commercial use and reduce the concentrations of contaminants in soil vapor and groundwater to levels below applicable SCGs. Based on the results of the remedial investigations conducted at the Site, the following Remedial Action Objectives (RAOs) have been identified:

5.2.1 Soil

The cVOC PCE, was detected above the Unrestricted Use and Protection of Groundwater SCO at three interior locations in the area adjacent to the dry cleaning equipment. The highest concentrations were identified within the shallow interval of zero to two ft-bg; PCE was also detected at a lower concentration at a maximum depth of six ft-bg.

One pesticide, 4,4'-DDT was detected above the Unrestricted Use and Protection of Groundwater SCOs, but below the Commercial Use SCO.

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

5.2.2 Groundwater

The cVOC PCE was detected in the groundwater at the highest concentration at a location adjacent to the dry cleaning equipment, above relevant SCGs. Naturally-occurring metals were detected above relevant SCGs.

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore the groundwater aquifer to pre-release conditions, to the extent practicable.

5.2.3 Soil Vapor

Chlorinated solvents have been detected at elevated concentrations in the soil vapor at the Site.

RAOs for Public Health Protection

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

6.0 DESCRIPTION OF REMEDIAL ACTION WORK PLAN

6.1 Evaluation of Remedial Alternatives

The following alternatives are considered to address contamination in soil, soil vapor and groundwater are discussed below:

6.1.1 Soil

Two remedial alternatives were considered to address cVOC-impacts in the soil.

Alternative 1 – Track 1 Excavation. Excavation of all soil with concentrations above the Unrestricted Use SCOs. Based on previous investigations and pre-design soil sampling completed at the Site (further discussed in Section 8 of this RAWP), this alternative would include the removal of shallow soil as well as deeper soils, where PCE contamination was documented to a depth of nine ft-bg, at the Site. PCE in soil, as documented during pre-design soil sampling and previous investigations at the Site, are shown in Figure 3.

Concrete and soil removal and subsequent disposal would occur within the excavated areas. The area would be backfilled with soil and capped with concrete. End-point samples would confirm the removal of soil to concentrations below applicable Unrestricted Use SCOs.

A CAMP (Appendix D of the HASP) and Soil/Materials Management Plan (Appendix D) will be implemented during the invasive Site activities to prevent or minimize potential impacts to human health and the environment. End-point samples will confirm the removal of soil to concentrations below applicable SCOs.

Due to limited access, the vertical extent of PCE contamination, and low overhead space at the Site, this alternative is not recommended.

Alternative 2 – Track 4 with Soil Vapor Extraction (SVE). Due to the extent of PCE contamination and the low overhead space, hot spot excavation to meet Protection of Groundwater SCOs within the top fifteen feet is not feasible to meet Track 1 objectives. For this alternative, the historic fill and soil, which meets Commercial Use SCOs, will be left in place and a soil vapor extraction (SVE) system would treat the remaining PCE impacts above the Protection of Groundwater SCO. PCE was detected at a maximum concentration of 79 mg/kg within the shallow interval in the area adjacent to the former dry cleaning equipment during the remedial investigations performed at the Site. Pre-design soil sampling, further described in Section 8 of this RAWP, was completed at the Site in order to vertically and horizontally delineate PCE contamination. Results of this sampling event identified PCE contamination present to a depth of nine ft-bg (at the approximate groundwater interface) along the perimeter of the Site, adjacent to the neighboring commercial space.

A minimum of four vertical SVE wells will be installed around the areas of documented PCE contamination to approximately three feet above the depth of groundwater, to be determined in field. The SVE system is designed to treat the on-site soil, incorporating an assumed radius of influence (ROI) across the Site. Given the assumed soil permeability of historic fill and no intervals of varying permeabilities, a maximum ROI of 25 feet is proposed. Pressure/vapor monitoring

locations will be installed at assumed ROI extents. A vacuum reading of 0.1 in-wc induced at these locations will be considered an acceptable value indicating that the vacuum is being appropriately induced within the extraction wells. The proposed SVE layouts and details are included on drawings X-100 through X-103, included in Appendix F.

The extraction wells will be connected with PVC piping via trenching. Above grade cast iron piping will be routed to the back of the building and connected to a vacuum blower. A blower test will be completed to appropriately size the fan. The SVE exhaust stream will be sampled prior to system start up and air cleaning requirements will be designed subsequent to sample analysis. An SVE Design Document will be provided following effluent sampling to include the final design layout and is further discussed in Section 9 of this RAWP.

The property is currently improved with a concrete building slab covering the entire Site. The attainment of a Track 4 remedy requires the installation of a cover system to prevent exposure to residual/soil fill; the building slab is already in place. The existing concrete cover system will be maintained and managed in accordance with a Site Management Plan (SMP). Figure 9 shows the extent of the cover system.

Groundwater is not potable in this area of Queens and any associated potential vapor intrusion would be addressed using an active SSDS and site cover system. This alternative would remove less contaminant mass and would instead rely on long-term institutional and engineering controls. Given the above mentioned site constraints, this is the preferred remedy.

6.1.2 Groundwater

Three remedial alternatives for groundwater have been considered and are described below.

Alternative 1 – No action. PCE has been detected in groundwater at concentrations up to 52 ug/L at the on-Site location adjacent to the former PCE storage area. Groundwater was encountered during implementation of the RI at a depth between 6.48 to 8.25 ft-bg. Groundwater is not expected to be encountered in any of the soil alternatives proposed in this RAWP. This alternative would rely on long-term institutional and engineering controls.

Groundwater in the New York City area is not used as a potable (drinking) water source. New York City residents receive their drinking water supply from surface reservoirs located in upstate New York.

Post-remedial groundwater monitoring would be completed to identify any fluctuations in groundwater concentrations over time. Post-remedial groundwater wells are shown on Figure 8.

Alternative 2 – In-Situ Chemical Oxidation (ISCO) Treatment. Implementation of ISCO treatment involves introducing oxidants into the subsurface via injection in order to break down contaminants into less toxic compounds. An in situ chemical oxidation reagent will be introduced into the subsurface to breakdown cVOCs, specifically PCE, detected at elevated concentrations in the groundwater. The chemical oxidant would be introduced to the aquifer via an encapsulated reactant cylinder emplaced into one on-site groundwater monitoring well (HIP-GW-1) adjacent to the dry cleaning equipment. Encapsulated reactant technology enables the oxidant, solid form

potassium permanganate, to provide years of controlled oxidant release in saturated soils and groundwater.

This alternative is the preferred remedy as it is appropriate for both anoxic and aerobic conditions within the groundwater, as well as the given lithology of the Site. Given these parameters, a pilot test will not be required prior to implementation.

Alternative 3 – Air Sparging (AS). Chlorinated impacts would be treated with an air sparging (AS) system. The long-term institutional and engineering controls would include groundwater monitoring and other site management activities.

6.1.3 Soil Vapor

Two remedial alternatives were considered to address the elevated levels of cVOCs present in the sub-slab soil vapor at the Site.

Alternative 1 – Active Sub-Slab Depressurization System. An active SSDS is being installed off-Site within Mall #2 in accordance with the approved IRM Work Plan (August 2017). Based on the elevated soil vapor concentrations at the Site, the active SSDS would be extended to include the Site footprint to minimize the potential for vapor intrusion. The system will be operated on a continuous basis.

The SSDS will be designed in general accordance with the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006. The performance goal of the sub-slab vapor mitigation system will be to depressurize below the current slab to at least -0.02 inches of water column (in-wc); however, differential pressure readings above -0.004 in-wc will be considered acceptable.

The proposed SSDS layouts and details are included on drawings X-100 through X-103, included in Appendix F. The SSDS will consist of two suction pits installed beneath the at-grade slab that will each be connected to a fan on the roof via cast iron piping. The SSDS has been designed as an extension of the approved SSDS discussed in the IRM WP for off-Site commercial spaces. The SSDS will depressurize beneath the entire footprint of Mall #2, including the Site. Further design considerations are discussed in Section 9.0 of this RAWP.

In this alternative, long-term institutional and engineering controls would include an active SSDS as part of site management activities.

Alternative 2 – Active SSDS and Vapor Sealant. An active SSDS would be installed at the Site consistent with Soil Vapor Alternative 1. A vapor sealant will be installed over the entire concrete slab and will consist of a chemically resistant barrier with a minimum thickness of 20-mil.

In this alternative, long-term institutional and engineering controls would include a vapor barrier and an active SSDS as part of site management activities.

6.2 Standards, Criteria and Guidance (SCGs)

The Remedial Action SCGs are listed below.

SCG	Scope / Application
NYSDEC Brownfield Cleanup Program Guide (draft 2004)	General program guidance
NYSDEC CP-51 / Soil Cleanup Guidance (2010)	Commercial Use SCOs for soil
NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (2010)	End-point sampling methodology; underground storage tank (UST) closure
NYSDEC DER-31 Green Remediation (2011)	Green remediation components
NYSDEC TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (1998)	Class GA Standards for groundwater
NYSDOH Guidance for Evaluating Soil Vapor Intrusions in the State of New York (2006)	Soil vapor guidance
NYSDOH Generic Community Air Monitoring Plan	Plan for monitoring dust and volatile organics resulting from construction activities
New York State Codes, Rules and Regulations (NYCRR) Title 6 Part 360 – Solid Waste Management Facilities	Off-site disposal of waste for facilities in NYC
New York State Codes, Rules and Regulations (NYCRR) Title 6 Part 364 – Waste Transporter Permits	Transporter requirements for off-site disposal of waste
6 NYCRR Part 370 – Hazardous Waste Management System	Disposal of hazardous waste, if encountered
6 NYCRR Part 375 – Environmental Remediation Programs (December 2006)	General administrative guidance
6 NYCRR Part 376 – Land Disposal Restrictions	Disposal of hazardous waste, if encountered
6 NYCRR Part 750 – State Pollutant Discharge Elimination System (SPDES) Regulations	Discharge of wastewater and stormwater
Code of Federal Regulations (CFR) Title 29 Part 1910.120 - Hazardous Waste Operations and Emergency Response Standard	Worker safety
29 CFR Title 29 Part 1926 - Safety and Health Regulations for Construction	Worker safety
40 CFR Parts 144 and 146 – Underground Injection Control Program	Injection of chemicals into the groundwater
Title 15, Rules of the City of New York (RCNY), Chapter 19 - Use of the Public Sewers	Discharge of groundwater to the municipal sewer system
NYCDEP Limitations for Effluent to Sanitary or Combined Sewers	Discharge of groundwater to the municipal sewer system

6.3 Evaluation of Alternatives

The remedial alternatives for soil, groundwater and soil vapor are discussed below. Each alternative was evaluated based on the following remedy selection factors (as defined in DER-10, Section 4.2):

- Protection of human health and the environment
- Conformance with standards, criteria and guidelines
- Short-term effectiveness and performance
- Long-term effectiveness and performance
- Reduction in toxicity, mobility or volume
- Implementability
- Cost effectiveness
- Community acceptance
- Land use

6.3.1 Protection of Human Health and the Environment

Each alternative would be protective of human health and the environment. Soil is not required to be excavated to meet Commercial Use SCOs. Groundwater in this area is not used as a source of drinking water. Potential soil vapor impacts from an on-site source would be managed by installing long-term engineering controls.

A Health and Safety Plan (HASP), including monitoring/management for particulates and volatiles. will be implemented during remedial activities

6.3.2 Conformance with Standards, Criteria and Guidelines

Each alternative would conform to the SCGs. All soil alternatives would attain levels consistent with the proposed Site use (including Alternative 2, Track 4 SVE). Groundwater impacts would be monitored.

On-site construction safety will conform to the HASP requirements, which incorporate OSHA requirements.

6.3.3 Short-Term Effectiveness and Performance

Each alternative would be effective over a short-term time horizon. The soil alternatives are consistent with the proposed commercial use. Soil Alternative 1 (Track 1 SCOs) is associated with the most significant short-term impacts, related to the increased duration associated with more extensive and deeper soil removal. Soil Alternative 2 (Track 4 SVE) would be associated with increased site management into the future. Groundwater Alternative 2 (ISCO) would also be associated with short-term impacts. These impacts include the potential for particulate and volatile impacts and additional truck traffic. These potential impacts are addressed in the various control plans included in this RAWP.

6.3.4 Long-Term Effectiveness and Performance

Each alternative would be effective over a long-term time horizon. The two soil alternatives would be consistent with the proposed use, given long-term engineering controls. Groundwater impacts would be monitored. Groundwater is not used as a source of drinking water in this area. Potential for residual impacts in soil vapor would remain and would be managed by the installation of an active SSDS.

6.3.5 Reduction in Toxicity, Mobility or Volume

Each alternative would reduce the toxicity, mobility and volume of the contaminants present on-site with the exception of Groundwater Alternative 1 (No Action). The bulk of the impacts present at the Site would be removed by both Soil Alternatives; however, over different time durations.

6.3.6 Implementability

Each alternative would be implementable. Due to the excavation depth required on-Site to meet Track 1 SCOs within the existing building, Soil Alternative 1 would be considerably more difficult to implement given the difficult on-site drilling conditions encountered during the Site investigation and the required depth of excavation. Groundwater Alternatives 2 (ISCO Treatment) and 3 (Air Sparging), and Soil Vapor Alternatives 1 (active SSDS) and 2 (active SSDS and vapor barrier) can be implemented as part of the Site remedial action and installed subsequent to installation of the approved IRM Work Plan SSDS design for Mall #2.

6.3.7 Cost Effectiveness

The implementation of Soil Alternative 2 (Track 4 SCOs, SVE), Groundwater Alternative 2 (ISCO) and Soil Vapor Alternative 1 (active SSDS) is estimated at approximately $250,000, as shown in Table 14. The costs to implement Soil Alternatives 1 (Track 1 SCOs), Groundwater Alternatives 2 (ISCO Treatment) and 3 (AS), and Soil Vapor Alternative 2 (active SSDS and Vapor sealant) would be higher.

6.3.8 Community Acceptance

Each alternative appropriately addresses potential exposure pathways (see Sections 6.3.3 and 6.3.4). Soil Alternatives 1 (Track 1 SCOs) and 2 (Track 4 SVE), Groundwater Alternative 2 (ISCO) and Soil Vapor Alternative 1 (SSDS) will result in a decrease in toxicity, mobility and volume (see Section 6.3.5). Implementation of these alternatives would allow for continued productive use of the Site and should result in acceptance by the community.

The on-site portion of Soil Vapor Alternatives 1 (active SSDS) and 2 (active SSDS and vapor sealant) can be implemented as an extension of the SSDS to be installed at the off-Site commercial spaces within Mall #2, as included in the approved IRM Work Plan. Any short-term impacts (see Section 6.3.3) will be addressed by the various control plans described in this RAWP.

6.3.9 Land Use

Each of the proposed alternatives is compatible with the proposed land use at the Site.

The following findings, based on a review of previous environmental and public documents, support the compatibility of the proposed Site land use with that of the surrounding area:

1. The use proposed for the Site conforms to applicable zoning laws or maps or the reasonably anticipated future use of the Site.
2. The proposed use conforms to historical and/or recent development patterns in the area.
3. The Site does not fall within the boundaries of an existing Brownfield Opportunity Area (BOA).
4. The Site is located in an R6 zoning district; a designation which denotes a built-up, medium density area; however, the zoning district has a C2-2 overlay, allowing for commercial uses to meet local retail needs and allows for commercial and residential uses in the same building.
5. The Site is located in an urban setting characterized by residential and commercial uses. There are no areas zoned for agricultural use in the proximity of the Site.
6. According to the NYSDEC database for environmental justice concerns, the Site is part of a Potential Environmental Justice Area (PEJAs); however, no environmental justice concerns have been identified.
7. There are no federal or state land designations.
8. The population growth patterns and projections support the proposed land use.
9. The Site is accessible to existing infrastructure.
10. The Site is not located in close proximity to important federal, state or local natural resources, including waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species.
11. Municipal water supply wells are not present in this area of New York City; therefore, groundwater from the Site cannot affect municipal water supply wells or recharge areas. The Federal Emergency Management Agency (FEMA) flood insurance rate map for the Site (Map Number 3604970242F) indicates that the Site is located outside Zone X, the 0.2% annual chance (or 500 year) floodplain.

6.4 Selection of the Preferred Remedial Actions

The preferred Track 4 remedy, intended to address all environmental issues associated with the Site, consists of the following:

- All on-site soils meet Commercial Use SCOs. All soil left on-site that do not meet the Protection of Groundwater SCOs will be capped;
- Installation of four vertical SVE extraction wells within the area of documented PCE soil contamination. An SVE Design Document will be provided to NYSDEC following completion of the effluent sampling and will include the final SVE layout and potential air cleaning requirements;
- Installation of an active SSDS at the Site to minimize vapor intrusion;
- Completion of ISCO treatment via an encapsulated reactant cylinder emplaced into the existing on-site groundwater monitoring well. Encapsulated reactant technology enables the oxidant, solid form potassium permanganate, to provide years of controlled oxidant release in saturated soils and groundwater;
- Maintenance of the existing composite cover system at the Site;

- Post-remedial groundwater monitoring;
- Preparation of a Final Engineering Report (FER) to document the implemented remedial actions; and,
- Development of a Site Management Plan (SMP) for long term management of remaining contamination as required by an Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, and (3) reporting.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Department-issued Decision Document. All deviations from the RAWP and/or Decision Document will be promptly reported to NYSDEC for approval and fully explained in the FER. The Site will meet the Commercial Use SCOs and an SVE system will treat the soil with PCE above Protection of Groundwater SCOs. Soil vapor impacts will be mitigated by removing the major source of chlorinated solvents within the shallow soil and installing an active SSDS and continued operation of the active SSDS to be installed as part of the IRM Work Plan within Mall #2.

The following land-use factors were considered in selecting these remedial measures. Land Use Factor	Remedy Evaluation Result
Zoning	Remedy is consistent
Applicable comprehensive community master plans or land use plans	Remedy is consistent (not within a Brownfield Opportunity Area)
Surrounding property uses	Remedy is consistent
Citizen participation	Remedy is consistent; CPP requirements implemented regardless of selected remedy
Environmental justice concerns	None identified (Site is in a PEJA)
Land use designations	Remedy is consistent
Populations growth patterns	Remedy is consistent
Accessibility to existing infrastructure	Remedy is consistent
Proximity to cultural resources	None identified
Proximity to natural resources	None identified
Off-Site groundwater impacts	Groundwater will be monitored on-Site and at the downgradient borders following implementation of the remedy.
Proximity to floodplains	Site is not within the 500-year flood zone.
Geography and geology of the Site	Remedy is consistent
Current Institutional Controls	None currently present

Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;

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

7.0 REMEDIAL ACTION PROGRAM

7.1 Governing Documents

7.1.1 Site Specific Health and Safety Plan

A Site Specific Health and Safety Plan (HASP) has been created for the Site and is included in Appendix C. All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA. An emergency contact sheet with names and phone numbers is included in Table 1 of the HASP and defines the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency. The HASP and requirements defined in this RAWP pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

7.1.2 Quality Assurance Project Plan

A Quality Assurance Project Plan (QAPP) has been created for the site to address quality control and quality assurance procedures for all site sampling, including continued groundwater sampling, and is included in Appendix E.

7.1.3 Soil/Materials Management Plan

The Soil/Materials Management Plan (SMMP) includes plans for managing any soils/materials that are disturbed at the Site. The soil disturbances are limited to the installation of SSDSs and trenching. The development is less than one acre in area and a Stormwater Pollution Prevention Plan (SWPPP) is not required.

The SMMP, which describes procedures for excavation, handling, storage, and transport and disposal, is included in Appendix D.

7.1.4 Community Air Monitoring Plan

The purpose of the Community Air Monitoring Plan (CAMP) is to protect downwind receptors (e.g., residences, businesses, schools, nearby workers, and the public) from potential airborne contaminants released as a direct result of the Remedial Action being performed at the Site. Airborne contaminants will be monitored during the installation of SSDSs and shallow excavation. The CAMP is included in Appendix A.

7.1.5 Citizen Participation Plan

The Citizen Participation Plan (CPP) enables citizens to participate more fully in decisions that affect their health, environment, and social well-being. The CPP will be updated throughout the Remedial Action in response to any community feedback.

7.1.6 Site Operations Plan

The Remedial Engineer is responsible to ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

7.2 General Remedial Construction Information

7.2.1 Project Organization and Emergency Contacts

The following are the principal personnel who will be assist in the management, oversight and completion of this project:

Tenen Environmental, LLC
121 West 27th Street, Suite 702, New York, NY 10001
(646) 606-2332

- Mary Manto, Technical Director: responsible for overall coordination and management of the project.
- Matthew M. Carroll, PE: Remedial Engineer for the project.
- Mohamed Ahmed, Senior Geologist: responsible for quality assurance of sampling procedures and laboratory data.
- Kristen Meisner, Project Engineer: responsible for the day-to-day field monitoring activities, including soil excavation and load-out, dust monitoring and PID monitoring. Post-remedial sampling activities and report preparation will be the function of a Project Engineer from Tenen.

Subcontractors
Laboratory:
Alpha Analytical, Inc., 8 Walkup Drive in Westborough, MA
(800) 624-9220
NYSDOH Environmental Laboratory Approval Program (ELAP) Certification No. 11148 for solid and hazardous waste

Driller:
Cascade, 30 N. Prospect Avenue, Lynbrook NY 11563
(516) 596-6300

Data Validation:
L.A.B Validation Corp., 14 West Point Drive, East Northport, NY 11731
(516) 523-7891

Remedial Party:
Rochdale Village, Inc.
169-55 137th Avenue
Queens, New York 11434

Resumes of key personnel involved in the Remedial Action are presented in the QAPP, included as Appendix E.

7.2.2 Remedial Engineer

The Remedial Engineer (RE) for this project will be Matthew M. Carroll, P.E. The RE is a registered professional engineer (PE) licensed by the State of New York. The RE will have primary direct responsibility for implementation of the remedial program for the HIP Cleaners Site

(NYSDEC BCA Index No. C241166-10-14; Site No. C241166). The RE will certify in the Final Engineering Report (FER) that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the RAWP and any other relevant provisions of ECL 27-1419 have been achieved in conformance with that Plan. Other RE certification requirements are listed later in this RAWP.

The RE will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil disturbance, characterization, removal, air monitoring, emergency spill response, import of back fill material (if any), and management of waste transport and disposal. The RE will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The RE will review all pre-remedial plans submitted by contractors for compliance with this RAWP and will certify compliance in the FER.

7.2.3 Remedial Action Construction Schedule

A general Remedial Action construction schedule is included in Table 15.

7.2.4 Work Hours

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

7.2.5 Mobilization

Mobilization includes field personnel orientation, equipment mobilization (including CAMP equipment), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

7.2.6 Erosion and Sedimentation Controls

Erosion and sediment controls are not required for the implementation of the Remedial Action.

7.2.7 Equipment and Material Staging

All equipment and materials will be stored at the Site in accordance with the requirements of this RAWP, manufacturer's recommendations, and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction. The Contractor shall maintain accurate records documenting the measures taken to protect each equipment item. The Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property. No work shall commence until Notice To Commence work is provided by the Remedial Engineer.

7.2.8 Demobilization

Disturbed areas resulting from remediation activities will be restored or addressed during construction activities.

All remediation and construction materials will be disposed of in accordance with the applicable rules and regulations. General refuse will be handled in accordance with the rules and regulations of the New York City Department of Sanitation.

7.2.9 Utility Markout and Easement Layout

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

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

7.2.10 Required Permits

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is included as Table 16. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the FER.

7.2.11 Site Security and Signage

The Site building is currently secured with locking doors and 24/7 security within Rochdale Village.

7.2.12 Pre-Remedy Meeting with NYSDEC

Prior to contractor mobilization to the Site, a meeting or conference call will be held with the NYSDEC, the Remedial Engineer and the selected contractor.

7.2.13 Estimated Remedial Action Costs

The estimated cost to implement the Remedial Action is approximately $250,000. An itemized summary of estimated costs is included as Table 14. This table will be revised based on actual costs and included in the FER.

7.2.14 Deviations from the Remedial Action Plan

During the implementation of the RAWP, any material deviation from the RAWP will be noted and immediately brought to the attention of the RE. The RE or his/her representative will contact the NYSDEC Project Manager and determine if the deviation necessitates a formal RAWP modification and NYSDEC approval. If no formal RAWP modification is required, the deviation will be noted in the Site reports and explained in the FER.

7.3 Reporting

7.3.1 Daily Reporting

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

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

Daily reporting will be conducted during active Site remediation periods including SSDS installation and shallow soil excavation.

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

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

A Site map that shows a predefined alphanumeric grid for use in identifying locations described in reports submitted to NYSDEC is provided as Figure 7.

The NYSDEC assigned project number will appear on all reports.

7.3.2 Monthly Reporting

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers by the 10th day of the following month and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., tons of material exported and imported, etc.);

- Photographs of the work completed during the reporting period;
- Description of approved activity modifications, including changes to work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

7.3.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be included in the daily reports as needed, and a comprehensive collection of photos will be included in the Final Engineering Report.

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

7.3.4 Complaint Management Plan

All complaints received will be logged in by the Site Superintendent and reported in the daily report. Each complaint will be investigated as to its validity, the source determined, and a resolution adopted. Once a remedy has been put in place it will be recorded with the original complaint and reported in the daily report.

8.0 PRE-DESIGN SAMPLING

The basis for determining preferred alternatives for the Site Remedial Action included the completion of pre-design soil sampling. Soil sampling was completed in order to vertically and horizontally delineate the extent of PCE contamination above the Protection of Groundwater SCO of 1.3 mg/kg. The Site is operated as an active dry cleaner and no redevelopment is currently proposed.

Soil Delineation Sampling Methodology
Pre-design soil sampling was completed to assess horizontal delineation of PCE impacts within the on-Site shallow soil and vertical delineation of PCE impacts above the groundwater interface. Soil sampling was centralized around the area of the former dry cleaning equipment to delineate and supplement the sampling completed and discussed in Tenen's Remedial Investigation Report (2019). The goal of pre-design soil sampling was to potentially outline a shallow excavation plan if appropriate. Pre-design soil sampling locations and their respective PCE concentrations are shown on Figure 3.

Seven soil borings were advanced on-site utilizing a hand-held 420M Geoprobe® unit. Soil samples were collected from acetate liners through macrocores using the Geoprobe® unit. Soil at each sample interval was screened for VOCs using a PID and described using the Unified Soil Classification System, including documentation of observations regarding potential contamination such as odors, staining, etc. All descriptions and observations were documented in a field notebook.

The soil investigation consisted of collecting soil samples within the shallow (zero to two feet below grade) interval with the goal of horizontally delineating PCE impacts to below Protection of Groundwater SCOs. Vertical delineation samples were also collected at the first apparent clean zone based on PID readings, or at the groundwater interface. Soil samples were analyzed for TCL VOCs by EPA Method 8260C.

During all ground invasive activities, a Community Air Monitoring Plan (CAMP) was implemented. The main goal of the CAMP was to keep objectionable odors, VOCs and/or particulates from reaching the surrounding community. The NYSDOH Generic CAMP, which includes monitoring for VOCs and particulates, was implemented. Readings were documented in a field notebook.

Soil Delineation Analytical Results
During the Remedial Investigation, PCE was detected in one sample, HIP-SB-1 (0-2), in the shallow interval at a concentration of 79 mg/kg, above the Unrestricted Use and Protection of Groundwater SCO of 1.3 mg/kg, but below the Restricted Commercial Use SCO of 150 mg/kg. PCE was also detected in the deeper intervals at a depth of 5.5 to 8 ft-bg in one sample, SB-8, at a concentration of 1.89 mg/kg, marginally above the Unrestricted Use and Protection of Groundwater SCO.

As shown in Figure 3, the results of the pre-design sampling indicate that PCE impacts extend towards the south perimeter of the Site, along the adjacent commercial wall. PCE was detected at a maximum concentration of 60 mg/kg at HIP-D6 in the shallow interval along the adjacent commercial wall. PCE was also detected above the groundwater interface at a maximum concentration of 37 mg/kg, at HIP-D5 (8-9), along the adjacent commercial wall.

Due to the extent of PCE impacts and the low overhead space/access constraints, excavation of a hot spot is not proposed at the Site. Instead, installation of an SVE system, further discussed in Section 10 of this report, is the preferred remedy for soil remediation.

9.0 REMEDIAL ACTION IMPLEMENTATION: INSTALL SSDS

An active SSDS will be installed to depressurize beneath the building slab beneath the Site.

9.1 Sub-slab Depressurization System

An active SSDS will be installed to minimize the potential for vapor intrusion. The system will be operated on a continuous basis. The active SSDS will be installed in conjunction with the active SSDS installed throughout Mall #2 as part of the approved IRM WP (August 2017).

Active Depressurization/Venting System
The layouts and details are included on drawings X-100 through X-103, included in Appendix F. The active SSDS is a permanent Engineering Control (EC) for the Site.

The SSDS will depressurize below the current building slab as compared to the building environment. The SSDS has been designed to create a pressure differential of approximately -0.02 in-wc beneath the building slab, as compared to the building air pressure; however, differential pressure readings above -0.004 in-wc will be considered acceptable.

Suction Pits
The SSDS will consist of a minimum two suction pits installed beneath the Site building slab that will be connected to a fan on the roof via cast iron (interior) and PVC (exterior) piping. To create the suction pits, the existing slab will be saw cut and the underlying soil will be removed to a depth of at least 18 inches. The void space will be lined with geotextile fabric and a layer of ¾" clean stone aggregate (or similar material).

The layout of the proposed suction pits is included on drawing X-101 and the details are shown on drawing X-104, both in Appendix F.

Crack Sealing
The existing building slab will be inspected for cracks. If any are identified, they will be filled with non-VOC sealant (e.g., Retro-Coat™ caulk by Land Science Technologies).

Piping and Exhaust Location
A cast iron pipe (6" nominal size) will be inserted into each suction pit. The slab penetration points will be sealed with a chemically-resistant sealant (e.g., bituthene liquid membrane). The riser pipes will connect to exterior 6" cast iron header pipes that will run outside the building to the roof. All horizontal piping runs will be slightly pitched back towards the pressure relief point to allow for drainage of any moisture. The final location of all vertical riser piping, header piping, and roof mounts will be determined by a Professional Engineer in consultation with the building owner.

A blower capable of creating the required flow will be mounted on the roof. In order to size the fan, a blower test (described below) will be performed after the sub-grade components are installed under the building slab.

To avoid entry of extracted subsurface vapors into the building, the vent pipe's exhaust will be:

1. at least twelve inches above the surface of the highest roof level;
2. at least ten feet above ground level;
3. at least ten feet away from any opening that is less than two feet below the exhaust point; and
4. at least ten feet from any adjoining or adjacent buildings, or HVAC intakes or supply registers.

The exhaust location, labeling, alarms and system components have been designed in general accordance with the NYSDOH *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (2006).

The proposed piping network layout is shown on drawing X-101, the roof layout is shown on drawing X-102, and details are shown on drawing X-103, in Appendix F.

Pressure Monitoring Points
Several pressure monitoring points will be installed through the slab to confirm the resulting pressure field.

The proposed pressure monitoring point locations are shown on drawing X-100 and the details are shown on drawing X-103, both in Appendix F.

Blower Test
Following the installation of the suction pits, a blower test will be completed in order to size the blower. A regenerative blower will be mobilized to the Site and a step-test will be completed to determine the flows from each suction pit to depressurize below the slab at least -0.02 in-wc. The above-grade head losses will be modeled using the Darcy-Weisbach equation.

Pressure Testing and Alarm System
An alarm system will be installed that will notify the building management if a drop in pressure indicates that the system is not operating as designed. In general, a pressure switch will be placed on the main riser with a field-set switch point. The alarm will be a horn-strobe mounted in the building.

The locations of the pressure switches and alarms are shown on drawings X-101 and X-102 in Appendix F.

Initial Start-Up
After the depressurization and venting systems have been installed, the following will be completed:

1. visual inspection of building slabs for any cracks or holes. If any are identified, they will be sealed using caulk;
2. measurement of the sub-slab pressure at the monitoring point to ensure that the remedial goal of -0.02 in-wc has been achieved. If the start-up is not conducted during heating season, the pressure differential will also be measured during heating season to

ensure that the remedial goal of -0.02 in-wc has been achieved. While -0.02 in-wc is the design goal, differential pressure readings above -0.004 in-wc will be considered acceptable.

3. if appliances that rely on natural draft for exhaust of carbon monoxide and other combustion gases are identified, the potential for back draft will be tested. The potential for back draft will be determined using a carbon monoxide meter. If any back draft is identified, it will be corrected.

Operations, Maintenance and Monitoring (OM&M) Plan

A draft Operations, Maintenance and Monitoring (OM&M) Plan is included in Appendix G. The OM&M Plan includes the currently specified items and will be updated following the completion of the SSDS.

Shut-down

A proposal to discontinue the SSDS may be made based on confirmatory sampling. The SSDS will not be shut-down unless written approval is obtained from NYSDEC and NYSDOH.

9.2 Materials Transport Off-Site

Soil/fill will be excavated during the installation of suction pits. The material will be drummed and staged for disposal. All transport of materials will be performed by licensed haulers in accordance with appropriate local, state, and federal regulations, including 6NYCRR Part 364. Materials will be transported in accordance with the SMMP, located in Appendix D.

9.3 Community Air Monitoring Plan (CAMP)

The NYSDOH Generic CAMP, which includes monitoring for VOCs and particulates, will be implemented during installation of the suction pits in accordance with this RAWP.

10.0 REMEDIAL ACTION IMPLEMENTATION: INSTALL SVE

In order to address elevated concentrations of chlorinated solvents in soil left in place, an SVE system will be designed and installed.

10.1 SVE Layout

The SVE system layout includes the installation of vacuum extraction wells at four locations at the Site, as shown in Figure 6. The extraction wells will be installed using the direct push drilling method due to overhead constraints. The extraction wells will be constructed of 4-inch Schedule 40 PVC 20-slot well screen and solid riser pipe, 6" cast iron. Each extraction well will be constructed with a screen that will be set in the unsaturated zone from below the existing slab to three feet above the groundwater interface, to be determined in field. The annular space around each well screen will be backfilled with No. 2 sand to at least two feet above the well screen. A two-foot bentonite seal will then be placed atop the sand pack and the borehole will be grouted to grade using a bentonite Portland cement mixture.

A maximum radius of influence (ROI) of 25 feet is contemplated given the assumed soil permeability and size of the Site. Four one-inch pressure /vapor monitoring points will be installed at the Site along the perimeter of the hot spot area as determined by the remedial investigation and pre-design sampling. The SVE monitoring points will be constructed of 1-inch Schedule 40 PVC 10-slot well screen set at the two-foot intervals within the screened interval of the extraction wells. No intervals of different apparent permeabilities were identified during the remedial investigation to a depth of the approximate groundwater depth. The vapor point wells will be constructed in a similar manner to the extraction wells. Extraction well and vapor monitoring point construction details are included in Appendix F.

SVE extraction wells will be connected below grade by four-inch PVC piping. Trenching will be completed in order to connect the four locations. To create the trench, the existing slab will be saw cut and the underlying soil will be removed to a depth of approximately six-inches. Once piping has been installed, ¾-inch clean stone aggregate (or NYSDEC approved soil) will be backfilled around the piping and the four-inch concrete slab will be reinstalled in these areas. The excavated soil material will be drummed and staged for disposal. All transport of materials will be performed by licensed haulers in accordance with appropriate local, state, and federal regulations, including 6NYCRR Part 364. Materials will be transported in accordance with the SMMP, located in Appendix D. Above grade piping will be six-inch cast iron, routed along the exterior of the commercial unit in back of the building.

Subsequent to the completed installation of all above and below grade piping, a blower test will be completed in order to appropriately size the vacuum fan. A regenerative blower will be mobilized to the Site and a step-test will be completed to determine the flows the combined extraction wells to depressurize below the slab at least -0.1 in-wc. The above-grade head losses will be modeled using the Darcy-Weisbach equation.

Prior to system start-up, one effluent vapor sample will be collected from the combined SVE stream from a certified 6-Liter Summa Canister in accordance with NYSDOH Soil Vapor Sampling Guidelines. The vapor sample will be sent to a New York State certified laboratory

where they will be analyzed for the presence of VOCs using EPA Method TO-15. Laboratory reporting limits will be below 0.2 ug/m^3 for compounds on NYSDOH Decision Matrices A and C and below 1 ug/m^3 for compounds on the NYSDOH Decision Matrix B. Indoor air sampling has been previously completed and documented in Tenen's RIR, January 2019. Contaminant air concentration modeling using USEPA's AERSCREEN software will be completed to assess off-site impacts. Predicted impacts will be compared to guideline concentrations and this comparison will be used to determine the appropriate Environmental Rating and, if needed, the degree of control required for the acceptable operation of the source of PCE. In accordance with 6 NYCRR Part 212-2.2 Table 2, the maximum allowable emission rate for PCE is 1,000 pounds per year (lb/yr) (or 2.74 lb/day). The results of effluent sampling will be used to design the SVE effluent treatment system. The treatment system process will be designed in compliance with Air Toxics Control Program 6 NYCRR Part 212.

An SMP will be prepared that includes an Operations, Maintenance and Monitoring (OM&M) Plan. The OM&M Plan will be used to determine the efficacy of the SVE system after system start-up.

10.2 SVE System

The goals of the permanent SVE system for the Site are to remove VOCs from the soil and prevent off-Site migration of soil vapors.

An SVE Design Document will be provided following completion of effluent sampling and include a discussion of the final SVE design including potential air cleaning equipment requirements. In general, the SVE system will include SVE extraction wells, pressure /vapor monitoring locations and a long-term regenerative blower, and the potential for air cleaning requirements such as a granular activated carbo (GAC) unit. The discharge will be consistent with the NYSDEC DAR-1 guidance.

The SVE system will be operated and maintained into the future under a Site Management Plan. Any plan to suspend or terminate SVE operations will require NYSDEC approval. Following termination of the SVE system, the active SSDS will be operated as a long-term engineering control, as described in Section 9.0. A composite cover, consisting of a four-inch thick concrete building slab is already in place at the Site and will be maintained in accordance with the SMP.

Operations, Maintenance and Monitoring (OM&M) Plan
A draft Operations, Maintenance and Monitoring (OM&M) Plan for the SVE is included in Appendix G. The OM&M Plan includes the currently specified items and will be updated following the completion of the SVE.

Community Air Monitoring Plan
The NYSDOH Generic CAMP, which includes monitoring for VOCs and particulates, will be implemented during installation of all below grade SVE components.

11.0 REMEDIAL ACTION IMPLEMENTATION: IN-SITU CHEMICAL TREATMENT

As discussed in Section 6.1.2, the components of the remedial action to address groundwater impacts include in-situ chemical oxidation (ISCO).

11.1 ISCO Implementation

The goal of the in-situ chemical oxidation treatment for the Site is to break down contaminant cVOCs into less toxic compounds through the introduction of oxidants into the subsurface via an encapsulated reactant cylinder emplaced into the existing on-site groundwater monitoring well (HIP-GW-1). Each cylinder has a 1.35-inch diameter and is two-feet long, with approximately 2.6 pounds of solid form oxidant crystalline particles of the oxidant potassium permanganate, mixed with a benign paraffin wax. Five cylinders will be placed in a PVC holder and lowered within the full screen interval (10-feet). The cylinders will remain within the wells for their life cycle, typically between two to five years depending upon the groundwater flow.

The ISCO reactant cylinder will be removed from the monitoring well HIP-GW-1 prior to sampling to allow for stabilization of the aquifer. The length of time required for stabilization is based on soil oxidant demand and the groundwater flow rate. The potassium permanganate results in a pink color to the groundwater; samples will not be collected until there is no pink hue in the purge water. In addition to colorimetric evaluation, treatment wells will be measured for field parameters [pH, oxidation reduction potential (redox), dissolved oxygen (DO), temperature, and specific conductance] prior to ISCO to establish baseline conditions and prior to any post remedial groundwater sampling event. Dissolved oxygen values, in particular, will be assessed for the presence of residual oxidant.

The design goal is to decrease the concentrations of PCE to below the Class GA Standard. Groundwater monitoring will be completed in accordance with an SMP.

12.0 REMAINING ON-SITE CONTAMINATION

The successful implementation of the Remedial Action will result in the following:

- All soil left on-site will meet Commercial Use SCOs. All soil left on-site that does not meet the Track 1 Unrestricted Use and Protection of Groundwater SCOs will be capped. Elevated cVOCs in the soil be treated with the installation of an SVE system.
- Groundwater will be treated using ISCO with a design goal of meeting the Class GA Standard for PCE.
- Remaining contamination may be present in the groundwater and sub-slab soil vapor with the potential for indoor air impacts. An active SSDS will address any residual soil vapor impacts.

Since residual contaminated groundwater and soil vapor will or may remain after the remedy is complete, Engineering and Institutional Controls (ECs and ICs) are required to protect human health and the environment. These ECs and ICs are described below. Long-term management of EC/ICs and of remaining contamination will be executed under a Site-specific Site Management Plan (SMP) that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing remaining contamination. The Controlled Property (the Site) will have two primary EC systems. These are:

- Active Sub-slab Depressurization System;
- Active Soil Vapor Extraction System;
- Composite Cover System; and
- Post-Remedial Groundwater Monitoring.

The SSDS and SVE system will be long-term ECs. While post-remedial groundwater monitoring is part of the selected remedy, it is presented as an EC because it will continue after the FER and SMP are submitted. The FER will report remaining contamination on the Site in tabular and map form, including any exceedances.

13.0 ENGINEERING CONTROLS

13.1 Engineering Control Systems – On-Site

As discussed above, four engineering controls (ECs) will be utilized at the Site: an active SSDS and SVE system, a composite cover system, and continued groundwater monitoring. The ECs will be established in an Environmental Easement assigned to the property by the titleholder and will be implemented under a SMP. The post-remedial groundwater monitoring is considered an EC only because it will be continued following submittal of the FER. The conceptual approach, general system design, maintenance and monitoring (OM&M) requirements and criteria for termination of each of these systems are described below.

13.1.1 Description of Engineering Controls

13.1.1.1 Sub-Slab Depressurization System

The active SSDS will be completed and started-up as described in Section 9.0 of this RAWP.

13.1.1.2 Soil Vapor Extraction System

After completion of the final SVE design considerations, the system will be completed and started-up as described in Section 10.0 of this RAWP.

13.1.1.3 Cover System

A four-inch concrete slab cover system will be maintained at the Site.

13.1.1.4 *Post-Remedial Groundwater Monitoring*

Long-term monitoring (eight quarterly events) of the groundwater will be conducted to confirm groundwater concentrations. All quarterly monitoring samples will be analyzed for VOCs.

13.1.2 Criteria for Termination of Remedial Systems

11.1.2.1 *Sub-Slab Depressurization and Soil Vapor Extraction Systems*

The operation of the SSDS and SVE system will not be discontinued without written approval by NYSDEC and NYSDOH. Proposals to discontinue the SSDS and SVE systems may be made based on confirmatory sampling.

13.1.2.2 *Post-Remedial Groundwater Monitoring*

Groundwater monitoring to confirm the groundwater concentrations is planned for eight quarters.

Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Monitoring activities will be outlined in the SMP.

14.0 INSTITUTIONAL CONTROLS

An Institutional Control (IC) will be required to manage remaining contamination on Site and off-site and to ensure that the ECs remain protective of public health and the environment. The ICs consist of two elements designed to ensure continual and proper management of remaining contamination in perpetuity: an Environmental Easement and a Site Management Plan.

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, will be recorded with Queens County for the Site and any off-site property requiring mitigation to provide an enforceable means of ensuring the continual and proper management of remaining contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

14.1 Environmental Easement

The Environmental Easement renders the Site and any property requiring mitigation as Controlled Properties. The Environmental Easements must be recorded with the Queens County Office of the City Register before the Certificate of Completion can be issued by NYSDEC. A series of Institutional Controls are required under this remedy to implement, maintain and monitor these Engineering Control systems, prevent future exposure to remaining contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to residential, restricted residential, commercial or industrial use(s) only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan, which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls that support Engineering Controls are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in the SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

- On-Site environmental monitoring devices, including but not limited to, [groundwater monitor wells and soil vapor probes], must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;
- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

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

- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the Site Management Plan;
- The Controlled Property may be used for residential, restricted residential, commercial or industrial use only, provided the long-term Engineering and Institutional Controls included in the Site Management Plan are employed;
- The Controlled Property may not be used for a higher level of use, such as unrestricted use without an amendment or extinguishment of the Environmental Easement;
- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This [time period] statement must be certified by an expert that the NYSDEC finds acceptable.

The Environmental Easement will incorporate the ICs required to implement, maintain and monitor the ECs, prevent future exposure to remaining contamination by controlling disturbances of the subsurface soil and restrict the use of the Site to commercial uses only, unless discontinued or modified with the approval of NYSDEC.

The Environmental Easement for the controlled property will include the following requirements:

- requires the remedial party or Site owner to complete and submit to NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for residential, restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health (NYCDOH); and

- requires compliance with the NYSDEC-approved SMP.

14.2 Site Management Plan

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

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

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of site monitoring; (3) an Operation and Maintenance (O&M) Plan for implementation of remedial containment systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The Periodic Review Report (PRR) submitted under the SMP will be based on a calendar year. The first PRR will be submitted to the NYSDEC within 15 months after the date of COC issuance. Any lapses in the engineering or institutional controls noted in the PRR will be required to be corrected expeditiously and the NYSDEC notified of the correction. The SMP will include the following:

1. Introduction with purpose, summary of remediation and site conditions;
2. Institutional and Engineering Control Plan;
3. O&M Plan;
4. Site Monitoring Plan;
5. Site maintenance requirements;
6. Citizen Participation Plan;
7. Personnel organization and responsibilities;
8. Health and Safety Plan;
9. Records and forms;
10. Emergency Contingency Plan; and
11. Copies of Environmental Easement and applicable Site plans, including electronic versions.

The Institutional and Engineering Control Plan will include, but is not limited to:

- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including a provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls; and,
- maintaining site access controls and NYSDEC notification; and the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

The OM&M Plan will include, but is not limited to:

- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining access controls and Department notification; and
- providing NYSDEC access to the site and O&M records.

The Site Monitoring Plan will include, but is not limited to:

- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to NYSDEC; and,
- monitoring for soil vapor intrusion for any buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

The Site Management Reporting Plan will include, but is not limited to:

- Details regarding post-COC reporting requirements, including a schedule
- The contents of the annual report, including:
    - an evaluation of the EC/ICs, EC/IC certifications, results of period Site inspections and deliverables to be generated;
    - frequency and type of the EC/IC and Site inspections;
    - inspection forms, sampling data and maintenance reports;
    - an evaluation of records and reporting; and,
    - corrective measure plans.

15.0 FINAL ENGINEERING REPORT

A Final Engineering Report (FER) will be submitted to the NYSDEC Project Manager within 90 days of completing the remedial action. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site and off-site properties requiring mitigation. The Final Engineering Report will include as-built drawings for all constructed elements, calculation and manufacturer documentation for treatment systems, certifications, manifests, bills of lading as well as the complete Site Management Plan (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

The Final Engineering Report will include written and photographic documentation of all remedial work performed under this remedy. Photographs will be taken of all remedial activities and submitted to NYSDEC in digital format after completion of active Site remediation. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. A photo log keyed to photo file ID numbers will be prepared to provide explanation for all representative photos.

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

The FER will provide a thorough summary of all remaining contamination left on the Site and off-site properties requiring mitigation after the remedy is complete. Remaining contamination includes all contamination that exceeds the Track 1 Unrestricted Use and Protection of Groundwater SCOs in 6NYCRR Part 375-6. A table that shows exceedances from Track 1 Unrestricted Use and Protection of Groundwater SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that shows the location and summarizes exceedances from Track 1 Unrestricted Use and Protection of Groundwater SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

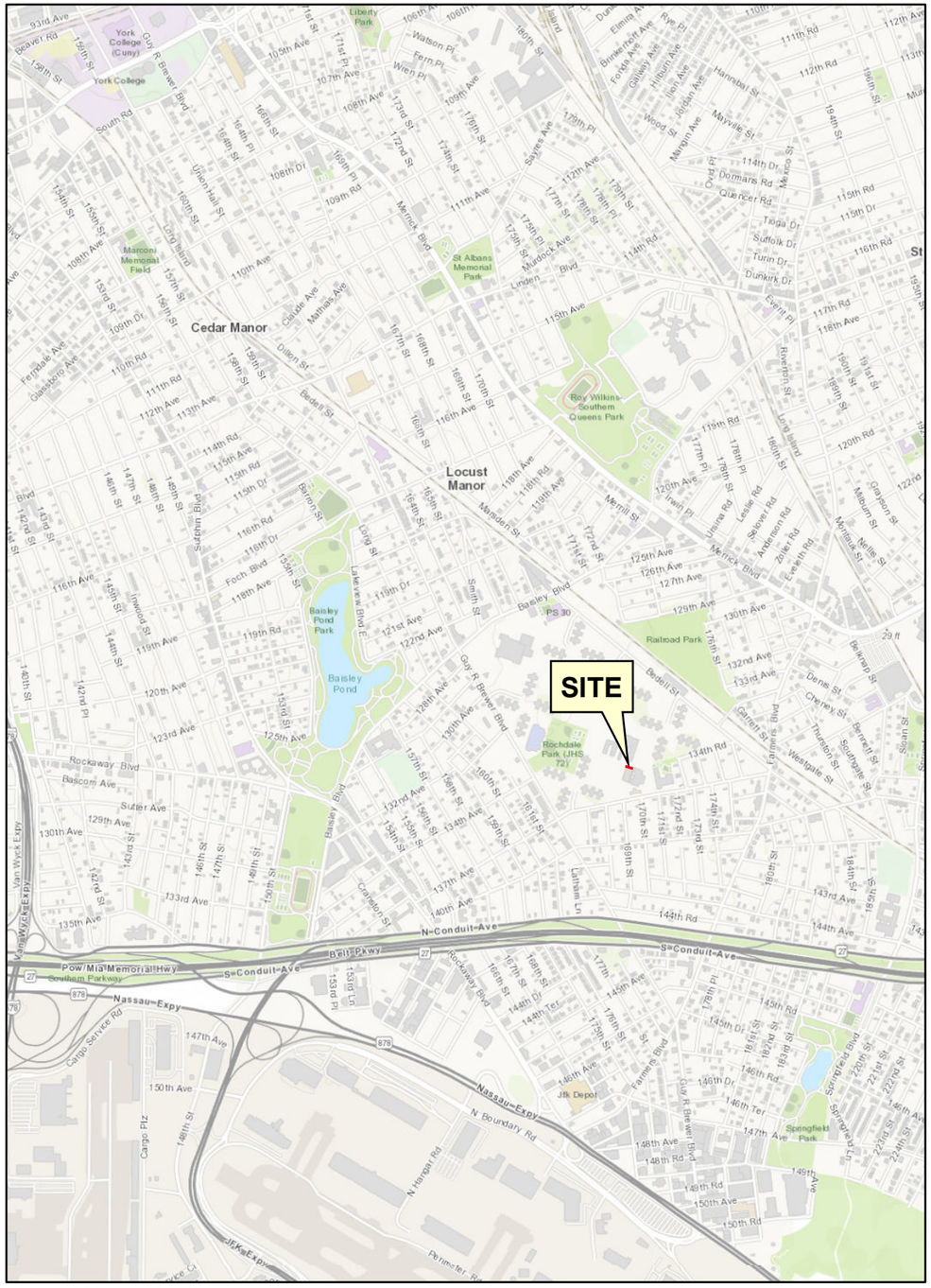
The Final Engineering Report will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include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

This FER will include the following:

1. Certification by the RE that the data generated is useable and meets the remedial requirements;
2. Certification by the RE that any financial assurance mechanisms required by the NYSDEC have been executed;
3. Certification by the RE that the remedial work conformed to the RAWP;
4. Certification by the RE that dust, odor, and vapor control measures were implemented during invasive work and conformed with the RAWP;
5. Certification by the RE that all the remedial waste was transported and disposed in accordance with the RAWP;
6. Certification by the RE that the source approval and sampling of imported acceptable fill was completed in a manner consistent with the methodology of the RAWP;
7. Summary of the remedy and all remedial actions completed;
8. Description of any problems encountered and their resolutions;
9. Description of the deviations from the approved RAWP;
10. Listing of waste streams, quantity of materials disposed, and where they were disposed;
11. Analytical QA/QC completed for the environmental media sampling during the remedial activities, including DUSR or other data validation;
12. List of the remediation standards applied to the remedial actions;
13. List of all applicable local, regional, and national governmental permits, certificates, or other approvals required for the remedial and development work;
14. Tables and figures containing all pre- and post-remedial data, including volumes of soil removed (as applicable);
15. Description of source and quality of fill (as applicable);
16. "As-built" drawings including SSDS/SVE design;
17. Air quality and dust monitoring data, including any supporting documentation on the decisions made based on the data;
18. Copies of all the submitted periodic reports; and
19. Copies of all manifests of off-site transport of waste material.

The FER will meet the requirements of DER-10 5.8(b) and (c). All documents and reports submitted to the NYSDEC in an electronic format that complies with NYSDEC's Electronic Document Standards (EDS) or as otherwise directed by DER. All data generated will be submitted in an electronic data deliverable (EDD) that complies with the DEC's Electronic Data Warehouse Standards (EDWS) or as otherwise directed by DER. These digital documents shall be in PDF form and, where appropriate, supplemented by photos and Microsoft Excel files.

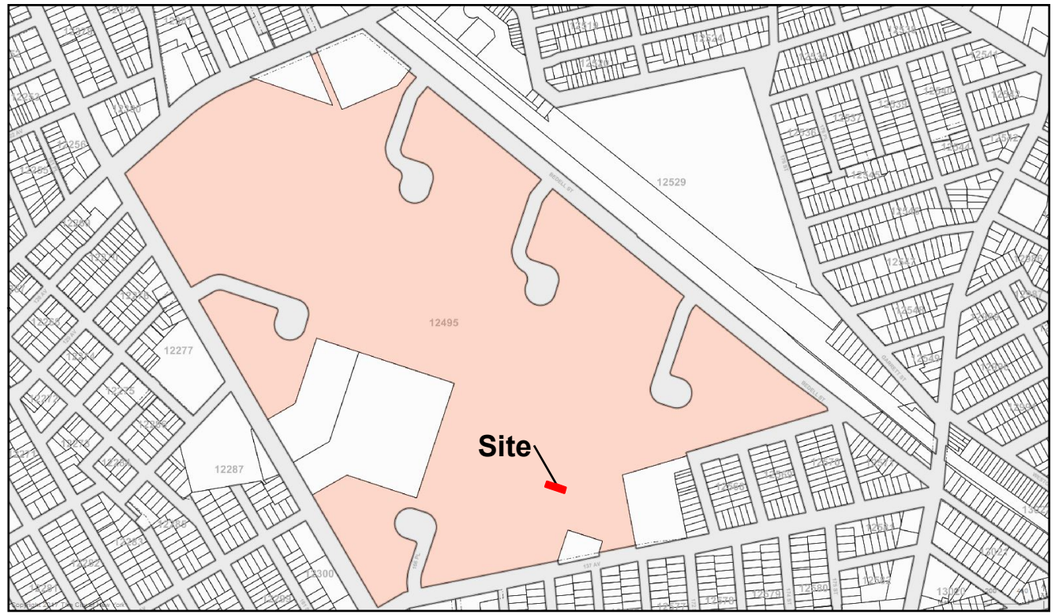
Figures



Basemap: ESRI, World Topo Map
USGS Jamaica, NY Quandrangle

Site Location

0 1,000 2,000 4,000 Feet



http://gis.nyc.gov/taxmap/map.htm

Department of Finance Digital Tax Map

0 400 800 1,600 Feet

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
NYC Department of City Planning, Information Technology Division

Department of City Planning MapPLUTO - 2016 v2

0 400 800 1,600 Feet

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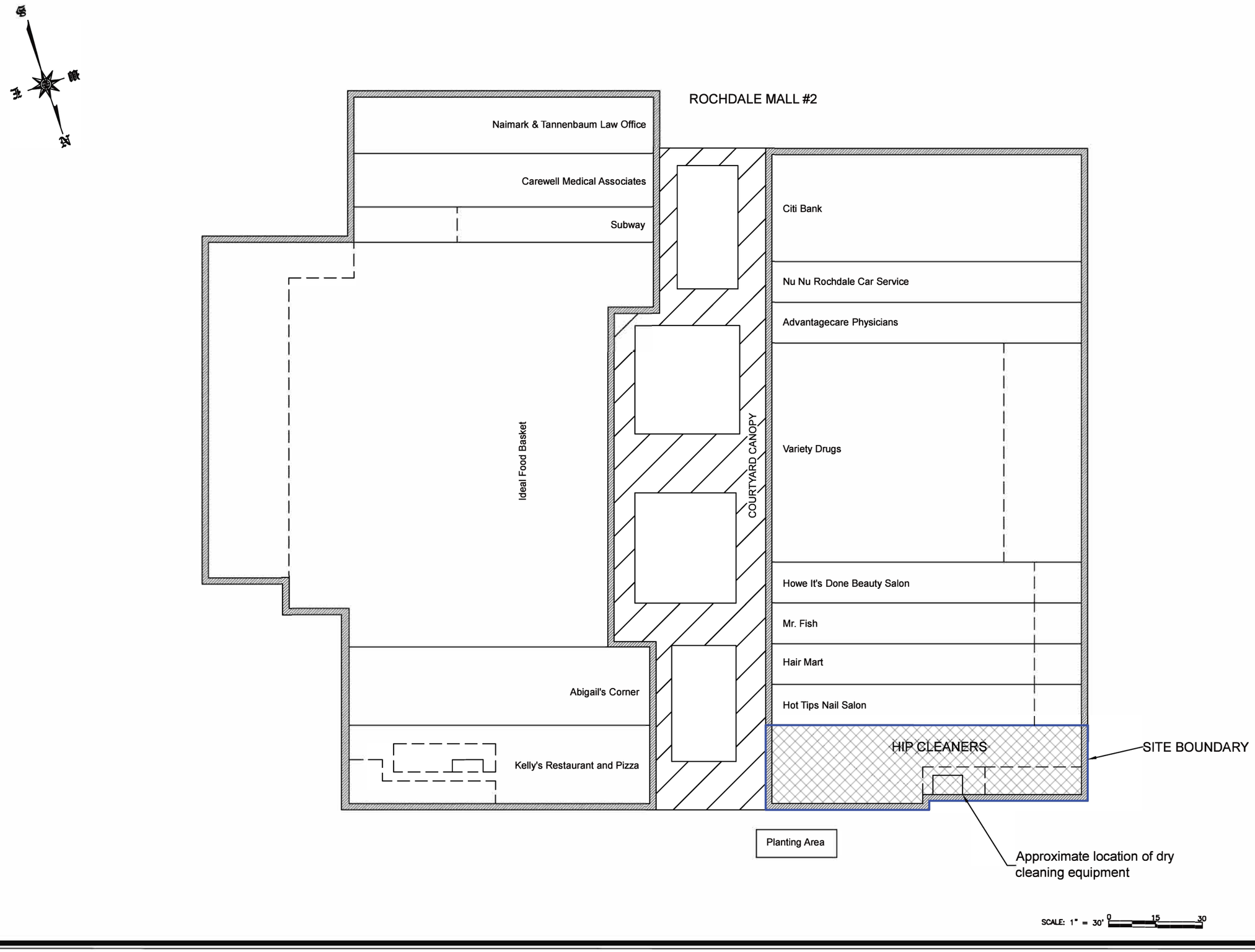
Drawn By	Checked By	Date	Scale
LM	KM	November 2017	As Noted

Drawing Title: **Site Location Map**

Drawing No: **Figure 1**



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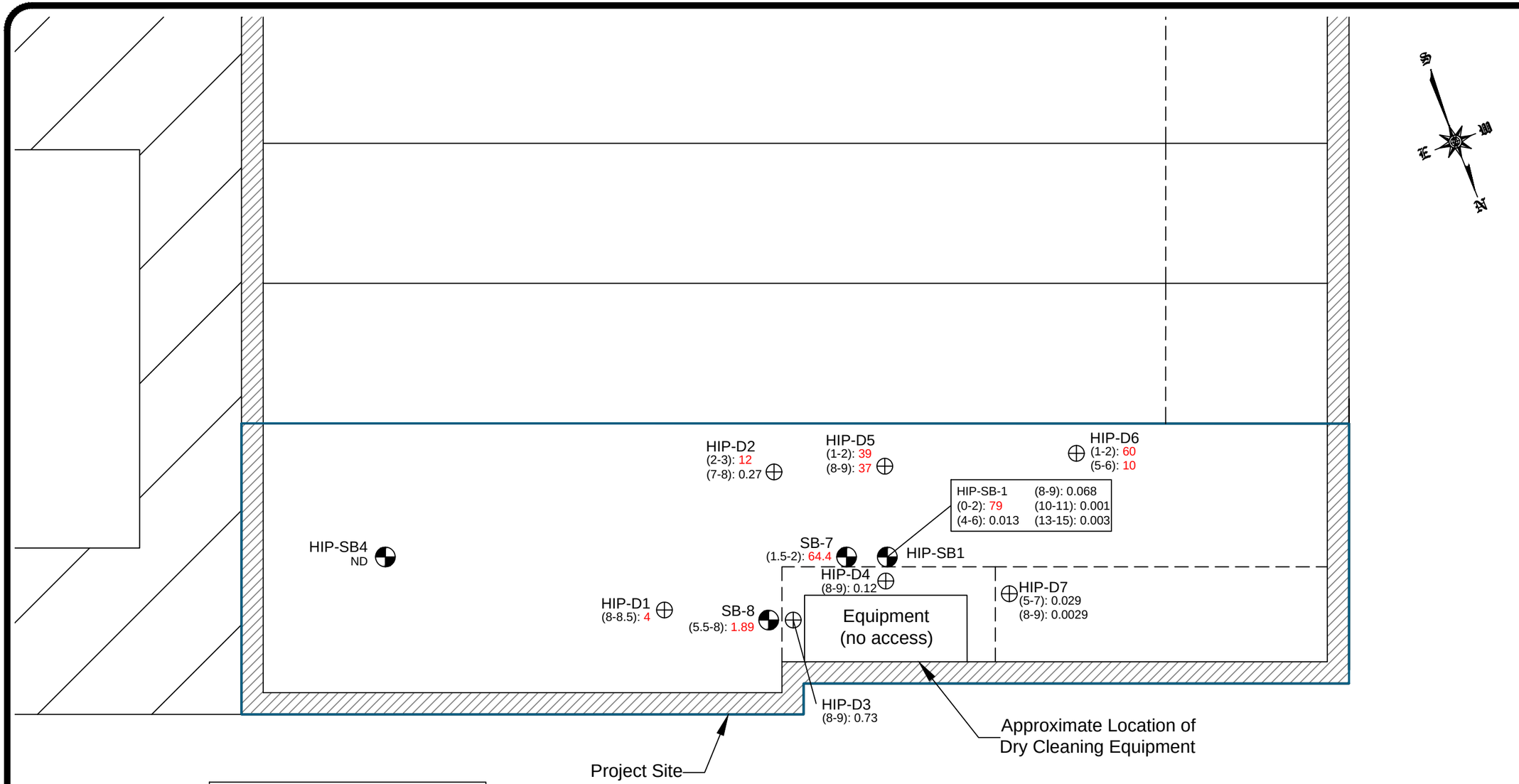
DRAWN BY	CHECKED BY	DATE	SCALE:
KM	MC	MARCH 2016	AS NOTED

DRAWING TITLE: FIGURE 2

DRAWING NO. SITE LAYOUT



Notes:

1. Concentrations of PCE Shown in mg/kg
2. mg/kg = milligrams per kilogram
3. PCE = Perchloroethylene
4. Concentrations above Protection of Groundwater SCO of 1.3 mg/kg are shown in red
5. SCO = Soil Cleanup Objective
6. Sampling intervals are shown in parenthesis, as feet below grade

Legend

- Remedial Investigation Soil Samples
- Pre-Design Soil Samples
- Project Site

0 5' 10' 20'

Drawing Scale

SITE

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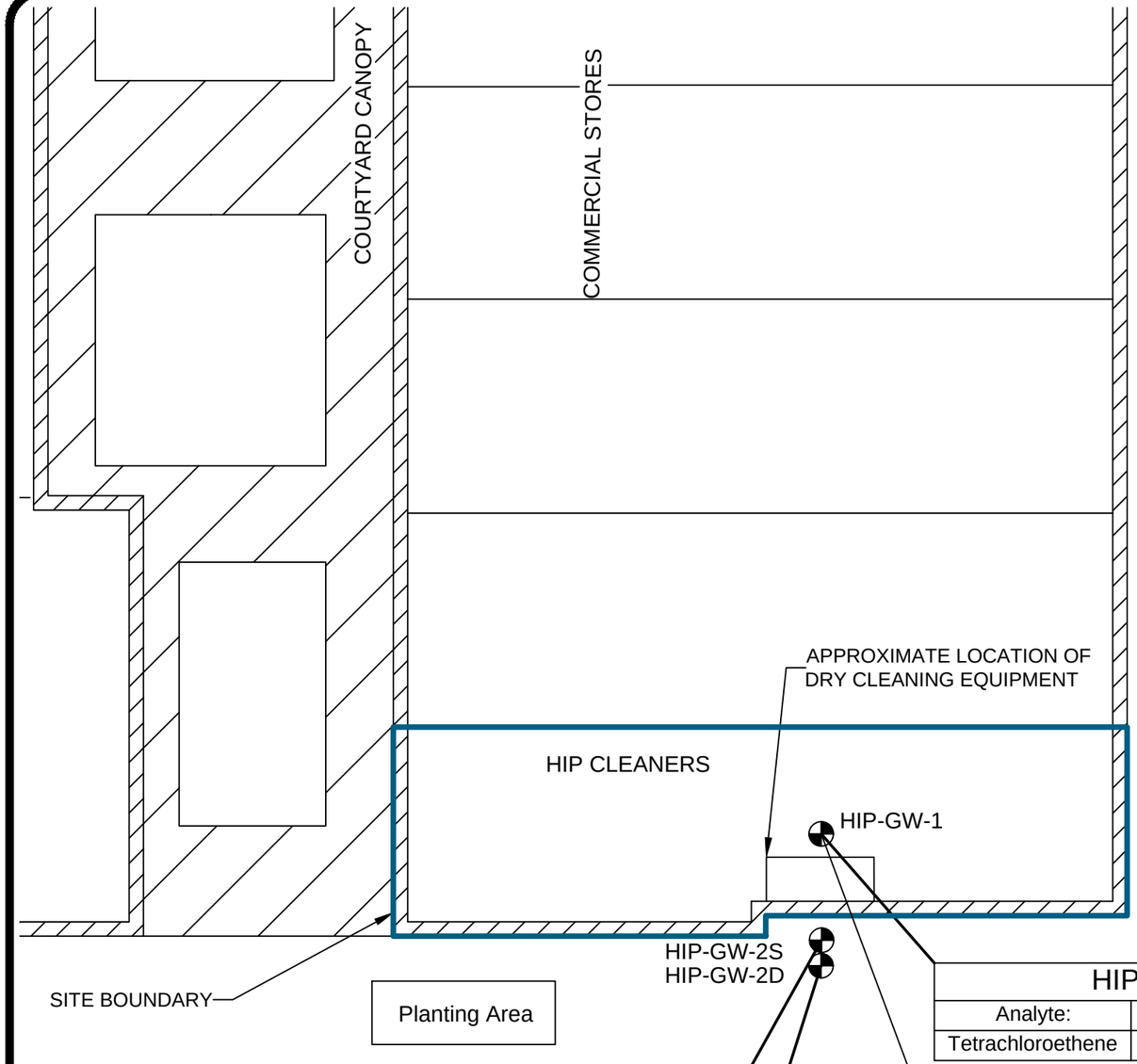
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	KM	February 2019	As Noted

DRAWING TITLE: Summary of PCE in Soil

DRAWING NO.: Figure 3



LEGEND

PERMANENT GROUNDWATER MONITORING WELL

NOTES:

Concentrations highlighted in yellow indicate values above Class GA Standards
Class GA Standards = NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Water Quality Standards and Guidance Values
Units: micrograms per liter (ug/l)
PCE = tetrachloroethene

HIP-GW-7

HIP-GW-7 (8/15/18)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	**14**

HIP-GW-3S (11/18/15)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	**20**

HIP-GW-3S (8/15/18)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	**6.6**

HIP-GW-3D (11/20/15)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	2.7

HIP-GW-3S
HIP-GW-3D

HIP-GW-1 (11/20/15)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	**52**

HIP-GW-2S (11/20/15)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	**13**

HIP-GW-1 (8/15/18)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	**26**

HIP-GW-1 (11/20/15)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	0.5

HIP-GW-6 (12/28/16)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	**4.4**

HIP-GW-6

HIP-GW-6 DUP (12/28/16)		
Analyte:	Class GA Standard	Concentration
Tetrachloroethene	5	**6**

0 10' 20' 40'
Drawing Scale

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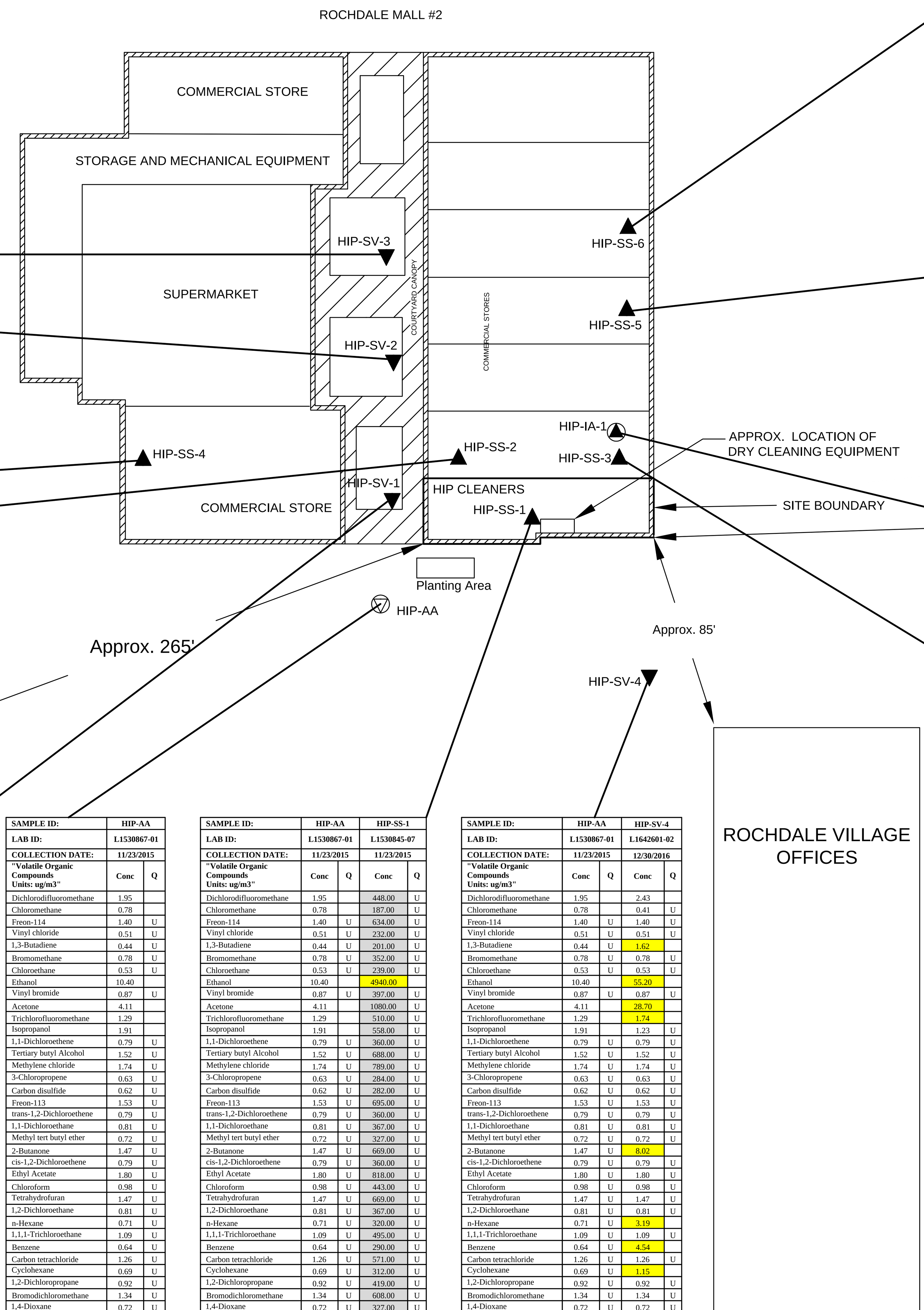
DRAWN BY: LM
CHECKED BY: KM
DATE: January 2019
SCALE: As Noted

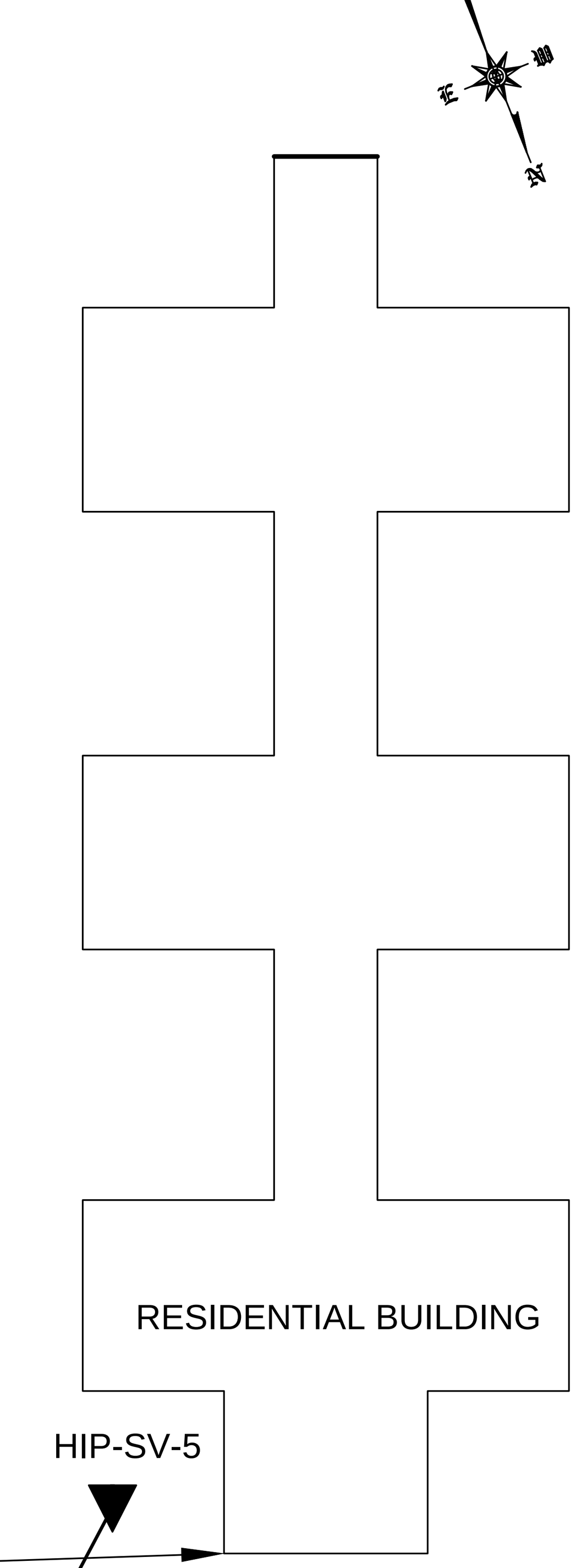
DRAWING TITLE: PCE in Groundwater
DRAWING NO.: Figure 4

SAMPLE ID:	HIP-AA		HIP-SS-4	
LAB ID:	L1530867-01		L1530845-05	
COLLECTION DATE:	11/23/2015		11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		3.36	
Chloromethane	0.78		0.41	U
Freon-114	1.40	U	1.40	U
Vinyl chloride	0.51	U	0.51	U
1,3-Butadiene	0.44	U	0.44	U
Bromomethane	0.78	U	0.78	U
Chloroethane	0.53	U	0.53	U
Ethanol	10.40		198.00	
Vinyl bromide	0.87	U	0.87	
Acetone	4.11		57.00	
Trichlorofluoromethane	1.29		4.66	
Isopropanol	1.91		121.00	
1,1-Dichloroethene	0.79	U	0.79	U
Tertiary butyl Alcohol	1.52	U	2.41	
Methylene chloride	1.74	U	1.74	U
3-Chloropropene	0.63	U	0.63	U
Carbon disulfide	0.62	U	0.62	U
Freon-113	1.53	U	1.53	U
trans-1,2-Dichloroethene	0.79	U	0.79	U
1,1-Dichloroethane	0.81	U	0.81	U
Methyl tert butyl ether	0.72	U	0.72	U
2-Butanone	1.47	U	3.83	
cis-1,2-Dichloroethene	0.79	U	0.79	U
Ethyl Acetate	1.80	U	2.42	
Chloroform	0.98	U	1.04	
Tetrahydrofuran	1.47	U	1.47	U
1,2-Dichloroethane	0.81	U	0.81	U
n-Hexane	0.71	U	0.71	U
1,1,1-Trichloroethane	1.09	U	1.09	U
Benzene	0.64	U	1.15	
Carbon tetrachloride	1.26	U	1.26	U
Cyclohexane	0.69	U	0.69	U
1,2-Dichloropropane	0.92	U	0.92	U
Bromodichloromethane	1.34	U	1.34	U
1,4-Dioxane	0.72	U	0.72	U
Trichloroethene	1.07	U	1.07	U
2,2,4-Trimethylpentane	0.93	U	0.93	U
Heptane	0.82	U	1.40	
cis-1,3-Dichloropropene	0.91	U	0.91	U
4-Methyl-2-pentanone	2.05	U	2.05	U
trans-1,3-Dichloropropene	0.91	U	0.91	U
1,1,2-Trichloroethane	1.09	U	1.09	U
Toluene	1.56		5.58	
2-Hexanone	0.82	U	0.82	U
Dibromochloromethane	1.70	U	1.70	U
1,2-Dibromoethane	1.54	U	1.54	U
Tetrachloroethene	4.24		110.00	
Chlorobenzene	0.92	U	0.92	U
Ethylbenzene	0.87	U	19.50	
p/m-Xylene	1.74	U	96.40	
Bromoform	2.07	U	2.07	U
Styrene	0.85	U	1.65	
1,1,2,2-Tetrachloroethane	1.37	U	1.37	U
o-Xylene	0.87	U	44.70	
4-Ethyltoluene	0.98	U	2.95	
1,3,5-Trimethylbenzene	0.98	U	3.71	
1,2,4-Trimethylbenzene	0.98	U	12.70	
Benzyl chloride	1.04	U	1.04	U
1,3-Dichlorobenzene	1.20	U	1.20	U
1,4-Dichlorobenzene	1.20	U	1.20	U
1,2-Dichlorobenzene	1.20	U	1.20	U
1,2,4-Trichlorobenzene	1.48	U	1.48	U
Hexachlorobutadiene	2.13	U	2.13	U

SAMPLE ID:	HIP-AA		HIP-SV-2	
LAB ID:	L1530867-01		L1530845-02	
COLLECTION DATE:	11/23/2015		11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		1.93	
Chloromethane	0.78		0.76	
Freon-114	1.40	U	1.40	U
Vinyl chloride	0.51	U	0.51	U
1,3-Butadiene	0.44	U	0.44	U
Bromomethane	0.78	U	0.78	U
Chloroethane	0.53	U	0.53	U
Ethanol	10.40		138.00	
Vinyl bromide	0.87	U	0.87	U
Acetone	4.11		24.50	
Trichlorofluoromethane	1.29		1.30	
Isopropanol	1.91		34.40	
1,1-Dichloroethene	0.79	U	0.79	U
Tertiary butyl Alcohol	1.52	U	13.90	
Methylene chloride	1.74	U	1.74	U
3-Chloropropene	0.63	U	0.63	U
Carbon disulfide	0.62	U	0.62	U
Freon-113	1.53	U	1.53	U
trans-1,2-Dichloroethene	0.79	U	0.79	U
1,1-Dichloroethane	0.81	U	0.81	U
Methyl tert butyl ether	0.72	U	0.72	U
2-Butanone	1.47	U	2.38	
cis-1,2-Dichloroethene	0.79	U	0.79	U
Ethyl Acetate	1.80	U	1.80	U
Chloroform	0.98	U	3.76	
Tetrahydrofuran	1.47	U	1.47	U
1,2-Dichloroethane	0.81	U	0.81	U
n-Hexane	0.71	U	0.71	U
1,1,1-Trichloroethane	1.09	U	1.09	U
Benzene	0.64	U	27.90	
Carbon tetrachloride	1.26	U	1.26	U
Cyclohexane	0.69	U	10.40	
1,2-Dichloropropane	0.92	U	0.92	U
Bromodichloromethane	1.34	U	1.34	U
1,4-Dioxane	0.72	U	0.72	U
Trichloroethene	1.07	U	1.07	U
2,2,4-Trimethylpentane	0.93	U	0.93	U
Heptane	0.82	U	0.82	U
cis-1,3-Dichloropropene	0.91	U	0.91	U
4-Methyl-2-pentanone	2.05	U	2.05	U
trans-1,3-Dichloropropene	0.91	U	0.91	U
1,1,2-Trichloroethane	1.09	U	1.09	U
Toluene	1.56		2.46	
2-Hexanone	0.82	U	0.82	U
Dibromochloromethane	1.70	U	1.70	U
1,2-Dibromoethane	1.54	U	1.54	U
Tetrachloroethene	4.24		1.36	U
Chlorobenzene	0.92	U	0.92	U
Ethylbenzene	0.87	U	0.87	U
p/m-Xylene	1.74	U	1.74	U
Bromoform	2.07	U	2.07	U
Styrene	0.85	U	0.85	U
1,1,2,2-Tetrachloroethane	1.37	U	1.37	U
o-Xylene	0.87	U	0.87	U
4-Ethyltoluene	0.98	U	0.98	U
1,3,5-Trimethylbenzene	0.98	U	0.98	U
1,2,4-Trimethylbenzene	0.98	U	0.98	U
Benzyl chloride	1.04	U	1.04	U
1,3-Dichlorobenzene	1.20	U	1.20	U
1,4-Dichlorobenzene	1.20	U	1.20	U
1,2-Dichlorobenzene	1.20	U	1.20	U
1,2,4-Trichlorobenzene	1.48	U	1.48	U
Hexachlorobutadiene	2.13	U	2.13	U

SAMPLE ID:	HIP-AA		HIP-SV-3	
LAB ID:	L1530867-01		L1531046-01	
COLLECTION DATE:	11/23/2015		11/24/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		3.61	
Chloromethane	0.78		1.03	U
Freon-114	1.40	U	3.49	U
Vinyl chloride	0.51	U	1.28	U
1,3-Butadiene	0.44	U	1.11	U
Bromomethane	0.78	U	1.94	U
Chloroethane	0.53	U	1.32	U
Ethanol	10.40		58.00	
Vinyl bromide	0.87	U	2.19	U
Acetone	4.11		25.20	
Trichlorofluoromethane	1.29		262.00	
Isopropanol	1.91		3.07	U
1,1-Dichloroethene	0.79	U	1.98	U
Tertiary butyl Alcohol	1.52	U	3.79	U
Methylene chloride	1.74	U	4.34	U
3-Chloropropene	0.63	U	1.57	U
Carbon disulfide	0.62	U	1.56	U
Freon-113	1.53	U	3.83	U
trans-1,2-Dichloroethene	0.79	U	1.98	U
1,1-Dichloroethane	0.81	U	2.02	U
Methyl tert butyl ether	0.72	U	1.80	U
2-Butanone	1.47	U	3.69	U
cis-1,2-Dichloroethene	0.79	U	1.98	U
Ethyl Acetate	1.80	U	4.50	U
Chloroform	0.98	U	21.50	
Tetrahydrofuran	1.47	U	3.69	U
1,2-Dichloroethane	0.81	U	2.02	U
n-Hexane	0.71	U	1.76	U
1,1,1-Trichloroethane	1.09	U	2.73	U
Benzene	0.64	U	2.23	
Carbon tetrachloride	1.26	U	3.15	U
Cyclohexane	0.69	U	1.72	U
1,2-Dichloropropane	0.92	U	2.31	U
Bromodichloromethane	1.34	U	3.35	U
1,4-Dioxane	0.72	U	1.80	U
Trichloroethene	1.07	U	2.69	U
2,2,4-Trimethylpentane	0.93	U	2.34	U
Heptane	0.82	U	2.05	U
cis-1,3-Dichloropropene	0.91	U	2.27	U
4-Methyl-2-pentanone	2.05	U	5.12	U
trans-1,3-Dichloropropene	0.91	U	2.27	U
1,1,2-Trichloroethane	1.09	U	2.73	U
Toluene	1.56		3.96	
2-Hexanone	0.82	U	2.05	U
Dibromochloromethane	1.70	U	4.26	U
1,2-Dibromoethane	1.54	U	3.84	U
Tetrachloroethene	4.24		1340.00	
Chlorobenzene	0.92	U	2.30	U
Ethylbenzene	0.87	U	3.97	
p/m-Xylene	1.74	U	18.50	
Bromoform	2.07	U	5.17	U
Styrene	0.85	U	2.13	U
1,1,2,2-Tetrachloroethane	1.37	U	3.43	U
o-Xylene	0.87	U	8.77	
4-Ethyltoluene	0.98	U	2.46	U
1,3,5-Trimethylbenzene	0.98	U	2.46	U
1,2,4-Trimethylbenzene	0.98	U	2.62	
Benzyl chloride	1.04	U	2.59	U
1,3-Dichlorobenzene	1.20	U	3.01	U
1,4-Dichlorobenzene	1.20	U	3.01	U
1,2-Dichlorobenzene	1.20	U	3.01	U
1,2,4-Trichlorobenzene	1.48	U	3.71	U
Hexachlorobutadiene	2.13	U	5.33	U





SAMPLE ID:	HIP-AA		HIP-SS-5	
LAB ID:	L1530867-01		L1530845-06	
COLLECTION DATE:	11/23/2015		11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		93.50	U
Chloromethane	0.78		39.00	U
Freon-114	1.40	U	132.00	U
Vinyl chloride	0.51	U	48.30	U
1,3-Butadiene	0.44	U	41.80	U
Bromomethane	0.78	U	73.40	U
Chloroethane	0.53	U	49.90	U
Ethanol	10.40		1050.00	
Vinyl bromide	0.87	U	82.60	U
Acetone	4.11		225.00	U
Trichlorofluoromethane	1.29		106.00	U
Isopropanol	1.91		116.00	U
1,1-Dichloroethene	0.79	U	74.90	U
Tertiary butyl Alcohol	1.52	U	143.00	U
Methylene chloride	1.74	U	164.00	U
3-Chloropropene	0.63	U	59.20	U
Carbon disulfide	0.62	U	58.90	U
Freon-113	1.53	U	145.00	U
trans-1,2-Dichloroethene	0.79	U	74.90	U
1,1-Dichloroethane	0.81	U	76.50	U
Methyl tert butyl ether	0.72	U	68.10	U
2-Butanone	1.47	U	140.00	U
cis-1,2-Dichloroethene	0.79	U	74.90	U
Ethyl Acetate	1.80	U	170.00	U
Chloroform	0.98	U	92.30	U
Tetrahydrofuran	1.47	U	140.00	U
1,2-Dichloroethane	0.81	U	76.50	U
n-Hexane	0.71	U	66.60	U
1,1,1-Trichloroethane	1.09	U	103.00	U
Benzene	0.64	U	60.40	U
Carbon tetrachloride	1.26	U	119.00	U
Cyclohexane	0.69	U	65.10	U
1,2-Dichloropropane	0.92	U	87.30	U
Bromodichloromethane	1.34	U	127.00	U
1,4-Dioxane	0.72	U	68.10	U
Trichloroethene	1.07	U	215.00	
2,2,4-Trimethylpentane	0.93	U	88.30	U
Heptane	0.82	U	77.50	U
cis-1,3-Dichloropropene	0.91	U	85.80	U
4-Methyl-2-pentanone	2.05	U	194.00	U
trans-1,3-Dichloropropene	0.91	U	85.80	U
1,1,2-Trichloroethane	1.09	U	103.00	U
Toluene	1.56		71.20	U
2-Hexanone	0.82	U	77.50	U
Dibromochloromethane	1.70	U	161.00	U
1,2-Dibromoethane	1.54	U	145.00	U
Tetrachloroethene	4.24		40600.00	
Chlorobenzene	0.92	U	87.00	U
Ethylbenzene	0.87	U	82.10	U
p/m-Xylene	1.74	U	164.00	U
Bromoform	2.07	U	195.00	U
Styrene	0.85	U	80.50	U
1,1,2,2-Tetrachloroethane	1.37	U	130.00	U
o-Xylene	0.87	U	82.10	U
4-Ethyltoluene	0.98	U	92.90	U
1,3,5-Trimethylbenzene	0.98	U	92.90	U
1,2,4-Trimethylbenzene	0.98	U	92.90	U
Benzyl chloride	1.04	U	97.90	U
1,3-Dichlorobenzene	1.20	U	114.00	U
1,4-Dichlorobenzene	1.20	U	114.00	U
1,2-Dichlorobenzene	1.20	U	114.00	U
1,2,4-Trichlorobenzene	1.48	U	140.00	U
Hexachlorobutadiene	2.13	U	202.00	U

SAMPLE ID:	HIP-AA		HIP-SS-6	
LAB ID:	L1530867-01		L1530845-08	
COLLECTION DATE:	11/23/2015		11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		325.00	U
Chloromethane	0.78		136.00	U
Freon-114	1.40	U	460.00	U
Vinyl chloride	0.51	U	168.00	U
1,3-Butadiene	0.44	U	146.00	U
Bromomethane	0.78	U	256.00	U
Chloroethane	0.53	U	174.00	U
Ethanol	10.40		3430.00	
Vinyl bromide	0.87	U	288.00	U
Acetone	4.11		782.00	U
Trichlorofluoromethane	1.29		370.00	U
Isopropanol	1.91		403.00	U
1,1-Dichloroethene	0.79	U	261.00	U
Tertiary butyl Alcohol	1.52	U	497.00	U
Methylene chloride	1.74	U	570.00	U
3-Chloropropene	0.63	U	206.00	U
Carbon disulfide	0.62	U	205.00	U
Freon-113	1.53	U	504.00	U
trans-1,2-Dichloroethene	0.79	U	261.00	U
1,1-Dichloroethane	0.81	U	266.00	U
Methyl tert butyl ether	0.72	U	237.00	U
2-Butanone	1.47	U	484.00	U
cis-1,2-Dichloroethene	0.79	U	261.00	U
Ethyl Acetate	1.80	U	591.00	U
Chloroform	0.98	U	321.00	U
Tetrahydrofuran	1.47	U	484.00	U
1,2-Dichloroethane	0.81	U	266.00	U
n-Hexane	0.71	U	232.00	U
1,1,1-Trichloroethane	1.09	U	359.00	U
Benzene	0.64	U	210.00	U
Carbon tetrachloride	1.26	U	414.00	U
Cyclohexane	0.69	U	226.00	U
1,2-Dichloropropane	0.92	U	304.00	U
Bromodichloromethane	1.34	U	441.00	U
1,4-Dioxane	0.72	U	237.00	U
Trichloroethene	1.07	U	354.00	U
2,2,4-Trimethylpentane	0.93	U	307.00	U
Heptane	0.82	U	270.00	U
cis-1,3-Dichloropropene	0.91	U	299.00	U
4-Methyl-2-pentanone	2.05	U	672.00	U
trans-1,3-Dichloropropene	0.91	U	299.00	U
1,1,2-Trichloroethane	1.09	U	359.00	U
Toluene	1.56		248.00	U
2-Hexanone	0.82	U	270.00	U
Dibromochloromethane	1.70	U	561.00	U
1,2-Dibromoethane	1.54	U	506.00	U
Tetrachloroethene	4.24		157000.00	
Chlorobenzene	0.92	U	303.00	U
Ethylbenzene	0.87	U	286.00	U
p/m-Xylene	1.74	U	573.00	U
Bromoform	2.07	U	680.00	U
Styrene	0.85	U	280.00	U
1,1,2,2-Tetrachloroethane	1.37	U	452.00	U
o-Xylene	0.87	U	286.00	U
4-Ethyltoluene	0.98	U	323.00	U
1,3,5-Trimethylbenzene	0.98	U	323.00	U
1,2,4-Trimethylbenzene	0.98	U	323.00	U
Benzyl chloride	1.04	U	341.00	U
1,3-Dichlorobenzene	1.20	U	396.00	U
1,4-Dichlorobenzene	1.20	U	396.00	U
1,2-Dichlorobenzene	1.20	U	396.00	U
1,2,4-Trichlorobenzene	1.48	U	488.00	U
Hexachlorobutadiene	2.13	U	702.00	U

SAMPLE ID:	HIP-AA		HIP-SS-2	
LAB ID:	L1530867-01		L1530845-03	
COLLECTION DATE:	11/23/2015		11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		4.94	U
Chloromethane	0.78		2.07	U
Freon-114	1.40	U	6.99	U
Vinyl chloride	0.51	U	2.56	U
1,3-Butadiene	0.44	U	2.21	U
Bromomethane	0.78	U	3.88	U
Chloroethane	0.53	U	2.64	U
Ethanol	10.40		228.00	
Vinyl bromide	0.87	U	4.37	U
Acetone	4.11		109.00	
Trichlorofluoromethane	1.29		5.62	U
Isopropanol	1.91		97.60	
1,1-Dichloroethene	0.79	U	3.96	U
Tertiary butyl Alcohol	1.52	U	7.58	U
Methylene chloride	1.74	U	8.69	U
3-Chloropropene	0.63	U	3.13	U
Carbon disulfide	0.62	U	3.11	U
Freon-113	1.53	U	7.66	U
trans-1,2-Dichloroethene	0.79	U	3.96	U
1,1-Dichloroethane	0.81	U	4.05	U
Methyl tert butyl ether	0.72	U	3.61	U
2-Butanone	1.47	U	7.37	U
cis-1,2-Dichloroethene	0.79	U	3.96	U
Ethyl Acetate	1.80	U	9.01	U
Chloroform	0.98	U	11.70	
Tetrahydrofuran	1.47	U	7.37	U
1,2-Dichloroethane	0.81	U	4.05	U
n-Hexane	0.71	U	3.52	U
1,1,1-Trichloroethane	1.09	U	5.46	U
Benzene	0.64	U	3.19	U
Carbon tetrachloride	1.26	U	6.29	U
Cyclohexane	0.69	U	3.44	U
1,2-Dichloropropane	0.92	U	4.62	U
Bromodichloromethane	1.34	U	6.70	U
1,4-Dioxane	0.72	U	3.60	U
Trichloroethene	1.07	U	5.37	
2,2,4-Trimethylpentane	0.93	U	4.67	U
Heptane	0.82	U	4.10	U
cis-1,3-Dichloropropene	0.91	U	4.54	U
4-Methyl-2-pentanone	2.05	U	10.20	U
trans-1,3-Dichloropropene	0.91	U	4.54	U
1,1,2-Trichloroethane	1.09	U	5.46	U
Toluene	1.56		7.01	
2-Hexanone	0.82	U	4.10	U
Dibromochloromethane	1.70	U	8.52	U
1,2-Dibromoethane	1.54	U	7.69	U
Tetrachloroethene	4.24		2340.00	
Chlorobenzene	0.92	U	4.61	U
Ethylbenzene	0.87	U	19.80	
p/m-Xylene	1.74	U	92.50	
Bromoform	2.07	U	10.30	U
Styrene	0.85	U	4.26	U
1,1,2,2-Tetrachloroethane	1.37	U	6.87	U
o-Xylene	0.87	U	41.60	
4-Ethyltoluene	0.98	U	4.92	U
1,3,5-Trimethylbenzene	0.98	U	4.92	U
1,2,4-Trimethylbenzene	0.98	U	10.50	
Benzyl chloride	1.04	U	5.18	U
1,3-Dichlorobenzene	1.20	U	6.01	U
1,4-Dichlorobenzene	1.20	U	6.01	U
1,2-Dichlorobenzene	1.20	U	6.01	U
1,2,4-Trichlorobenzene	1.48	U	7.42	U
Hexachlorobutadiene	2.13	U	10.70	U

SAMPLE ID:	HIP-AA		HIP-SV-6	
LAB ID:	L1530867-01		L1642601-01	
COLLECTION DATE:	11/23/2015		12/30/2016	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		2.50	
Chloromethane	0.78		0.41	U
Freon-114	1.40	U	1.40	U
Vinyl chloride	0.51	U	0.51	U
1,3-Butadiene	0.44	U	0.44	U
Bromomethane	0.78	U	0.78	U
Chloroethane	0.53	U	0.53	U
Ethanol	10.40		40.50	
Vinyl bromide	0.87	U	0.87	U
Acetone	4.11		109.00	
Trichlorofluoromethane	1.29		2.28	
Isopropanol	1.91		1.23	U
1,1-Dichloroethene	0.79	U	0.79	U
Tertiary butyl Alcohol	1.52	U	1.52	U
Methylene chloride	1.74	U	1.74	U
3-Chloropropene	0.63	U	0.63	U
Carbon disulfide	0.62	U	0.62	U
Freon-113	1.53	U	1.53	U
trans-1,2-Dichloroethene	0.79	U	0.79	U
1,1-Dichloroethane	0.81	U	0.81	U
Methyl tert butyl ether	0.72	U	0.72	U
2-Butanone	1.47	U	29.50	
cis-1,2-Dichloroethene	0.79	U	0.79	U
Ethyl Acetate	1.80	U	1.80	U
Chloroform	0.98	U	0.98	U
Tetrahydrofuran	1.47	U	1.47	U
1,2-Dichloroethane	0.81	U	0.81	U
n-Hexane	0.71	U	3.46	
1,1,1-Trichloroethane	1.09	U	1.09	U
Benzene	0.64	U	4.06	
Carbon tetrachloride	1.26	U	1.26	U
Cyclohexane	0.69	U	1.23	
1,2-Dichloropropane	0.92	U	0.92	U
Bromodichloromethane	1.34	U	1.34	U
1,4-Dioxane	0.72	U	0.72	U
Trichloroethene	1.07	U	1.07	U
2,2,4-Trimethylpentane	0.93	U	1.56	
Heptane	0.82	U	1.16	
cis-1,3-Dichloropropene	0.91	U	0.91	U
4-Methyl-2-pentanone	2.05	U	2.05	U
trans-1,3-Dichloropropene	0.91	U	0.91	U
1,1,2-Trichloroethane	1.09	U	1.09	U
Toluene	1.56		6.14	
2-Hexanone	0.82	U	0.82	U
Dibromochloromethane	1.70	U	1.70	U
1,2-Dibromoethane	1.54	U	1.54	U
Tetrachloroethene	4.24		1.36	U
Chlorobenzene	0.92	U	0.92	U
Ethylbenzene	0.87	U	0.87	U
p/m-Xylene	1.74	U	1.75	
Bromoform	2.07	U	2.07	U
Styrene	0.85	U	0.85	U
1,1,2,2-Tetrachloroethane	1.37	U	1.37	U
o-Xylene	0.87	U	0.87	U
4-Ethyltoluene	0.98	U	0.98	U
1,3,5-Trimethylbenzene	0.98	U	0.98	U
1,2,4-Trimethylbenzene	0.98	U	0.98	U
Benzyl chloride	1.04	U	1.04	U
1,3-Dichlorobenzene	1.20	U	1.20	U
1,4-Dichlorobenzene	1.20	U	1.20	U
1,2-Dichlorobenzene	1.20	U	1.20	U
1,2,4-Trichlorobenzene	1.48	U	1.48	U
Hexachlorobutadiene	2.13	U	2.13	U

SAMPLE ID:	HIP-AA		HIP-SV-1	
LAB ID:	L1530867-01		L1530845-01	
COLLECTION DATE:	11/23/2015		11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		2.03	
Chloromethane	0.78		0.41	U
Freon-114	1.40	U	1.40	U
Vinyl chloride	0.51	U	0.51	U
1,3-Butadiene	0.44	U	0.44	U
Bromomethane	0.78	U	0.78	U
Chloroethane	0.53	U	0.53	U
Ethanol	10.40		125.00	
Vinyl bromide	0.87	U	0.87	U
Acetone	4.11		15.40	
Trichlorofluoromethane	1.29		1.39	
Isopropanol	1.91		23.20	
1,1-Dichloroethene	0.79	U	0.79	U
Tertiary butyl Alcohol	1.52	U	1.52	U
Methylene chloride	1.74	U	1.74	U
3-Chloropropene	0.63	U	0.63	U
Carbon disulfide	0.62	U	0.62	U
Freon-113	1.53	U	1.53	U
trans-1,2-Dichloroethene	0.79	U	0.79	U
1,1-Dichloroethane	0.81	U	0.81	U
Methyl tert butyl ether	0.72	U	0.72	U
2-Butanone	1.47	U	1.47	U
cis-1,2-Dichloroethene	0.79	U	0.79	U
Ethyl Acetate	1.80	U	1.80	U
Chloroform	0.98	U	0.98	U
Tetrahydrofuran	1.47	U	1.47	U
1,2-Dichloroethane	0.81	U	0.81	U
n-Hexane	0.71	U	0.71	U
1,1,1-Trichloroethane	1.09	U	1.09	U
Benzene	0.64	U	1.92	
Carbon tetrachloride	1.26	U	1.26	U
Cyclohexane	0.69	U	0.69	U
1,2-Dichloropropane	0.92	U	0.92	U
Bromodichloromethane	1.34	U	1.34	U
1,4-Dioxane	0.72	U	0.72	U
Trichloroethene	1.07	U	1.07	U
2,2,4-Trimethylpentane	0.93	U	0.93	U
Heptane	0.82	U	0.82	U
cis-1,3-Dichloropropene	0.91	U	0.91	U
4-Methyl-2-pentanone	2.05	U	2.05	U
trans-1,3-Dichloropropene	0.91	U	0.91	U
1,1,2-Trichloroethane	1.09	U	1.09	U
Toluene	1.56		2.17	
2-Hexanone	0.82	U	0.82	U
Dibromochloromethane	1.70	U	1.70	U
1,2-Dibromoethane	1.54	U	1.54	U
Tetrachloroethene	4.24		1.36	U
Chlorobenzene	0.92	U	0.92	U
Ethylbenzene	0.87	U	10.40	
p/m-Xylene	1.74	U	54.70	
Bromoform	2.07	U	2.07	U
Styrene	0.85	U	0.85	U
1,1,2,2-Tetrachloroethane	1.37	U	1.37	U
o-Xylene	0.87	U	23.50	
4-Ethyltoluene	0.98	U	1.07	
1,3,5-Trimethylbenzene	0.98	U	1.52	
1,2,4-Trimethylbenzene	0.98	U	4.64	
Benzyl chloride	1.04	U	1.04	U
1,3-Dichlorobenzene	1.20	U	2.93	
1,4-Dichlorobenzene	1.20	U	1.20	U
1,2-Dichlorobenzene	1.20	U	1.20	U
1,2,4-Trichlorobenzene	1.48	U	1.48	U
Hexachlorobutadiene	2.13	U	2.13	U

SAMPLE ID:	HIP-AA	
LAB ID:	L1530867-01	
COLLECTION DATE:	11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q
Dichlorodifluoromethane	1.95	
Chloromethane	0.78	
Freon-114	1.40	U
Vinyl chloride	0.51	U
1,3-Butadiene	0.44	U
Bromomethane	0.78	U
Chloroethane	0.53	U
Ethanol	10.40	
Vinyl bromide	0.87	U
Acetone	4.11	
Trichlorofluoromethane	1.29	
Isopropanol	1.91	
1,1-Dichloroethene	0.79	U
Tertiary butyl Alcohol	1.52	U
Methylene chloride	1.74	U
3-Chloropropene	0.63	U
Carbon disulfide	0.62	U
Freon-113	1.53	U
trans-1,2-Dichloroethene	0.79	U
1,1-Dichloroethane	0.81	U
Methyl tert butyl ether	0.72	U
2-Butanone	1.47	U
cis-1,2-Dichloroethene	0.79	U
Ethyl Acetate	1.80	U
Chloroform	0.98	U
Tetrahydrofuran	1.47	U
1,2-Dichloroethane	0.81	U
n-Hexane	0.71	U
1,1,1-Trichloroethane	1.09	U
Benzene	0.64	U
Carbon tetrachloride	1.26	U
Cyclohexane	0.69	U
1,2-Dichloropropane	0.92	U
Bromodichloromethane	1.34	U
1,4-Dioxane	0.72	U
Trichloroethene	1.07	U
2,2,4-Trimethylpentane	0.93	U
Heptane	0.82	U
cis-1,3-Dichloropropene	0.91	U
4-Methyl-2-pentanone	2.05	U
trans-1,3-Dichloropropene	0.91	U
1,1,2-Trichloroethane	1.09	U
Toluene	1.56	
2-Hexanone	0.82	U
Dibromochloromethane	1.70	U
1,2-Dibromoethane	1.54	U
Tetrachloroethene	4.24	
Chlorobenzene	0.92	U
Ethylbenzene	0.87	U
p/m-Xylene	1.74	U
Bromoform	2.07	U
Styrene	0.85	U
1,1,2,2-Tetrachloroethane	1.37	U
o-Xylene	0.87	U
4-Ethyltoluene	0.98	U
1,3,5-Trimethylbenzene	0.98	U
1,2,4-Trimethylbenzene	0.98	U
Benzyl chloride	1.04	U
1,3-Dichlorobenzene	1.20	U
1,4-Dichlorobenzene	1.20	U
1,2-Dichlorobenzene	1.20	U
1,2,4-Trichlorobenzene	1.48	U
Hexachlorobutadiene	2.13	U

SAMPLE ID:	HIP-AA		HIP-SS-1	
LAB ID:	L1530867-01		L1530845-07	
COLLECTION DATE:	11/23/2015		11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		448.00	U
Chloromethane	0.78		187.00	U
Freon-114	1.40	U	634.00	U
Vinyl chloride	0.51	U	232.00	U
1,3-Butadiene	0.44	U	201.00	U
Bromomethane	0.78	U	352.00	U
Chloroethane	0.53	U	239.00	U
Ethanol	10.40		4940.00	
Vinyl bromide	0.87	U	397.00	U
Acetone	4.11		1080.00	U
Trichlorofluoromethane	1.29		510.00	U
Isopropanol	1.91		558.00	U
1,1-Dichloroethene	0.79	U	360.00	U
Tertiary butyl Alcohol	1.52	U	688.00	U
Methylene chloride	1.74	U	789.00	U
3-Chloropropene	0.63	U	284.00	U
Carbon disulfide	0.62	U	282.00	U
Freon-113	1.53	U	695.00	U
trans-1,2-Dichloroethene	0.79	U	360.00	U
1,1-Dichloroethane	0.81	U	367.00	U
Methyl tert butyl ether	0.72	U	327.00	U
2-Butanone	1.47	U	669.00	U
cis-1,2-Dichloroethene	0.79	U	360.00	U
Ethyl Acetate	1.80	U	818.00	U
Chloroform	0.98	U	443.00	U
Tetrahydrofuran	1.47	U	669.00	U
1,2-Dichloroethane	0.81	U	367.00	U
n-Hexane	0.71	U	320.00	U
1,1,1-Trichloroethane	1.09	U	495.00	U
Benzene	0.64	U	290.00	U
Carbon tetrachloride	1.26	U	571.00	U
Cyclohexane	0.69	U	312.00	U
1,2-Dichloropropane	0.92	U	419.00	U
Bromodichloromethane	1.34	U	608.00	U
1,4-Dioxane	0.72	U	327.00	U
Trichloroethene	1.07	U	1240.00	
2,2,4-Trimethylpentane	0.93	U	424.00	U
Heptane	0.82	U	372.00	U
cis-1,3-Dichloropropene	0.91	U	412.00	U
4-Methyl-2-pentanone	2.05	U	930.00	U
trans-1,3-Dichloropropene	0.91	U	412.00	U
1,1,2-Trichloroethane	1.09	U	495.00	U
Toluene	1.56		342.00	U
2-Hexanone	0.82	U	372.00	U
Dibromochloromethane	1.70	U	773.00	U
1,2-Dibromoethane	1.54	U	697.00	U
Tetrachloroethene	4.24		403000.00	
Chlorobenzene	0.92	U	418.00	U
Ethylbenzene	0.87	U	394.00	U
p/m-Xylene	1.74	U	786.00	U
Bromoform	2.07	U	938.00	U
Styrene	0.85	U	386.00	U
1,1,2,2-Tetrachloroethane	1.37	U	623.00	U
o-Xylene	0.87	U	394.00	U
4-Ethyltoluene	0.98	U	446.00	U
1,3,5-Trimethylbenzene	0.98	U	446.00	U
1,2,4-Trimethylbenzene	0.98	U	446.00	U
Benzyl chloride	1.04	U	470.00	U
1,3-Dichlorobenzene	1.20	U	545.00	U
1,4-Dichlorobenzene	1.20	U	545.00	U
1,2-Dichlorobenzene	1.20	U	545.00	U
1,2,4-Trichlorobenzene	1.48	U	673.00	U
Hexachlorobutadiene	2.13	U	967.00	U

SAMPLE ID:	HIP-AA		HIP-SV-4	
LAB ID:	L1530867-01		L1642601-02	
COLLECTION DATE:	11/23/2015		12/30/2016	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		2.43	
Chloromethane	0.78		0.41	U
Freon-114	1.40	U	1.40	U
Vinyl chloride	0.51	U	0.51	U
1,3-Butadiene	0.44	U	1.62	
Bromomethane	0.78	U	0.78	U
Chloroethane	0.53	U	0.53	U
Ethanol	10.40		55.20	
Vinyl bromide	0.87	U	0.87	U
Acetone	4.11		28.70	
Trichlorofluoromethane	1.29		1.74	
Isopropanol	1.91		1.23	U
1,1-Dichloroethene	0.79	U	0.79	U
Tertiary butyl Alcohol	1.52	U	1.52	U
Methylene chloride	1.74	U	1.74	U
3-Chloropropene	0.63	U	0.63	U
Carbon disulfide	0.62	U	0.62	U
Freon-113	1.53	U	1.53	U
trans-1,2-Dichloroethene	0.79	U	0.79	U
1,1-Dichloroethane	0.81	U	0.81	U
Methyl tert butyl ether	0.72	U	0.72	U
2-Butanone	1.47	U	8.02	
cis-1,2-Dichloroethene	0.79	U	0.79	U
Ethyl Acetate	1.80	U	1.80	U
Chloroform	0.98	U	0.98	U
Tetrahydrofuran	1.47	U	1.47	U
1,2-Dichloroethane	0.81	U	0.81	U
n-Hexane	0.71	U	3.19	
1,1,1-Trichloroethane	1.09	U	1.09	U
Benzene	0.64	U	4.54	
Carbon tetrachloride	1.26	U	1.26	U
Cyclohexane	0.69	U	1.15	
1,2-Dichloropropane	0.92	U	0.92	U
Bromodichloromethane	1.34	U	1.34	U
1,4-Dioxane	0.72	U	0.72	U
Trichloroethene	1.07	U	1.07	U
2,2,4-Trimethylpentane	0.93	U	1.70	
Heptane	0.82	U	1.30	
cis-1,3-Dichloropropene	0.91	U	0.91	U
4-Methyl-2-pentanone	2.05	U	2.05	U
trans-1,3-Dichloropropene	0.91	U	0.91	U
1,1,2-Trichloroethane	1.09	U	1.09	U
Toluene	1.56		8.89	
2-Hexanone	0.82	U	0.82	U
Dibromochloromethane	1.70	U	1.70	U
1,2-Dibromoethane	1.54	U	1.54	U
Tetrachloroethene	4.24		4.75	
Chlorobenzene	0.92	U	0.92	U
Ethylbenzene	0.87	U	0.87	U
p/m-Xylene	1.74	U	1.98	
Bromoform	2.07	U	2.07	U
Styrene	0.85	U	0.85	U
1,1,2,2-Tetrachloroethane	1.37	U	1.37	U
o-Xylene	0.87	U	0.87	U
4-Ethyltoluene	0.98	U	0.98	U
1,3,5-Trimethylbenzene	0.98	U	0.98	U
1,2,4-Trimethylbenzene	0.98	U	1.03	
Benzyl chloride	1.04	U	1.04	U
1,3-Dichlorobenzene	1.20	U	1.20	U
1,4-Dichlorobenzene	1.20	U	1.20	U
1,2-Dichlorobenzene	1.20	U	1.20	U
1,2,4-Trichlorobenzene	1.48	U	33.00	
Hexachlorobutadiene	2.13	U	2.13	U

SAMPLE ID:	HIP-AA		HIP-SS-3	
LAB ID:	L1530867-01		L1530845-04	
COLLECTION DATE:	11/23/2015		11/23/2015	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		668.00	U
Chloromethane	0.78		279.00	U
Freon-114	1.40	U	944.00	U
Vinyl chloride	0.51	U	345.00	U
1,3-Butadiene	0.44	U	299.00	U
Bromomethane	0.78	U	524.00	U
Chloroethane	0.53	U	356.00	U
Ethanol	10.40		6820.00	
Vinyl bromide	0.87	U	590.00	U
Acetone	4.11		1600.00	U
Trichlorofluoromethane	1.29		759.00	U
Isopropanol	1.91		828.00	U
1,1-Dichloroethene	0.79	U	535.00	U
Tertiary butyl Alcohol	1.52	U	1020.00	U
Methylene chloride	1.74	U	1170.00	U
3-Chloropropene	0.63	U	423.00	U
Carbon disulfide	0.62	U	420.00	U
Freon-113	1.53	U	1030.00	U
trans-1,2-Dichloroethene	0.79	U	535.00	U
1,1-Dichloroethane	0.81	U	546.00	U
Methyl tert butyl ether	0.72	U	487.00	U
2-Butanone	1.47	U	994.00	U
cis-1,2-Dichloroethene	0.79	U	535.00	U
Ethyl Acetate	1.80	U	1210.00	U
Chloroform	0.98	U	659.00	U
Tetrahydrofuran	1.47	U	994.00	U
1,2-Dichloroethane	0.81	U	546.00	U
n-Hexane	0.71	U	476.00	U
1,1,1-Trichloroethane	1.09	U	737.00	U
Benzene	0.64	U	431.00	U
Carbon tetrachloride	1.26	U	849.00	U
Cyclohexane	0.69	U	465.00	U
1,2-Dichloropropane	0.92	U	624.00	U
Bromodichloromethane	1.34	U	904.00	U
1,4-Dioxane	0.72	U	486.00	U
Trichloroethene	1.07	U	2790.00	
2,2,4-Trimethylpentane	0.93	U	631.00	U
Heptane	0.82	U	553.00	U
cis-1,3-Dichloropropene	0.91	U	613.00	U
4-Methyl-2-pentanone	2.05	U	1380.00	U
trans-1,3-Dichloropropene	0.91	U	613.00	U
1,1,2-Trichloroethane	1.09	U	737.00	U
Toluene	1.56		509.00	U
2-Hexanone	0.82	U	553.00	U
Dibromochloromethane	1.70	U	1150.00	U
1,2-Dibromoethane	1.54	U	1040.00	U
Tetrachloroethene	4.24		780000.00	
Chlorobenzene	0.92	U	622.00	U
Ethylbenzene	0.87	U	586.00	U
p/m-Xylene	1.74	U	1170.00	U
Bromoform	2.07	U	1400.00	U
Styrene	0.85	U	575.00	U
1,1,2,2-Tetrachloroethane	1.37	U	927.00	U
o-Xylene	0.87	U	586.00	U
4-Ethyltoluene	0.98	U	664.00	U
1,3,5-Trimethylbenzene	0.98	U	664.00	U
1,2,4-Trimethylbenzene	0.98	U	664.00	U
Benzyl chloride	1.04	U	699.00	U
1,3-Dichlorobenzene	1.20	U	812.00	U
1,4-Dichlorobenzene	1.20	U	812.00	U
1,2-Dichlorobenzene	1.20	U	812.00	U
1,2,4-Trichlorobenzene	1.48	U	1000.00	U
Hexachlorobutadiene	2.13	U	1440.00	U

SAMPLE ID:	HIP-AA		HIP-IA-1	
LAB ID:	L1530867-01		L1642440-01	
COLLECTION DATE:	11/23/2015		12/28/2016	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		3.05	
Chloromethane	0.78		1.15	
Freon-114	1.40	U	1.40	U
Vinyl chloride	0.51	U	0.05	U
1,3-Butadiene	0.44	U	0.44	U
Bromomethane	0.78	U	0.78	U
Chloroethane	0.53	U	2.16	
Ethanol	10.40		124.00	
Vinyl bromide	0.87	U	0.87	U
Acetone	4.11		9070.00	E
Trichlorofluoromethane	1.29		1.60	
Isopropanol	1.91		1420.00	E
1,1-Dichloroethene	0.79	U	0.08	U
Tertiary butyl Alcohol	1.52	U	1.52	U
Methylene chloride	1.74	U	1.74	U
3-Chloropropene	0.63	U	0.63	U
Carbon disulfide	0.62	U	0.62	U
Freon-113	1.53	U	1.53	U
trans-1,2-Dichloroethene	0.79	U	0.79	U
1,1-Dichloroethane	0.81	U	0.81	U
Methyl tert butyl ether	0.72	U	0.72	U
2-Butanone	1.47	U	1.79	
cis-1,2-Dichloroethene	0.79	U	0.08	U
Ethyl Acetate	1.80	U	443.00	E
Chloroform	0.98	U	1.27	
Tetrahydrofuran	1.47	U	1.47	U
1,2-Dichloroethane	0.81	U	0.81	U
n-Hexane	0.71	U	0.71	U
1,1,1-Trichloroethane	1.09	U	0.11	U
Benzene	0.64	U	0.64	U
Carbon tetrachloride	1.26	U	0.64	
Cyclohexane	0.69	U	0.69	U
1,2-Dichloropropane	0.92	U	0.92	U
Bromodichloromethane	1.34	U	1.34	U
1,4-Dioxane	0.72	U	0.72	U
Trichloroethene	1.07	U	0.27	
2,2,4-Trimethylpentane	0.93	U	0.93	U
Heptane	0.82	U	0.86	
cis-1,3-Dichloropropene	0.91	U	0.91	U
4-Methyl-2-pentanone	2.05	U	2.05	U
trans-1,3-Dichloropropene	0.91	U	0.91	U
1,1,2-Trichloroethane	1.09	U	1.09	U
Toluene	1.56		3.36	
2-Hexanone	0.82	U	0.82	U
Dibromochloromethane	1.70	U	1.70	U
1,2-Dibromoethane	1.54	U	1.54	U
Tetrachloroethene	4.24		37.10	
Chlorobenzene	0.92	U	0.92	U
Ethylbenzene	0.87	U	0.87	U
p/m-Xylene	1.74	U	1.74	U
Bromoform	2.07	U	2.07	U
Styrene	0.85	U	0.85	U
1,1,2,2-Tetrachloroethane	1.37	U	1.37	U
o-Xylene	0.87	U	0.87	U
4-Ethyltoluene	0.98	U	0.98	U
1,3,5-Trimethylbenzene	0.98	U	0.98	U
1,2,4-Trimethylbenzene	0.98	U	0.98	U
Benzyl chloride	1.04	U	1.04	U
1,3-Dichlorobenzene	1.20	U	1.20	U
1,4-Dichlorobenzene	1.20	U	1.20	U
1,2-Dichlorobenzene	1.20	U	1.20	U
1,2,4-Trichlorobenzene	1.48	U	1.48	U
Hexachlorobutadiene	2.13	U	2.13	U

SAMPLE ID:	HIP-AA		HIP-SV-5	
LAB ID:	L1530867-01		L1642601-03	
COLLECTION DATE:	11/23/2015		12/30/2016	
"Volatile Organic Compounds Units: ug/m3"	Conc	Q	Conc	Q
Dichlorodifluoromethane	1.95		9.89	U
Chloromethane	0.78		4.13	U
Freon-114	1.40	U	14.00	U
Vinyl chloride	0.51	U	5.11	U
1,3-Butadiene	0.44	U	4.42	U
Bromomethane	0.78	U	7.77	U
Chloroethane	0.53	U	5.28	U
Ethanol	10.40		94.20	U
Vinyl bromide	0.87	U	8.74	U
Acetone	4.11		23.80	U
Trichlorofluoromethane	1.29		2350.00	
Isopropanol	1.91		12.30	U
1,1-Dichloroethene	0.79	U	7.93	U
Tertiary butyl Alcohol	1.52	U	15.20	U
Methylene chloride	1.74	U	17.40	U
3-Chloropropene	0.63	U	6.26	U
Carbon disulfide	0.62	U	6.23	U
Freon-113	1.53	U	15.30	U
trans-1,2-Dichloroethene	0.79	U	7.93	U
1,1-Dichloroethane	0.81	U	8.09	U
Methyl tert butyl ether	0.72	U	7.21	U
2-Butanone	1.47	U	14.70	U
cis-1,2-Dichloroethene	0.79	U	7.93	U
Ethyl Acetate	1.80	U	18.00	U
Chloroform	0.98	U	9.77	U
Tetrahydrofuran	1.47	U	14.70	U
1,2-Dichloroethane	0.81	U	8.09	U
n-Hexane	0.71	U	7.05	U
1,1,1-Trichloroethane	1.09	U	10.90	U
Benzene	0.64	U	6.39	U
Carbon tetrachloride	1.26	U	12.60	U
Cyclohexane	0.69	U	6.88	U
1,2-Dichloropropane	0.92	U	9.24	U
Bromodichloromethane	1.34	U	13.40	U
1,4-Dioxane	0.72	U	7.21	U
Trichloroethene	1.07	U	10.70	U
2,2,4-Trimethylpentane	0.93	U	9.34	U
Heptane	0.82	U	8.20	U
cis-1,3-Dichloropropene	0.91	U	9.08	U
4-Methyl-2-pentanone	2.05	U	20.50	U
trans-1,3-Dichloropropene	0.91	U	9.08	U
1,1,2-Trichloroethane	1.09	U	10.90	U
Toluene	1.56		7.54	U
2-Hexanone	0.82	U	8.20	U
Dibromochloromethane	1.70	U	17.00	U
1,2-Dibromoethane	1.54	U	15.40	U
Tetrachloroethene	4.24		13.60	U
Chlorobenzene	0.92	U	9.21	U
Ethylbenzene	0.87	U	8.69	U
p/m-Xylene	1.74	U	17.40	U
Bromoform	2.07	U	20.70	U
Styrene	0.85	U	8.52	U
1,1,2,2-Tetrachloroethane	1.37	U	13.70	U
o-Xylene	0.87	U	8.69	U
4-Ethyltoluene	0.98	U	9.83	U
1,3,5-Trimethylbenzene	0.98	U	9.83	U
1,2,4-Trimethylbenzene	0.98	U	9.83	U
Benzyl chloride	1.04	U	10.40	U
1,3-Dichlorobenzene	1.20	U	12.00	U
1,4-Dichlorobenzene	1.20	U	12.00	U
1,2-Dichlorobenzene	1.20	U	12.00	U
1,2,4-Trichlorobenzene	1.48	U	14.80	U
Hexachlorobutadiene	2.13	U	21.30	U

NOTES:

Cells highlighted in yellow indicate concentrations above the ambient level (HIP-AA)
Cells shaded in grey indicate RL concentrations above the ambient level
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the RL is shown
U = not detected at or above the RL
Results and RL values are in micrograms per cubic meter (ug/m3)

LEGEND

- ▲ SUB-SLAB VAPOR POINT
- ▼ SOIL VAPOR POINT
- AMBIENT AIR
- INDOOR AIR

0 20' 40' 80'
Drawing Scale

SITE
HIP Cleaners
Rochdale Village
169-47 137th Avenue
Jamaica Queens

CONSULTANT
TENEN ENVIRONMENTAL

TENEN ENVIRONMENTAL, LLC
121 West 27th Street
Suit 702
New York, NY 10001
O: 646-606-2332
F: 646-606-2379

DRAWN BY: LM

CHECKED BY: KM

DATE: October 2017

SCALE: As Noted

DRAWING TITLE:
Summary of Soil Vapor Concentrations Compared to Ambient Air Concentrations

DRAWING NO.
Figure 5A

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SV-3
LAB ID:			L1531046-01
COLLECTION DATE:			11/24/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	4.34 U
Trichloroethene	A	2	2.69 U
Tetrachloroethene	B	30	1340

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SS-2
LAB ID:			L1530845-03
COLLECTION DATE:			11/23/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	8.69 U
Trichloroethene	A	2	5.37
Tetrachloroethene	B	30	2340

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SS-6
LAB ID:			L1530845-08
COLLECTION DATE:			11/23/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	570 U
Trichloroethene	A	2	354 U
Tetrachloroethene	B	30	157000

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SV-2
LAB ID:			L1530845-02
COLLECTION DATE:			11/23/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	1.74 U
Trichloroethene	A	2	1.07 U
Tetrachloroethene	B	30	1.36 U

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SS-5
LAB ID:			L1530845-06
COLLECTION DATE:			11/23/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	164 U
Trichloroethene	A	2	215
Tetrachloroethene	B	30	40600

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SV-1
LAB ID:			L1530845-01
COLLECTION DATE:			11/23/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	1.74 U
Trichloroethene	A	2	1.07 U
Tetrachloroethene	B	30	1.36 U

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-IA-1
LAB ID:			L1642440-01
COLLECTION DATE:			12/28/2016
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	1.74 U
Trichloroethene	A	2	0.274
Tetrachloroethene	B	30	37.1

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SV-5
LAB ID:			L1642601-03
COLLECTION DATE:			12/30/2016
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	17.4 U
Trichloroethene	A	2	10.7 U
Tetrachloroethene	B	30	13.6 U

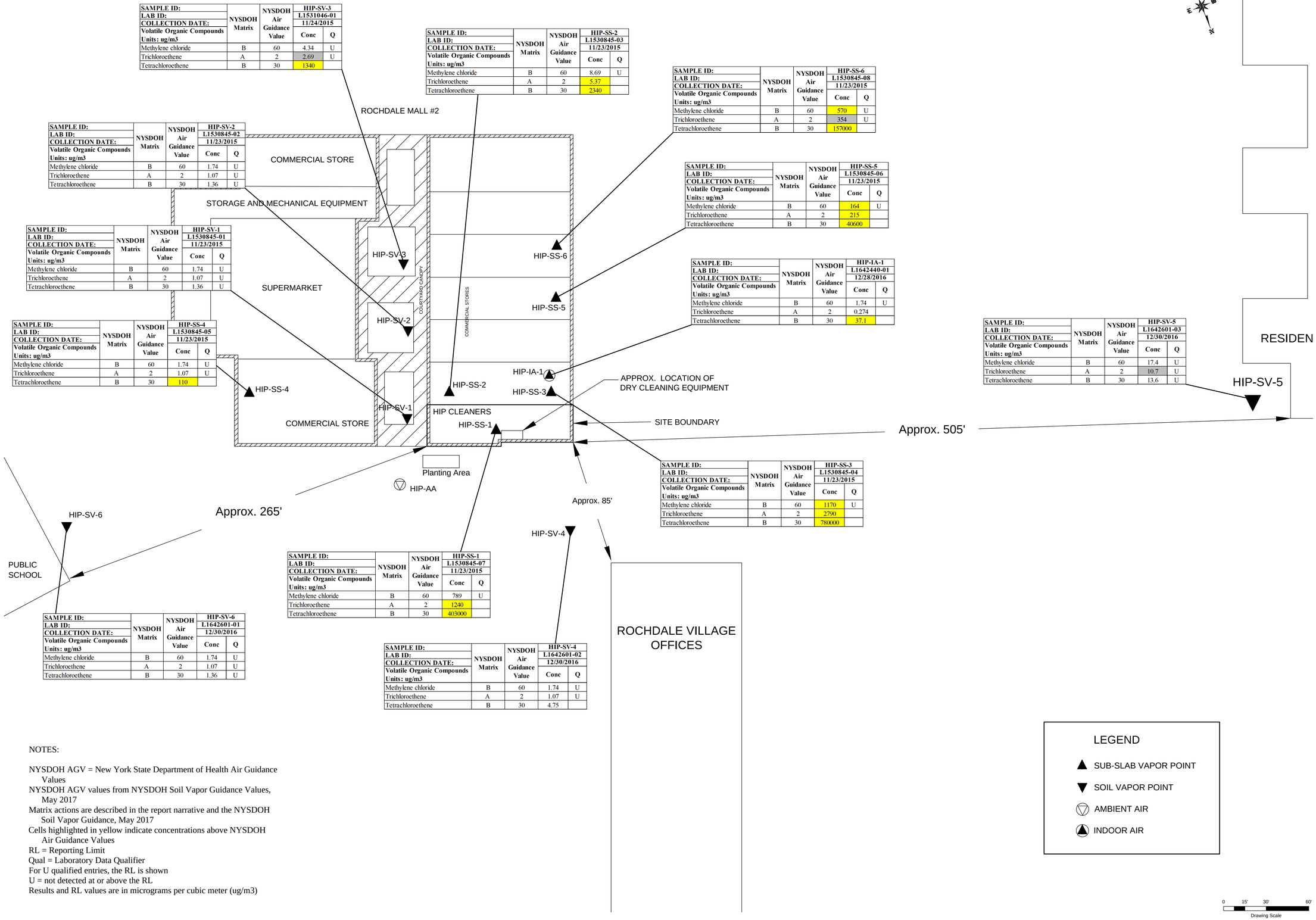
SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SS-4
LAB ID:			L1530845-05
COLLECTION DATE:			11/23/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	1.74 U
Trichloroethene	A	2	1.07 U
Tetrachloroethene	B	30	110

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SS-3
LAB ID:			L1530845-04
COLLECTION DATE:			11/23/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	1170 U
Trichloroethene	A	2	2790
Tetrachloroethene	B	30	780000

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SS-1
LAB ID:			L1530845-07
COLLECTION DATE:			11/23/2015
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	789 U
Trichloroethene	A	2	1240
Tetrachloroethene	B	30	403000

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SV-6
LAB ID:			L1642601-01
COLLECTION DATE:			12/30/2016
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	1.74 U
Trichloroethene	A	2	1.07 U
Tetrachloroethene	B	30	1.36 U

SAMPLE ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	HIP-SV-4
LAB ID:			L1642601-02
COLLECTION DATE:			12/30/2016
Volatile Organic Compounds Units: ug/m3			Conc / Q
Methylene chloride	B	60	1.74 U
Trichloroethene	A	2	1.07 U
Tetrachloroethene	B	30	4.75



NOTES:

NYSDOH AGV = New York State Department of Health Air Guidance Values
NYSDOH AGV values from NYSDOH Soil Vapor Guidance Values, May 2017
Matrix actions are described in the report narrative and the NYSDOH Soil Vapor Guidance, May 2017
Cells highlighted in yellow indicate concentrations above NYSDOH Air Guidance Values
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the RL is shown
U = not detected at or above the RL
Results and RL values are in micrograms per cubic meter (ug/m3)

LEGEND

- SUB-SLAB VAPOR POINT
- SOIL VAPOR POINT
- AMBIENT AIR
- INDOOR AIR

0 15' 30' 60'
Drawing Scale

SITE
HIP Cleaners
Rochdale Village
169-47 137th Avenue
Jamaica Queens

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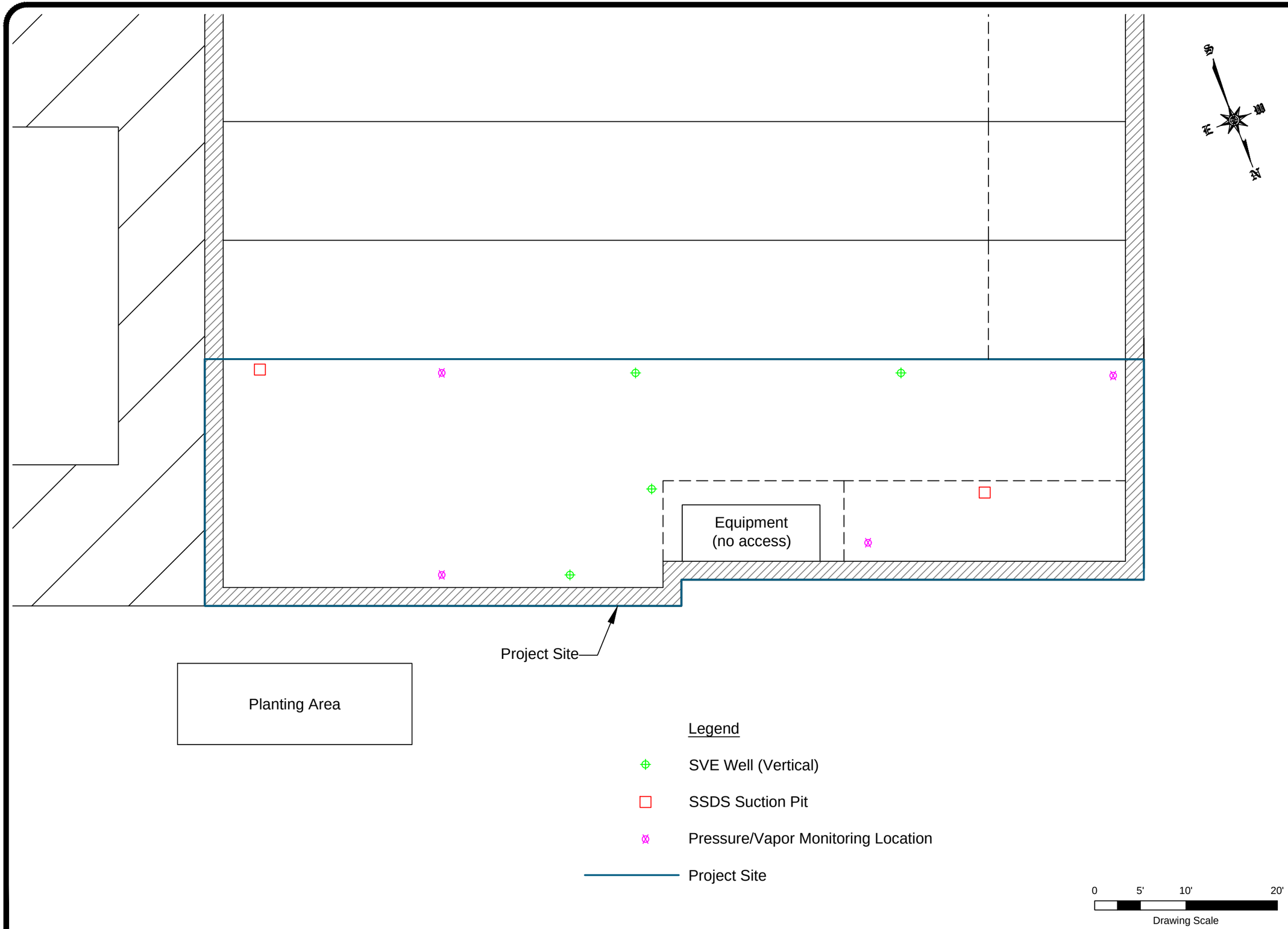
DATE: October 2017
SCALE: As Noted

DRAWING TITLE: Summary of Soil Vapor Concentrations Compared to AGVs
DRAWING NO.: Figure 5B



SITE

HIP Cleaners
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169-47 137th Avenue
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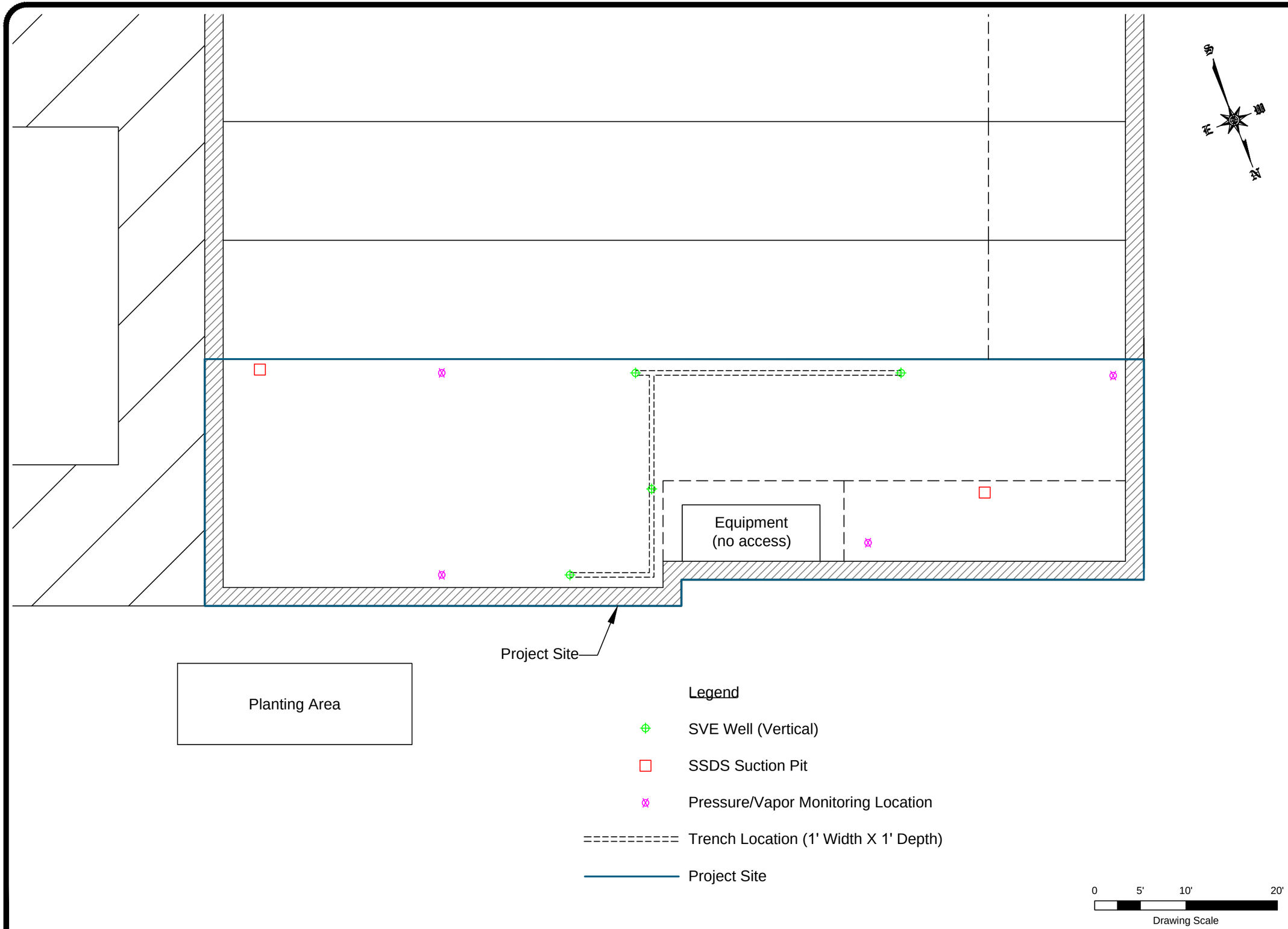
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	KM	March 2019	As Noted

DRAWING TITLE: SVE and SSDS Layout

DRAWING NO.: Figure 6a



SITE

HIP Cleaners
Rochdale Village
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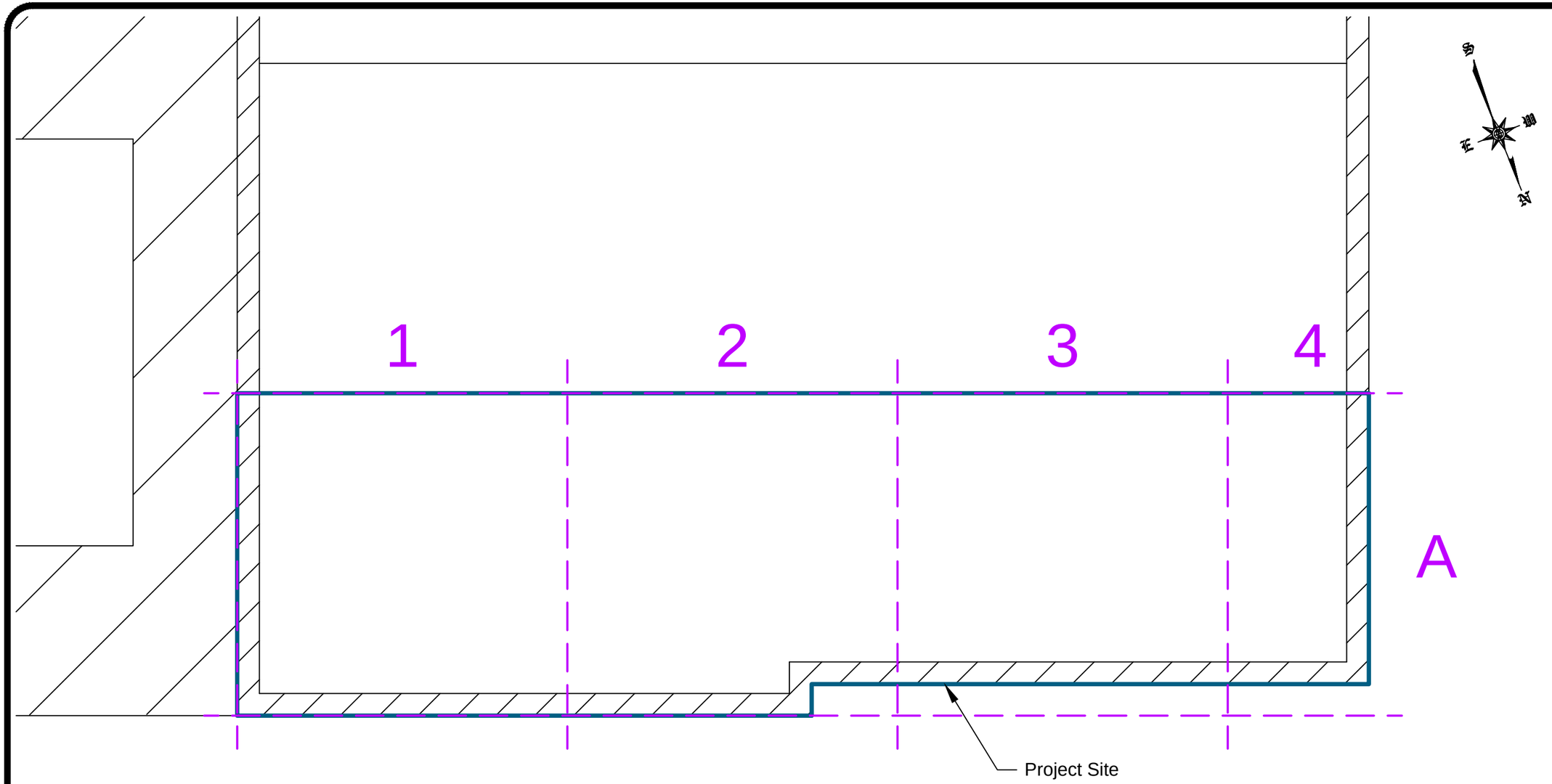
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	KM	March 2019	As Noted

DRAWING TITLE: Trench Layout

DRAWING NO.: Figure 6b



Legend

Alphanumeric Grid

Project Site

0 5' 10' 20'

Drawing Scale

SITE

HIP Cleaners
Rochdale Village
169-47 137th Avenue
Jamaica, Queens

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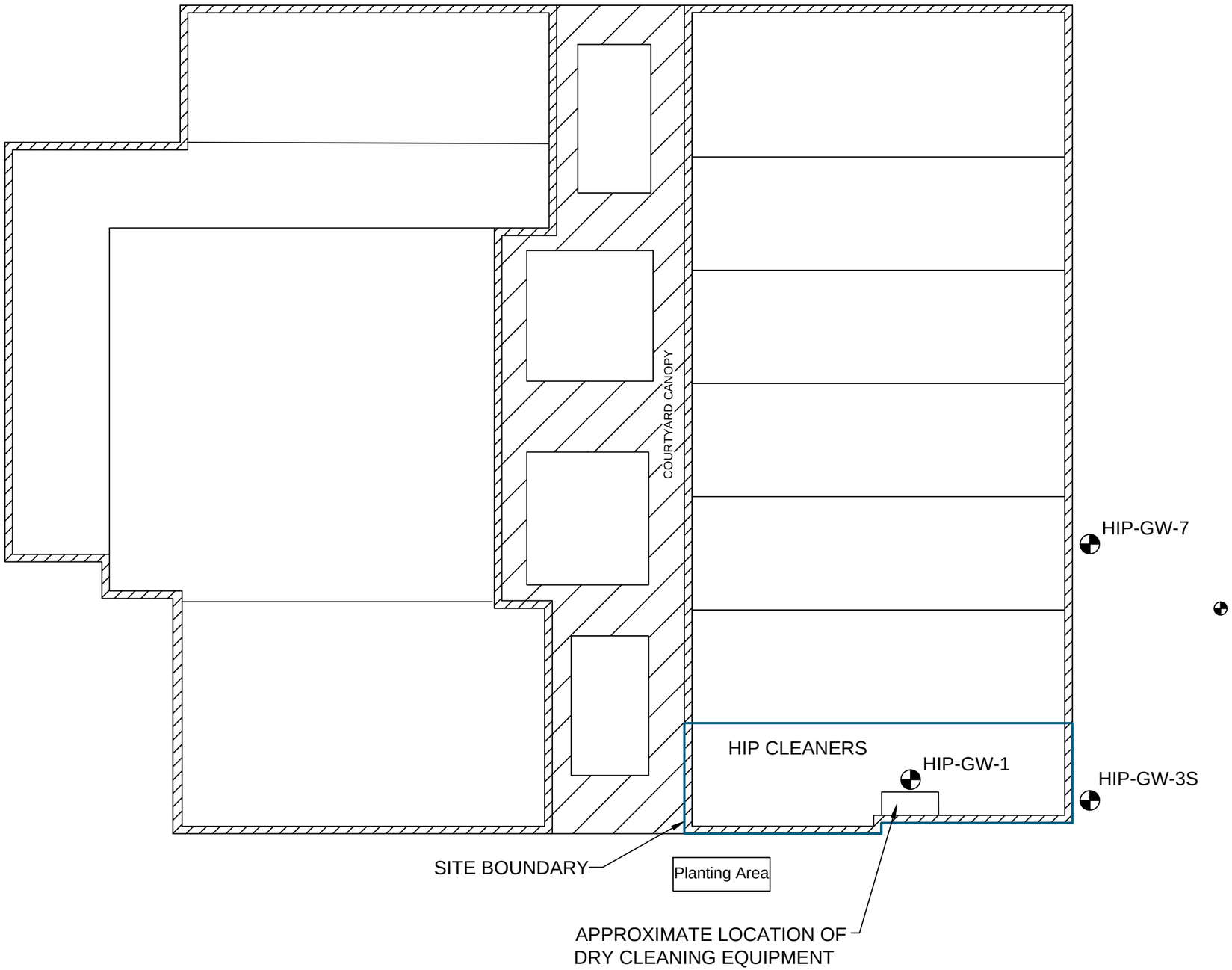
LM	KM	October 2017	As Noted

DRAWING TITLE: Alphanumeric Grid

DRAWING NO. Figure 7



LEGEND

PERMANENT GROUNDWATER MONITORING WELL

GENERAL GROUNDWATER FLOW DIRECTION

0 15' 30' 60'

Drawing Scale

SITE

HIP Cleaners
Rochdale Village
169-47 137th Avenue
Jamaica, Queens

CONSULTANT

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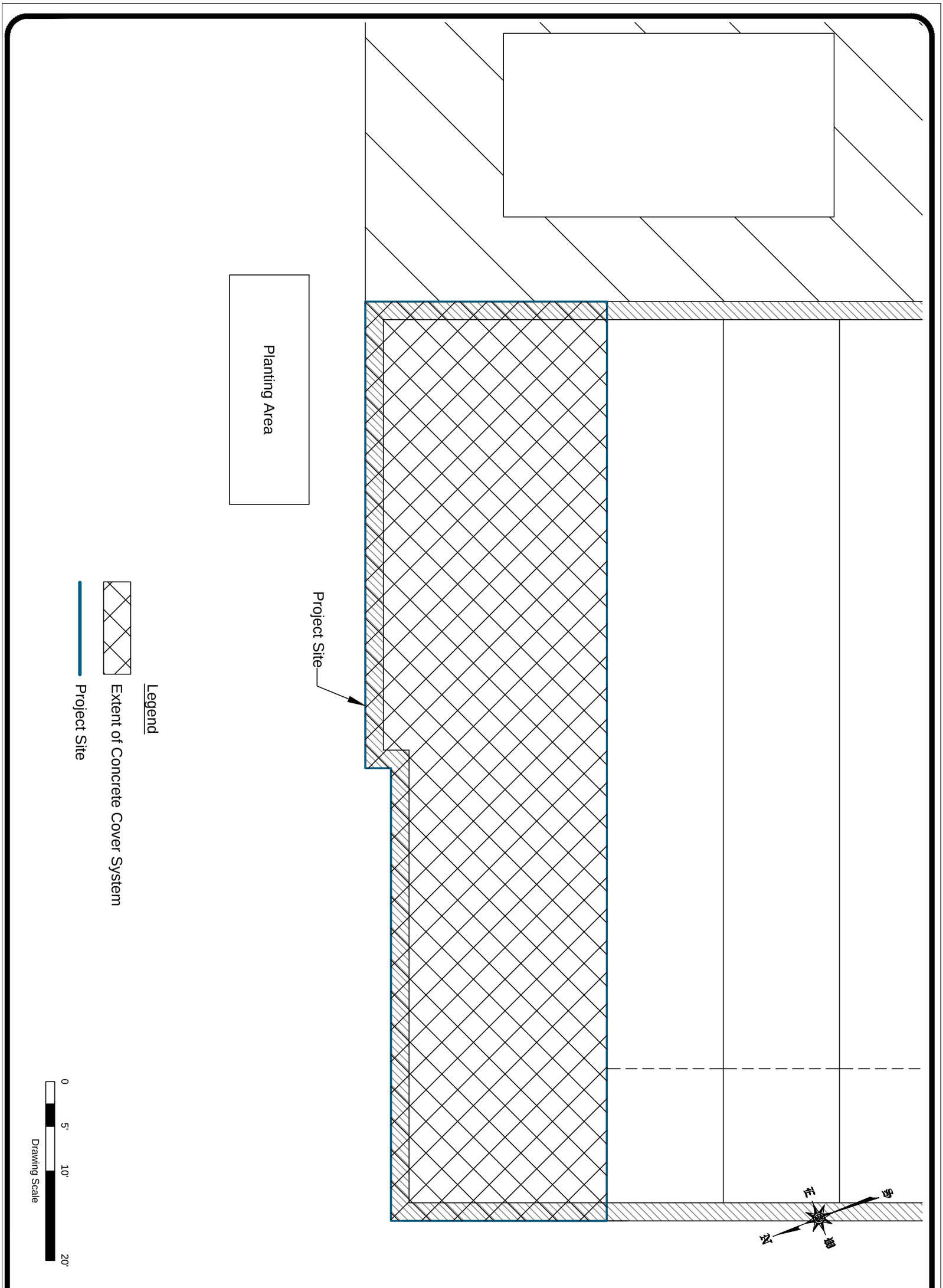
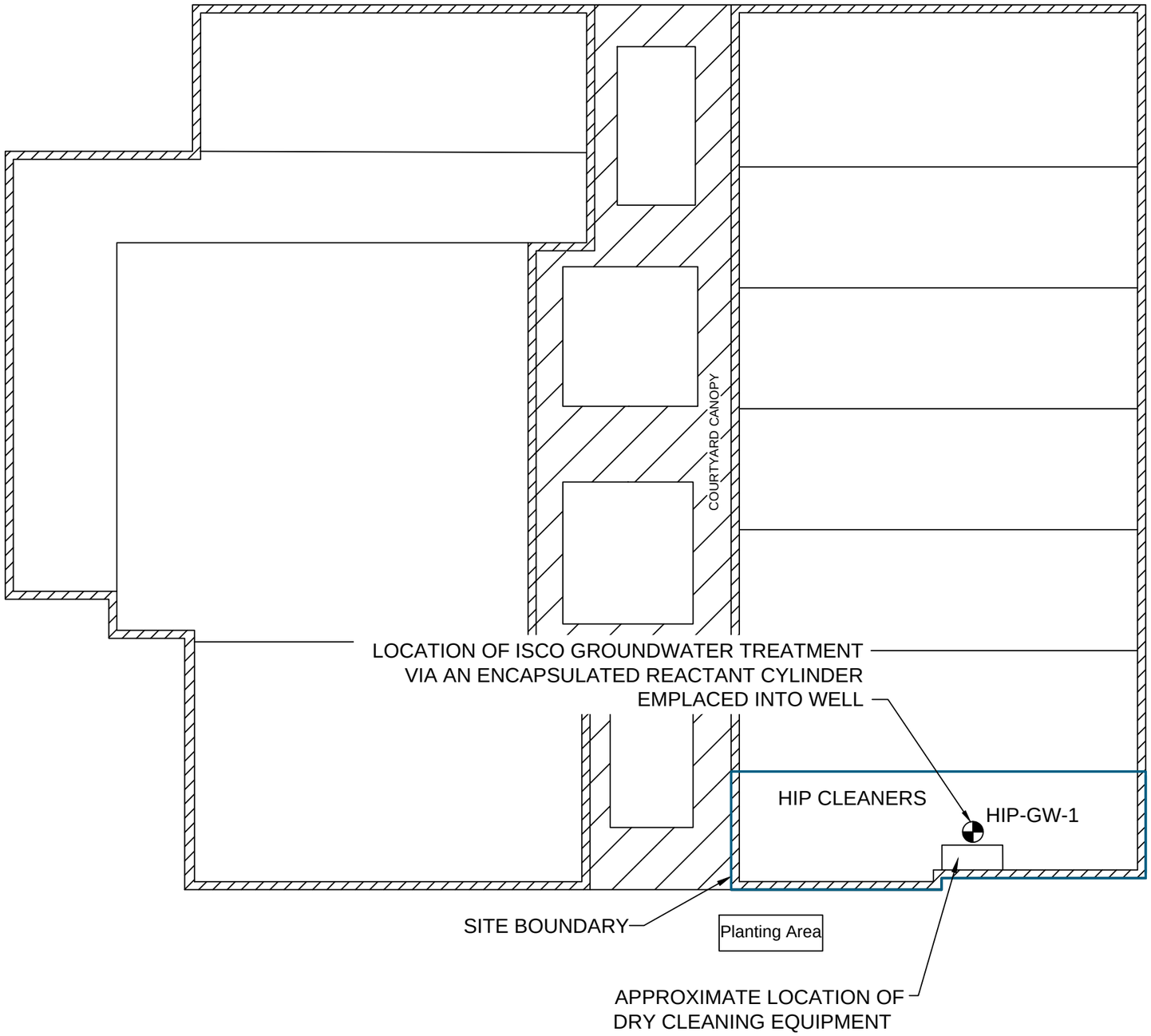
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	KM	October 2019	As Noted

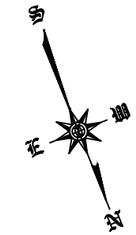
DRAWING TITLE.
Post Remedial Groundwater Locations

DRAWING NO.
Figure 8



DRAWING TITLE. Extent of Concrete Cover System	DRAWN BY LM	CONSULTANT TENEN ENVIRONMENTAL TENEN ENVIRONMENTAL, LLC 121 West 27th Street Suite 702 New York, NY 10001 O: 646-606-2332 F: 646-606-2379	SITE HIP Cleaners Rochdale Village 169-47 137th Avenue Jamaica, Queens
	CHECKED BY KM		
DRAWING NO. Figure 9	DATE March 2019		
	SCALE: As Noted		





LEGEND

PERMANENT GROUNDWATER MONITORING WELL

GENERAL GROUNDWATER FLOW DIRECTION

0 15' 30' 60'

Drawing Scale

SITE

HIP Cleaners
Rochdale Village
169-47 137th Avenue
Jamaica, Queens

CONSULTANT

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New York, NY 10001
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DRAWN BY	CHECKED BY	DATE	SCALE:
LM	KM	October 2019	As Noted

DRAWING TITLE: ISCO Treatment

DRAWING NO.: Figure 10

Tables

HIP Cleaners- Rochdale Village - Queens, NY
BCP Site C241166
Table 1
Unrestricted Use Soil Cleanup Objectives (SCOs)

From Table 375-6.8(a) Unsrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	SCO
Metals		
Arsenic	7440-38-2	13[c]
Barium	7440-39-3	350[c]
Beryllium	7440-41-7	7.2
Cadmium	7440-43-9	2.5[c]
Chromium, hexavalent[e]	18540-29-9	1[b]
Chromium, trivalent[e]	16065-83-1	30[c]
Copper	7440-50-8	50
Total Cyanide[e,f]		27
Lead	7439-92-1	63[c]
Manganese	7439-96-5	1,600[c]
Total Mercury		0.18[c]
Nickel	7440-02-0	30
Selenium	7782-49-2	3.9[c]
Silver	7440-22-4	2
Zinc	7440-66-6	109[c]
PCBs/Pesticides		
2,4,5-TP Acid (Silvex)[f]	93-72-1	3.8
4,4'-DDE	72-55-9	0.0033[b]
4,4'-DDT	50-29-3	0.0033[b]
4,4'-DDD	72-54-8	0.0033[b]
Aldrin	309-00-2	0.005[c]
alpha-BHC	319-84-6	0.02
beta-BHC	319-85-7	0.036
Chlordane (alpha)	5103-71-9	0.094
delta-BHC[g]	319-86-8	0.04
Dibenzofuran[f]	132-64-9	7
Dieldrin	60-57-1	0.005[c]
Endosulfan I[d,f]	959-98-8	2.4
Endosulfan Ii[d,f]	33213-65-9	2.4
Endosulfan sulfate[d,f]	1031-07-8	2.4
Endrin	72-20-8	0.014
Heptachlor	76-44-8	0.042
Lindane	58-89-9	0.1
Polychlorinated biphenyls	1336-36-3	0.1

Contaminant	CAS Number	SCO
Semivolatiles		
Acenaphthene	83-32-9	20
Acenapthylene[f]	208-96-8	100[a]
Anthracene[f]	120-12-7	100[a]
Benz(a)anthracene[f]	56-55-3	1[c]
Benzo(a)pyrene	50-32-8	1[c]
Benzo(b)fluoranthene[f]	205-99-2	1[c]
Benzo(g,h,i)perylene[f]	191-24-2	100
Benzo(k)fluoranthene[f]	207-08-9	0.8[c]
Chrysene[f]	218-01-9	1[c]
Dibenz(a,h)anthracene[f]	53-70-3	0.33[b]
Fluoranthene[f]	206-44-0	100[a]
Fluorene[f]	86-73-7	30
Indeno(1,2,3-cd)pyrene[f]	193-39-5	0.5[c]
m-Cresol[f]	108-39-4	0.33[b]
Naphthalene[f]	91-20-3	12
o-Cresol[f]	95-48-7	0.33[b]
p-Cresol[f]	106-44-5	0.33[b]
Pentachlorophenol	87-86-5	0.8[b]
Phenanthrene[f]	85-01-8	100
Phenol	108-95-2	0.33[b]
Pyrene[f]	129-00-0	100
Volatiles		
1,1,1-Trichloroethane[f]	71-55-6	0.68
1,1-Dichloroethane[f]	75-34-3	0.27
1,1-Dichloroethene[f]	75-35-4	0.33
1,2-Dichlorobenzene[f]	95-50-1	1.1
1,2-Dichloroethane	107-06-2	0.2[c]
cis-1,2-Dichloroethene[f]	156-59-2	0.25
trans-1,2-Dichloroethene[f]	156-60-5	0.19
1,3-Dichlorobenzene[f]	541-73-1	2.4
1,4-Dichlorobenzene	106-46-7	1.8
1,4-Dioxane	123-91-1	0.1[b]
Acetone	67-64-1	0.05
Benzene	71-43-2	0.06
n-Butylbenzene[f]	104-51-8	12
Carbon tetrachloride[f]	56-23-5	0.76
Chlorobenzene	108-90-7	1.1
Chloroform	67-66-3	0.37
Ethylbenzene[f]	100-41-4	1
Hexachlorobenzene[f]	118-74-1	0.33[b]
Methyl ethyl ketone	78-93-3	0.12
Methyl tert-butyl ether[f]	1634-04-4	0.93
Methylene chloride	75-09-2	0.05
n-Propylbenzene[f]	103-65-1	3.9
sec-Butylbenzene[f]	135-98-8	11
tert-Butylbenzene[f]	98-06-6	5.9
Tetrachloroethene	127-18-4	1.3
Toluene	108-88-3	0.07
Trichloroethene	79-01-6	0.47
1,2,4-Trimethylbenzene[f]	95-63-6	3.6
1,3,5- Trimethylbenzene[f]	108-67-8	8.4
Vinyl chloride[f]	75-01-4	0.02
Xylene (mixed)	1330-20-7	0.26

Notes:
All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified.
Footnotes (designations are from Table in Part 375). See Technical Support Document (TSD).
a The SCOs for unrestricted use were capped at a maximum value of 100 ppm. See TSD section 9.3.
b For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.
c For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.
d SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.
e The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.
f Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with "NS". Where such contaminants appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD.

Table 2 - Part 375 Commercial Use SCOs		
HIP Cleaners- Rochdale Village- Queens, NY		
BCP Site #C241166		
Contaminant	**CAS Number**	**Commercial**
Metals		
Arsenic	7440-38-2	16f
Barium	7440-39-3	400
Beryllium	7440-41-7	590
Cadmium	7440-43-9	9.3
Chromium, hexavalent h	18540-29-9	400
Chromium, trivalenth	16065-83-1	1,500
Copper	7440-50-8	270
Total Cyanide h		27
Lead	7439-92-1	1,000
Manganese	7439-96-5	10,000 d
Total Mercury		2.8j
Nickel	7440-02-0	310
Selenium	7782-49-2	1,500
Silver	7440-22-4	1,500
Zinc	7440-66-6	10,000 d
PCBs/Pesticides		
2,4,5-TP Acid (Silvex)	93-72-1	500b
4,4'-DDE	72-55-9	62
4,4'-DDT	50-29-3	47
4,4'-DDD	72-54-8	92
Aldrin	309-00-2	0.68
alpha-BHC	319-84-6	3.4
beta-BHC	319-85-7	3
Chlordane (alpha)	5103-71-9	24
delta-BHC	319-86-8	500b
Dibenzofuran	132-64-9	350
Dieldrin	60-57-1	1.4
Endosulfan I	959-98-8	200i
Endosulfan II	33213-65-9	200i
Endosulfan sulfate	1031-07-8	200i
Endrin	72-20-8	89
Heptachlor	76-44-8	15
Lindane	58-89-9	9.2
Polychlorinated biphenyls	1336-36-3	1
Semivolatiles		
Acenaphthene	83-32-9	500b
Acenapthylene	208-96-8	500b
Anthracene	120-12-7	500b
Benz(a)anthracene	56-55-3	5.6
Benzo(a)pyrene	50-32-8	1f
Benzo(b)fluoranthene	205-99-2	5.6
Benzo(g,h,i)perylene	191-24-2	500b
Benzo(k)fluoranthene	207-08-9	56
Chrysene	218-01-9	56
Dibenz(a,h)anthracene	53-70-3	0.56
Fluoranthene	206-44-0	500b
Fluorene	86-73-7	500b
Indeno(1,2,3-cd)pyrene	193-39-5	5.6
m-Cresol	108-39-4	500b
Naphthalene	91-20-3	500b
o-Cresol	95-48-7	500b
p-Cresol	106-44-5	500b
Pentachlorophenol	87-86-5	6.7
Phenanthrene	85-01-8	500b
Phenol	108-95-2	500b
Pyrene	129-00-0	500b
Volatiles		
1,1,1-Trichloroethane	71-55-6	500b
1,1-Dichloroethane	75-34-3	240
1,1-Dichloroethene	75-35-4	500b
1,2-Dichlorobenzene	95-50-1	500b
1,2-Dichloroethane	107-06-2	30
cis-1,2-Dichloroethene	156-59-2	500b
trans-1,2-Dichloroethene	156-60-5	500b
1,3-Dichlorobenzene	541-73-1	280
1,4-Dichlorobenzene	106-46-7	130
1,4-Dioxane	123-91-1	130
Acetone	67-64-1	500b
Benzene	71-43-2	44
Butylbenzene	104-51-8	500b
Carbon tetrachloride	56-23-5	22
Chlorobenzene	108-90-7	500b
Chloroform	67-66-3	350
Ethylbenzene	100-41-4	390
Hexachlorobenzene	118-74-1	6
Methyl ethyl ketone	78-93-3	500b
Methyl tert-butyl ether	1634-04-4	500b
Methylene chloride	75-09-2	500b
n-Propylbenzene	103-65-1	500b
sec-Butylbenzene	135-98-8	500b
tert-Butylbenzene	98-06-6	500b
Tetrachloroethene	127-18-4	150
Toluene	108-88-3	500b
Trichloroethene	79-01-6	200
1,2,4-Trimethylbenzene	95-63-6	190
1,3,5- Trimethylbenzene	108-67-8	190
Vinyl chloride	75-01-4	13
Xylene (mixed)	1330-20-7	500b

Notes:

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

NS = Not specified. See Technical Support Document (TSD).

a - The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

b - The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

c - The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

d - The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

e - For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

f - For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.

g - This SCO is derived from data on mixed isomers of BHC.

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

i - This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.

j - This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts). See TSD Table 5.6-1.

HIP Cleaners- Rochdale Village, Queens, NY
BCP Site C241166
Table 3
NYSDEC Division of Water TOGS 1.1.1 Class GA Standards

From Table 1: New York State Ambient Water Quality Standards and Guidance Values
(Division of Water Technical and Operational Guidance Series (1.1.1), June 1998)

Contaminant	CAS Number	Class GA Standard
Volatiles		
1,1,1,2-Tetrachloroethane	630-20-6	5*
1,1,1-Trichloroethane	71-55-6	5*
1,1,2,2-Tetrachloroethane	79-34-5	5*
1,1,2-Trichloroethane	79-00-5	1
1,1-Dichloroethane	75-34-3	5*
1,1-Dichloroethene	75-35-4	5*
1,1-Dichloropropene	563-58-6	5*
1,2,3-Trichloropropane	96-18-4	0.04
1,2,4,5-Tetramethylbenzene	95-93-2	5*
1,2,4-Trimethylbenzene	95-63-6	5*
1,2-Dibromo-3-chloropropane	96-12-8	0.04
1,2-Dichlorobenzene	95-50-1	3
1,2-Dichloroethane	107-06-2	0.6
1,2-Dichloropropane	78-87-5	1
1,3,5-Trimethylbenzene	108-67-8	5*
1,3-Dichlorobenzene	541-73-1	3
1,3-Dichloropropane	142-28-9	5*
1,4-Dichlorobenzene	106-46-7	3
2,2-Dichloropropane	594-20-7	5*
2-Hexanone	591-78-6	50**
Acetone	67-64-1	50**
Acrylonitrile	107-13-1	5*
Benzene	71-43-2	1
Bromobenzene	108-86-1	5*
Bromochloromethane	74-97-5	5*
Bromodichloromethane	75-27-4	50**
Bromoform	75-25-2	50**
Bromomethane	74-83-9	5*
Butylbenzene	104-51-8	5*
Carbon tetrachloride	56-23-5	5
Chlorobenzene	108-90-7	5*
Chloroethane	75-00-3	5*
Chloroform	75-34-3	7
Chloromethane (Methyl Chloride)	74-87-3	5*
cis-1,2-Dichloroethene	156-59-2	5*
Dibromochloromethane	124-48-1	50**
Dibromomethane	74-95-3	5*
Dichlorodifluoromethane	75-71-8	5*
Ethylbenzene	100-41-4	5*
Hexachlorobenzene	87-68-3	0.04
Hexachlorobutadiene	87-68-3	0.5
Isopropylbenzene	98-82-8	5*
Methylene chloride	75-09-2	5*
m-Xylene (1,3-Xylene)	108-38-3	5*
Naphthalene	91-20-3	10**
n-Propylbenzene	103-65-1	5*
o-Chlorotoluene	95-49-8	5*
o-Xylene (1,2-Xylene)	95-47-6	5*
p-Chlorotoluene	106-43-4	5*
p-Isopropyltoluene	99-87-6	5*
p-Xylene (1,4-Xylene)	106-42-3	5*
sec-Butylbenzene	135-98-8	5*
Styrene	100-42-5	5*
tert-Butylbenzene	98-06-6	5*
Tetrachloroethene	127-18-4	5*
Toluene	108-88-3	5*

Contaminant	CAS Number	Class GA Standard
Volatiles		
Total 1,3-Dichloropropene	542-75-6	0.4 (1)
trans-1,2-Dichloroethene	156-60-5	5*
trans-1,4-Dichloro-2-butene	110-57-6	5*
Trichloroethene	79-01-6	5*
Trichlorofluoromethane	75-69-4	5*
Vinyl chloride	75-01-4	2
Semivolatiles		
1,2,4,5-Tetrachlorobenzene	95-94-3	5*
1,2-Dichlorobenzene	95-50-1	3
1,3-Dichlorobenzene	541-73-1	3
1,4-Dichlorobenzene	106-46-7	3
3,3'-Dichlorobenzidine	91-94-1	5*
2,4-Dichlorophenol	120-83-2	5*
2,4-Dimethylphenol	105-67-9	50**
2,4-dinitrophenol	51-28-5	10**
2,4-Dinitrotoluene	121-14-2	5*
2,6-Dinitrotoluene	606-20-2	5*
2-Chloronaphthalene	91-58-7	10**
2-Nitroaniline	88-74-4	5*
3-Nitroaniline	99-09-2	5*
4-Chloroaniline	106-47-8	5*
4-Nitroaniline	100-01-6	5*
Acenaphthene	83-32-9	20**
Aniline	62-53-3	5*
Anthracene	120-12-7	50**
Benzo(a)anthracene	56-55-3	0.002**
Benzo(a)pyrene	50-32-8	0
Benzo(b)fluoranthene	205-99-2	0.002**
Benzo(k)fluoranthene	207-08-9	0.002**
Biphenyl	92-52-4	5*
Bis(2-chloroethoxy)methane	111-91-1	5*
Bis(2-chloroethyl)ether	111-44-4	1.0
Bis(2-Ethylhexyl)phthalate	117-81-7	5
Butyl benzyl phthalate	85-68- 7	50**
Chrysene	218-01-9	0.002
Diethyl phthalate	84-66-2	50**
Dimethyl phthalate	131-11-3	50**
Di-n-butylphthalate	84-74-2	50
Di-n-octylphthalate	117-84-0	50**
Fluoranthene	206-44-0	50**
Fluorene	86-73-7	50**
Hexachlorobenzene	118-74-1	0.04
Hexachlorobutadiene	87-68-3	0.5
Hexachlorocyclopentadiene	77-47-4	5*
Hexachloroethane	67-72-1	5*
Indeno(1,2,3-cd)Pyrene	193-39-5	0.002
Isophorone	78-59-1	50**
Naphthalene	91-20-3	10**
Nitrobenzene	98-95-3	0.4
NitrosoDiPhenylAmine(NDPA	86-30-6	50**
Pentachlorophenol	87-86-5	1(2)
Phenanthrene	85-01-8	50**
Phenol	108-95-2	1 (2)
Pyrene	129-00-0	50**

Notes:
All Class GA Standards are in micrograms per liter (ug/l). Compounds without standards or guideline values are not shown.
*The principal organic contaminant standard for groundwater of 5 ug/l applies to this substance.
** The value shown is a Guidance Value
(1) refers to sum of cis- and trans-1,3-dichloropropene.
(2) refers to the sum of Total Phenols (phenolic compounds)

Table 4: Volatile Organic Compounds (VOCs) in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP/SB1 (0-2)		HIP/SB1 (4-6)		HIP/SB1 (8-9)		HIP/SB1 (10-11)		HIP/SB1 (13-15)		HIP/SB2D (3-5)		HIP/SB2D (9-11)		HIP/SB2D (33-35)	
LAB SAMPLE ID	NY-RESC	NY-RESGW	NY-UNRES	L1528458-01		L1528458-03		L1528458-02		L1528458-04		L1528458-05		L1529510-06		L1529510-07		L1529510-08	
COLLECTION DATE				11/2/2015		11/2/2015		11/2/2015		11/2/2015		11/2/2015		11/11/2015		11/11/2015		11/11/2015	
Volatile Organic Compounds Units: mg/kg				Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Methylene chloride	500	0.05	0.05	0.3	U	0.0012	U	0.0013	U	0.0014	U	0.0014	U	0.0012	U	0.0013	U	0.0014	U
1,1-Dichloroethane	240	0.27	0.27	0.023	U	0.0001	U	0.0001	U	0.00011	U	0.00011	U	0.0001	U	0.0001	U	0.00011	U
Chloroform	350	0.37	0.37	0.1	U	0.00041	U	0.00044	U	0.00046	U	0.00048	U	0.00041	U	0.00044	U	0.00048	U
Carbon tetrachloride	22	0.76	0.76	0.057	U	0.00024	U	0.00025	U	0.00026	U	0.00027	U	0.00024	U	0.00025	U	0.00027	U
1,2-Dichloropropane	--	--	--	0.062	U	0.00026	U	0.00027	U	0.00028	U	0.00029	U	0.00026	U	0.00027	U	0.00029	U
Dibromochloromethane	--	--	--	0.042	U	0.00017	U	0.00018	U	0.00019	U	0.0002	U	0.00017	U	0.00018	U	0.0002	U
1,1,2-Trichloroethane	--	--	--	0.083	U	0.00034	U	0.00036	U	0.00038	U	0.00039	U	0.00034	U	0.00036	U	0.00039	U
Tetrachloroethene	150	1.3	1.3	79		0.013		0.068		0.001	J	0.0031		0.0073		0.004		0.00018	U
Chlorobenzene	500	1.1	1.1	0.095	U	0.00039	U	0.00042	U	0.00043	U	0.00045	U	0.00039	U	0.00042	U	0.00045	U
Trichlorofluoromethane	--	--	--	0.1	U	0.00043	U	0.00047	U	0.00048	U	0.0005	U	0.00043	U	0.00046	U	0.0005	U
1,2-Dichloroethane	30	0.02	0.02	0.031	U	0.00013	U	0.00014	U	0.00014	U	0.00015	U	0.00013	U	0.00014	U	0.00015	U
1,1,1-Trichloroethane	500	0.68	0.68	0.03	U	0.00012	U	0.00013	U	0.00014	U	0.00014	U	0.00012	U	0.00013	U	0.00014	U
Bromodichloromethane	--	--	--	0.047	U	0.00019	U	0.00021	U	0.00022	U	0.00022	U	0.00019	U	0.00021	U	0.00022	U
trans-1,3-Dichloropropene	--	--	--	0.033	U	0.00014	U	0.00014	U	0.00015	U	0.00016	U	0.00014	U	0.00014	U	0.00016	U
cis-1,3-Dichloropropene	--	--	--	0.032	U	0.00013	U	0.00014	U	0.00015	U	0.00015	U	0.00013	U	0.00014	U	0.00015	U
1,3-Dichloropropene, Total	--	--	--	0.032	U	0.00013	U	0.00014	U	0.00015	U	0.00015	U	0.00013	U	0.00014	U	0.00015	U
1,1-Dichloropropene	--	--	--	0.038	U	0.00016	U	0.00017	U	0.00018	U	0.00018	U	0.00016	U	0.00017	U	0.00018	U
Bromoform	--	--	--	0.064	U	0.00026	U	0.00028	U	0.00029	U	0.0003	U	0.00026	U	0.00028	U	0.0003	U
1,1,2,2-Tetrachloroethane	--	0.6	--	0.028	U	0.00011	U	0.00012	U	0.00012	U	0.00013	U	0.00011	U	0.00012	U	0.00013	U
Benzene	44	0.06	0.06	0.032	U	0.00013	U	0.00014	U	0.00015	U	0.00015	U	0.00013	U	0.00014	U	0.00015	U
Toluene	500	0.7	0.7	0.053	U	0.00022	U	0.00023	U	0.00024	U	0.00029	J	0.00022	U	0.00023	U	0.00025	U
Ethylbenzene	390	1	1	0.035	U	0.00014	U	0.00015	U	0.00016	U	0.00016	U	0.00014	U	0.00015	U	0.00016	U
Chloromethane	--	--	--	0.08	U	0.00033	U	0.00035	U	0.00036	U	0.00038	U	0.00033	U	0.00035	U	0.00038	U
Bromomethane	--	--	--	0.092	U	0.00038	U	0.00041	U	0.00042	U	0.00044	U	0.00038	U	0.0004	U	0.00044	U
Vinyl chloride	13	0.02	0.02	0.032	U	0.00013	U	0.00014	U	0.00015	U	0.00015	U	0.00013	U	0.00014	U	0.00015	U
Chloroethane	--	1.9	--	0.086	U	0.00035	U	0.00038	U	0.00039	U	0.00041	U	0.00035	U	0.00038	U	0.00041	U
1,1-Dichloroethene	500	0.33	0.33	0.072	U	0.00029	U	0.00031	U	0.00032	U	0.00034	U	0.00029	U	0.00031	U	0.00034	U
trans-1,2-Dichloroethene	500	0.19	0.19	0.058	U	0.00024	U	0.00025	U	0.00026	U	0.00027	U	0.00024	U	0.00025	U	0.00027	U
Trichloroethene	200	0.47	0.47	0.034	U	0.00014	U	0.00015	U	0.00016	U	0.00016	U	0.00014	U	0.00015	U	0.00016	U
1,2-Dichlorobenzene	500	1.1	1.1	0.042	U	0.00017	U	0.00018	U	0.00019	U	0.0002	U	0.00017	U	0.00018	U	0.0002	U
1,3-Dichlorobenzene	280	2.4	2.4	0.037	U	0.00015	U	0.00016	U	0.00017	U	0.00017	U	0.00015	U	0.00016	U	0.00017	U
1,4-Dichlorobenzene	130	1.8	1.8	0.038	U	0.00015	U	0.00017	U	0.00017	U	0.00018	U	0.00016	U	0.00016	U	0.00018	U
Methyl tert butyl ether	500	0.93	0.93	0.023	U	0.00009	U	0.0001	U	0.0001	U	0.00011	U	0.0001	U	0.0001	U	0.00011	U
p/m-Xylene	--	--	--	0.054	U	0.00022	U	0.00024	U	0.00025	U	0.00025	U	0.00022	U	0.00024	U	0.00026	U
o-Xylene	--	--	--	0.047	U	0.00019	U	0.00021	U	0.00021	U	0.00022	U	0.00019	U	0.0002	U	0.00022	U
Xylenes, Total	500	1.6	0.26	0.047	U	0.00019	U	0.00021	U	0.00021	U	0.00022	U	0.00019	U	0.0002	U	0.00022	U
cis-1,2-Dichloroethene	500	0.25	0.25	0.039	U	0.00016	U	0.00017	U	0.00018	U	0.00018	U	0.00016	U	0.00017	U	0.00018	U
1,2-Dichloroethene, Total	--	--	--	0.039	U	0.00016	U	0.00017	U	0.00018	U	0.00018	U	0.00016	U	0.00017	U	0.00018	U
Dibromomethane	--	--	--	0.045	U	0.00018	U	0.0002	U	0.0002	U	0.00021	U	0.00018	U	0.0002	U	0.00021	U
Styrene	--	--	--	0.11	U	0.00045	U	0.00048	U	0.0005	U	0.00052	U	0.00045	U	0.00048	U	0.00052	U
Dichlorodifluoromethane	--	--	--	0.052	U	0.00021	U	0.00023	U	0.00024	U	0.00024	U	0.00021	U	0.00023	U	0.00025	U
Acetone	500	0.05	0.05	0.28	U	0.0012	U	0.003	J	0.0013	U	0.0013	U	0.0012	U	0.0012	U	0.0044	J
Carbon disulfide	--	2.7	--	0.3	U	0.0012	U	0.0013	U	0.0014	U	0.0014	U	0.0012	U	0.0013	U	0.0014	U
2-Butanone	500	0.12	0.12	0.074	U	0.0003	U	0.00033	U	0.00034	U	0.00035	U	0.0003	U	0.00032	U	0.00035	U
Vinyl acetate	--	--	--	0.036	U	0.00015	U	0.00016	U	0.00016	U	0.00017	U	0.00015	U	0.00016	U	0.00017	U
4-Methyl-2-pentanone	--	1	--	0.066	U	0.00027	U	0.00029	U	0.0003	U	0.00031	U	0.00027	U	0.00029	U	0.00032	U
1,2,3-Trichloropropane	--	0.34	--	0.044	U	0.00018	U	0.0002	U	0.0002	U	0.00021	U	0.00018	U	0.00019	U	0.00021	U
2-Hexanone	--	--	--	0.18	U	0.00074	U	0.0008	U	0.00083	U	0.00086	U	0.00075	U	0.0008	U	0.00086	U
Bromochloromethane	--	--	--	0.075	U	0.00031	U	0.00033	U	0.00034	U	0.00036	U	0.00031	U	0.00033	U	0.00036	U
2,2-Dichloropropane	--	--	--	0.062	U	0.00025	U	0.00027	U	0.00028	U	0.00029	U	0.00025	U	0.00027	U	0.00029	U
1,2-Dibromoethane	--	--	--	0.048	U	0.0002	U	0.00021	U	0.00022	U	0.00022	U	0.0002	U	0.00021	U	0.00022	U
1,3-Dichloropropane	--	0.3	--	0.04	U	0.00016	U	0.00017	U	0.00018	U	0.00019	U	0.00016	U	0.00017	U	0.00019	U
1,1,1,2-Tetrachloroethane	--	--	--	0.087	U	0.00036	U	0.00038	U	0.0004	U	0.00041	U	0.00036	U	0.00038	U	0.00041	U
Bromobenzene	--	--	--	0.057	U	0.00023	U	0.00025	U	0.00026	U	0.00027	U	0.00023	U	0.00025	U	0.00027	U
n-Butylbenzene	500	12	12	0.031	U	0.00013	U	0.00014	U	0.00014	U	0.00015	U	0.00013	U	0.00014	U	0.00015	U
sec-Butylbenzene	500	11	11	0.033	U	0.00014	U	0.00015	U	0.00015	U	0.00016	U	0.00014	U	0.00014	U	0.00016	U
tert-Butylbenzene	500	5.9	5.9	0.037	U	0.00015	U	0.00016	U	0.00017	U	0.00017	U	0.00015	U	0.00016	U	0.00018	U
o-Chlorotoluene	--	--	--	0.044	U	0.00018	U	0.00019	U	0.0002	U	0.0002	U	0.00018	U	0.00019	U	0.00021	U
p-Chlorotoluene	--	--	--	0.036	U	0.00015	U	0.00016	U	0.00016	U	0.00017	U	0.00015	U	0.00016	U	0.00017	U
1,2-Dibromo-3-chloropropane	--	--	--	0.11	U	0.00044	U	0.00048	U	0.00049	U	0.00051	U	0.00044	U	0.00047	U	0.00051	U
Hexachlorobutadiene	--	--	--	0.062	U	0.00026	U	0.00027	U	0.00028	U	0.00029	U	0.00026	U	0.00027	U	0.00029	U
Isopropylbenzene	--	2.3	--	0.028	U	0.00012	U	0.00012	U	0.00013	U	0.00013	U	0.00012	U	0.00012	U	0.00013	U
p-Isopropyltoluene	--	10	--	0.034	U	0.00014	U	0.00015	U	0.00016	U	0.00016	U	0.00014	U	0.00015	U	0.00016	U
Naphthalene	500	12	12	0.038	U	0.00015	U	0.00017	U	0.00017	U	0.00018	U	0.00016	U	0.00016	U	0.00018	U
Acrylonitrile	--	--	--	0.14	U	0.00058	U	0.00062	U	0.00064	U	0.00066	U	0.00058	U	0.00061	U	0.00066	U
n-Propylbenzene	500	3.9	3.9	0.03	U	0.00012	U	0.00013	U	0.00014	U	0.00014	U	0.00012	U	0.00013	U	0.00014	U
1,2,3-Trichlorobenzene	--	--	--	0.04	U	0.00016	U	0.00018	U	0.00018	U	0.00019	U	0.00016	U	0.00018	U	0.00019	U
1,2,4-Trichlorobenzene	--	3.4	--	0.05	U	0.0002	U	0.00022	U	0.00023	U	0.00023	U	0.0002	U	0.00022	U	0.00024	U
1,3,5-Trimethylbenzene	190	8.4	8.4	0.039	U	0.00016	U	0.00017	U	0.00018	U	0.00018	U	0.00016	U	0.00017	U	0.00018	U
1,2,4-Trimethylbenzene	190	3.6	3.6	0.038	U	0.00016	U	0.00017	U	0.00018	U	0.00018	U	0.00016	U	0.00017	U	0.00018	U
1,4-Dioxane	130	0.1	0.1	3.9	U	0.016	U	0.017	U	0.018	U	0.018	U	0.016	U	0.017	U	0.019	U
p-Diethylbenzene	--	--	--	0.044	U	0.00018	U	0.00019	U	0.0002	U	0.0002	U	0.00018	U	0.00019	U	0.00021	U
p-Ethyltoluene	--	--	--	0.034	U	0.00014	U	0.00015	U	0.00015	U	0.00016	U	0.00014	U	0.00015	U	0.00016	U
1,2,4,5-Tetramethylbenzene	--	--	--	0.036	U	0.00014	U	0.00016	U	0.00016	U	0.00017	U	0.00014	U	0.00016	U	0.00017	U
Ethyl ether	--	--	--	0.071	U	0.00029	U	0.00031	U	0.00032	U	0.00034	U	0.00029	U	0.00031	U	0.00034	U
trans-1,4-Dichloro-2-butene	--	--	--	0.11	U	0.00044	U	0.00047	U	0.00049	U	0.0005	U	0.00044	U	0.00047	U	0.00051	U
Total VOCs	--	--	--	79	-	0.013	-	0.071	-	0.001		0.00339	-	0.0073	-	0.004	-	0.0044	-
Unknown	--	--	--	NA		NA		NA		NA		NA		0.003		NA		0.0052	
Unknown	--	--	--	NA		0.0035		NA		NA		NA		NA		NA		NA	
No Tentatively Identified Compo	--	--	--	0	U	NA		0	U	0	U	0	U	NA		0	U	NA	
Unknown	--	--	--	NA		NA		NA		NA		NA		0.01		NA		NA	
Unknown Benzene	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Alkane	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Aromatic	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Aromatic	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Aromatic	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Aromatic	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Benzene	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Benzene	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Benzene, pentamethyl-	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Alkane	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Alkane	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Benzene	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Benzene	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Alkane	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown	--	--	--	NA		NA		NA		NA		NA		0.034		NA		0.016	
Tetradecane	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Total TIC Compounds	--	--	--	NA		0.0035		NA		NA		NA		0.047		NA		0.0212	

Notes:
NY-UNRES = New York Unrestricted Use Criteria
NY-RESC = Commercial Criteria, New York Restricted Use
NY-RESGW = Groundwater Criteria, New York Restricted Use
Cells highlighted in yellow indicate concentrations above the NY-RESC, NY-RESGW, and NY-UNRES values
Cells highlighted in blue indicate concentrations above either the NY-RESGW or NY-UNRES value, or both, but below the NY-RESC value
Cells highlighted in grey indicate MDL values above the Unrestricted SCO and/or the Restricted Groundwater SCO, but below the Restricted Commercial Use SCO
DUP = designation for duplicate sample
SCO = Soil Cleanup Objective
MDL = Maximum Detection Limit
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 4: Volatile Organic Compounds (VOCs) in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP-SB-3D(1-3)		HIP-SB-3D(9-11)		HIP-SB-3D(48-50)		HIP/SB4 (0-2)		HIP/SB4 (13-15)		HIP/SB4 (9-11)		HIP/SB5 (1-3)		HIP/SB5 (1-3) DUP	
LAB SAMPLE ID	NY-RESC	NY-RESGW	NY-UNRES	L1528963-05		L1528963-01		L1528963-06		L1528458-06		L1528458-07		L1528458-08		L1529510-01		L1529510-02	
COLLECTION DATE				11/5/2015		11/5/2015		11/5/2015		11/2/2015		11/2/2015		11/2/2015		11/10/2015		11/10/2015	
Volatile Organic Compounds Units: mg/kg				Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Methylene chloride	500	0.05	0.05	0.0012	U	0.0014	U	0.0015	U	0.0012	U	0.0013	U	0.0013	U	0.0013	U	0.0013	U
1,1-Dichloroethane	240	0.27	0.27	0.0001	U	0.00011	U	0.00011	U	0.00009	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U
Chloroform	350	0.37	0.37	0.00042	U	0.00047	U	0.00049	U	0.00038	U	0.00043	U	0.00044	U	0.00042	U	0.00042	U
Carbon tetrachloride	22	0.76	0.76	0.00024	U	0.00027	U	0.00028	U	0.00022	U	0.00024	U	0.00025	U	0.00024	U	0.00024	U
1,2-Dichloropropane	--	--	--	0.00026	U	0.00029	U	0.0003	U	0.00024	U	0.00027	U	0.00027	U	0.00026	U	0.00026	U
Dibromochloromethane	--	--	--	0.00017	U	0.0002	U	0.0002	U	0.00016	U	0.00018	U	0.00018	U	0.00018	U	0.00018	U
1,1,2-Trichloroethane	--	--	--	0.00034	U	0.00039	U	0.0004	U	0.00032	U	0.00036	U	0.00036	U	0.00035	U	0.00035	U
Tetrachloroethene	150	1.3	1.3	0.085		0.00018	U	0.0078		0.00015	U	0.00016	U	0.00017	U	0.00016	U	0.00016	U
Chlorobenzene	500	1.1	1.1	0.00039	U	0.00044	U	0.00046	U	0.00036	U	0.00041	U	0.00041	U	0.0004	U	0.0004	U
Trichlorofluoromethane	--	--	--	0.00044	U	0.00049	U	0.00052	U	0.0004	U	0.00045	U	0.00046	U	0.00044	U	0.00044	U
1,2-Dichloroethane	30	0.02	0.02	0.00013	U	0.00014	U	0.00015	U	0.00012	U	0.00013	U	0.00014	U	0.00013	U	0.00013	U
1,1,1-Trichloroethane	500	0.68	0.68	0.00012	U	0.00014	U	0.00015	U	0.00012	U	0.00013	U	0.00013	U	0.00013	U	0.00013	U
Bromodichloromethane	--	--	--	0.0002	U	0.00022	U	0.00023	U	0.00018	U	0.0002	U	0.00021	U	0.0002	U	0.0002	U
trans-1,3-Dichloropropene	--	--	--	0.00014	U	0.00015	U	0.00016	U	0.00012	U	0.00014	U	0.00014	U	0.00014	U	0.00014	U
cis-1,3-Dichloropropene	--	--	--	0.00013	U	0.00015	U	0.00016	U	0.00012	U	0.00014	U	0.00014	U	0.00014	U	0.00014	U
1,3-Dichloropropene, Total	--	--	--	0.00013	U	0.00015	U	0.00016	U	0.00012	U	0.00014	U	0.00014	U	0.00014	U	0.00014	U
1,1-Dichloropropene	--	--	--	0.00016	U	0.00018	U	0.00019	U	0.00015	U	0.00016	U	0.00017	U	0.00016	U	0.00016	U
Bromoform	--	--	--	0.00027	U	0.0003	U	0.00031	U	0.00025	U	0.00028	U	0.00028	U	0.00027	U	0.00027	U
1,1,2,2-Tetrachloroethane	--	0.6	--	0.00011	U	0.00013	U	0.00013	U	0.0001	U	0.00012	U	0.00012	U	0.00012	U	0.00012	U
Benzene	44	0.06	0.06	0.00013	U	0.00015	U	0.00016	U	0.00012	U	0.00014	U	0.00014	U	0.00014	U	0.00014	U
Toluene	500	0.7	0.7	0.00022	U	0.00025	U	0.00026	U	0.00035	J	0.00034	J	0.00023	U	0.00022	U	0.00022	U
Ethylbenzene	390	1	1	0.00014	U	0.00016	U	0.00017	U	0.00013	U	0.00015	U	0.00015	U	0.00015	U	0.00015	U
Chloromethane	--	--	--	0.00033	U	0.00037	U	0.00039	U	0.00031	U	0.00034	U	0.00035	U	0.00034	U	0.00034	U
Bromomethane	--	--	--	0.00038	U	0.00043	U	0.00045	U	0.00035	U	0.0004	U	0.0004	U	0.00039	U	0.00039	U
Vinyl chloride	13	0.02	0.02	0.00013	U	0.00015	U	0.00016	U	0.00012	U	0.00014	U	0.00014	U	0.00013	U	0.00013	U
Chloroethane	--	1.9	--	0.00036	U	0.0004	U	0.00042	U	0.00033	U	0.00037	U	0.00038	U	0.00036	U	0.00036	U
1,1-Dichloroethene	500	0.33	0.33	0.0003	U	0.00033	U	0.00035	U	0.00027	U	0.00031	U	0.00031	U	0.0003	U	0.0003	U
trans-1,2-Dichloroethene	500	0.19	0.19	0.00024	U	0.00027	U	0.00028	U	0.00022	U	0.00025	U	0.00025	U	0.00024	U	0.00024	U
Trichloroethene	200	0.47	0.47	0.00096	J	0.00016	U	0.00017	U	0.00013	U	0.00015	U	0.00015	U	0.00014	U	0.00014	U
1,2-Dichlorobenzene	500	1.1	1.1	0.00017	U	0.00019	U	0.0002	U	0.00016	U	0.00018	U	0.00018	U	0.00018	U	0.00018	U
1,3-Dichlorobenzene	280	2.4	2.4	0.00015	U	0.00017	U	0.00018	U	0.00014	U	0.00016	U	0.00016	U	0.00015	U	0.00015	U
1,4-Dichlorobenzene	130	1.8	1.8	0.00016	U	0.00018	U	0.00018	U	0.00014	U	0.00016	U	0.00016	U	0.00016	U	0.00016	U
Methyl tert butyl ether	500	0.93	0.93	0.0001	U	0.00011	U	0.00011	U	0.00009	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U
p/m-Xylene	--	--	--	0.00022	U	0.00025	U	0.00026	U	0.00021	U	0.00023	U	0.00024	U	0.00023	U	0.00023	U
o-Xylene	--	--	--	0.00019	U	0.00022	U	0.00023	U	0.00018	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U
Xylenes, Total	500	1.6	0.26	0.00019	U	0.00022	U	0.00023	U	0.00018	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U
cis-1,2-Dichloroethene	500	0.25	0.25	0.00016	U	0.00018	U	0.00019	U	0.00015	U	0.00017	U	0.00017	U	0.00016	U	0.00016	U
1,2-Dichloroethene, Total	--	--	--	0.00016	U	0.00018	U	0.00019	U	0.00015	U	0.00017	U	0.00017	U	0.00016	U	0.00016	U
Dibromomethane	--	--	--	0.00018	U	0.00021	U	0.00022	U	0.00017	U	0.00019	U	0.00019	U	0.00019	U	0.00019	U
Styrene	--	--	--	0.00046	U	0.00051	U	0.00053	U	0.00042	U	0.00047	U	0.00048	U	0.00046	U	0.00046	U
Dichlorodifluoromethane	--	--	--	0.00022	U	0.00024	U	0.00025	U	0.0002	U	0.00022	U	0.00023	U	0.00022	U	0.00022	U
Acetone	500	0.05	0.05	0.0026	J	0.0056	J	0.012	J	0.0011	U	0.012		0.0091	J	0.0012	U	0.0012	U
Carbon disulfide	--	2.7	--	0.0012	U	0.0014	U	0.0015	U	0.0011	U	0.0013	U	0.0013	U	0.0013	U	0.0013	U
2-Butanone	500	0.12	0.12	0.00031	U	0.00035	U	0.00036	U	0.00028	U	0.00032	U	0.00032	U	0.00031	U	0.00031	U
Vinyl acetate	--	--	--	0.00015	U	0.00017	U	0.00018	U	0.00014	U	0.00015	U	0.00016	U	0.00015	U	0.00015	U
4-Methyl-2-pentanone	--	1	--	0.00028	U	0.00031	U	0.00032	U	0.00025	U	0.00028	U	0.00029	U	0.00028	U	0.00028	U
1,2,3-Trichloropropane	--	0.34	--	0.00018	U	0.00021	U	0.00022	U	0.00017	U	0.00019	U	0.00019	U	0.00019	U	0.00019	U
2-Hexanone	--	--	--	0.00076	U	0.00085	U	0.00088	U	0.00069	U	0.00078	U	0.00079	U	0.00076	U	0.00076	U
Bromochloromethane	--	--	--	0.00031	U	0.00035	U	0.00037	U	0.00029	U	0.00032	U	0.00033	U	0.00032	U	0.00032	U
2,2-Dichloropropane	--	--	--	0.00026	U	0.00029	U	0.0003	U	0.00024	U	0.00026	U	0.00027	U	0.00026	U	0.00026	U
1,2-Dibromoethane	--	--	--	0.0002	U	0.00022	U	0.00023	U	0.00018	U	0.0002	U	0.00021	U	0.0002	U	0.0002	U
1,3-Dichloropropane	--	0.3	--	0.00016	U	0.00018	U	0.00019	U	0.00015	U	0.00017	U	0.00017	U	0.00017	U	0.00017	U
1,1,1,2-Tetrachloroethane	--	--	--	0.00036	U	0.0004	U	0.00042	U	0.00033	U	0.00037	U	0.00038	U	0.00036	U	0.00036	U
Bromobenzene	--	--	--	0.00024	U	0.00026	U	0.00028	U	0.00022	U	0.00024	U	0.00025	U	0.00024	U	0.00024	U
n-Butylbenzene	500	12	12	0.001	J	0.00015	U	0.00015	U	0.00012	U	0.00013	U	0.00014	U	0.00013	U	0.00013	U
sec-Butylbenzene	500	11	11	0.00014	U	0.00016	U	0.00016	U	0.00013	U	0.00014	U	0.00014	U	0.00014	U	0.00014	U
tert-Butylbenzene	500	5.9	5.9	0.00015	U	0.00017	U	0.00018	U	0.00014	U	0.00016	U	0.00016	U	0.00016	U	0.00016	U
o-Chlorotoluene	--	--	--	0.00018	U	0.0002	U	0.00021	U	0.00017	U	0.00019	U	0.00019	U	0.00018	U	0.00018	U
p-Chlorotoluene	--	--	--	0.00015	U	0.00017	U	0.00018	U	0.00014	U	0.00016	U	0.00016	U	0.00015	U	0.00015	U
1,2-Dibromo-3-chloropropane	--	--	--	0.00045	U	0.0005	U	0.00052	U	0.00041	U	0.00046	U	0.00047	U	0.00045	U	0.00045	U
Hexachlorobutadiene	--	--	--	0.00026	U	0.00029	U	0.0003	U	0.00024	U	0.00027	U	0.00027	U	0.00026	U	0.00026	U
Isopropylbenzene	--	2.3	--	0.00012	U	0.00013	U	0.00014	U	0.00011	U	0.00012	U	0.00012	U	0.00012	U	0.00012	U
p-Isopropyltoluene	--	10	--	0.00014	U	0.00016	U	0.00017	U	0.00013	U	0.00015	U	0.00015	U	0.00014	U	0.00014	U
Naphthalene	500	12	12	0.0054	J	0.00018	U	0.00018	U	0.00014	U	0.00016	U	0.00016	U	0.00016	U	0.00016	U
Acrylonitrile	--	--	--	0.00058	J	0.00065	U	0.00068	U	0.00054	U	0.0006	U	0.00061	U	0.00059	U	0.00059	U
n-Propylbenzene	500	3.9	3.9	0.00012	J	0.00014	U	0.00014	U	0.00011	U	0.00013	U	0.00013	U	0.00012	U	0.00012	U
1,2,3-Trichlorobenzene	--	--	--	0.00017	J	0.00019	U	0.0002	U	0.00015	U	0.00017	U	0.00018	U	0.00017	U	0.00017	U
1,2,4-Trichlorobenzene	--	3.4	--	0.00021	J	0.00023	U	0.00024	U	0.00019	U	0.00021	U	0.00022	U	0.00021	U	0.00021	U
1,3,5-Trimethylbenzene	190	8.4	8.4	0.00016	J	0.00018	U	0.00019	U	0.00015	U	0.00017	U	0.00017	U	0.00016	U	0.00016	U
1,2,4-Trimethylbenzene	190	3.6	3.6	0.0026	J	0.00018	U	0.00019	U	0.00015	U	0.00016	U	0.00017	U	0.00016	U	0.00016	U
1,4-Dioxane	130	0.1	0.1	0.016	U	0.018	U	0.019	U	0.015	U	0.017	U	0.017	U	0.016	U	0.016	U
p-Diethylbenzene	--	--	--	0.00018	U	0.0002	U	0.00021	U	0.00017	U	0.00019	U	0.00019	U	0.00018	U	0.00018	U
p-Ethyltoluene	--	--	--	0.00036	J	0.00016	U	0.00016	U	0.00013	U	0.00014	U	0.00015	U	0.00014	U	0.00014	U
1,2,4,5-Tetramethylbenzene	--	--	--	0.011	J	0.00016	U	0.00017	U	0.00014	U	0.00015	U	0.00016	U	0.00015	U	0.00015	U
Ethyl ether	--	--	--	0.00029	U	0.00033	U	0.00034	U	0.00027	U	0.0003	U	0.00031	U	0.0003	U	0.0003	U
trans-1,4-Dichloro-2-butene	--	--	--	0.00044	U	0.0005	U	0.00052	U	0.00041	U	0.00046	U	0.00047	U	0.00045	U	0.00045	U
Total VOCs	--	--	--	0.10892	-	0.0056	-	0.0198	-	0.00035		0.01234		0.0091	-	-		-	-
Unknown	--	--	--	NA		NA		NA		0.017		0.026		0.025		0.0028		NA	
Unknown	--	--	--	NA		NA		NA		NA		NA		NA		NA		0.0075	
No Tentatively Identified Compo	--	--	--	NA		0	U	0	U	NA		NA		NA		NA		NA	
Unknown	--	--	--	NA		NA		NA		NA		NA		NA		0.005		NA	
Unknown Benzene	--	--	--	0.0078		NA		NA		NA		NA		NA		NA		NA	
Unknown Alkane	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Aromatic	--	--	--	0.0054		NA		NA		NA		NA		NA		NA		NA	
Unknown Aromatic	--	--	--	0.021		NA		NA		NA		NA		NA		NA		NA	
Unknown Aromatic	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Aromatic	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Benzene	--	--	--	0.01		NA		NA		NA		NA		NA		NA		NA	
Unknown Benzene	--	--	--	0.026		NA		NA		NA		NA		NA		NA		NA	
Benzene, pentamethyl-	--	--	--	0.0066		NA		NA		NA		NA		NA		NA		NA	
Unknown Alkane	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Alkane	--	--	--	0.0048		NA		NA		NA		NA		NA		NA		NA	
Unknown Benzene	--	--	--	NA		NA		NA		NA		NA		NA		NA		NA	
Unknown Benzene	--	--	--	0.0098		NA		NA		NA		NA		NA		NA		NA	
Unknown Alkane	--	--	--	0.0048		NA		NA		NA		NA		NA		NA		NA	
Unknown	--	--	--	NA		NA		NA		0.0038		0.013		0.02		0.021		NA	
Tetradecane	--	--	--	0.0086		NA		NA		NA	-	NA	-	NA	-	NA		NA	
Total TIC Compounds	--	--	--	0.1048		NA		NA		0.0208		0.039		0.045		0.0288		0.0075	

Notes:
NY-UNRES = New York Unrestricted Use Criteria
NY-RESC = Commercial Criteria, New York Restricted Use
NY-RESGW = Groundwater Criteria, New York Restricted Use
Cells highlighted in yellow indicate concentrations above the NY-RESC, NY-RESGW, and NY-UNRES values
Cells highlighted in blue indicate concentrations above either the NY-RESGW or NY-UNRES value, or both, but below the NY-RESC value
Cells highlighted in grey indicate MDL values above the Unrestricted SCO and/or the Restricted Groundwater SCO, but below the Restricted Commercial Use SCO
DUP = designation for duplicate sample
SCO = Soil Cleanup Objective
MDL = Maximum Detection Limit
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 4: Volatile Organic Compounds (VOCs) in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP/SB5 (9-11)		HIP/SB5 (11-13)		HIP/SB5 (13-15)		HIP SB-6 (0-2)		HIP SB-6 (10-12)		HIP SB-6 (16-18)		HIP SB-6 (16-18) DUP	
LAB SAMPLE ID				L1529510-03		L1529510-04		L1529510-05		L1641415-01		L1641415-02		L1641415-03		L1641415-04	
COLLECTION DATE	NY-RESC	NY-RESGW	NY-UNRES	11/10/2015		11/10/2015		11/10/2015		12/20/2016		12/20/2016		12/20/2016		12/20/2016	
Volatile Organic Compounds Units: mg/kg				Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Methylene chloride	500	0.05	0.05	0.0013	U	0.0013	U	0.0014	U	0.012	U	0.012	U	0.012	U	0.012	U
1,1-Dichloroethane	240	0.27	0.27	0.0001	U	0.0001	U	0.00011	U	0.0019	U	0.0018	U	0.0018	U	0.0018	U
Chloroform	350	0.37	0.37	0.00045	U	0.00044	U	0.00046	U	0.0019	U	0.0018	U	0.0018	U	0.0018	U
Carbon tetrachloride	22	0.76	0.76	0.00025	U	0.00025	U	0.00026	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
1,2-Dichloropropane	--	--	--	0.00028	U	0.00027	U	0.00028	U	0.0044	U	0.0042	U	0.0042	U	0.0043	U
Dibromochloromethane	--	--	--	0.00018	U	0.00018	U	0.00019	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
1,1,2-Trichloroethane	--	--	--	0.00037	U	0.00037	U	0.00038	U	0.0019	U	0.0018	U	0.0018	U	0.0018	U
Tetrachloroethene	150	1.3	1.3	0.00017	U	0.00017	U	0.00017	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Chlorobenzene	500	1.1	1.1	0.00042	U	0.00042	U	0.00043	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Trichlorofluoromethane	--	--	--	0.00047	U	0.00047	U	0.00048	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,2-Dichloroethane	30	0.02	0.02	0.00014	U	0.00014	U	0.00014	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
1,1,1-Trichloroethane	500	0.68	0.68	0.00013	U	0.00013	U	0.00014	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Bromodichloromethane	--	--	--	0.00021	U	0.00021	U	0.00022	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
trans-1,3-Dichloropropene	--	--	--	0.00015	U	0.00014	U	0.00015	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
cis-1,3-Dichloropropene	--	--	--	0.00014	U	0.00014	U	0.00015	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
1,3-Dichloropropene, Total	--	--	--	0.00014	U	0.00014	U	0.00015	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
1,1-Dichloropropene	--	--	--	0.00017	U	0.00017	U	0.00018	U	0.0062	U	0.006	U	0.006	U	0.0062	U
Bromoform	--	--	--	0.00028	U	0.00028	U	0.00029	U	0.005	U	0.0048	U	0.0048	U	0.005	U
1,1,2,2-Tetrachloroethane	--	0.6	--	0.00012	U	0.00012	U	0.00012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Benzene	44	0.06	0.06	0.00014	U	0.00014	U	0.00015	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Toluene	500	0.7	0.7	0.00024	U	0.00023	U	0.00024	U	0.0004	J	0.0018	U	0.00034	J	0.00029	J
Ethylbenzene	390	1	1	0.00015	U	0.00015	U	0.00016	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Chloromethane	--	--	--	0.00036	U	0.00035	U	0.00037	U	0.0062	U	0.006	U	0.006	U	0.0062	U
Bromomethane	--	--	--	0.00041	U	0.00041	U	0.00042	U	0.0025	U	0.0024	U	0.0024	U	0.0025	U
Vinyl chloride	13	0.02	0.02	0.00014	U	0.00014	U	0.00015	U	0.0025	U	0.0024	U	0.0024	U	0.0025	U
Chloroethane	--	1.9	--	0.00038	U	0.00038	U	0.00039	U	0.0025	U	0.0024	U	0.0024	U	0.0025	U
1,1-Dichloroethene	500	0.33	0.33	0.00032	U	0.00032	U	0.00033	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
trans-1,2-Dichloroethene	500	0.19	0.19	0.00026	U	0.00026	U	0.00026	U	0.0019	U	0.0018	U	0.0018	U	0.0018	U
Trichloroethene	200	0.47	0.47	0.00015	U	0.00015	U	0.00016	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
1,2-Dichlorobenzene	500	1.1	1.1	0.00018	U	0.00018	U	0.00019	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,3-Dichlorobenzene	280	2.4	2.4	0.00016	U	0.00016	U	0.00017	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,4-Dichlorobenzene	130	1.8	1.8	0.00017	U	0.00017	U	0.00017	U	0.0062	U	0.006	U	0.006	U	0.0062	U
Methyl tert butyl ether	500	0.93	0.93	0.0001	U	0.0001	U	0.0001	U	0.0025	U	0.0024	U	0.0024	U	0.0025	U
p/m-Xylene	--	--	--	0.00024	U	0.00024	U	0.00025	U	0.0025	U	0.0024	U	0.0024	U	0.0025	U
o-Xylene	--	--	--	0.00021	U	0.00021	U	0.00021	U	0.0025	U	0.0024	U	0.0024	U	0.0025	U
Xylenes, Total	500	1.6	0.26	0.00021	U	0.00021	U	0.00021	U	0.0025	U	0.0024	U	0.0024	U	0.0025	U
cis-1,2-Dichloroethene	500	0.25	0.25	0.00017	U	0.00017	U	0.00018	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
1,2-Dichloroethene, Total	--	--	--	0.00017	U	0.00017	U	0.00018	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Dibromomethane	--	--	--	0.0002	U	0.0002	U	0.0002	U	0.012	U	0.012	U	0.012	U	0.012	U
Styrene	--	--	--	0.00049	U	0.00048	U	0.0005	U	0.0025	U	0.0024	U	0.0024	U	0.0025	U
Dichlorodifluoromethane	--	--	--	0.00023	U	0.00023	U	0.00024	U	0.012	U	0.012	U	0.012	U	0.012	U
Acetone	500	0.05	0.05	0.0044	J	0.0043	J	0.0013	U	0.012	U	0.012	U	0.0061	J	0.012	U
Carbon disulfide	--	2.7	--	0.0013	U	0.0013	U	0.0014	U	0.012	U	0.012	U	0.012	U	0.012	U
2-Butanone	500	0.12	0.12	0.00033	U	0.00033	U	0.00034	U	0.012	U	0.012	U	0.012	U	0.012	U
Vinyl acetate	--	--	--	0.00016	U	0.00016	U	0.00016	U	0.012	U	0.012	U	0.012	U	0.012	U
4-Methyl-2-pentanone	--	1	--	0.0003	U	0.00029	U	0.0003	U	0.012	U	0.012	U	0.012	U	0.012	U
1,2,3-Trichloropropane	--	0.34	--	0.0002	U	0.0002	U	0.0002	U	0.012	U	0.012	U	0.012	U	0.012	U
2-Hexanone	--	--	--	0.00081	U	0.0008	U	0.00083	U	0.012	U	0.012	U	0.012	U	0.012	U
Bromochloromethane	--	--	--	0.00033	U	0.00033	U	0.00034	U	0.0062	U	0.006	U	0.006	U	0.0062	U
2,2-Dichloropropane	--	--	--	0.00027	U	0.00027	U	0.00028	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,2-Dibromoethane	--	--	--	0.00021	U	0.00021	U	0.00022	U	0.005	U	0.0048	U	0.0048	U	0.005	U
1,3-Dichloropropane	--	0.3	--	0.00018	U	0.00017	U	0.00018	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,1,1,2-Tetrachloroethane	--	--	--	0.00038	U	0.00038	U	0.0004	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Bromobenzene	--	--	--	0.00025	U	0.00025	U	0.00026	U	0.0062	U	0.006	U	0.006	U	0.0062	U
n-Butylbenzene	500	12	12	0.00014	U	0.00014	U	0.00014	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
sec-Butylbenzene	500	11	11	0.00015	U	0.00015	U	0.00015	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
tert-Butylbenzene	500	5.9	5.9	0.00016	U	0.00016	U	0.00017	U	0.0062	U	0.006	U	0.006	U	0.0062	U
o-Chlorotoluene	--	--	--	0.00019	U	0.00019	U	0.0002	U	0.0062	U	0.006	U	0.006	U	0.0062	U
p-Chlorotoluene	--	--	--	0.00016	U	0.00034	J	0.00016	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,2-Dibromo-3-chloropropane	--	--	--	0.00048	U	0.00048	U	0.00049	U	0.0062	U	0.006	U	0.006	U	0.0062	U
Hexachlorobutadiene	--	--	--	0.00028	U	0.00027	U	0.00028	U	0.0062	U	0.006	U	0.006	U	0.0062	U
Isopropylbenzene	--	2.3	--	0.00012	U	0.00012	U	0.00013	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
p-Isopropyltoluene	--	10	--	0.00015	U	0.00015	U	0.00016	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Naphthalene	500	12	12	0.00017	U	0.00017	U	0.00017	U	0.00071	J	0.00032	J	0.006	U	0.0062	U
Acrylonitrile	--	--	--	0.00062	U	0.00062	U	0.00064	U	0.012	U	0.012	U	0.012	U	0.012	U
n-Propylbenzene	500	3.9	3.9	0.00013	U	0.00013	U	0.00014	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
1,2,3-Trichlorobenzene	--	--	--	0.00018	U	0.00018	U	0.00018	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,2,4-Trichlorobenzene	--	3.4	--	0.00022	U	0.00022	U	0.00023	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,3,5-Trimethylbenzene	190	8.4	8.4	0.00017	U	0.00017	U	0.00018	U	0.0062	U	0.006	U	0.006	U	0.0062	U
1,2,4-Trimethylbenzene	190	3.6	3.6	0.00017	U	0.00017	U	0.00018	U	0.001	J	0.006	U	0.006	U	0.0062	U
1,4-Dioxane	130	0.1	0.1	0.017	U	0.017	U	0.018	U	0.12	U	0.12	U	0.12	U	0.12	U
p-Diethylbenzene	--	--	--	0.00019	U	0.00019	U	0.0002	U	0.0013	J	0.0048	U	0.0048	U	0.005	U
p-Ethyltoluene	--	--	--	0.00015	U	0.00015	U	0.00015	U	0.005	U	0.0048	U	0.0048	U	0.005	U
1,2,4,5-Tetramethylbenzene	--	--	--	0.00016	U	0.00016	U	0.00016	U	0.0012	J	0.0048	U	0.0048	U	0.005	U
Ethyl ether	--	--	--	0.00031	U	0.00031	U	0.00032	U	0.0062	U	0.006	U	0.006	U	0.0062	U
trans-1,4-Dichloro-2-butene	--	--	--	0.00047	U	0.00047	U	0.00049	U	0.0062	U	0.006	U	0.006	U	0.0062	U
Total VOCs	--	--	--	0.0044	-	0.00464	-	-	-	0.00461	-	0.00032	-	0.00644	-	0.00029	-
Unknown	--	--	--	NA		0.013		NA		-		0.00284	J	-		0.00363	J
Unknown	--	--	--	0.0077		NA		NA		0.00468	J	0.00401	J	0.00349	J	0.00418	J
No Tentatively Identified Compo	--	--	--	NA		NA		0	U								
Unknown	--	--	--	NA		NA		NA		0.00572	J	0.00474	J	0.00407	J	0.0026	J
Unknown Benzene	--	--	--	NA		NA		NA									
Unknown Alkane	--	--	--	NA		NA		NA									
Unknown Aromatic	--	--	--	NA		NA		NA									
Unknown Aromatic	--	--	--	NA		NA		NA									
Unknown Aromatic	--	--	--	NA		NA		NA									
Unknown Aromatic	--	--	--	NA		NA		NA									
Unknown Benzene	--	--	--	NA		NA		NA									
Unknown Benzene	--	--	--	NA		NA		NA									
Benzene, pentamethyl-	--	--	--	NA		NA		NA									
Unknown Alkane	--	--	--	NA		NA		NA									
Unknown Alkane	--	--	--	NA		NA		NA									
Unknown Benzene	--	--	--	NA		NA		NA									
Unknown Benzene	--	--	--	NA		NA		NA									
Unknown Alkane	--	--	--	NA		NA		NA									
Unknown	--	--	--	NA		0.013		NA									
Tetradecane	--	--	--	NA		NA		NA									
Total TIC Compounds	--	--	--	0.0077		0.026		NA		0.0104	J	0.01159	J	0.00756	J	0.01041	J

Notes:
NY-UNRES = New York Unrestricted Use Criteria
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NY-RESGW = Groundwater Criteria, New York Restricted Use
Cells highlighted in yellow indicate concentrations above the NY-RESC, NY-RESGW, and NY-UNRES values
Cells highlighted in blue indicate concentrations above either the NY-RESGW or NY-UNRES value, or both, but below the NY-RESC value
Cells highlighted in grey indicate MDL values above the Unrestricted SCO and/or the Restricted Groundwater SCO, but below the Restricted Commercial Use SCO
DUP = designation for duplicate sample
SCO = Soil Cleanup Objective
MDL = Maximum Detection Limit
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL.
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 5: Semi Volatile Organic Compounds in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP/SB1 (0-2)		HIP/SB1 (4-6)		HIP/SB1 (8-9)		HIP/SB1 (13-15)		HIP/SB2D (3-5)		HIP/SB2D (9-11)		HIP-SB-3D(1-3)		HIP-SB-3D(9-11)	
LAB SAMPLE ID				L1528458-01		L1528458-03		L1528458-02		L1528458-05		L1529510-06		L1529510-07		L1528963-05		L1528963-01	
COLLECTION DATE	NY-RESC	NY-RESGW	NY-UNRES	11/2/2015		11/2/2015		11/2/2015		11/2/2015		11/11/2015		11/11/2015		11/5/2015		11/5/2015	
Semivolatile Organic Compounds Units: mg/kg				**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Acenaphthene	500	98	20	0.037	U	0.038	U	0.041	U	0.044	U	0.038	U	0.04	U	0.038	U	0.042	U
1,2,4-Trichlorobenzene	--	3.4	--	0.058	U	0.06	U	0.066	U	0.07	U	0.06	U	0.064	U	0.061	U	0.067	U
Hexachlorobenzene	6	1.4	0.33	0.033	U	0.034	U	0.037	U	0.04	U	0.034	U	0.036	U	0.035	U	0.038	U
Bis(2-chloroethyl)ether	--	--	--	0.05	U	0.052	U	0.056	U	0.06	U	0.052	U	0.055	U	0.052	U	0.058	U
2-Chloronaphthalene	--	--	--	0.058	U	0.06	U	0.065	U	0.069	U	0.06	U	0.064	U	0.061	U	0.067	U
1,2-Dichlorobenzene	500	1.1	1.1	0.059	U	0.06	U	0.066	U	0.07	U	0.06	U	0.064	U	0.061	U	0.067	U
1,3-Dichlorobenzene	280	2.4	2.4	0.056	U	0.058	U	0.063	U	0.067	U	0.058	U	0.062	U	0.059	U	0.065	U
1,4-Dichlorobenzene	130	1.8	1.8	0.054	U	0.056	U	0.061	U	0.065	U	0.056	U	0.06	U	0.057	U	0.062	U
3,3'-Dichlorobenzidine	--	--	--	0.048	U	0.049	U	0.053	U	0.057	U	0.049	U	0.052	U	0.05	U	0.055	U
2,4-Dinitrotoluene	--	--	--	0.038	U	0.04	U	0.043	U	0.046	U	0.04	U	0.042	U	0.04	U	0.044	U
2,6-Dinitrotoluene	--	0.17	--	0.046	U	0.047	U	0.051	U	0.054	U	0.047	U	0.05	U	0.048	U	0.052	U
Fluoranthene	500	1000	100	0.033	U	0.034	U	0.037	U	0.039	U	0.034	U	0.036	U	0.058	J	0.038	U
4-Chlorophenyl phenyl ether	--	--	--	0.054	U	0.056	U	0.061	U	0.065	U	0.056	U	0.06	U	0.057	U	0.062	U
4-Bromophenyl phenyl ether	--	--	--	0.041	U	0.042	U	0.046	U	0.049	U	0.042	U	0.045	U	0.043	U	0.047	U
Bis(2-chloroisopropyl)ether	--	--	--	0.063	U	0.065	U	0.07	U	0.075	U	0.065	U	0.069	U	0.066	U	0.072	U
Bis(2-chloroethoxy)methane	--	--	--	0.054	U	0.056	U	0.061	U	0.064	U	0.056	U	0.059	U	0.056	U	0.062	U
Hexachlorobutadiene	--	--	--	0.05	U	0.052	U	0.056	U	0.06	U	0.052	U	0.055	U	0.052	U	0.058	U
Hexachlorocyclopentadiene	--	--	--	0.11	U	0.12	U	0.13	U	0.14	U	0.12	U	0.13	U	0.12	U	0.13	U
Hexachloroethane	--	--	--	0.032	U	0.033	U	0.036	U	0.039	U	0.033	U	0.036	U	0.034	U	0.037	U
Isophorone	--	4.4	--	0.048	U	0.049	U	0.053	U	0.057	U	0.049	U	0.052	U	0.05	U	0.055	U
Naphthalene	500	12	12	0.059	U	0.061	U	0.066	U	0.071	U	0.061	U	0.065	U	0.062	U	0.068	U
Nitrobenzene	69	0.17	--	0.042	U	0.044	U	0.048	U	0.051	U	0.044	U	0.047	U	0.044	U	0.049	U
NitrosoDiPhenylAmine(NDPA)/DPA	--	--	--	0.038	U	0.039	U	0.042	U	0.045	U	0.039	U	0.041	U	0.039	U	0.043	U
n-Nitrosodi-n-propylamine	--	--	--	0.053	U	0.055	U	0.06	U	0.063	U	0.055	U	0.058	U	0.055	U	0.061	U
Bis(2-Ethylhexyl)phthalate	--	435	--	0.074	J	0.13	J	0.14	J	0.15	J	0.048	U	0.093	J	0.29		0.054	U
Butyl benzyl phthalate	--	122	--	0.036	J	0.036	U	0.039	U	0.042	U	0.036	U	0.038	U	0.036	U	0.04	U
Di-n-butylphthalate	--	8.1	--	0.034	U	0.036	U	0.039	U	0.041	U	0.035	U	0.038	U	0.036	U	0.04	U
Di-n-octylphthalate	--	120	--	0.044	U	0.045	U	0.049	U	0.052	U	0.045	U	0.048	U	0.046	U	0.05	U
Diethyl phthalate	--	7.1	--	0.038	U	0.039	U	0.042	U	0.045	U	0.039	U	0.041	U	0.039	U	0.043	U
Dimethyl phthalate	--	27	--	0.045	U	0.047	U	0.051	U	0.054	U	0.047	U	0.05	U	0.047	U	0.052	U
Benzo(a)anthracene	5.6	1	1	0.035	U	0.036	U	0.039	U	0.042	U	0.036	U	0.038	U	0.044	J	0.04	U
Benzo(a)pyrene	1	22	1	0.044	U	0.045	U	0.049	U	0.052	U	0.045	U	0.048	U	0.048	J	0.05	U
Benzo(b)fluoranthene	5.6	1.7	1	0.036	U	0.037	U	0.04	U	0.043	U	0.037	U	0.04	U	0.062	J	0.041	U
Benzo(k)fluoranthene	56	1.7	0.8	0.034	U	0.035	U	0.038	U	0.041	U	0.035	U	0.037	U	0.036	U	0.039	U
Chrysene	56	1	1	0.035	U	0.036	U	0.039	U	0.042	U	0.036	U	0.038	U	0.045	J	0.04	U
Acenaphthylene	500	107	100	0.033	U	0.034	U	0.037	U	0.04	U	0.034	U	0.037	U	0.035	U	0.038	U
Anthracene	500	1000	100	0.03	U	0.031	U	0.033	U	0.035	U	0.03	U	0.033	U	0.031	U	0.034	U
Benzo(ghi)perylene	500	1000	100	0.037	U	0.038	U	0.042	U	0.044	U	0.038	U	0.041	U	0.039	U	0.043	U
Fluorene	500	386	30	0.051	U	0.053	U	0.057	U	0.061	U	0.053	U	0.056	U	0.053	U	0.059	U
Phenanthrene	500	1000	100	0.035	U	0.036	U	0.039	U	0.042	U	0.036	U	0.038	U	0.036	U	0.04	U
Dibenzo(a,h)anthracene	0.56	1000	0.33	0.034	U	0.036	U	0.039	U	0.041	U	0.036	U	0.038	U	0.036	U	0.04	U
Indeno(1,2,3-cd)Pyrene	5.6	8.2	0.5	0.04	U	0.041	U	0.044	U	0.047	U	0.041	U	0.044	U	0.041	U	0.046	U
Pyrene	500	1000	100	0.035	U	0.036	U	0.039	U	0.041	U	0.036	U	0.038	U	0.055	J	0.04	U
Biphenyl	--	--	--	0.059	U	0.061	U	0.066	U	0.07	U	0.061	U	0.065	U	0.061	U	0.068	U
4-Chloroaniline	--	0.22	--	0.047	U	0.049	U	0.053	U	0.056	U	0.048	U	0.052	U	0.049	U	0.054	U
2-Nitroaniline	--	0.4	--	0.05	U	0.052	U	0.056	U	0.06	U	0.052	U	0.055	U	0.052	U	0.058	U
3-Nitroaniline	--	0.5	--	0.049	U	0.051	U	0.055	U	0.059	U	0.051	U	0.054	U	0.051	U	0.057	U
4-Nitroaniline	--	--	--	0.048	U	0.05	U	0.054	U	0.057	U	0.05	U	0.053	U	0.05	U	0.055	U
Dibenzofuran	350	6.2	7	0.06	U	0.061	U	0.067	U	0.071	U	0.061	U	0.066	U	0.062	U	0.068	U
2-Methylnaphthalene	--	36.4	--	0.057	U	0.059	U	0.064	U	0.068	U	0.059	U	0.063	U	0.059	U	0.066	U
1,2,4,5-Tetrachlorobenzene	--	--	--	0.055	U	0.057	U	0.062	U	0.066	U	0.057	U	0.061	U	0.058	U	0.064	U
Acetophenone	--	--	--	0.055	U	0.057	U	0.062	U	0.066	U	0.057	U	0.061	U	0.058	U	0.064	U
2,4,6-Trichlorophenol	--	--	--	0.034	U	0.035	U	0.038	U	0.04	U	0.035	U	0.037	U	0.035	U	0.039	U
P-Chloro-M-Cresol	--	--	--	0.052	U	0.053	U	0.058	U	0.062	U	0.06	U	0.064	U	0.06	U	0.066	U
2-Chlorophenol	--	--	--	0.054	U	0.056	U	0.06	U	0.064	U	0.055	U	0.058	U	0.055	U	0.061	U
2,4-Dichlorophenol	--	0.4	--	0.058	U	0.06	U	0.065	U	0.069	U	0.057	U	0.061	U	0.058	U	0.064	U
2,4-Dimethylphenol	--	--	--	0.053	U	0.055	U	0.06	U	0.063	U	0.06	U	0.064	U	0.06	U	0.066	U
2-Nitrophenol	--	0.3	--	0.056	U	0.057	U	0.062	U	0.066	U	0.25	U	0.27	U	0.25	U	0.28	U
4-Nitrophenol	--	0.1	--	0.058	U	0.06	U	0.065	U	0.069	U	0.067	U	0.072	U	0.068	U	0.075	U
2,4-Dinitrophenol	--	0.2	--	0.24	U	0.25	U	0.27	U	0.29	U	0.039	U	0.042	U	0.04	U	0.044	U
4,6-Dinitro-o-cresol	--	--	--	0.065	U	0.067	U	0.073	U	0.078	U	0.054	U	0.058	U	0.055	U	0.061	U
Pentachlorophenol	6.7	0.8	0.8	0.038	U	0.039	U	0.043	U	0.046	U	0.059	U	0.063	U	0.06	U	0.066	U
Phenol	500	0.33	0.33	0.053	U	0.054	U	0.059	U	0.063	U	0.06	U	0.064	U	0.061	U	0.067	U
2-Methylphenol	500	0.33	0.33	0.058	U	0.059	U	0.064	U	0.068	U	0.06	U	0.064	U	0.06	U	0.066	U
3-Methylphenol/4-Methylphenol	500	0.33	0.33	0.059	U	0.06	U	0.066	U	0.07	U	0.19	U	0.2	U	0.19	U	0.21	U
2,4,5-Trichlorophenol	--	0.1	--	0.058	U	0.06	U	0.065	U	0.069	U	0.057	U	0.06	U	0.057	U	0.063	U
Benzoic Acid	--	2.7	--	0.18	U	0.19	U	0.2	U	0.22	U	0.04	U	0.042	U	0.04	U	0.044	U
Benzyl Alcohol	--	--	--	0.055	U	0.057	U	0.062	U	0.066	U	-		0.093	-	0.602	-	-	-
Carbazole	--	--	--	0.038	U	0.04	U	0.043	U	0.046	U								
Total SVOCs	--	--	--	0.11		0.13		0.14	-	0.15		-	-	0	U	-	-	0	U
No Tentatively Identified Compounds	--	--	--	NA		0	U	0	U	0	U	0.24		-	-	0.28		-	-
Unknown	--	--	--	8.9		NA		NA		NA		0.2		-	-	0.6		-	-
Unknown	--	--	--	NA		NA		NA		NA		-	-	-	-	-	-	-	-
Unknown	--	--	--	NA		NA		NA		NA		0.19		-	-	0.25		-	-
Cyclic Octaatomic Sulfur	--	--	--	NA		NA		NA		NA		0.63	-	-	-				
Unknown	--	--	--	NA		NA		NA		NA		0.000348	U	0.000374	U				
Total SVOCs	--	--	--	8.9		NA		NA		NA		0.000331	U	0.000356	U	1.13	-	-	-

Notes:
NY-UNRES = New York Unrestricted Use Criteria
NY-RESC = Commercial Criteria, New York Restricted Use
NY-RESGW = Groundwater Criteria, New York Restricted Use
Cells highlighted in yellow indicate concentrations above the NY-RESC, NY-RESGW, and NY-UNRES values
Cells highlighted in blue indicate concentrations above either the NY-RESGW or NY-UNRES value, or both, but below the NY-RESC value
Cells highlighted in grey indicate MDL values above the Unrestricted SCO and/or the Restricted Groundwater SCO, but below the Restricted Commercial Use SCO
DUP = designation for duplicate sample
SCO = Soil Cleanup Objective
MDL = Maximum Detection Limit
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL.
Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 5: Semi Volatile Organic Compounds in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP-SB-3D(48-50)		HIP/SB4 (0-2)		HIP/SB4 (9-11)		HIP/SB4 (13-15)		HIP/SB5 (1-3)		HIP/SB5 (1-3) DUP		HIP/SB5 (9-11)		HIP/SB5 (11-13)		HIP/SB5 (13-15)	
LAB SAMPLE ID				L1528963-06		L1528458-06		L1528458-08		L1528458-07		L1529510-01		L1529510-02		L1529510-03		L1529510-04		L1529510-05	
COLLECTION DATE	NY-RESC	NY-RESGW	NY-UNRES	11/5/2015		11/2/2015		11/2/2015		11/2/2015		11/10/2015		11/10/2015		11/10/2015		11/10/2015		11/10/2015	
Semivolatile Organic Compounds Units: mg/kg				**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Acenaphthene	500	98	20	0.045	U	0.035	U	0.04	U	0.04	U	0.038	U	0.039	U	0.041	U	0.041	U	0.042	U
1,2,4-Trichlorobenzene	--	3.4	--	0.071	U	0.056	U	0.064	U	0.063	U	0.061	U	0.062	U	0.065	U	0.065	U	0.067	U
Hexachlorobenzene	6	1.4	0.33	0.04	U	0.032	U	0.037	U	0.036	U	0.035	U	0.035	U	0.037	U	0.037	U	0.038	U
Bis(2-chloroethyl)ether	--	--	--	0.061	U	0.048	U	0.055	U	0.054	U	0.052	U	0.053	U	0.056	U	0.055	U	0.057	U
2-Chloronaphthalene	--	--	--	0.071	U	0.056	U	0.064	U	0.063	U	0.061	U	0.061	U	0.064	U	0.064	U	0.067	U
1,2-Dichlorobenzene	500	1.1	1.1	0.071	U	0.056	U	0.065	U	0.063	U	0.061	U	0.062	U	0.065	U	0.065	U	0.067	U
1,3-Dichlorobenzene	280	2.4	2.4	0.068	U	0.054	U	0.062	U	0.061	U	0.059	U	0.059	U	0.062	U	0.062	U	0.064	U
1,4-Dichlorobenzene	130	1.8	1.8	0.066	U	0.052	U	0.06	U	0.058	U	0.057	U	0.057	U	0.06	U	0.06	U	0.062	U
3,3'-Dichlorobenzidine	--	--	--	0.058	U	0.046	U	0.052	U	0.051	U	0.05	U	0.05	U	0.053	U	0.053	U	0.054	U
2,4-Dinitrotoluene	--	--	--	0.047	U	0.037	U	0.042	U	0.042	U	0.04	U	0.041	U	0.043	U	0.043	U	0.044	U
2,6-Dinitrotoluene	--	0.17	--	0.055	U	0.044	U	0.05	U	0.049	U	0.048	U	0.048	U	0.051	U	0.051	U	0.052	U
Fluoranthene	500	1000	100	0.04	U	0.031	U	0.036	U	0.035	U	0.034	U	0.16		0.036	U	0.036	U	0.038	U
4-Chlorophenyl phenyl ether	--	--	--	0.066	U	0.052	U	0.06	U	0.058	U	0.057	U	0.057	U	0.06	U	0.06	U	0.062	U
4-Bromophenyl phenyl ether	--	--	--	0.05	U	0.039	U	0.045	U	0.044	U	0.043	U	0.043	U	0.046	U	0.046	U	0.047	U
Bis(2-chloroisopropyl)ether	--	--	--	0.076	U	0.06	U	0.069	U	0.068	U	0.066	U	0.066	U	0.07	U	0.07	U	0.072	U
Bis(2-chloroethoxy)methane	--	--	--	0.066	U	0.052	U	0.06	U	0.058	U	0.056	U	0.057	U	0.06	U	0.06	U	0.062	U
Hexachlorobutadiene	--	--	--	0.061	U	0.048	U	0.056	U	0.054	U	0.052	U	0.053	U	0.056	U	0.056	U	0.058	U
Hexachlorocyclopentadiene	--	--	--	0.14	U	0.11	U	0.13	U	0.12	U	0.12	U	0.12	U	0.13	U	0.13	U	0.13	U
Hexachloroethane	--	--	--	0.039	U	0.031	U	0.036	U	0.035	U	0.034	U	0.034	U	0.036	U	0.036	U	0.037	U
Isophorone	--	4.4	--	0.058	U	0.046	U	0.052	U	0.051	U	0.05	U	0.05	U	0.053	U	0.053	U	0.054	U
Naphthalene	500	12	12	0.072	U	0.057	U	0.065	U	0.064	U	0.062	U	0.063	U	0.066	U	0.066	U	0.068	U
Nitrobenzene	69	0.17	--	0.052	U	0.041	U	0.047	U	0.046	U	0.044	U	0.045	U	0.047	U	0.047	U	0.049	U
NitrosoDiPhenylAmine(NDPA)/DPA	--	--	--	0.045	U	0.036	U	0.041	U	0.04	U	0.039	U	0.04	U	0.042	U	0.042	U	0.043	U
n-Nitrosodi-n-propylamine	--	--	--	0.064	U	0.051	U	0.059	U	0.057	U	0.056	U	0.056	U	0.059	U	0.059	U	0.061	U
Bis(2-Ethylhexyl)phthalate	--	435	--	0.057	U	0.12	J	0.15	J	0.14	J	0.079	J	0.089	J	0.053	J	0.064	J	0.054	U
Butyl benzyl phthalate	--	122	--	0.042	U	0.034	U	0.038	U	0.038	U	0.036	U	0.037	U	0.039	U	0.039	U	0.04	U
Di-n-butylphthalate	--	8.1	--	0.042	U	0.033	U	0.038	U	0.037	U	0.036	U	0.036	U	0.038	U	0.038	U	0.039	U
Di-n-octylphthalate	--	120	--	0.053	U	0.042	U	0.048	U	0.047	U	0.046	U	0.046	U	0.049	U	0.049	U	0.05	U
Diethyl phthalate	--	7.1	--	0.046	U	0.036	U	0.042	U	0.041	U	0.039	U	0.04	U	0.042	U	0.042	U	0.043	U
Dimethyl phthalate	--	27	--	0.055	U	0.044	U	0.05	U	0.049	U	0.047	U	0.048	U	0.05	U	0.05	U	0.052	U
Benzo(a)anthracene	5.6	1	1	0.042	U	0.034	U	0.038	U	0.038	U	0.036	U	0.082	J	0.039	U	0.039	U	0.04	U
Benzo(a)pyrene	1	22	1	0.053	U	0.042	U	0.048	U	0.047	U	0.046	U	0.066	J	0.048	U	0.048	U	0.05	U
Benzo(b)fluoranthene	5.6	1.7	1	0.044	U	0.035	U	0.04	U	0.039	U	0.038	U	0.083	J	0.04	U	0.04	U	0.041	U
Benzo(k)fluoranthene	56	1.7	0.8	0.041	U	0.033	U	0.038	U	0.037	U	0.036	U	0.036	U	0.038	U	0.038	U	0.039	U
Chrysene	56	1	1	0.042	U	0.034	U	0.039	U	0.038	U	0.036	U	0.078	J	0.039	U	0.039	U	0.04	U
Acenaphthylene	500	107	100	0.04	U	0.032	U	0.037	U	0.036	U	0.035	U	0.035	U	0.037	U	0.037	U	0.038	U
Anthracene	500	1000	100	0.036	U	0.028	U	0.033	U	0.032	U	0.031	U	0.031	U	0.033	U	0.033	U	0.034	U
Benzo(ghi)perylene	500	1000	100	0.045	U	0.036	U	0.041	U	0.04	U	0.039	U	0.039	J	0.041	U	0.041	U	0.042	U
Fluorene	500	386	30	0.062	U	0.049	U	0.056	U	0.055	U	0.053	U	0.054	U	0.057	U	0.057	U	0.059	U
Phenanthrene	500	1000	100	0.042	U	0.034	U	0.038	U	0.038	U	0.036	U	0.067	J	0.039	U	0.039	U	0.04	U
Dibenzo(a,h)anthracene	0.56	1000	0.33	0.042	U	0.033	U	0.038	U	0.037	U	0.036	U	0.036	U	0.038	U	0.038	U	0.04	U
Indeno(1,2,3-cd)Pyrene	5.6	8.2	0.5	0.048	U	0.038	U	0.044	U	0.043	U	0.041	U	0.042	U	0.044	U	0.044	U	0.045	U
Pyrene	500	1000	100	0.042	U	0.033	U	0.038	U	0.037	U	0.036	U	0.12		0.038	U	0.038	U	0.04	U
Biphenyl	--	--	--	0.071	U	0.056	U	0.065	U	0.063	U	0.061	U	0.062	U	0.065	U	0.065	U	0.067	U
4-Chloroaniline	--	0.22	--	0.057	U	0.045	U	0.052	U	0.051	U	0.049	U	0.05	U	0.052	U	0.052	U	0.054	U
2-Nitroaniline	--	0.4	--	0.061	U	0.048	U	0.056	U	0.054	U	0.052	U	0.053	U	0.056	U	0.056	U	0.058	U
3-Nitroaniline	--	0.5	--	0.06	U	0.047	U	0.054	U	0.053	U	0.051	U	0.052	U	0.055	U	0.055	U	0.056	U
4-Nitroaniline	--	--	--	0.058	U	0.046	U	0.053	U	0.052	U	0.05	U	0.051	U	0.053	U	0.053	U	0.055	U
Dibenzofuran	350	6.2	7	0.072	U	0.057	U	0.066	U	0.064	U	0.062	U	0.063	U	0.066	U	0.066	U	0.068	U
2-Methylnaphthalene	--	36.4	--	0.069	U	0.055	U	0.063	U	0.061	U	0.059	U	0.06	U	0.063	U	0.063	U	0.065	U
1,2,4,5-Tetrachlorobenzene	--	--	--	0.067	U	0.053	U	0.061	U	0.06	U	0.058	U	0.058	U	0.061	U	0.061	U	0.063	U
Acetophenone	--	--	--	0.067	U	0.053	U	0.061	U	0.06	U	0.058	U	0.058	U	0.061	U	0.061	U	0.063	U
2,4,6-Trichlorophenol	--	--	--	0.041	U	0.032	U	0.037	U	0.036	U	0.035	U	0.036	U	0.037	U	0.037	U	0.038	U
P-Chloro-M-Cresol	--	--	--	0.07	U	0.05	U	0.057	U	0.056	U	0.06	U	0.061	U	0.064	U	0.064	U	0.066	U
2-Chlorophenol	--	--	--	0.064	U	0.052	U	0.059	U	0.058	U	0.056	U	0.056	U	0.059	U	0.059	U	0.061	U
2,4-Dichlorophenol	--	0.4	--	0.068	U	0.056	U	0.064	U	0.062	U	0.058	U	0.059	U	0.062	U	0.062	U	0.064	U
2,4-Dimethylphenol	--	--	--	0.07	U	0.051	U	0.059	U	0.057	U	0.06	U	0.061	U	0.064	U	0.064	U	0.066	U
2-Nitrophenol	--	0.3	--	0.3	U	0.053	U	0.061	U	0.06	U	0.25	U	0.26	U	0.27	U	0.27	U	0.28	U
4-Nitrophenol	--	0.1	--	0.079	U	0.056	U	0.064	U	0.062	U	0.068	U	0.069	U	0.072	U	0.072	U	0.075	U
2,4-Dinitrophenol	--	0.2	--	0.046	U	0.23	U	0.27	U	0.26	U	0.04	U	0.04	U	0.042	U	0.042	U	0.044	U
4,6-Dinitro-o-cresol	--	--	--	0.064	U	0.063	U	0.072	U	0.07	U	0.055	U	0.056	U	0.059	U	0.058	U	0.06	U
Pentachlorophenol	6.7	0.8	0.8	0.07	U	0.037	U	0.042	U	0.041	U	0.06	U	0.061	U	0.064	U	0.064	U	0.066	U
Phenol	500	0.33	0.33	0.071	U	0.051	U	0.058	U	0.057	U	0.061	U	0.062	U	0.065	U	0.065	U	0.067	U
2-Methylphenol	500	0.33	0.33	0.07	U	0.055	U	0.063	U	0.062	U	0.06	U	0.061	U	0.064	U	0.064	U	0.066	U
3-Methylphenol/4-Methylphenol	500	0.33	0.33	0.22	U	0.056	U	0.064	U	0.063	U	0.19	U	0.19	U	0.2	U	0.2	U	0.21	U
2,4,5-Trichlorophenol	--	0.1	--	0.067	U	0.056	U	0.064	U	0.062	U	0.057	U	0.058	U	0.061	U	0.061	U	0.063	U
Benzoic Acid	--	2.7	--	0.046	U	0.17	U	0.2	U	0.19	U	0.04	U	0.04	U	0.042	U	0.042	U	0.044	U
Benzyl Alcohol	--	--	--	-	-	0.053	U	0.061	U	0.059	U	0.079	-	0.784	-	0.053		0.064		-	
Carbazole	--	--	--			0.037	U	0.042	U	0.041	U										
Total SVOCs	--	--	--	0	U	0.12		0.15		0.14		-	-	0	U	-	-	0	U	-	-
No Tentatively Identified Compounds	--	--	--	-	-	NA		0	U	0		-	-	-	-	-	-	-	-	-	-
Unknown	--	--	--	-	-	NA		NA		NA		-	-	-	-	-	-	-	-	-	-
Unknown	--	--	--	-	-	0.22		NA		NA		0.45		-	-	-	-	-	-	-	-
Unknown	--	--	--	-	-	0.19		NA		NA		-	-	-	-	-	-	-	-	-	-
Cyclic Octaatomic Sulfur	--	--	--			NA		NA		NA										0.19	-
Unknown	--	--	--			NA		NA		NA										0.000375	U
Total SVOCs	--	--	--	-	-	0.41		NA		NA		0.61	-	-	-	0.18	-	-	-	0.000356	U

Notes:
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NY-RESGW = Groundwater Criteria, New York Restricted Use
Cells highlighted in yellow indicate concentrations above the NY-RESC, NY-RESGW, and NY-UNRES values
Cells highlighted in blue indicate concentrations above either the NY-RESGW or NY-UNRES value, or both, but below the NY-RESC value
Cells highlighted in grey indicate MDL values above the Unrestricted SCO and/or the Restricted Groundwater SCO, but below the Restricted Commercial Use SCO
DUP = designation for duplicate sample
SCO = Soil Cleanup Objective
MDL = Maximum Detection Limit
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 6: Pesticides and PCBs in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP/SB1 (0-2)		HIP/SB1 (4-6)		HIP/SB1 (8-9)		HIP/SB1 (13-15)		HIP/SB2D (3-5)		HIP/SB2D (9-11)	
LAB SAMPLE ID				L1528458-01		L1528458-03		L1528458-02		L1528458-05		L1529510-06		L1529510-07	
COLLECTION DATE	NY-RESC	NY-RESGW	NY-UNRES	11/2/2015		11/2/2015		11/2/2015		11/2/2015		11/11/2015		11/11/2015	
Pesticides Units: mg/kg				**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Delta-BHC	500	0.25	0.04	0.000323	U	0.000345	U	0.00037	U	0.000381	U	0.000348	U	0.000374	U
Lindane	9.2	0.1	0.1	0.000307	U	0.000328	U	0.000352	U	0.000362	U	0.000331	U	0.000356	U
Alpha-BHC	3.4	0.02	0.02	0.000195	U	0.000208	U	0.000224	U	0.00023	U	0.00021	U	0.000226	U
Beta-BHC	3	0.09	0.036	0.000625	U	0.000667	U	0.000716	U	0.000737	U	0.000674	U	0.000724	U
Heptachlor	15	0.38	0.042	0.000369	U	0.000394	U	0.000423	U	0.000436	U	0.000398	U	0.000428	U
Aldrin	0.68	0.19	0.005	0.00058	U	0.00062	U	0.000665	U	0.000684	U	0.000626	U	0.000672	U
Heptachlor epoxide	--	0.02	--	0.000927	U	0.00099	U	0.00106	U	0.00109	U	0.001	U	0.00107	U
Endrin	89	0.06	0.014	0.000282	U	0.000301	U	0.000323	U	0.000332	U	0.000304	U	0.000326	U
Endrin ketone	--	--	--	0.000424	U	0.000453	U	0.000486	U	0.0005	U	0.000458	U	0.000492	U
Dieldrin	1.4	0.1	0.005	0.000515	U	0.00055	U	0.00059	U	0.000607	U	0.000555	U	0.000597	U
4,4'-DDE	62	17	0.0033	0.00318		0.000407	U	0.000437	U	0.00045	U	0.00419		0.000645	J
4,4'-DDD	92	14	0.0033	0.002		0.000628	U	0.000674	U	0.000693	U	0.000634	U	0.000681	U
4,4'-DDT	47	136	0.0033	0.00801		0.00142	U	0.00152	U	0.00156	U	0.00167	J	0.00154	U
Endosulfan I	200	102	2.4	0.000389	U	0.000416	U	0.000446	U	0.000459	U	0.00042	U	0.000451	U
Endosulfan II	200	102	2.4	0.000551	U	0.000588	U	0.000631	U	0.00065	U	0.000594	U	0.000638	U
Endosulfan sulfate	200	1000	2.4	0.000327	U	0.000349	U	0.000375	U	0.000386	U	0.000352	U	0.000379	U
Methoxychlor	--	900	--	0.000961	U	0.00103	U	0.0011	U	0.00113	U	0.00104	U	0.00111	U
Toxaphene	--	--	--	0.00865	U	0.00924	U	0.00992	U	0.0102	U	0.00933	U	0.01	U
cis-Chlordane	24	2.9	0.094	0.000574	U	0.000613	U	0.000658	U	0.000677	U	0.000619	U	0.000665	U
trans-Chlordane	--	--	--	0.000544	U	0.000581	U	0.000623	U	0.000641	U	0.000819	J	0.00232	J
Chlordane	--	--	--	0.00546	U	0.00583	U	0.00626	U	0.00644	U	0.00589	U	0.00633	U
Polychlorinated Biphenyls															
Aroclor 1016	1	3.2	0.1	0.00285	U	0.00291	U	0.00309	U	0.00337	U	0.00294	U	0.003	U
Aroclor 1221	1	3.2	0.1	0.00333	U	0.0034	U	0.0036	U	0.00393	U	0.00343	U	0.0035	U
Aroclor 1232	1	3.2	0.1	0.00423	U	0.00432	U	0.00458	U	0.005	U	0.00436	U	0.00445	U
Aroclor 1242	1	3.2	0.1	0.00442	U	0.00451	U	0.00478	U	0.00522	U	0.00455	U	0.00465	U
Aroclor 1248	1	3.2	0.1	0.00305	U	0.00311	U	0.0033	U	0.0036	U	0.00314	U	0.00321	U
Aroclor 1254	1	3.2	0.1	0.00297	U	0.00303	U	0.00321	U	0.0035	U	0.021	J	0.00312	U
Aroclor 1260	1	3.2	0.1	0.00275	U	0.00281	U	0.00298	U	0.00325	U	0.0135	J	0.0138	J
Aroclor 1262	1	3.2	0.1	0.00179	U	0.00183	U	0.00194	U	0.00212	U	0.00184	U	0.00188	U
Aroclor 1268	1	3.2	0.1	0.00524	U	0.00534	U	0.00567	U	0.00618	U	0.00539	U	0.00551	U
PCBs, Total	--	--	--	0.00179	U	0.00183	U	0.00194	U	0.00212	U	0.0345	J	0.0138	J

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Cells highlighted in blue indicate concentrations above either the NY-RESGW or NY-UNRES value, or both, but below the NY-RESC value
Cells highlighted in grey indicate MDL values above the Unrestricted SCO and/or the Restricted Groundwater SCO, but below the Restricted Commercial Use SCO
DUP = designation for duplicate sample
SCO = Soil Cleanup Objective
MDL = Maximum Detection Limit
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 6: Pesticides and PCBs in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP-SB-3D(1-3)		HIP-SB-3D(9-11)		HIP-SB-3D(48-50)		HIP/SB4 (0-2)		HIP/SB4 (13-15)		HIP/SB4 (9-11)	
LAB SAMPLE ID				L1528963-05		L1528963-01		L1528963-06		L1528458-06		L1528458-07		L1528458-08	
COLLECTION DATE	NY-RESC	NY-RESGW	NY-UNRES	11/5/2015		11/5/2015		11/5/2015		11/2/2015		11/2/2015		11/2/2015	
Pesticides Units: mg/kg				**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Delta-BHC	500	0.25	0.04	0.000351	U	0.00039	U	0.000407	U	0.000324	U	0.000351	U	0.000356	U
Lindane	9.2	0.1	0.1	0.000334	U	0.000371	U	0.000387	U	0.000309	U	0.000334	U	0.000339	U
Alpha-BHC	3.4	0.02	0.02	0.000212	U	0.000236	U	0.000246	U	0.000196	U	0.000212	U	0.000215	U
Beta-BHC	3	0.09	0.036	0.00068	U	0.000755	U	0.000788	U	0.000628	U	0.00068	U	0.00069	U
Heptachlor	15	0.38	0.042	0.000402	U	0.000446	U	0.000466	U	0.000372	U	0.000402	U	0.000408	U
Aldrin	0.68	0.19	0.005	0.000631	U	0.000701	U	0.000732	U	0.000584	U	0.000631	U	0.00064	U
Heptachlor epoxide	--	0.02	--	0.00101	U	0.00112	U	0.00117	U	0.000932	U	0.00101	U	0.00102	U
Endrin	89	0.06	0.014	0.000306	U	0.00034	U	0.000355	U	0.000283	U	0.000306	U	0.000311	U
Endrin ketone	--	--	--	0.000462	U	0.000513	U	0.000535	U	0.000427	U	0.000462	U	0.000468	U
Dieldrin	1.4	0.1	0.005	0.00056	U	0.000622	U	0.000649	U	0.000518	U	0.00056	U	0.000568	U
4,4'-DDE	62	17	0.0033	0.00121	J	0.000461	U	0.00048	U	0.000383	U	0.000415	U	0.00042	U
4,4'-DDD	92	14	0.0033	0.000639	U	0.00071	U	0.000741	U	0.000591	U	0.00064	U	0.000649	U
4,4'-DDT	47	136	0.0033	0.00525		0.0016	U	0.00167	U	0.00133	U	0.00144	U	0.00146	U
Endosulfan I	200	102	2.4	0.000423	U	0.00047	U	0.000491	U	0.000392	U	0.000424	U	0.00043	U
Endosulfan II	200	102	2.4	0.000599	U	0.000666	U	0.000694	U	0.000554	U	0.000599	U	0.000608	U
Endosulfan sulfate	200	1000	2.4	0.000356	U	0.000395	U	0.000412	U	0.000329	U	0.000356	U	0.000361	U
Methoxychlor	--	900	--	0.00104	U	0.00116	U	0.00121	U	0.000967	U	0.00105	U	0.00106	U
Toxaphene	--	--	--	0.00941	U	0.0104	U	0.0109	U	0.0087	U	0.00942	U	0.00955	U
cis-Chlordane	24	2.9	0.094	0.0024		0.000694	U	0.000724	U	0.000577	U	0.000625	U	0.000634	U
trans-Chlordane	--	--	--	0.0042		0.000657	U	0.000686	U	0.000547	U	0.000592	U	0.0006	U
Chlordane	--	--	--	0.00594	U	0.0066	U	0.00688	U	0.00549	U	0.00594	U	0.00602	U
Polychlorinated Biphenyls															
Aroclor 1016	1	3.2	0.1	0.00291	U	0.00326	U	0.00346	U	0.00269	U	0.00301	U	0.00304	U
Aroclor 1221	1	3.2	0.1	0.0034	U	0.00381	U	0.00404	U	0.00314	U	0.00351	U	0.00354	U
Aroclor 1232	1	3.2	0.1	0.00432	U	0.00484	U	0.00514	U	0.00399	U	0.00446	U	0.0045	U
Aroclor 1242	1	3.2	0.1	0.00451	U	0.00506	U	0.00537	U	0.00417	U	0.00466	U	0.0047	U
Aroclor 1248	1	3.2	0.1	0.00311	U	0.00349	U	0.0037	U	0.00288	U	0.00321	U	0.00324	U
Aroclor 1254	1	3.2	0.1	0.00303	U	0.0034	U	0.0036	U	0.0028	U	0.00313	U	0.00316	U
Aroclor 1260	1	3.2	0.1	0.00281	U	0.00315	U	0.00334	U	0.0026	U	0.0029	U	0.00293	U
Aroclor 1262	1	3.2	0.1	0.00183	U	0.00205	U	0.00218	U	0.00169	U	0.00189	U	0.0019	U
Aroclor 1268	1	3.2	0.1	0.00534	U	0.00599	U	0.00636	U	0.00494	U	0.00552	U	0.00557	U
PCBs, Total	--	--	--	0.00183	U	0.00205	U	0.00218	U	0.00169	U	0.00189	U	0.0019	U

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Cells highlighted in grey indicate MDL values above the Unrestricted SCO and/or the Restricted Groundwater SCO, but below the Restricted Commercial Use SCO
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SCO = Soil Cleanup Objective
MDL = Maximum Detection Limit
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 6: Pesticides and PCBs in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION	NY-RESC	NY-RESGW	NY-UNRES	HIP/SB5 (1-3)		HIP/SB5 (1-3) DUP		HIP/SB5 (9-11)		HIP/SB5 (11-13)		HIP/SB5 (13-15)	
LAB SAMPLE ID				L1529510-01		L1529510-02		L1529510-03		L1529510-04		L1529510-05	
COLLECTION DATE				11/10/2015		11/10/2015		11/10/2015		11/10/2015		11/10/2015	
Pesticides Units: mg/kg				**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Delta-BHC	500	0.25	0.04	0.000355	U	0.00034	U	0.000368	U	0.00036	U	0.000375	U
Lindane	9.2	0.1	0.1	0.000337	U	0.000324	U	0.00035	U	0.000342	U	0.000356	U
Alpha-BHC	3.4	0.02	0.02	0.000214	U	0.000206	U	0.000223	U	0.000218	U	0.000226	U
Beta-BHC	3	0.09	0.036	0.000687	U	0.000659	U	0.000714	U	0.000697	U	0.000726	U
Heptachlor	15	0.38	0.042	0.000406	U	0.000389	U	0.000422	U	0.000412	U	0.000429	U
Aldrin	0.68	0.19	0.005	0.000638	U	0.000612	U	0.000662	U	0.000647	U	0.000674	U
Heptachlor epoxide	--	0.02	--	0.00102	U	0.000977	U	0.00106	U	0.00103	U	0.00108	U
Endrin	89	0.06	0.014	0.000309	U	0.000297	U	0.000321	U	0.000314	U	0.000327	U
Endrin ketone	--	--	--	0.000466	U	0.000447	U	0.000484	U	0.000473	U	0.000493	U
Dieldrin	1.4	0.1	0.005	0.000566	U	0.000543	U	0.000588	U	0.000574	U	0.000598	U
4,4'-DDE	62	17	0.0033	0.00162	J	0.00155	J	0.000435	U	0.000425	U	0.000442	U
4,4'-DDD	92	14	0.0033	0.00152	J	0.00154	J	0.000671	U	0.000656	U	0.000682	U
4,4'-DDT	47	136	0.0033	0.0034	U	0.0014	U	0.00151	U	0.00148	U	0.00154	U
Endosulfan I	200	102	2.4	0.00181	U	0.00041	U	0.000444	U	0.000434	U	0.000452	U
Endosulfan II	200	102	2.4	0.00181	U	0.00058	U	0.000629	U	0.000614	U	0.000639	U
Endosulfan sulfate	200	1000	2.4	0.000755	U	0.000344	U	0.000373	U	0.000364	U	0.000379	U
Methoxychlor	--	900	--	0.0034	U	0.00101	U	0.0011	U	0.00107	U	0.00112	U
Toxaphene	--	--	--	0.034	U	0.00912	U	0.00988	U	0.00965	U	0.01	U
cis-Chlordane	24	2.9	0.094	0.00226	U	0.000605	U	0.000656	U	0.00064	U	0.000666	U
trans-Chlordane	--	--	--	0.00226	U	0.000573	U	0.000621	U	0.000607	U	0.000631	U
Chlordane	--	--	--	0.0147	U	0.00576	U	0.00623	U	0.00609	U	0.00634	U
Polychlorinated Biphenyls													
Aroclor 1016	1	3.2	0.1	0.00289	U	0.00293	U	0.00318	U	0.00315	U	0.00318	U
Aroclor 1221	1	3.2	0.1	0.00337	U	0.00342	U	0.00371	U	0.00367	U	0.00372	U
Aroclor 1232	1	3.2	0.1	0.00428	U	0.00435	U	0.00472	U	0.00467	U	0.00473	U
Aroclor 1242	1	3.2	0.1	0.00448	U	0.00454	U	0.00493	U	0.00488	U	0.00494	U
Aroclor 1248	1	3.2	0.1	0.00308	U	0.00313	U	0.0034	U	0.00336	U	0.0034	U
Aroclor 1254	1	3.2	0.1	0.003	U	0.00305	U	0.00331	U	0.00328	U	0.00331	U
Aroclor 1260	1	3.2	0.1	0.00279	U	0.00283	U	0.00307	U	0.00304	U	0.00307	U
Aroclor 1262	1	3.2	0.1	0.00181	U	0.00184	U	0.002	U	0.00198	U	0.002	U
Aroclor 1268	1	3.2	0.1	0.0053	U	0.00538	U	0.00584	U	0.00578	U	0.00585	U
PCBs, Total	--	--	--	0.00181	U	0.00184	U	0.002	U	0.00198	U	0.002	U

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Cells highlighted in grey indicate MDL values above the Unrestricted SCO and/or the Restricted Groundwater SCO, but below the Restricted Commercial Use SCO
DUP = designation for duplicate sample
SCO = Soil Cleanup Objective
MDL = Maximum Detection Limit
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 7: Metals in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP/SB1 (0-2)		HIP/SB1 (8-9)		HIP/SB1 (4-6)		HIP/SB1 (13-15)		HIP/SB4 (0-2)		HIP/SB4 (13-15)		HIP/SB4 (9-11)	
LAB SAMPLE ID				L1528458-01		L1528458-02		L1528458-03		L1528458-05		L1528458-06		L1528458-07		L1528458-08	
COLLECTION DATE	NY-RESC	NY-RESGW	NY-UNRES	11/2/2015		11/2/2015		11/2/2015		11/2/2015		11/2/2015		11/2/2015		11/2/2015	
Total Metals Units: mg/kg				**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	Q	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Aluminum, Total	--	--	--	5600		2800		4500		1500		5200		2100		2000	
Antimony, Total	--	--	--	0.69	U	0.75		0.71	U	0.81	U	0.64	U	0.73	U	0.75	U
Arsenic, Total	16	16	13	3.8		2.5		0.77	J	0.43	J	2		1		1.4	
Barium, Total	400	820	350	30		6.9		11		9.2		18		12		10	
Beryllium, Total	590	47	7.2	0.25	J	0.34	J	0.09	U	0.1	U	0.18	J	0.09	U	0.09	U
Cadmium, Total	9.3	7.5	2.5	0.06	U	0.07	U	0.06	U	0.07	U	0.06	U	0.06	U	0.07	U
Calcium, Total	--	--	--	3000		360		2600		370		450		560		580	
Chromium, Total	--	--	--	10		13		8.5		5.2		12		10		6.3	
Cobalt, Total	--	--	--	3.5		4		1.9		1.4	J	4.1		2.2		2	
Copper, Total	270	1720	50	9.9		8.2		1		4.5		6.8		7		4.3	
Iron, Total	--	--	--	9800		18000		8600		2200		11000		4100		2800	
Lead, Total	1000	450	63	21		0.19		0.18	U	0.2	U	1.5	J	0.18	U	0.82	J
Magnesium, Total	--	--	--	1100		600		620		640		1200		910		820	
Manganese, Total	10000	2000	1600	230		30		66		19		220		32		28	
Mercury, Total	2.8	0.73	0.18	0.03	J	0.02	U	0.02	U	0.02	U	0.02		0.02	U	0.02	U
Nickel, Total	310	130	30	9.4		9.7		4.8		9.4		14		13		8.6	
Potassium, Total	--	--	--	320		240		210	J	370		320		390		250	
Selenium, Total	1500	4	3.9	0.26	U	0.28	U	0.27	U	0.3	U	0.24	U	0.47	J	0.28	U
Silver, Total	1500	8.3	2	0.17	U	0.19	U	0.18	U	0.2	U	0.16	U	0.18	U	0.19	U
Sodium, Total	--	--	--	97	J	51	J	60	J	100	J	53	J	93	J	72	J
Thallium, Total	--	--	--	0.35	U	0.38	U	0.35	U	0.4	U	0.32	U	0.36	U	0.37	U
Vanadium, Total	--	--	--	12		13		8.5		3.6		12		5.3		6.4	
Zinc, Total	10000	2480	109	60		39		13		12		24		14		11	

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Results and MDL values are in milligrams per kilogram (mg/kg)
Soil sample depths shown in feet (ft) within sample location
-- = No standard

Table 7: Metals in Soil
HIP Cleaners- Rochdale Village
Tenen Environmental

LOCATION				HIP-SB-3D(9-11)		HIP-SB-3D(1-3)		HIP-SB-3D(48-50)		HIP/SB5 (1-3)		HIP/SB5 (1-3) DUP		HIP/SB5 (9-11)		HIP/SB5 (11-13)		HIP/SB5 (13-15)		HIP/SB2D (3-5)		HIP/SB2D (9-11)	
LAB SAMPLE ID				L1528963-01		L1528963-05		L1528963-06		L1529510-01		L1529510-02		L1529510-03		L1529510-04		L1529510-05		L1529510-06		L1529510-07	
COLLECTION DATE	NY-RESC	NY-RESGW	NY-UNRES	11/5/2015		11/5/2015		11/5/2015		11/10/2015		11/10/2015		11/10/2015		11/10/2015		11/10/2015		11/11/2015		11/11/2015	
Total Metals Units: mg/kg				**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Aluminum, Total	--	--	--	1700		5400		1200		4900		4900		2300		2700		2400		5000		3800	
Antimony, Total	--	--	--	0.8	U	4.4	U	0.84	U	1.7	J	0.69	U	0.73	U	0.73	U	0.78	U	0.71	U	0.73	U
Arsenic, Total	16	16	13	0.2	U	2.2		0.44	J	2.4		2.3		0.49	J	0.18	U	1.5		2.6		7.5	
Barium, Total	400	820	350	10		27		8.9		20		19		12		15		11		27		11	
Beryllium, Total	590	47	7.2	0.1	U	0.2	J	0.1	U	0.17	J	0.16	J	0.09	U	0.09	U	0.1	U	0.21	J	0.21	
Cadmium, Total	9.3	7.5	2.5	0.07	U	0.89	U	0.07	U	0.06	U	0.06	U	0.06	U	0.06	U	0.07	U	0.06	U	0.06	U
Calcium, Total	--	--	--	450		9200		430		13000		18000		380		520		550		4100		580	
Chromium, Total	--	--	--	5.2		11		5.3		8.3		8.7		7.3		7.9		9.3		11		21	
Cobalt, Total	--	--	--	1.8	J	3		1.8	J	2.2		2.3		1.9		2.4		2.3		3.1		5.6	
Copper, Total	270	1720	50	5		8		2.7		9		9.3		6.2		6		6.4		13		9.5	
Iron, Total	--	--	--	2400		9100		5800		8600		7900		4700		6000		12000		11000		73000	
Lead, Total	1000	450	63	0.48	J	24		0.21	U	13		12		1.5	J	0.18	U	0.2	U	22		1.8	U
Magnesium, Total	--	--	--	820		1200		690		7500		9800		1000		1200		750		1200		350	
Manganese, Total	10000	2000	1600	26		150		75		94		100		27		36		28		160		66	
Mercury, Total	2.8	0.73	0.18	0.02	U	0.02	J	0.02	U	0.04	J	0.04	J	0.02	U	0.02	U	0.02	U	0.04	J	0.02	U
Nickel, Total	310	130	30	9.2		10		4		6.7		6.6		12		11		7.2		8.5		9.2	
Potassium, Total	--	--	--	460		270		440		260		280		420		600	J	410		380		200	
Selenium, Total	1500	4	3.9	0.3	U	1.8	U	0.32	U	0.26	U	0.26	U	0.27	U	0.28	U	0.29	U	0.27	U	0.36	
Silver, Total	1500	8.3	2	0.2	U	0.89	U	0.21	U	0.17	U	0.17	U	0.18	U	0.18	U	0.2	U	0.18	U	0.18	U
Sodium, Total	--	--	--	100	J	78	J	32	U	270		270		90	J	60		44	J	850		230	
Thallium, Total	--	--	--	0.4	U	1.8	U	0.42	U	0.35	U	0.35	U	0.36	U	0.37	U	0.39	U	0.36	U	0.39	
Vanadium, Total	--	--	--	4.3		11		6.2		11		12		4.6		5.8		6.7		13		13	
Zinc, Total	10000	2480	109	9.4		97		6.4		21		21		12		13		10		42		25	

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-- = No standard

Table 8: Volatile Organic Compounds (VOCs) in Groundwater
HIP Cleaners- Rochdale Village
Tenen Environmental

SAMPLE ID:		HIP GW1		HIP GW2S		HIP GW2D		HIP GW 3S		HIP GW 3S DUP		HIP GW3D		HIP-GW-6		HIP-GW-6 DUP	
LAB ID:		L1530650-02		L1530650-01		L1530650-03		L1530339-01		L1530339-02		L1530650-07		L1642312-01		L1642312-02	
COLLECTION DATE:	NY-TOGS-GA	11/20/2015		11/20/2015		11/20/2015		11/18/2015		11/18/2015		11/20/2015		12/28/2016		12/28/2016	
Volatile Organic Compounds Units: ug/l		**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	Conc	Q	**Conc**	**Q**
Methylene chloride	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,1-Dichloroethane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Chloroform	7	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Carbon tetrachloride	5	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.5	U	0.5	U
1,2-Dichloropropane	1	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	1	U	1	U
Dibromochloromethane	50	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.5	U	0.5	U
1,1,2-Trichloroethane	1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1.5	U	1.5	U
Tetrachloroethene	5	52		13		0.5		20		19		2.7		4.4		6	
Chlorobenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Trichlorofluoromethane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,2-Dichloroethane	0.6	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.5	U	0.5	U
1,1,1-Trichloroethane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Bromodichloromethane	50	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.5	U	0.5	U
trans-1,3-Dichloropropene	0.4	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.5	U	0.5	U
cis-1,3-Dichloropropene	0.4	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.5	U	0.5	U
1,3-Dichloropropene, Total	--	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.5	U	0.5	U
1,1-Dichloropropene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Bromoform	50	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	2	U	2	U
1,1,2,2-Tetrachloroethane	5	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.5	U	0.5	U
Benzene	1	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.5	U	0.5	U
Toluene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Ethylbenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Chloromethane	--	0.7	U	0.88	J	1	J	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Bromomethane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Vinyl chloride	2	0.07	U	0.07	U	0.07	U	0.07	U	0.07	U	0.07	U	1	U	1	U
Chloroethane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,1-Dichloroethene	5	0.14	U	0.14	U	0.28	J	0.14	U	0.14	U	0.14	U	0.5	U	0.5	U
trans-1,2-Dichloroethene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Trichloroethene	5	1.1		0.46	J	0.18	U	0.8		0.82		0.18	U	0.5	U	0.2	J
1,2-Dichlorobenzene	3	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,3-Dichlorobenzene	3	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,4-Dichlorobenzene	3	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Methyl tert butyl ether	10	0.7	U	0.7	U	2.4	J	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
p/m-Xylene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
o-Xylene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Xylenes, Total	--	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
cis-1,2-Dichloroethene	5	0.7	U	0.7	U	1.8	J	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,2-Dichloroethene, Total	--	0.7	U	0.7	U	1.8	J	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Dibromomethane	5	1	U	1	U	1	U	1	U	1	U	1	U	5	U	5	U
1,2,3-Trichloropropane	0.04	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Acrylonitrile	5	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	5	U	5	U
Styrene	930	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Dichlorodifluoromethane	5	1	U	1	U	1	U	1	U	1	U	1	U	5	U	5	U
Acetone	50	2.1	J	1.5	U	1.5	U	1.5	U	1.8	J	4	J	5	U	5	U
Carbon disulfide	60	1	U	1	U	1	U	1	U	1	U	1	U	5	U	5	U
2-Butanone	50	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	5	U	5	U
Vinyl acetate	--	1	U	1	U	1	U	1	U	1	U	1	U	5	U	5	U
4-Methyl-2-pentanone	--	1	U	1	U	1	U	1	U	1	U	1	U	5	U	5	U
2-Hexanone	50	1	U	1	U	1	U	1	U	1	U	1	U	5	U	5	U
Bromochloromethane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
2,2-Dichloropropane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,2-Dibromoethane	0.0006	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	2	U	2	U
1,3-Dichloropropane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,1,1,2-Tetrachloroethane	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Bromobenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
n-Butylbenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
sec-Butylbenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
tert-Butylbenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
o-Chlorotoluene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
p-Chlorotoluene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,2-Dibromo-3-chloropropane	0.04	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Hexachlorobutadiene	0.5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Isopropylbenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
p-Isopropyltoluene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
Naphthalene	10	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.95	J	1.5	J
n-Propylbenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,2,3-Trichlorobenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,2,4-Trichlorobenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,3,5-Trimethylbenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,2,4-Trimethylbenzene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
1,4-Dioxane	--	41	U	41	U	41	U	41	U	41	U	41	U	250	U	250	U
p-Diethylbenzene	--	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.77	J	1.1	J
p-Ethyltoluene	--	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2	U	2	U
1,2,4,5-Tetramethylbenzene	5	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	2	U	0.88	J
Ethyl ether	--	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
trans-1,4-Dichloro-2-butene	5	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.5	U	2.5	U
No Tentatively Identified Compounds	--	-		-		-		ND		ND		ND					
Sulfur Dioxide	--	-		4.9	J	4.9	J	NA		NA		-	-	-		-	
Unknown	--	1.4	J	1.4	J	1	J	NA		NA		-	-	6.34	J	5.62	J
Total TIC Compounds	--	1.4	J	6.3	J	5.9	J	NA		NA		-	-	6.34	J	7.52	J

Notes:
NY-TOGS-GA: New York TOGS 111 Groundwater Effluent Limitations criteria reflects all addendum to criteria through June 2004.
MDL = Maximum Detection Limit
Conc = Concentration
Q = Laboratory Data Qualifier
NA = Not Analyzed
Cells highlighted in yellow indicate concentrations above NY-TOGS-GA
Cells shaded in grey indicate MDL values above NY-TOGS-GA
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
-- = No standard

Table 8: Volatile Organic Compounds (VOCs) in Groundwater
HIP Cleaners- Rochdale Village
Tenen Environmental

SAMPLE ID:		FIELD BLANK		FIELD BLANK		TRIP BLANK		HIP-GW-7		HIP-GW-3S		HIP-GW-1		FIELD BLANK		TRIP BLANK	
LAB ID:		L1530339-03		L1642312-03		L1642312-04		L1831969-01		L1831969-02		L1831969-03		L1831969-04		L1831969-05	
COLLECTION DATE:	NY-TOGS-GA	11/18/2015		12/28/2016		12/28/2016		8/15/2018		8/15/2018		8/15/2018		8/15/2018		8/15/2018	
Volatile Organic Compounds Units: ug/l		**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Methylene chloride	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,1-Dichloroethane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Chloroform	7	0.7	U	2.5	U	2.5	U	1.1	J	0.7	U	0.7	U	-		0.7	U
Carbon tetrachloride	5	0.13	U	0.5	U	0.5	U	0.13	U	0.13	U	0.13	U	-		0.13	U
1,2-Dichloropropane	1	0.13	U	1	U	1	U	0.14	U	0.14	U	0.14	U	-		0.14	U
Dibromochloromethane	50	0.15	U	0.5	U	0.5	U	0.15	U	0.15	U	0.15	U	-		0.15	U
1,1,2-Trichloroethane	1	0.5	U	1.5	U	1.5	U	0.5	U	0.5	U	0.5	U	-		0.5	U
Tetrachloroethene	5	0.18	U	0.5	U	0.5	U	14		6.6		26		-		0.18	U
Chlorobenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Trichlorofluoromethane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,2-Dichloroethane	0.6	0.13	U	0.5	U	0.5	U	0.13	U	0.13	U	0.13	U	-		0.13	U
1,1,1-Trichloroethane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Bromodichloromethane	50	0.19	U	0.5	U	0.5	U	0.19	U	0.19	U	0.19	U	-		0.19	U
trans-1,3-Dichloropropene	0.4	0.16	U	0.5	U	0.5	U	0.16	U	0.16	U	0.16	U	-		0.16	U
cis-1,3-Dichloropropene	0.4	0.14	U	0.5	U	0.5	U	0.14	U	0.14	U	0.14	U	-		0.14	U
1,3-Dichloropropene, Total	--	0.14	U	0.5	U	0.5	U	0.14	U	0.14	U	0.14	U	-		0.14	U
1,1-Dichloropropene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Bromoform	50	0.65	U	2	U	2	U	0.65	U	0.65	U	0.65	U	-		0.65	U
1,1,2,2-Tetrachloroethane	5	0.14	U	0.5	U	0.5	U	0.17	U	0.17	U	0.17	U	-		0.17	U
Benzene	1	0.16	U	0.5	U	0.5	U	0.16	U	0.16	U	0.16	U	-		0.16	U
Toluene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Ethylbenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Chloromethane	--	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Bromomethane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Vinyl chloride	2	0.07	U	1	U	1	U	0.07	U	0.07	U	0.07	U	-		0.07	U
Chloroethane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,1-Dichloroethene	5	0.14	U	0.5	U	0.5	U	0.17	U	0.17	U	0.17	U	-		0.17	U
trans-1,2-Dichloroethene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Trichloroethene	5	0.18	U	0.5	U	0.5	U	1.6		0.21	J	1.1		-		0.18	U
1,2-Dichlorobenzene	3	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,3-Dichlorobenzene	3	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,4-Dichlorobenzene	3	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Methyl tert butyl ether	10	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
p/m-Xylene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
o-Xylene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Xylenes, Total	--	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
cis-1,2-Dichloroethene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,2-Dichloroethene, Total	--	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Dibromomethane	5	1	U	5	U	5	U	1	U	1	U	1	U	-		1	U
1,2,3-Trichloropropane	0.04	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Acrylonitrile	5	1.5	U	5	U	5	U	1.5	U	1.5	U	1.5	U	-		1.5	U
Styrene	930	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Dichlorodifluoromethane	5	1	U	5	U	5	U	1	U	1	U	1	U	-		1	U
Acetone	50	3.9	J	5	U	5	U	1.5	U	1.5	U	1.5	U	-		1.5	J
Carbon disulfide	60	1	U	5	U	5	U	1	U	1	U	1	U	-		1	U
2-Butanone	50	1.9	U	5	U	5	U	1.9	U	1.9	U	1.9	U	-		1.9	U
Vinyl acetate	--	1	U	5	U	5	U	1	U	1	U	1	U	-		1	U
4-Methyl-2-pentanone	--	1	U	5	U	5	U	1	U	1	U	1	U	-		1	U
2-Hexanone	50	1	U	5	U	5	U	1	U	1	U	1	U	-		1	U
Bromochloromethane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
2,2-Dichloropropane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,2-Dibromoethane	0.0006	0.65	U	2	U	2	U	0.65	U	0.65	U	0.65	U	-		0.65	U
1,3-Dichloropropane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,1,1,2-Tetrachloroethane	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Bromobenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
n-Butylbenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
sec-Butylbenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
tert-Butylbenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
o-Chlorotoluene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
p-Chlorotoluene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,2-Dibromo-3-chloropropane	0.04	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Hexachlorobutadiene	0.5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Isopropylbenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
p-Isopropyltoluene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
Naphthalene	10	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
n-Propylbenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,2,3-Trichlorobenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,2,4-Trichlorobenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,3,5-Trimethylbenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,2,4-Trimethylbenzene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,4-Dioxane	--	41	U	250	U	250	U	61	U	61	U	61	U	-		61	U
p-Diethylbenzene	--	0.7	U	2	U	2	U	0.7	U	0.7	U	0.7	U	-		0.7	U
p-Ethyltoluene	--	0.7	U	2	U	2	U	0.7	U	0.7	U	0.7	U	-		0.7	U
1,2,4,5-Tetramethylbenzene	5	0.65	U	2	U	2	U	0.54	U	0.54	U	0.54	U	-		0.54	U
Ethyl ether	--	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
trans-1,4-Dichloro-2-butene	5	0.7	U	2.5	U	2.5	U	0.7	U	0.7	U	0.7	U	-		0.7	U
No Tentatively Identified Compounds	--	ND						NA		NA		NA		NA		NA	
Sulfur Dioxide	--	NA		-		1.02	J	NA		NA		NA		NA		NA	
Unknown	--	NA		1.16	J	-	-	NA		NA		NA		NA		NA	
Total TIC Compounds	--	NA		1.16	J	1.02	J	16.7	-	6.81	-	27.1	-	-	-	1.5	-

Notes:
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MDL = Maximum Detection Limit
Conc = Concentration
Q = Laboratory Data Qualifier
NA = Not Analyzed
Cells highlighted in yellow indicate concentrations above NY-TOGS-GA
Cells shaded in grey indicate MDL values above NY-TOGS-GA
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
-- = No standard

Table 9: SVOCs in Groundwater
HIP Cleaners- Rochdale Village
Tenen Environmental

SAMPLE ID:		HIP GW1		HIP GW2S		HIP GW2D		HIP GW 3S		HIP GW 3S DUP		HIP GW3D		FIELD BLANK	
LAB ID:		L1530650-02		L1530650-01		L1530650-03		L1530339-01		L1530339-02		L1530650-07		L1530339-03	
COLLECTION DATE:	NY-TOGS-GA	11/20/2015		11/20/2015		11/20/2015		11/18/2015		11/18/2015		11/20/2015		11/18/2015	
Semivolatile Organic Compounds Units: ug/l		Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
1,2,4-Trichlorobenzene	5	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
Bis(2-chloroethyl)ether	1	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U
1,2-Dichlorobenzene	3	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
1,3-Dichlorobenzene	3	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U
1,4-Dichlorobenzene	3	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U
3,3'-Dichlorobenzidine	5	0.48	U	0.48	U	0.48	U	0.48	U	0.48	U	0.48	U	0.48	U
2,4-Dinitrotoluene	5	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2,6-Dinitrotoluene	5	0.89	U	0.89	U	0.89	U	0.89	U	0.89	U	0.89	U	0.89	U
4-Chlorophenyl phenyl ether	--	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
4-Bromophenyl phenyl ether	--	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
Bis(2-chloroisopropyl)ether	5	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Bis(2-chloroethoxy)methane	5	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Hexachlorocyclopentadiene	5	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U
Isophorone	50	0.79	U	0.79	U	0.79	U	0.79	U	0.79	U	0.79	U	0.79	U
Nitrobenzene	0.4	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
NitrosoDiPhenylAmine(NDPA)/DPA	50	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U
n-Nitrosodi-n-propylamine	--	0.64	U	0.64	U	0.64	U	0.64	U	0.64	U	0.64	U	0.64	U
Bis(2-Ethylhexyl)phthalate	5	0.93	U	0.93	U	0.93	U	0.93	U	0.93	U	0.93	U	0.93	U
Butyl benzyl phthalate	50	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
Di-n-butylphthalate	50	0.77	U	0.77	U	0.77	U	0.77	U	0.77	U	0.77	U	0.77	U
Di-n-octylphthalate	50	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
Diethyl phthalate	50	0.39	U	0.39	U	0.39	U	0.39	U	0.39	U	0.39	U	0.39	U
Dimethyl phthalate	50	0.33	U	0.33	U	0.33	U	0.33	U	0.33	U	0.33	U	0.33	U
Biphenyl	--	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U
4-Chloroaniline	5	0.84	U	0.84	U	0.84	U	0.84	U	0.84	U	0.84	U	0.84	U
2-Nitroaniline	5	0.96	U	0.96	U	0.96	U	0.96	U	0.96	U	0.96	U	0.96	U
3-Nitroaniline	5	0.67	U	0.67	U	0.67	U	0.67	U	0.67	U	0.67	U	0.67	U
4-Nitroaniline	5	0.83	U	0.83	U	0.83	U	0.83	U	0.83	U	0.83	U	0.83	U
Dibenzofuran	--	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
1,2,4,5-Tetrachlorobenzene	5	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
Acetophenone	--	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
2,4,6-Trichlorophenol	--	0.78	U	0.78	U	0.78	U	0.78	U	0.78	U	0.78	U	0.78	U
P-Chloro-M-Cresol	--	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
2-Chlorophenol	--	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U
2,4-Dichlorophenol	2	0.56	U	0.56	U	0.56	U	0.56	U	0.56	U	0.56	U	0.56	U
2,4-Dimethylphenol	2	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U
2-Nitrophenol	--	1	U	1	U	1	U	1	U	1	U	1	U	1	U
4-Nitrophenol	--	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
2,4-Dinitrophenol	2	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
4,6-Dinitro-o-cresol	--	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
Phenol	2	0.27	U	0.27	U	0.27	U	0.27	U	0.27	U	0.27	U	0.27	U
2-Methylphenol	--	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
3-Methylphenol/4-Methylphenol	--	0.72	U	0.72	U	0.72	U	0.72	U	0.72	U	0.72	U	0.72	U
2,4,5-Trichlorophenol	--	0.75	U	0.75	U	0.75	U	0.75	U	0.75	U	0.75	U	0.75	U
Benzoic Acid	--	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Benzyl Alcohol	--	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Carbazole	--	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
Unknown	--	-		-		-		ND		ND		-	-	ND	
Unknown	--	12	J	10	J	6.2	J	4.4	J	6.6	J	20	J	-	-
Unknown	--	-		17	J	-		NA		NA		--		NA	
Acenaphthene	20	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
2-Chloronaphthalene	10	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Fluoranthene	50	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Hexachlorobutadiene	0.5	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Naphthalene	10	0.04	U	0.04	U	0.07	J	0.04	U	0.04	U	0.04	U	0.04	U
Benzo(a)anthracene	--	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
Benzo(a)pyrene	0	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Benzo(b)fluoranthene	0.002	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
Benzo(k)fluoranthene	0.002	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Chrysene	0.002	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Acenaphthylene	--	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Anthracene	50	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Benzo(ghi)perylene	--	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Fluorene	50	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Phenanthrene	50	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
Dibenzo(a,h)anthracene	--	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Indeno(1,2,3-cd)Pyrene	0.002	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Pyrene	50	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
2-Methylnaphthalene	--	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Pentachlorophenol	2	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Hexachlorobenzene	0.04	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
Hexachloroethane	5	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U

Notes:
NY-TOGS-GA: New York TOGS 111 Groundwater Effluent Limitations criteria reflects all addendum to criteria through June 2004.
MDL = Maximum Detection Limit
Conc = Concentration
Q = Laboratory Data Qualifier
NA = Not Analyzed
Cells highlighted in yellow indicate concentrations above NY-TOGS-GA
Cells shaded in grey indicate MDL values above NY-TOGS-GA
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
-- = No standard

Table 10: Pesticides and PCBs in Groundwater
HIP Cleaners- Rochdale Village
Tenen Environmental

SAMPLE ID:		HIP GW1		HIP GW2S		HIP GW2D		HIP GW 3S		HIP GW 3S DUP		HIP GW3D		FIELD BLANK	
LAB ID:		L1530650-02		L1530650-01		L1530650-03		L1530339-01		L1530339-02		L1530650-07		L1530339-03	
COLLECTION DATE:	NY-TOGS-GA	11/20/2015		11/20/2015		11/20/2015		11/18/2015		11/18/2015		11/20/2015		11/18/2015	
Pesticides Units: ug/l		**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Delta-BHC	0.04	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Lindane	0.05	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U
Alpha-BHC	0.01	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U
Beta-BHC	0.04	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Heptachlor	0.04	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U
Aldrin	0	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
Heptachlor epoxide	0.03	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U
Endrin	0	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U
Endrin ketone	5	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Dieldrin	0.004	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U
4,4'-DDE	0.2	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U
4,4'-DDD	0.3	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
4,4'-DDT	0.2	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U	0.004	U
Endosulfan I	--	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U
Endosulfan II	--	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Endosulfan sulfate	--	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Methoxychlor	35	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
Toxaphene	0.06	0.063	U	0.063	U	0.063	U	0.063	U	0.063	U	0.063	U	0.063	U
cis-Chlordane	--	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
trans-Chlordane	--	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Chlordane	0.05	0.046	U	0.046	U	0.046	U	0.046	U	0.046	U	0.046	U	0.046	U
Polychlorinated Biphenyls															
Aroclor 1016	0.09	0.055	U	0.055	U	0.055	U	0.055	U	0.055	U	0.055	U	0.055	U
Aroclor 1221	0.09	0.053	U	0.053	U	0.053	U	0.053	U	0.053	U	0.053	U	0.053	U
Aroclor 1232	0.09	0.031	U	0.031	U	0.031	U	0.031	U	0.031	U	0.031	U	0.031	U
Aroclor 1242	0.09	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Aroclor 1248	0.09	0.051	U	0.051	U	0.051	U	0.051	U	0.051	U	0.051	U	0.051	U
Aroclor 1254	0.09	0.034	U	0.034	U	0.034	U	0.034	U	0.034	U	0.034	U	0.034	U
Aroclor 1260	0.09	0.032	U	0.032	U	0.032	U	0.032	U	0.032	U	0.032	U	0.032	U
Aroclor 1262	0.09	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Aroclor 1268	0.09	0.038	U	0.038	U	0.038	U	0.038	U	0.038	U	0.038	U	0.038	U
PCBs, Total	--	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U

Notes:
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MDL = Maximum Detection Limit
Conc = Concentration
Q = Laboratory Data Qualifier
NA = Not Analyzed
Cells highlighted in yellow indicate concentrations above NY-TOGS-GA
Cells shaded in grey indicate MDL values above NY-TOGS-GA
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
-- = No standard

Table 11: Metals in Groundwater
HIP Cleaners- Rochdale Village
Tenen Environmental

SAMPLE ID:		HIP GW1		HIP GW2S		HIP GW2D		HIP GW 3S		HIP GW 3S DUP		HIP GW3D		FIELD BLANK	
LAB ID:		L1530650-02		L1530650-01		L1530650-03		L1530339-01		L1530339-02		L1530650-07		L1530339-03	
COLLECTION DATE:	NY-TOGS-GA	11/20/2015		11/20/2015		11/20/2015		11/18/2015		11/18/2015		11/20/2015		11/18/2015	
Dissolved Metals Units: ug/l		**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Aluminum, Dissolved	2000	24		550		7	J	5	J	3	J	21.8		2	U
Antimony, Dissolved	6	0.6	J	0.8	J	0.6	J	1.7	J	0.6	J	1.92	J	0.7	J
Arsenic, Dissolved	50	0.4	J	0.6		1.8		0.3	J	0.2	J	1.12		0.1	U
Barium, Dissolved	2000	91.1		177		115.4		56.8		58.7		96.55		0.2	J
Beryllium, Dissolved	3	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.15	U	0.2	U
Cadmium, Dissolved	10	0.1	J	0.15	J	0.1	J	0.1	J	0.1	J	0.06	J	0.1	U
Calcium, Dissolved	--	150000		190000		44000		108000		90300		42900		44	J
Chromium, Dissolved	100	1.9	J	5		2.4	J	1.4	J	1.3	J	9.92	J	1.4	J
Cobalt, Dissolved	--	2.1		1.8		5.4		1.6		1.6		11.24		0.1	U
Copper, Dissolved	1000	3		5.7		0.7	J	6.4		7		0.48	J	0.3	U
Iron, Dissolved	600	154		1060		1440		42	J	41	J	6200		12	U
Lead, Dissolved	50	0.1	U	0.9	J	0.1	U	0.1	U	0.1	U	0.35	J	0.1	U
Magnesium, Dissolved	35000	8100		13400		6270		6130		6050		7900		22	U
Manganese, Dissolved	600	111.1		61.4		158.2		41.7		40.4		263.3		0.3	J
Mercury, Dissolved	1.4	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.33	U	0.06	U
Nickel, Dissolved	200	5.3		7		17.5		10.7		11.9		196.5		0.4	J
Potassium, Dissolved	--	9670		11000		6720		6040		6570		4260		19	U
Selenium, Dissolved	20	4	J	4	J	1	U	3	J	2	J	1	U	1	U
Silver, Dissolved	100	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.07	U	0.1	U
Sodium, Dissolved	--	245000		276000		45700		83600		73400		36000		130	J
Thallium, Dissolved	0.5	0.4	J	0.7		0.1	J	0.3	J	0.4	J	0.05	U	0.1	U
Vanadium, Dissolved	--	3.3	J	6.5		0.8	J	0.7	J	0.8	J	1.39	J	0.6	U
Zinc, Dissolved	5000	12.2		6.1	J	2.6	J	3.4	J	2.6	U	8.98	J	2.6	U
Total Metals															
Aluminum, Total	2000	3860		41300		157		174		108		867		2	U
Antimony, Total	6	0.5	J	0.6	J	0.2	J	0.1	J	0.1	J	0.1	J	0.1	U
Arsenic, Total	50	1.7		5.5		2.1		0.49	J	0.5	J	1.5		0.1	U
Barium, Total	2000	115.2		406.3		118.6		61		61.5		108.3		0.4	J
Beryllium, Total	3	0.4	J	1.8		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Cadmium, Total	10	0.17	J	0.6		0.1	U	0.1	J	0.1	J	0.1	J	0.1	U
Calcium, Total	--	125000		148000		44800		97400		103000		44600		59	J
Chromium, Total	100	21.6		177.2		3	J	3.1		2.3		5		1.8	J
Cobalt, Total	--	6.2		38.7		6		2.1		1.9		13.4		0.1	U
Copper, Total	1000	18.3		130		2.9		8.9		8.8		5		0.3	U
Iron, Total	600	12000		52400		1930		257		192		10300		12	U
Lead, Total	50	12.4		52.2		0.5	J	0.9		0.5		2		0.1	U
Magnesium, Total	35000	8690		20400		6650		7390		6810		7240		22	U
Manganese, Total	600	148.2		391.9		165.9		46.2		43		344.7		0.3	U
Mercury, Total	1.4	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Nickel, Total	200	18.5		154.9		19.5		13.6		12.6		208.1		1	J
Potassium, Total	--	9740		15700		6920		7130		6900		4550		19	U
Selenium, Total	20	4.7	J	16		1	U	3	J	3	J	1	U	1	U
Silver, Total	100	0.1	U	0.5		0.1	U	0.1	U	0.1	U	0.1	U	0.1	J
Sodium, Total	--	189000		185000		47500		83500		93600		32500		146	J
Thallium, Total	0.5	0.4	J	1.5		0.1	J	0.4	J	0.3	J	0.1	J	0.1	U
Vanadium, Total	--	22.4		137.4		2.5	J	1.8	J	1.2	J	5.9		0.6	U
Zinc, Total	5000	77.1		278		3.5	J	5.8	J	5.6	J	11.5		3.2	J

Notes:
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J = estimated value, indicating the detected value is below the RL, but above the MDL
-- = No standard

Table 12 - Volatile Organic Compounds in Soil Vapor Compared to Ambient Air Conditions
HIP Cleaners - Rochdale Village
Tenen Environmental

SAMPLE ID:	HIP-AA		HIP-SV-1		HIP-SV-2		HIP-SV-3		HIP-SV-4		HIP-SV-5		HIP-SV-6		HIP-SS-1		HIP-SS-2		HIP-SS-3		HIP-SS-4		HIP-SS-5		HIP-SS-6		HIP-IA-1	
LAB ID:	**L1530867-01**		**L1530845-01**		**L1530845-02**		**L1531046-01**		**L1642601-02**		**L1642601-03**		**L1642601-01**		**L1530845-07**		**L1530845-03**		**L1530845-04**		**L1530845-05**		**L1530845-06**		**L1530845-08**		**L1642440-01**	
COLLECTION DATE:	**11/23/2015**		**11/23/2015**		**11/23/2015**		**11/24/2015**		**12/30/2016**		**12/30/2016**		**12/30/2016**		**11/23/2015**		**11/23/2015**		**11/23/2015**		**11/23/2015**		**11/23/2015**		**11/23/2015**		**12/28/2016**	
Volatile Organic Compounds Units: ug/m3	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Dichlorodifluoromethane	1.95		2.03		1.93		3.61		2.43		9.89	U	2.5		448	U	4.94	U	668	U	3.36		93.5	U	325	U	3.05	
Chloromethane	0.781		0.413	U	0.76		1.03	U	0.413	U	4.13	U	0.413	U	187	U	2.07	U	279	U	0.413	U	39	U	136	U	1.15	
Freon-114	1.4	U	1.4	U	1.4	U	3.49	U	1.4	U	14	U	1.4	U	634	U	6.99	U	944	U	1.4	U	132	U	460	U	1.4	U
Vinyl chloride	0.511	U	0.511	U	0.511	U	1.28	U	0.511	U	5.11	U	0.511	U	232	U	2.56	U	345	U	0.511	U	48.3	U	168	U	0.051	U
1,3-Butadiene	0.442	U	0.442	U	0.442	U	1.11	U	1.62		4.42	U	0.442	U	201	U	2.21	U	299	U	0.442	U	41.8	U	146	U	0.442	U
Bromomethane	0.777	U	0.777	U	0.777	U	1.94	U	0.777	U	7.77	U	0.777	U	352	U	3.88	U	524	U	0.777	U	73.4	U	256	U	0.777	U
Chloroethane	0.528	U	0.528	U	0.528	U	1.32	U	0.528	U	5.28	U	0.528	U	239	U	2.64	U	356	U	0.528	U	49.9	U	174	U	2.16	
Ethanol	10.4		125		138		58		55.2		94.2	U	40.5		4940		228		6820		198		1050		3430		124	
Vinyl bromide	0.874	U	0.874	U	0.874	U	2.19	U	0.874	U	8.74	U	0.874	U	397	U	4.37	U	590	U	0.874		82.6	U	288	U	0.874	U
Acetone	4.11		15.4		24.5		25.2		28.7		23.8	U	109		1080	U	109		1600	U	57		225	U	782	U	9070	E
Trichlorofluoromethane	1.29		1.39		1.3		262		1.74		2350		2.28		510	U	5.62	U	759	U	4.66		106	U	370	U	1.6	
Isopropanol	1.91		23.2		34.4		3.07	U	1.23	U	12.3	U	1.23	U	558	U	97.6		828	U	121		116	U	403	U	1420	E
1,1-Dichloroethene	0.793	U	0.793	U	0.793	U	1.98	U	0.793	U	7.93	U	0.793	U	360	U	3.96	U	535	U	0.793	U	74.9	U	261	U	0.079	U
Tertiary butyl Alcohol	1.52	U	1.52	U	13.9		3.79	U	1.52	U	15.2	U	1.52	U	688	U	7.58	U	1020	U	2.41		143	U	497	U	1.52	U
Methylene chloride	1.74	U	1.74	U	1.74	U	4.34	U	1.74	U	17.4	U	1.74	U	789	U	8.69	U	1170	U	1.74	U	164	U	570	U	1.74	U
3-Chloropropene	0.626	U	0.626	U	0.626	U	1.57	U	0.626	U	6.26	U	0.626	U	284	U	3.13	U	423	U	0.626	U	59.2	U	206	U	0.626	U
Carbon disulfide	0.623	U	0.623	U	0.623	U	1.56	U	0.623	U	6.23	U	0.623	U	282	U	3.11	U	420	U	0.623	U	58.9	U	205	U	0.623	U
Freon-113	1.53	U	1.53	U	1.53	U	3.83	U	1.53	U	15.3	U	1.53	U	695	U	7.66	U	1030	U	1.53	U	145	U	504	U	1.53	U
trans-1,2-Dichloroethene	0.793	U	0.793	U	0.793	U	1.98	U	0.793	U	7.93	U	0.793	U	360	U	3.96	U	535	U	0.793	U	74.9	U	261	U	0.793	U
1,1-Dichloroethane	0.809	U	0.809	U	0.809	U	2.02	U	0.809	U	8.09	U	0.809	U	367	U	4.05	U	546	U	0.809	U	76.5	U	266	U	0.809	U
Methyl tert butyl ether	0.721	U	0.721	U	0.721	U	1.8	U	0.721	U	7.21	U	0.721	U	327	U	3.61	U	487	U	0.721	U	68.1	U	237	U	0.721	U
2-Butanone	1.47	U	1.47	U	2.38		3.69	U	8.02		14.7	U	29.5		669	U	7.37	U	994	U	3.83		140	U	484	U	1.79	
cis-1,2-Dichloroethene	0.793	U	0.793	U	0.793	U	1.98	U	0.793	U	7.93	U	0.793	U	360	U	3.96	U	535	U	0.793	U	74.9	U	261	U	0.079	U
Ethyl Acetate	1.8	U	1.8	U	1.8	U	4.5	U	1.8	U	18	U	1.8	U	818	U	9.01	U	1210	U	2.42		170	U	591	U	443	E
Chloroform	0.977	U	0.977	U	3.76		21.5		0.977	U	9.77	U	0.977	U	443	U	11.7		659	U	1.04		92.3	U	321	U	1.27	
Tetrahydrofuran	1.47	U	1.47	U	1.47	U	3.69	U	1.47	U	14.7	U	1.47	U	669	U	7.37	U	994	U	1.47	U	140	U	484	U	1.47	U
1,2-Dichloroethane	0.809	U	0.809	U	0.809	U	2.02	U	0.809	U	8.09	U	0.809	U	367	U	4.05	U	546	U	0.809	U	76.5	U	266	U	0.809	U
n-Hexane	0.705	U	0.705	U	0.705	U	1.76	U	3.19		7.05	U	3.46		320	U	3.52	U	476	U	0.705	U	66.6	U	232	U	0.705	U
1,1,1-Trichloroethane	1.09	U	1.09	U	1.09	U	2.73	U	1.09	U	10.9	U	1.09	U	495	U	5.46	U	737	U	1.09	U	103	U	359	U	0.109	U
Benzene	0.639	U	1.92		27.9		2.23		4.54		6.39	U	4.06		290	U	3.19	U	431	U	1.15		60.4	U	210	U	0.639	U
Carbon tetrachloride	1.26	U	1.26	U	1.26	U	3.15	U	1.26	U	12.6	U	1.26	U	571	U	6.29	U	849	U	1.26	U	119	U	414	U	0.635	
Cyclohexane	0.688	U	0.688	U	10.4		1.72	U	1.15		6.88	U	1.23		312	U	3.44	U	465	U	0.688	U	65.1	U	226	U	0.688	U
1,2-Dichloropropane	0.924	U	0.924	U	0.924	U	2.31	U	0.924	U	9.24	U	0.924	U	419	U	4.62	U	624	U	0.924	U	87.3	U	304	U	0.924	U
Bromodichloromethane	1.34	U	1.34	U	1.34	U	3.35	U	1.34	U	13.4	U	1.34	U	608	U	6.7	U	904	U	1.34	U	127	U	441	U	1.34	U
1,4-Dioxane	0.721	U	0.721	U	0.721	U	1.8	U	0.721	U	7.21	U	0.721	U	327	U	3.6	U	486	U	0.721	U	68.1	U	237	U	0.721	U
Trichloroethene	1.07	U	1.07	U	1.07	U	2.69	U	1.07	U	10.7	U	1.07	U	1240		5.37		2790		1.07	U	215		354	U	0.274	
2,2,4-Trimethylpentane	0.934	U	0.934	U	0.934	U	2.34	U	1.7		9.34	U	1.56		424	U	4.67	U	631	U	0.934	U	88.3	U	307	U	0.934	U
Heptane	0.82	U	0.82	U	0.82	U	2.05	U	1.3		8.2	U	1.16		372	U	4.1	U	553	U	1.4		77.5	U	270	U	0.861	
cis-1,3-Dichloropropene	0.908	U	0.908	U	0.908	U	2.27	U	0.908	U	9.08	U	0.908	U	412	U	4.54	U	613	U	0.908	U	85.8	U	299	U	0.908	U
4-Methyl-2-pentanone	2.05	U	2.05	U	2.05	U	5.12	U	2.05	U	20.5	U	2.05	U	930	U	10.2	U	1380	U	2.05	U	194	U	672	U	2.05	U
trans-1,3-Dichloropropene	0.908	U	0.908	U	0.908	U	2.27	U	0.908	U	9.08	U	0.908	U	412	U	4.54	U	613	U	0.908	U	85.8	U	299	U	0.908	U
1,1,2-Trichloroethane	1.09	U	1.09	U	1.09	U	2.73	U	1.09	U	10.9	U	1.09	U	495	U	5.46	U	737	U	1.09	U	103	U	359	U	1.09	U
Toluene	1.56		2.17		2.46		3.96		8.89		7.54	U	6.14		342	U	7.01		509	U	5.58		71.2	U	248	U	3.36	
2-Hexanone	0.82	U	0.82	U	0.82	U	2.05	U	0.82	U	8.2	U	0.82	U	372	U	4.1	U	553	U	0.82	U	77.5	U	270	U	0.82	U
Dibromochloromethane	1.7	U	1.7	U	1.7	U	4.26	U	1.7	U	17	U	1.7	U	773	U	8.52	U	1150	U	1.7	U	161	U	561	U	1.7	U
1,2-Dibromoethane	1.54	U	1.54	U	1.54	U	3.84	U	1.54	U	15.4	U	1.54	U	697	U	7.69	U	1040	U	1.54	U	145	U	506	U	1.54	U
Tetrachloroethene	4.24		1.36	U	1.36	U	1340		4.75		13.6	U	1.36	U	403000		2340		780000		110		40600		157000		37.1	
Chlorobenzene	0.921	U	0.921	U	0.921	U	2.3	U	0.921	U	9.21	U	0.921	U	418	U	4.61	U	622	U	0.921	U	87	U	303	U	0.921	U
Ethylbenzene	0.869	U	10.4		0.869	U	3.97		0.869	U	8.69	U	0.869	U	394	U	19.8		586	U	19.5		82.1	U	286	U	0.869	U
p/m-Xylene	1.74	U	54.7		1.74	U	18.5		1.98		17.4	U	1.75		786	U	92.5		1170	U	96.4		164	U	573	U	1.74	U
Bromoform	2.07	U	2.07	U	2.07	U	5.17	U	2.07	U	20.7	U	2.07	U	938	U	10.3	U	1400	U	2.07	U	195	U	680	U	2.07	U
Styrene	0.852	U	0.852	U	0.852	U	2.13	U	0.852	U	8.52	U	0.852	U	386	U	4.26	U	575	U	1.65		80.5	U	280	U	0.852	U
1,1,2,2-Tetrachloroethane	1.37	U	1.37	U	1.37	U	3.43	U	1.37	U	13.7	U	1.37	U	623	U	6.87	U	927	U	1.37	U	130	U	452	U	1.37	U
o-Xylene	0.869	U	23.5		0.869	U	8.77		0.869	U	8.69	U	0.869	U	394	U	41.6		586	U	44.7		82.1	U	286	U	0.869	U
4-Ethyltoluene	0.983	U	1.07		0.983	U	2.46	U	0.983	U	9.83	U	0.983	U	446	U	4.92	U	664	U	2.95		92.9	U	323	U	0.983	U
1,3,5-Trimethylbenzene	0.983	U	1.52		0.983	U	2.46	U	0.983	U	9.83	U	0.983	U	446	U	4.92	U	664	U	3.71		92.9	U	323	U	0.983	U
1,2,4-Trimethylbenzene	0.983	U	4.64		0.983	U	2.62		1.03		9.83	U	0.983	U	446	U	10.5		664	U	12.7		92.9	U	323	U	0.983	U
Benzyl chloride	1.04	U	1.04	U	1.04	U	2.59	U	1.04	U	10.4	U	1.04	U	470	U	5.18	U	699	U	1.04	U	97.9	U	341	U	1.04	U
1,3-Dichlorobenzene	1.2	U	2.93		1.2	U	3.01	U	1.2	U	12	U	1.2	U	545	U	6.01	U	812	U	1.2	U	114	U	396	U	1.2	U
1,4-Dichlorobenzene	1.2	U	1.2	U	1.2	U	3.01	U	1.2	U	12	U	1.2	U	545	U	6.01	U	812	U	1.2	U	114	U	396	U	1.2	U
1,2-Dichlorobenzene	1.2	U	1.2	U	1.2	U	3.01	U	1.2	U	12	U	1.2	U	545	U	6.01	U	812	U	1.2	U	114	U	396	U	1.2	U
1,2,4-Trichlorobenzene	1.48	U	1.48	U	1.48	U	3.71	U	33		14.8	U	1.48	U	673	U	7.42	U	1000	U	1.48	U	140	U	488	U	1.48	U
Hexachlorobutadiene	2.13	U	2.13	U	2.13	U	5.33	U	2.13	U	21.3	U	2.13	U	967	U	10.7	U	1440	U	2.13	U	202	U	702	U	2.13	U

Notes:
Cells highlighted in yellow indicate concentrations above the ambient level (HIP-AA)
Cells shaded in grey indicate RL concentrations above the ambient level
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the RL is shown
U = not detected at or above the RL
Results and RL values are in micrograms per cubic meter (ug/m^3)

Table 13 - Volatile Organic Compounds in Soil Vapor Compared to NYSDOH Air Guidance Values
JS Cleaners - Rochdale Village
Tenen Environmental

SAMPLE ID:			HIP-SV-1		HIP-SV-2		HIP-SV-3		HIP-SV-4		HIP-SV-5		HIP-SV-6		HIP-SS-1		HIP-SS-2		HIP-SS-3		HIP-SS-4		HIP-SS-5		HIP-SS-6		HIP-IA-1	
LAB ID:	NYSDOH Matrix	NYSDOH Air Guidance Value	L1530845-01		L1530845-02		L1531046-01		L1642601-02		L1642601-03		L1642601-01		L1530845-07		L1530845-03		L1530845-04		L1530845-05		L1530845-06		L1530845-08		L1642440-01	
COLLECTION DATE:			11/23/2015		11/23/2015		11/24/2015		12/30/2016		12/30/2016		12/30/2016		11/23/2015		11/23/2015		11/23/2015		11/23/2015		11/23/2015		11/23/2015		12/28/2016	
Volatile Organic Compounds Units: ug/m3			Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Dichlorodifluoromethane		--	2.03		1.93		3.61		2.43		9.89	U	2.5		448	U	4.94	U	668	U	3.36		93.5	U	325	U	3.05	
Chloromethane		--	0.413	U	0.76		1.03	U	0.413	U	4.13	U	0.413	U	187	U	2.07	U	279	U	0.413	U	39	U	136	U	1.15	
Freon-114		--	1.4	U	1.4	U	3.49	U	1.4	U	14	U	1.4	U	634	U	6.99	U	944	U	1.4	U	132	U	460	U	1.4	U
Vinyl chloride	C	--	0.511	U	0.511	U	1.28	U	0.511	U	5.11	U	0.511	U	232	U	2.56	U	345	U	0.511	U	48.3	U	168	U	0.051	U
1,3-Butadiene		--	0.442	U	0.442	U	1.11	U	1.62		4.42	U	0.442	U	201	U	2.21	U	299	U	0.442	U	41.8	U	146	U	0.442	U
Bromomethane		--	0.777	U	0.777	U	1.94	U	0.777	U	7.77	U	0.777	U	352	U	3.88	U	524	U	0.777	U	73.4	U	256	U	0.777	U
Chloroethane		--	0.528	U	0.528	U	1.32	U	0.528	U	5.28	U	0.528	U	239	U	2.64	U	356	U	0.528	U	49.9	U	174	U	2.16	
Ethanol		--	125		138		58		55.2		94.2	U	40.5		4940		228		6820		198		1050		3430		124	
Vinyl bromide		--	0.874	U	0.874	U	2.19	U	0.874	U	8.74	U	0.874	U	397	U	4.37	U	590	U	0.874		82.6	U	288	U	0.874	U
Acetone		--	15.4		24.5		25.2		28.7		23.8	U	109		1080	U	109		1600	U	57		225	U	782	U	9070	E
Trichlorofluoromethane		--	1.39		1.3		262		1.74		2350		2.28		510	U	5.62	U	759	U	4.66		106	U	370	U	1.6	
Isopropanol		--	23.2		34.4		3.07	U	1.23	U	12.3	U	1.23	U	558	U	97.6		828	U	121		116	U	403	U	1420	E
1,1-Dichloroethene	A	--	0.793	U	0.793	U	1.98	U	0.793	U	7.93	U	0.793	U	360	U	3.96	U	535	U	0.793	U	74.9	U	261	U	0.079	U
Tertiary butyl Alcohol		--	1.52	U	13.9		3.79	U	1.52	U	15.2	U	1.52	U	688	U	7.58	U	1020	U	2.41		143	U	497	U	1.52	U
Methylene chloride	B	60	1.74	U	1.74	U	4.34	U	1.74	U	17.4	U	1.74	U	789	U	8.69	U	1170	U	1.74	U	164	U	570	U	1.74	U
3-Chloropropene		--	0.626	U	0.626	U	1.57	U	0.626	U	6.26	U	0.626	U	284	U	3.13	U	423	U	0.626	U	59.2	U	206	U	0.626	U
Carbon disulfide		--	0.623	U	0.623	U	1.56	U	0.623	U	6.23	U	0.623	U	282	U	3.11	U	420	U	0.623	U	58.9	U	205	U	0.623	U
Freon-113		--	1.53	U	1.53	U	3.83	U	1.53	U	15.3	U	1.53	U	695	U	7.66	U	1030	U	1.53	U	145	U	504	U	1.53	U
trans-1,2-Dichloroethene		--	0.793	U	0.793	U	1.98	U	0.793	U	7.93	U	0.793	U	360	U	3.96	U	535	U	0.793	U	74.9	U	261	U	0.793	U
1,1-Dichloroethane		--	0.809	U	0.809	U	2.02	U	0.809	U	8.09	U	0.809	U	367	U	4.05	U	546	U	0.809	U	76.5	U	266	U	0.809	U
Methyl tert butyl ether		--	0.721	U	0.721	U	1.8	U	0.721	U	7.21	U	0.721	U	327	U	3.61	U	487	U	0.721	U	68.1	U	237	U	0.721	U
2-Butanone		--	1.47	U	2.38		3.69	U	8.02		14.7	U	29.5		669	U	7.37	U	994	U	3.83		140	U	484	U	1.79	
cis-1,2-Dichloroethene	A	--	0.793	U	0.793	U	1.98	U	0.793	U	7.93	U	0.793	U	360	U	3.96	U	535	U	0.793	U	74.9	U	261	U	0.079	U
Ethyl Acetate		--	1.8	U	1.8	U	4.5	U	1.8	U	18	U	1.8	U	818	U	9.01	U	1210	U	2.42		170	U	591	U	443	E
Chloroform		--	0.977	U	3.76		21.5		0.977	U	9.77	U	0.977	U	443	U	11.7		659	U	1.04		92.3	U	321	U	1.27	
Tetrahydrofuran		--	1.47	U	1.47	U	3.69	U	1.47	U	14.7	U	1.47	U	669	U	7.37	U	994	U	1.47	U	140	U	484	U	1.47	U
1,2-Dichloroethane		--	0.809	U	0.809	U	2.02	U	0.809	U	8.09	U	0.809	U	367	U	4.05	U	546	U	0.809	U	76.5	U	266	U	0.809	U
n-Hexane		--	0.705	U	0.705	U	1.76	U	3.19		7.05	U	3.46		320	U	3.52	U	476	U	0.705	U	66.6	U	232	U	0.705	U
1,1,1-Trichloroethane	B	--	1.09	U	1.09	U	2.73	U	1.09	U	10.9	U	1.09	U	495	U	5.46	U	737	U	1.09	U	103	U	359	U	0.109	U
Benzene		--	1.92		27.9		2.23		4.54		6.39	U	4.06		290	U	3.19	U	431	U	1.15		60.4	U	210	U	0.639	U
Carbon tetrachloride	A	--	1.26	U	1.26	U	3.15	U	1.26	U	12.6	U	1.26	U	571	U	6.29	U	849	U	1.26	U	119	U	414	U	0.635	
Cyclohexane		--	0.688	U	10.4		1.72	U	1.15		6.88	U	1.23		312	U	3.44	U	465	U	0.688	U	65.1	U	226	U	0.688	U
1,2-Dichloropropane		--	0.924	U	0.924	U	2.31	U	0.924	U	9.24	U	0.924	U	419	U	4.62	U	624	U	0.924	U	87.3	U	304	U	0.924	U
Bromodichloromethane		--	1.34	U	1.34	U	3.35	U	1.34	U	13.4	U	1.34	U	608	U	6.7	U	904	U	1.34	U	127	U	441	U	1.34	U
1,4-Dioxane		--	0.721	U	0.721	U	1.8	U	0.721	U	7.21	U	0.721	U	327	U	3.6	U	486	U	0.721	U	68.1	U	237	U	0.721	U
Trichloroethene	A	2	1.07	U	1.07	U	2.69	U	1.07	U	10.7	U	1.07	U	1240		5.37		2790		1.07	U	215		354	U	0.274	
2,2,4-Trimethylpentane		--	0.934	U	0.934	U	2.34	U	1.7		9.34	U	1.56		424	U	4.67	U	631	U	0.934	U	88.3	U	307	U	0.934	U
Heptane		--	0.82	U	0.82	U	2.05	U	1.3		8.2	U	1.16		372	U	4.1	U	553	U	1.4		77.5	U	270	U	0.861	
cis-1,3-Dichloropropene		--	0.908	U	0.908	U	2.27	U	0.908	U	9.08	U	0.908	U	412	U	4.54	U	613	U	0.908	U	85.8	U	299	U	0.908	U
4-Methyl-2-pentanone		--	2.05	U	2.05	U	5.12	U	2.05	U	20.5	U	2.05	U	930	U	10.2	U	1380	U	2.05	U	194	U	672	U	2.05	U
trans-1,3-Dichloropropene		--	0.908	U	0.908	U	2.27	U	0.908	U	9.08	U	0.908	U	412	U	4.54	U	613	U	0.908	U	85.8	U	299	U	0.908	U
1,1,2-Trichloroethane		--	1.09	U	1.09	U	2.73	U	1.09	U	10.9	U	1.09	U	495	U	5.46	U	737	U	1.09	U	103	U	359	U	1.09	U
Toluene		--	2.17		2.46		3.96		8.89		7.54	U	6.14		342	U	7.01		509	U	5.58		71.2	U	248	U	3.36	
2-Hexanone		--	0.82	U	0.82	U	2.05	U	0.82	U	8.2	U	0.82	U	372	U	4.1	U	553	U	0.82	U	77.5	U	270	U	0.82	U
Dibromochloromethane		--	1.7	U	1.7	U	4.26	U	1.7	U	17	U	1.7	U	773	U	8.52	U	1150	U	1.7	U	161	U	561	U	1.7	U
1,2-Dibromoethane		--	1.54	U	1.54	U	3.84	U	1.54	U	15.4	U	1.54	U	697	U	7.69	U	1040	U	1.54	U	145	U	506	U	1.54	U
Tetrachloroethene	B	30	1.36	U	1.36	U	1340		4.75		13.6	U	1.36	U	403000		2340		780000		110		40600		157000		37.1	
Chlorobenzene		--	0.921	U	0.921	U	2.3	U	0.921	U	9.21	U	0.921	U	418	U	4.61	U	622	U	0.921	U	87	U	303	U	0.921	U
Ethylbenzene		--	10.4		0.869	U	3.97		0.869	U	8.69	U	0.869	U	394	U	19.8		586	U	19.5		82.1	U	286	U	0.869	U
p/m-Xylene		--	54.7		1.74	U	18.5		1.98		17.4	U	1.75		786	U	92.5		1170	U	96.4		164	U	573	U	1.74	U
Bromoform		--	2.07	U	2.07	U	5.17	U	2.07	U	20.7	U	2.07	U	938	U	10.3	U	1400	U	2.07	U	195	U	680	U	2.07	U
Styrene		--	0.852	U	0.852	U	2.13	U	0.852	U	8.52	U	0.852	U	386	U	4.26	U	575	U	1.65		80.5	U	280	U	0.852	U
1,1,2,2-Tetrachloroethane		--	1.37	U	1.37	U	3.43	U	1.37	U	13.7	U	1.37	U	623	U	6.87	U	927	U	1.37	U	130	U	452	U	1.37	U
o-Xylene		--	23.5		0.869	U	8.77		0.869	U	8.69	U	0.869	U	394	U	41.6		586	U	44.7		82.1	U	286	U	0.869	U
4-Ethyltoluene		--	1.07		0.983	U	2.46	U	0.983	U	9.83	U	0.983	U	446	U	4.92	U	664	U	2.95		92.9	U	323	U	0.983	U
1,3,5-Trimethylbenzene		--	1.52		0.983	U	2.46	U	0.983	U	9.83	U	0.983	U	446	U	4.92	U	664	U	3.71		92.9	U	323	U	0.983	U
1,2,4-Trimethylbenzene		--	4.64		0.983	U	2.62		1.03		9.83	U	0.983	U	446	U	10.5		664	U	12.7		92.9	U	323	U	0.983	U
Benzyl chloride		--	1.04	U	1.04	U	2.59	U	1.04	U	10.4	U	1.04	U	470	U	5.18	U	699	U	1.04	U	97.9	U	341	U	1.04	U
1,3-Dichlorobenzene		--	2.93		1.2	U	3.01	U	1.2	U	12	U	1.2	U	545	U	6.01	U	812	U	1.2	U	114	U	396	U	1.2	U
1,4-Dichlorobenzene		--	1.2	U	1.2	U	3.01	U	1.2	U	12	U	1.2	U	545	U	6.01	U	812	U	1.2	U	114	U	396	U	1.2	U
1,2-Dichlorobenzene		--	1.2	U	1.2	U	3.01	U	1.2	U	12	U	1.2	U	545	U	6.01	U	812	U	1.2	U	114	U	396	U	1.2	U
1,2,4-Trichlorobenzene		--	1.48	U	1.48	U	3.71	U	33		14.8	U	1.48	U	673	U	7.42	U	1000	U	1.48	U	140	U	488	U	1.48	U
Hexachlorobutadiene		--	2.13	U	2.13	U	5.33	U	2.13	U	21.3	U	2.13	U	967	U	10.7	U	1440	U	2.13	U	202	U	702	U	2.13	U

Notes:
NYSDOH AGV = New York State Department of Health Air Guidance Values
NYSDOH AGV values from NYSDOH Soil Vapor Guidance Values, May 2017
Matrix actions are described in the report narrative and the NYSDOH Soil Vapor Guidance, May 2017
Cells highlighted in yellow indicate concentrations above NYSDOH Air Guidance Values
RL = Reporting Limit
Qual = Laboratory Data Qualifier
For U qualified entries, the RL is shown
U = not detected at or above the RL
Results and RL values are in micrograms per cubic meter (ug/m^3)

HIP Cleaners
Table 14: Pre-design Sampling: VOCs in Soil

SAMPLE ID:		HIP-D1 (8-8.5)		HIP-D2 (2-3)		HIP-D2 (7-8)		HIP-D3 (8-9)		HIP-D4 (8-9)		HIP-D5 (1-2)		HIP-D5 (8-9)		HIP-D6 (1-2)		HIP-D6 (5-6)		HIP-D7 (5-6)		HIP-D7 (8-9)	
LAB ID:		L1830622-01		L1830622-02		L1830622-03		L1830622-04		L1830622-05		L1830622-06		L1830622-07		L1830622-08		L1830622-09		L1830622-10		L1830622-11	
COLLECTION DATE:	NY-UNRES	8/7/2018		8/7/2018		8/7/2018		8/7/2018		8/7/2018		8/7/2018		8/7/2018		8/7/2018		8/7/2018		8/7/2018		8/7/2018	
ANALYTE (mg/kg)		Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
VOLATILE ORGANICS BY 8260/5035																							
Methylene chloride	0.05	0.13	U	0.18	U	0.0046	J	0.0035	J	0.0084		0.3	U	0.3	U	0.19	U	0.14	U	0.0021	U	0.0073	
1,1-Dichloroethane	0.27	0.0082	U	0.011	U	0.00015	U	0.00017	U	0.00016	U	0.019	U	0.019	U	0.012	U	0.0086	U	0.00013	U	0.00017	U
Chloroform	0.37	0.0079	U	0.011	U	0.00015	U	0.00016	U	0.00016	U	0.018	U	0.018	U	0.012	U	0.0083	U	0.00013	U	0.00016	U
Carbon tetrachloride	0.76	0.013	U	0.018	U	0.00024	U	0.00027	U	0.00026	U	0.03	U	0.03	U	0.019	U	0.014	U	0.00021	U	0.00027	U
1,2-Dichloropropane		0.007	U	0.0098	U	0.00013	U	0.00015	U	0.00014	U	0.016	U	0.016	U	0.01	U	0.0074	U	0.00011	U	0.00015	U
Dibromochloromethane		0.0079	U	0.011	U	0.00015	U	0.00016	U	0.00016	U	0.018	U	0.018	U	0.012	U	0.0083	U	0.00013	U	0.00016	U
1,1,2-Trichloroethane		0.015	U	0.021	U	0.00028	U	0.00031	U	0.0003	U	0.035	U	0.035	U	0.022	U	0.016	U	0.00024	U	0.00031	U
Tetrachloroethene	1.3	4		12		0.27		0.073		0.12		39		37		10		10		0.029		0.0029	
Chlorobenzene	1.1	0.0072	U	0.0099	U	0.00013	U	0.00015	U	0.00014	U	0.017	U	0.017	U	0.01	U	0.0075	U	0.00012	U	0.00015	U
Trichlorofluoromethane		0.039	U	0.054	U	0.00073	U	0.00082	U	0.00078	U	0.091	U	0.092	U	0.057	U	0.041	U	0.00064	U	0.00081	U
1,2-Dichloroethane	0.02	0.014	U	0.02	U	0.00027	U	0.0003	U	0.00029	U	0.034	U	0.034	U	0.021	U	0.015	U	0.00023	U	0.0003	U
1,1,1-Trichloroethane	0.68	0.0094	U	0.013	U	0.00018	U	0.0002	U	0.00019	U	0.022	U	0.022	U	0.014	U	0.0099	U	0.00015	U	0.0002	U
Bromodichloromethane		0.0061	U	0.0085	U	0.00011	U	0.00013	U	0.00012	U	0.014	U	0.014	U	0.009	U	0.0065	U	0.0001	U	0.00013	U
trans-1,3-Dichloropropene		0.015	U	0.021	U	0.00029	U	0.00032	U	0.00031	U	0.036	U	0.036	U	0.022	U	0.016	U	0.00025	U	0.00032	U
cis-1,3-Dichloropropene		0.0089	U	0.012	U	0.00017	U	0.00018	U	0.00018	U	0.021	U	0.021	U	0.013	U	0.0094	U	0.00014	U	0.00018	U
1,3-Dichloropropene, Total		0.0089	U	0.012	U	0.00017	U	0.00018	U	0.00018	U	0.021	U	0.021	U	0.013	U	0.0094	U	0.00014	U	0.00018	U
1,1-Dichloropropene		0.009	U	0.012	U	0.00017	U	0.00019	U	0.00018	U	0.021	U	0.021	U	0.013	U	0.0094	U	0.00014	U	0.00018	U
Bromoform		0.014	U	0.019	U	0.00026	U	0.00029	U	0.00028	U	0.032	U	0.032	U	0.02	U	0.015	U	0.00022	U	0.00029	U
1,1,2,2-Tetrachloroethane		0.0094	U	0.013	U	0.00017	U	0.0002	U	0.00019	U	0.022	U	0.022	U	0.014	U	0.0099	U	0.00015	U	0.00019	U
Benzene	0.06	0.0094	U	0.013	U	0.00017	U	0.0002	U	0.00019	U	0.022	U	0.022	U	0.014	U	0.0099	U	0.00015	U	0.00019	U
Toluene	0.7	0.03	U	0.042	U	0.00057	U	0.00064	U	0.00061	U	0.071	U	0.072	U	0.045	U	0.032	U	0.0005	U	0.00064	U
Ethylbenzene	1	0.0079	U	0.011	U	0.00015	U	0.00016	U	0.00016	U	0.018	U	0.018	U	0.012	U	0.0084	U	0.00013	U	0.00016	U
Chloromethane		0.052	U	0.073	U	0.00098	U	0.0011	U	0.001	U	0.12	U	0.12	U	0.077	U	0.055	U	0.00085	U	0.0011	U
Bromomethane		0.033	U	0.045	U	0.00061	U	0.00068	U	0.00065	U	0.076	U	0.076	U	0.048	U	0.034	U	0.00053	U	0.00068	U
Vinyl chloride	0.02	0.019	U	0.026	U	0.00035	U	0.00039	U	0.00038	U	0.044	U	0.044	U	0.028	U	0.02	U	0.00031	U	0.00039	U
Chloroethane		0.025	U	0.035	U	0.00048	U	0.00053	U	0.00051	U	0.059	U	0.06	U	0.037	U	0.027	U	0.00041	U	0.00053	U
1,1-Dichloroethene	0.33	0.013	U	0.018	U	0.00025	U	0.00028	U	0.00027	U	0.031	U	0.031	U	0.02	U	0.014	U	0.00022	U	0.00028	U
trans-1,2-Dichloroethene	0.19	0.0077	U	0.011	U	0.00014	U	0.00016	U	0.00015	U	0.018	U	0.018	U	0.011	U	0.0081	U	0.00012	U	0.00016	U
Trichloroethene	0.47	0.0077	U	0.071		0.00032	J	0.00016	U	0.00071		0.071		0.096		0.11		0.094		0.00012	U	0.00016	U
1,2-Dichlorobenzene	1.1	0.0081	U	0.011	U	0.00015	U	0.00017	U	0.00016	U	0.019	U	0.019	U	0.012	U	0.0086	U	0.00013	U	0.00017	U
1,3-Dichlorobenzene	2.4	0.0083	U	0.012	U	0.00016	U	0.00017	U	0.00017	U	0.019	U	0.019	U	0.012	U	0.0088	U	0.00014	U	0.00017	U
1,4-Dichlorobenzene	1.8	0.0096	U	0.013	U	0.00018	U	0.0002	U	0.00019	U	0.022	U	0.022	U	0.014	U	0.01	U	0.00016	U	0.0002	U
Methyl tert butyl ether	0.93	0.011	U	0.016	U	0.00021	U	0.00024	U	0.00022	U	0.026	U	0.026	U	0.016	U	0.012	U	0.00018	U	0.00024	U
p/m-Xylene		0.032	U	0.044	U	0.00059	U	0.00066	U	0.00063	U	0.074	U	0.074	U	0.046	U	0.033	U	0.00051	U	0.00065	U
o-Xylene		0.016	U	0.023	U	0.00031	U	0.00034	U	0.00033	U	0.038	U	0.038	U	0.024	U	0.017	U	0.00026	U	0.00034	U
Xylenes, Total	0.26	0.016	U	0.023	U	0.00031	U	0.00034	U	0.00033	U	0.038	U	0.038	U	0.024	U	0.017	U	0.00026	U	0.00034	U
cis-1,2-Dichloroethene	0.25	0.0099	U	0.014	U	0.00018	U	0.0002	U	0.0002	U	0.023	U	0.023	U	0.014	U	0.01	U	0.00016	U	0.0002	U
1,2-Dichloroethene, Total		0.0077	U	0.011	U	0.00014	U	0.00016	U	0.00015	U	0.018	U	0.018	U	0.011	U	0.0081	U	0.00012	U	0.00016	U
Dibromomethane		0.013	U	0.018	U	0.00025	U	0.00028	U	0.00027	U	0.031	U	0.031	U	0.02	U	0.014	U	0.00022	U	0.00028	U
Styrene		0.011	U	0.015	U	0.00021	U	0.00023	U	0.00022	U	0.026	U	0.026	U	0.016	U	0.012	U	0.00018	U	0.00023	U
Dichlorodifluoromethane		0.052	U	0.071	U	0.00096	U	0.0011	U	0.001	U	0.12	U	0.12	U	0.075	U	0.054	U	0.00084	U	0.0011	U
Acetone	0.05	0.27	U	0.51	J	0.056		0.0056	U	0.038		0.63	U	0.63	U	0.4	U	0.28	U	0.035		0.019	
Carbon disulfide		0.26	U	0.36	U	0.0048	U	0.0053	U	0.0051	U	0.6	U	0.6	U	0.37	U	0.27	U	0.0042	U	0.0053	U
2-Butanone	0.12	0.12	U	0.17	U	0.0023	U	0.0026	U	0.0025	U	0.29	U	0.29	U	0.18	U	0.13	U	0.002	U	0.0026	U
Vinyl acetate		0.12	U	0.17	U	0.0023	U	0.0025	U	0.0024	U	0.28	U	0.28	U	0.18	U	0.13	U	0.002	U	0.0025	U
4-Methyl-2-pentanone		0.072	U	0.1	U	0.0013	U	0.0015	U	0.0014	U	0.17	U	0.17	U	0.1	U	0.076	U	0.0012	U	0.0015	U
1,2,3-Trichloropropane		0.0072	U	0.0099	U	0.00013	U	0.00015	U	0.00014	U	0.017	U	0.017	U	0.01	U	0.0075	U	0.00012	U	0.00015	U
2-Hexanone		0.066	U	0.092	U	0.0012	U	0.0014	U	0.0013	U	0.16	U	0.16	U	0.097	U	0.07	U	0.0011	U	0.0014	U
Bromochloromethane		0.012	U	0.016	U	0.00022	U	0.00024	U	0.00023	U	0.027	U	0.027	U	0.017	U	0.012	U	0.00019	U	0.00024	U
2,2-Dichloropropane		0.011	U	0.016	U	0.00021	U	0.00024	U	0.00023	U	0.026	U	0.026	U	0.017	U	0.012	U	0.00018	U	0.00024	U
1,2-Dibromoethane		0.016	U	0.022	U	0.00029	U	0.00033	U	0.00031	U	0.037	U	0.037	U	0.023	U	0.016	U	0.00025	U	0.00033	U
1,3-Dichloropropane		0.0094	U	0.013	U	0.00018	U	0.0002	U	0.00019	U	0.022	U	0.022	U	0.014	U	0.0099	U	0.00015	U	0.0002	U
1,1,1,2-Tetrachloroethane		0.0074	U	0.01	U	0.00014	U	0.00016	U	0.00015	U	0.017	U	0.017	U	0.011	U	0.0078	U	0.00012	U	0.00015	U
Bromobenzene		0.0082	U	0.011	U	0.00015	U	0.00017	U	0.00016	U	0.019	U	0.019	U	0.012	U	0.0086	U	0.00013	U	0.00017	U
n-Butylbenzene	12	0.0094	U	0.013	U	0.00018	U	0.0002	U	0.00019	U	0.022	U	0.022	U	0.014	U	0.0099	U	0.00015	U	0.0002	U
sec-Butylbenzene	11	0.0082	U	0.011	U	0.00015	U	0.00017	U	0.00016	U	0.019	U	0.019	U	0.012	U	0.0087	U	0.00013	U	0.00017	U
tert-Butylbenzene	5.9	0.0066	U	0.0092	U	0.00012	U	0.00014	U	0.00013	U	0.016	U	0.016	U	0.0097	U	0.007	U	0.00011	U	0.00014	U
o-Chlorotoluene		0.011	U	0.015	U	0.0002	U	0.00022	U	0.00021	U	0.025	U	0.025	U	0.016	U	0.011	U	0.00017	U	0.00022	U
p-Chlorotoluene		0.0061	U	0.0084	U	0.00011	U	0.00013	U	0.00012	U	0.014	U	0.014	U	0.0089	U	0.0064	U	0.0001	U	0.00013	U
1,2-Dibromo-3-chloropropane		0.056	U	0.078	U	0.001	U	0.0012	U	0.0011	U	0.13	U	0.13	U	0.082	U	0.059	U	0.00091	U	0.0012	U
Hexachlorobutadiene		0.0095	U	0.013	U	0.00018	U	0.0002	U	0.00019	U	0.022	U	0.022	U	0.014	U	0.01	U	0.00015	U	0.0002	U
Isopropylbenzene		0.0061	U	0.0085	U	0.00011	U	0.00013	U	0.00012	U	0.014	U	0.014	U	0.009	U	0.0065	U	0.0001	U	0.00013	U
p-Isopropyltoluene		0.0061	U	0.0085	U	0.00011	U	0.00013	U	0.00012	U	0.014	U	0.014	U	0.009	U	0.0065	U	0.0001	U	0.00013	U
Naphthalene	12	0.037	U	0.051	U	0.00068	U	0.00076	U	0.00073	U	0.085	U	0.086	U	0.054	U	0.039	U	0.00059	U	0.00076	U
Acrylonitrile		0.065	U	0.09	U	0.0012	U	0.0014	U	0.0013	U	0.15	U	0.15	U	0.095	U	0.068	U	0.001	U	0.0013	U
n-Propylbenzene	3.9	0.0096	U	0.013	U	0.00018	U	0.0002	U	0.00019	U	0.022	U	0.022	U	0.014	U	0.01	U	0.00016	U	0.0002	U
1,2,3-Trichlorobenzene		0.018	U	0.025	U	0.00034	U	0.00038	U	0.00036	U	0.042	U	0.042	U	0.026	U	0.019	U	0.00029	U	0.00038	U
1,2,4-Trichlorobenzene		0.015	U	0.021	U	0.00029	U	0.00032	U	0.0003	U	0.036	U	0.036	U	0.022	U	0.016	U	0.00025	U	0.00032	U
1,3,5-Trimethylbenzene	8.4	0.011	U	0.015	U	0.0002	U	0.00023	U	0.00022	U	0.025	U	0.025	U	0.016	U	0.011	U	0.00018	U	0.00022	U
1,2,4-Trimethylbenzene	3.6	0.019	U	0.026	U	0.00035	U	0.00039	U	0.00037	U	0.044	U	0.044	U	0.028	U	0.02	U	0.0003	U	0.00039	U
1,4-Dioxane	0.1	2	U	2.7	U	0.037	U	0.041	U	0.039	U	4.6	U	4.6	U	2.9	U	2.1	U	0.032	U	0.041	U
p-Diethylbenzene		0.01	U	0.014	U	0.00019	U	0.00021	U	0.0002	U	0.023	U	0.023	U	0.014	U	0.01	U	0.00016	U	0.00021	U
p-Ethyltoluene		0.022	U	0.03	U	0.0004	U	0.00045	U	0.00043	U	0.05	U	0.05	U	0.032	U	0.023	U	0.00035	U	0.00045	U
1,2,4,5-Tetramethylbenzene		0.011	U	0.015	U	0.0002	U	0.00022	U	0.00021	U	0.025	U	0.025	U	0.016	U	0.011	U	0.00017	U	0.00022	U
Ethyl ether		0.019	U	0.027	U	0.00036	U	0.0004	U	0.00038	U	0.045	U	0.045	U	0.028	U	0.02	U	0.00031	U	0.0004	U
trans-1,4-Dichloro-2-butene		0.08	U	0.11	U	0.0015	U	0.0017	U	0.0016	U	0.19	U	0.19	U	0.12	U	0.084	U	0.0013	U	0.0017	U
Total VOCs		4	-	12.581	-	0.33092	-	0.0765	-	0.68711	-	39.071	-	37.096	-	10.11	-	10.094	-	0.064	-	0.0292	-

Notes:
NY-UNRES: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
Notes:
Cells highlighted in yellow indicate concentrations above the NY-UNRES
Cells shaded in grey indicate MDL values above the NY-UNRES
MDL = Maximum Detection Limit
RL = Reporting limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
-- = No standard
Results and MDL values are in milligrams per killogram

Table 15: Estimated Remedial Costs
Brownfield Cleanup Program
HIP Cleaners - Rochdale Village - Queens, NY
C241166

HIP Rochdale Cleaners (BCP Site #C241166)

Task	Estimated Costs
Obtain/emplace ISCO reactant cylinders	$ 3,000.00
Installation of four SVE wells	$ 35,000.00
SVE system equipment	$ 30,000.00
Cast iron piping and plumbing installation	$ 50,000.00
Pilot test/system performance test/emission rate calculation	$ 10,000.00
Document remedial action (IRM Construction Completion Report, Final Engineering Report and Site Management Plan)	$ 45,000.00
Subtotal	$ 198,000.00
20% contingency	$ 39,600.00
Total estimated costs through COC	**$ 237,600.00**

ISCO = in-situ chemical oxidation
SVE = soil vapor extraction

Table 16
Brownfield Cleanup Program
HIP Cleaners - Rochdale Village - Queens, NY
C241166
Remedial Action Construction Schedule

Milestone	Duration (weeks)	Estimated Date
Approval of RAWP	0	6/1/20
Fact Sheet Announcing Start of Remedial Action	2	6/15/20
Mobilization	2	7/1/20
Start of Remedial Action	10	7/15/20
Construction Complete	--	10/1/20
Submittal of Environmental Easement (EE)	--	11/1/20
Submittal of Draft Site Management Plan (SMP)	--	11/1/20
Submittal of Draft Final Engineering Report (FER)	--	11/1/20
Submit Final Engineering Report (FER)	--	12/1/20
Obtain Certificate of Completion (COC)	--	12/15/20

Table 17
Brownfield Cleanup Program
HIP Cleaners - Rochdale Village - Queens, NY
C241166
Required Permits

Permit	Law, Statute or Code	Contact
--	--	--

Appendix A
NYSDOH Generic CAMP

New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must 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.

1. 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 must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix B
Significant Threat Determination

FACT SHEET

Brownfield Cleanup Program

HIP Cleaners (Rochdale Village Mall #2)
169-47 137th Street
Jamaica, Queens, NY 11434

SITE No. C241166

November 2019

NYSDEC REGION 2

Remedy Proposed for Brownfield Site Contamination; Public Comment Period Announced

The public is invited to comment on a proposed remedy being reviewed by the New York State Department of Environmental Conservation (NYSDEC) to address contamination related to the HIP Cleaners site (the "site") located at 169-47 137th Street, Jamaica, NY. Please see the map for the site location. Documents related to the cleanup of this site can be found at the location(s) identified on the left-hand side of this page under "Where to Find Information."

Based on the findings of the investigation, NYSDEC in consultation with the New York State Department of Health (NYSDOH) has determined that the site poses a significant threat to public health or the environment. This decision is based on the potential for human exposure to site-related contaminants via soil vapor.

How to Comment: NYSDEC is accepting written comments about the proposed plan for 45 days, from **November 28, 2019** through **January 11, 2020**.

- Access the RAWP and other project documents online through the DECinfo Locator: https://www.dec.ny.gov/data/DecDocs/C241166/.
- Documents also are available at the location(s) identified at left under "Where to Find Information."
- Please submit comments to the NYSDEC project manager listed under Project-Related Questions in the "Who to Contact" area at left.

Draft Remedial Action Work Plan: The proposed Commercial Use remedy consists of:

- Installation of an active sub-slab depressurization system (SSDS) and soil vapor extraction (SVE) system to minimize the potential for vapor intrusion at the site, and treat remaining tetrachloroethene (PCE) impacts in the soil;
- Maintenance of the existing site cover system;
- Groundwater treatment using in-situ (in-place) chemical oxidation;
- Post-remedial groundwater monitoring;
- Recording of an Environmental Easement to ensure proper future use of the site;
- Preparation of a Final Engineering Report (FER) to document the implemented remedial actions; and,

Where to Find Information

Access project documents through the DECinfo Locator and at these location(s):

Queens Public Library – Rochdale Village Branch
169-09 137th Avenue
Jamaica, NY 11434
Call for hours: (718) 723-4440

Queens Community Board 12
90-28 161st Street
Jamaica, NY 11432
(718) 658-3308

Who to Contact

Comments and questions are welcome and should be directed as follows:

Project Related Questions
Sondra Martinkat, Project Manager
NYSDEC, Region 2 Office
47-40 21st Street
Long Island City, NY 11101
(718) 482-7541
sondra.martinkat@dec.ny.gov

Project-Related Health Questions
Anthony Perretta
NYSDOH
Empire State Plaza
Corning Tower Room 1787
Albany, NY 12237
(518) 402-7860
beei@health.state.ny.us

For additional information on the New York's Brownfield Cleanup Program, visit:
www.dec.ny.gov/chemical/8450.html

BROWNFIELD CLEANUP PROGRAM

- Development of a Site Management Plan (SMP) for long term management of residual contamination as required by an Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, and (3) reporting.

The proposed remedy was developed by Rochdale Village, Inc. (the "Participant") after performing a detailed investigation of the site under New York's Brownfield Cleanup Program (BCP). A "Remedial Investigation Report", which describes the results of the site investigation was submitted prior to the Remedial Action Work Plan and is also available for review at the locations identified on Page 1.

Site Description: The site is located at 169-47 137th Avenue in Jamaica, NY within the Rochdale Village Mall #2, part of a larger community development and housing complex known as Rochdale Village. The site is 0.076 acres in size and is currently occupied by an active dry cleaner. A dry-cleaning facility has occupied the site for approximately 43 years.

Additional site details, including environmental and health assessment summaries, are available on NYSDEC's Environmental Site Remediation Database (by entering the Site ID, C241166) at:

http://www.dec.ny.gov/cfmx/extapps/derexternal/index.cfm?pageid=3

Summary of the Investigation: The primary contaminants of concern at the site are chlorinated volatile organic compounds (cVOCs), which are present in soil, groundwater and soil vapor, with the highest detections identified in the area adjacent to the former dry-cleaning equipment.

Next Steps: NYSDEC will consider public comments, revise the cleanup plan as necessary, and issue a final Decision Document. NYSDOH must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The draft RAWP is revised as needed to describe the selected remedy and will be made available to the public. The applicant(s) may then design and perform the cleanup action to address the site contamination, with oversight by NYSDEC and NYSDOH.

NYSDEC will keep the public informed throughout the investigation and cleanup of the site.

Brownfield Cleanup Program: New York's Brownfield Cleanup Program (BCP) encourages the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and redeveloped. These uses may include recreation, housing, business or other uses. A brownfield site is any real property where a contaminant is present at levels exceeding the soil cleanup objectives or other health-based or environmental standards, criteria or guidance adopted by NYSDEC that are applicable based on the reasonably anticipated use of the property, in accordance with applicable regulations.

For more information about the BCP, visit:

http://www.dec.ny.gov/chemical/8450.html

We encourage you to share this fact sheet with neighbors and tenants, and/or post this fact sheet in a prominent area of your building for others to see.

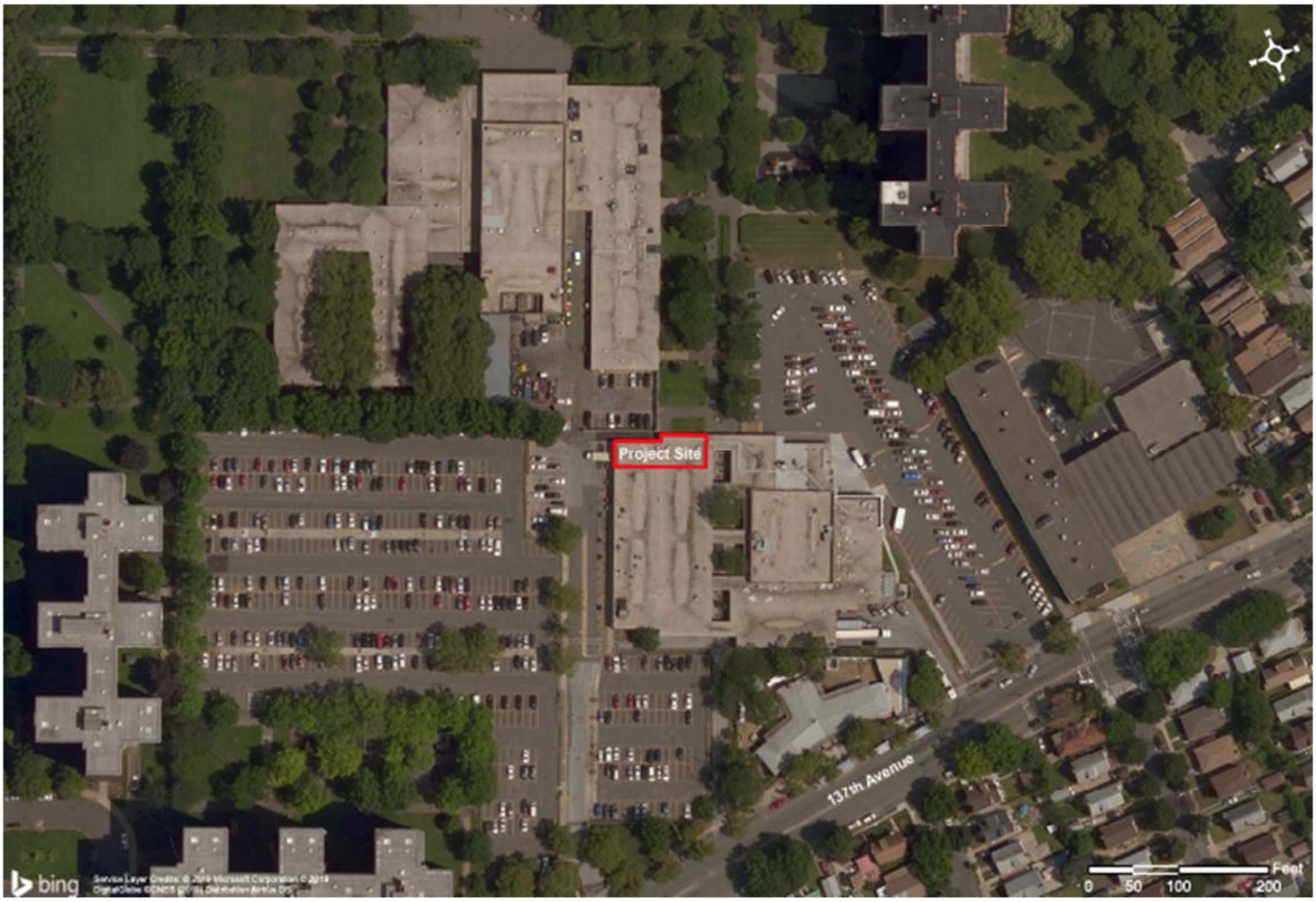
Stay Informed With DEC Delivers
Sign up to receive site updates by email:
www.dec.ny.gov/chemical/61092.html

Note: Please disregard if you already have signed up and received this fact sheet electronically.

DECinfo Locator
Interactive map to access DEC documents and public data about the environmental quality of specific sites: http://www.dec.ny.gov/pubs/109457.html

BROWNFIELD CLEANUP PROGRAM

Site Location Map



Appendix C
Construction Health and Safety Plan

Construction Health and Safety Plan

for
HIP Cleaners- Rochdale Village
Remedial Action Work Plan

165-50 Baisley Boulevard, Jamaica
Block 12495, portion of Lot 2
BCP Site # C241166

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
Rochdale Village, Inc.
169-55 137th Avenue
Queens, New York 11434

Prepared by:
TENEN ENVIRONMENTAL
121 West 27th Street, Suite 702
New York, NY 10001

May 2019

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1.0 INTRODUCTION

This Construction Health and Safety Plan (CHASP) has been prepared in conformance with the Occupational Safety and Health Administration (OSHA) standards and guidance that govern site investigation activities, other applicable regulations, and Tenen Environmental LLC (Tenen) health and safety policies and procedures. The purpose of this CHASP is the protection of Tenen field personnel and others during the implementation of the Remedial Action Work Plan (RAWP).

The HIP Cleaners (the Site) is located in the Rochdale Village Mall #2 at 169-47 137th Avenue in the Jamaica Section of Queens, New York. The HIP Cleaners is an active dry cleaning facility, located in a 3,330 square foot (sf) retail space within a strip mall in Rochdale Village community. Rochdale Village community is a 115-acre area, which includes twenty 14-story residential apartment buildings with associated management office, power plant, community center, maintenance and public safety building, two retail malls (Mall #1 and #2), medical offices, gasoline station, open space and parking areas. HIP Cleaners is the leaseholder for the current tenant space and has conducted dry cleaning operations at the Site since 1967.

1.1 Scope of HASP

This HASP includes safety procedures to be used by Tenen staff during the following activities:

- Collection of groundwater samples;
- Installation of groundwater well;
- In-situ chemical oxidation treatment;
- Installation of on-site sub-slab depressurization system (SSDS);
- Installation of soil vapor extraction (SVE) system;

Subcontractors will ensure that performance of the work is in compliance with this CHASP and applicable laws and regulations.

2.0 PROJECT SAFETY AUTHORITY

The following personnel are responsible for project health and safety under this HASP.

- Project Manager, Matthew Carroll
- Health and Safety Officer (HSO), Mohamed Ahmed

In addition, each individual working at the Site will be responsible for compliance with this CHASP and general safe working practices. All Site workers will have the authority to stop work if a potentially hazardous situation or event is observed.

2.1 Designated Personnel

The Project Manager is responsible for the overall operation of the project, including compliance with the HASP and general safe work practices. The Project Manager may also act as the Health and Safety Officer (HSO) for this project.

Tenen will appoint one of its on-site personnel as the on-site HSO. This individual will be responsible for the implementation of the HASP. The HSO will have a 4-year college degree in occupational safety or a related science/engineering field, and at least two (2) years of experience in implementation of air monitoring and hazardous materials sampling programs. The HSO will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards.

The HSO will be present on-site during all field operations involving drilling or other subsurface disturbance, and will be responsible for all health and safety activities and the delegation of duties to the field crew. The HSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the HSO must be absent from the field, a replacement who is familiar with the Construction Health and Safety Plan, air monitoring and personnel protective equipment (PPE) will be designated.

3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

Known previous and current uses of the site include operations that used chlorinated solvents.

A Remedial Investigation Report (RIR) dated March 1, 2017, was prepared by Tenen Environmental LLC (Tenen).

The investigation consisted of installation of soil borings and collection of soil samples, installation and sampling of groundwater monitoring wells, installation and sampling of soil vapor points and sampling of indoor and ambient air. Based on the results of the RI and previous investigations, the following summary has been prepared:

Site History

- A dry cleaning facility has occupied the Site property for a period of approximately 43 years. HIP Cleaners was identified as a Small Quantity Generator of Hazardous Wastes on the regulatory database, with no violations. At least one, and potentially two, USTs were identified at the rear of the property. The assumed tank(s) capacity was approximately 275-gallons. No petroleum-related impacts were detected in soil within this area.

Geology/Hydrogeology

- Based on boring logs, the Site is underlain by historic fill material (silty sands mixed with anthropogenic materials) and fine to medium sand and silts to a depth of approximately ten ft-bg, above medium to coarse grain sand and gravel to depths of up to 50 ft-bg. Soil boring HIP-SB-3D was advanced to a depth of 50 ft-bg to investigate the presence of a confining layer; no clay layer was encountered. The approximate depth to bedrock (Ravenswood Granodiorite) is 800 ft-bg.
- Groundwater was encountered between 6.48 to 8.25 ft-bg. The measured groundwater flow direction for the most recent sampling event is toward the northeast, consistent with the overall northerly flow of groundwater beneath the Site.

Chlorinated Solvents

- PCE was detected in soil above the Protection of Groundwater SCO of 1.3 mg/kg in soil samples within the shallow interval in the area adjacent to the location of the dry cleaning equipment, at a maximum concentration of 79 mg/kg.
- PCE was detected in groundwater at concentrations of up to 52 ug/L in shallow samples, above the Class GA Standard, with lower concentrations detected at downgradient locations. The highest concentration was in the sample collected on-Site near the former dry cleaner.
- PCE was the only VOC detected in groundwater and soil samples above regulatory levels, with the exception of metals in groundwater.
- PCE was detected in sub-slab, soil vapor and indoor air at concentrations above those detected in the ambient air. PCE was detected in the sub-slab soil vapor at concentrations up to 1,140,000 ug/m^3. TCE was detected in sub-slab at concentrations up to 2,790 ug/m^3.

- PCE was detected in soil vapor at lower concentrations outside of Mall #2's footprint, specifically at locations in the direction of the neighboring public school, residential building and office spaces.

Historic Fill-Related Impacts

- One pesticide was detected in the fill material at concentrations above the Unrestricted Use SCOs.

Qualitative Environmental Assessment

- The following potential exposure routes were identified: direct contact with surface soils, inhalation and incidental ingestion, ingestion of groundwater, direct contact with groundwater and inhalation of vapors.
- Potential impacts from these exposure routes can be mitigated through the implementation of HASP and CAMP during ground-intrusive activities and installation of an SSDS.

3.1 Human Exposure Pathways

The media of concern at the Site include potentially-impacted soil, groundwater and soil vapor. Potential exposure pathways include dermal contact, incidental ingestion and inhalation of vapors. The risk of dermal contact and incidental ingestion will be minimized through general safe work practices, a personal hygiene program and the use of PPE. The risk of inhalation will be minimized through the use of an air monitoring program for VOCs and particulates.

3.2 Chemical Hazards

Based on historic uses, the following contaminants of concern are present in media that will be encountered during the implementation of the RAWP:

Chlorinated Solvents

- Tetrachloroethylene (PCE)
- Trichloroethene (TCE)

SVOCs

- Polycyclic Aromatic Hydrocarbons (PAHs)

Metals

- Iron
- Manganese

Material Safety Data Sheets (MSDSs) for each contaminant of concern are included in Appendix C. All personnel are required to review the MSDSs included in this HASP.

3.3 Physical Hazards

The physical hazards associated with the field activities likely present a greater risk of injury than the chemical constituents at the Site. Activities within the scope of this project shall comply

with New York State and Federal OSHA construction safety standards.

Head Trauma
To minimize the potential for head injuries, field personnel will be required to wear National Institutes of Occupational Safety and Health (NIOSH)-approved hard hats during field activities. Hats must be worn properly and not altered in any way that would decrease the degree of protection provided.

Foot Trauma
To avoid foot injuries, field personnel will be required to wear steel-toed safety shoes while field activities are being performed. To afford maximum protection, all safety shoes must meet American National Standards Institute (ANSI) standards.

Eye Trauma
Field personnel will be required to wear eye protection (safety glasses with side shields) while field activities are being performed to prevent eye injuries caused by contact with chemical or physical agents.

Noise Exposure
Field personnel will be required to wear hearing protection (ear plugs or muffs) in high noise areas (noise from heavy equipment) while field activities are being performed.

Buried Utilities and Overhead Power Lines
Boring locations will be cleared by an underground utility locator service. In addition, prior to intrusive activities, the drilling subcontractor will contact the One Call Center to arrange for a utility mark-out, in accordance with New York State requirements. Protection from overhead power lines will be accomplished by maintaining safe distances of at least 15 feet at all times.

Thermal Stress
The effects of ambient temperature can cause physical discomfort, personal injury, and increase the probability of accidents. In addition, heat stress due to lack of body ventilation caused by protective clothing is an important consideration. Heat-related illnesses commonly consist of heat stroke and heat exhaustion.

The symptoms of heat stroke include: sudden onset; change in behavior; confusion; dry, hot and flushed skin; dilated pupils; fast pulse rate; body temperature reaching 105° or more; and/or, deep breathing later followed by shallow breathing.

The symptoms of heat exhaustion include: weak pulse; general weakness and fatigue; rapid shallow breathing; cold, pale and clammy skin; nausea or headache; profuse perspiration; unconsciousness; and/or, appearance of having fainted.

Heat-stress monitoring will be conducted if air temperatures exceed 70 degrees Fahrenheit. The initial work period will be set at 2 hours. Each worker will check his/her pulse at the wrist for 30 seconds early in each rest period. If the pulse rate exceeds 110 beats per minute, the next work period will be shortened by one-third.

One or more of the following precautions will reduce the risk of heat stress on the Site:

- Provide plenty of liquids to replace lost body fluids; water, electrolytic drinks, or both will be made available to minimize the risk of dehydration and heat stress
- Establish a work schedule that will provide appropriate rest periods
- Establish work regimens consistent with the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines
- Provide adequate employee training on the causes of heat stress and preventive measures

In the highly unlikely event of extreme low temperatures, reasonable precautions will be made to avoid risks associated with low temperature exposure.

Traffic

Field activities will occur near public roadways. As a result, vehicular traffic will be a potential hazard during these activities and control of these areas will be established using barricades or traffic cones. Additional staff will be assigned, as warranted, for the sole purpose of coordinating traffic. Personnel will also be required to wear high-visibility traffic vests while working in the vicinity of the public roadways and local requirements for lane closure will be observed as needed. All work in public rights-of-way will be coordinated with local authorities and will adhere to their requirements for working in traffic zones.

Hazardous Weather Conditions

All Site workers will be made aware of hazardous weather conditions, specifically including extreme heat, and will be requested to take the precautions described herein to avoid adverse health risks. All workers are encouraged to take reasonable, common sense precautions to avoid potential injury associated with possible rain or high wind, sleet, snow or freezing.

Slip, Trip and Fall

Areas at the Site may be slippery from mud or water. Care should be taken by all Site workers to avoid slip, trip, and fall hazards. Workers shall not enter areas that do not have adequate lighting. Additional portable lighting will be provided at the discretion of the HSO.

Biological Hazards

Drugs and alcohol are prohibited from the Site. Any on-site personnel violating this requirement will be immediately expelled from the site.

Any worker or oversight personnel with a medical condition that may require attention must inform the HSO of such condition. The HSO will describe appropriate measures to be taken if the individual should become symptomatic.

Due to the Site location in an urban area, it is highly unlikely that poisonous snakes, spiders, plants and insects will be encountered. However, other animals (dogs, cats, etc.) may be encountered and care should be taken to avoid contact.

4.0 AIR MONITORING

Air quality monitoring equipment will be used during all work activities to measure total organic vapors. A PID (to monitor total volatile organic concentrations) will be used during on-site

activities. The equipment will be calibrated daily and the results noted in the project field book. A background level will be established, at a minimum, on a daily basis, and recorded in the field book. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

During soil boring and sampling outside the mall buildings, particulate monitoring will be performed using a real-time particulate monitor that will monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

Object to be measured: Dust, Mists, Aerosols
Size range: <0.1 to 10 microns
Sensitivity: 0.001 mg/m3
Range: 0.001 to 10 mg/m3
Overall Accuracy: ±10% as compared to gravimetric analysis of stearic acid or reference dust.

Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. The action level will be established at 150 ug/m^3 over the integrated period not to exceed 15 minutes.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protection equipment required for various kinds of site investigation tasks is based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, "General Description and Discussion of the Levels of Protection and Protective Gear."

Tenen field personnel and other site personnel will wear Level D personal protective equipment. During activities such as drilling, well installation, or sampling, where there is a chance of contact with contaminated materials, modified Level D equipment will be worn. The protection will be upgraded to Level C if warranted by the results of the air monitoring. A description of the personnel protective equipment for Levels D and C is provided below.

Level D
Respiratory Protection: None
Protective Clothing: Hard hat, steel-toed shoes, long pants, nitrile gloves

Modified Level D
Respiratory Protection: None
Protective Clothing: Hard hat, steel-toed shoes, coveralls/tyvek, nitrile gloves

Level C
Respiratory Protection: Air purifying respirator with organic vapor cartridges and filters.
Protective Clothing: Same as modified Level D

6.0 EXPOSURE MONITORING

Selective monitoring of workers in the exclusion area may be conducted, as determined by the HSO, if sources of hazardous materials are identified. Personal monitoring may be conducted in the breathing zone at the discretion of the Project Manager or HSO and, if workers are wearing respiratory protective equipment, outside the face-piece.

7.0 SITE ACCESS

Access to the Site during the investigation will be controlled by the Project Manager or HSO. Unauthorized personnel will not be allowed access to the sampling areas.

8.0 WORK AREAS

During any activities involving drilling or other subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, clarify the type of protective equipment needed, and provide an area for decontamination.

The Exclusion Zone is defined as the area where potentially contaminated materials are generated as the result of drilling, sampling, or similar activities. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located adjacent to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, a field phone, fire extinguisher and/or first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all Site workers will assemble in the event of an emergency. These zones shall be designated daily, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Control measures such as "Caution" tape and traffic cones will be placed around the perimeter of the work area when work is being done in the areas of concern (i.e., areas with exposed soil) to prevent unnecessary access.

9.0 DECONTAMINATION PROCEDURES

Personnel Decontamination
Personnel decontamination (decon), if deemed necessary by the HSO, will take place in the designated decontamination area delineated for each sampling location. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Tyvek removal;
- Glove removal;
- Disposable clothing removal; and
- Field wash of hands and face.

Equipment Decontamination
Sampling equipment, such as split-spoons and bailers, will be decontaminated in accordance with U.S. Environmental Protection Agency methodologies, as described in the work plan.

Disposal of Materials
Purged well water, water used to decontaminate any equipment and well cuttings will be containerized and disposed off-site in accordance with federal, state and local regulations.

10.0 GENERAL SAFE WORK PRACTICES

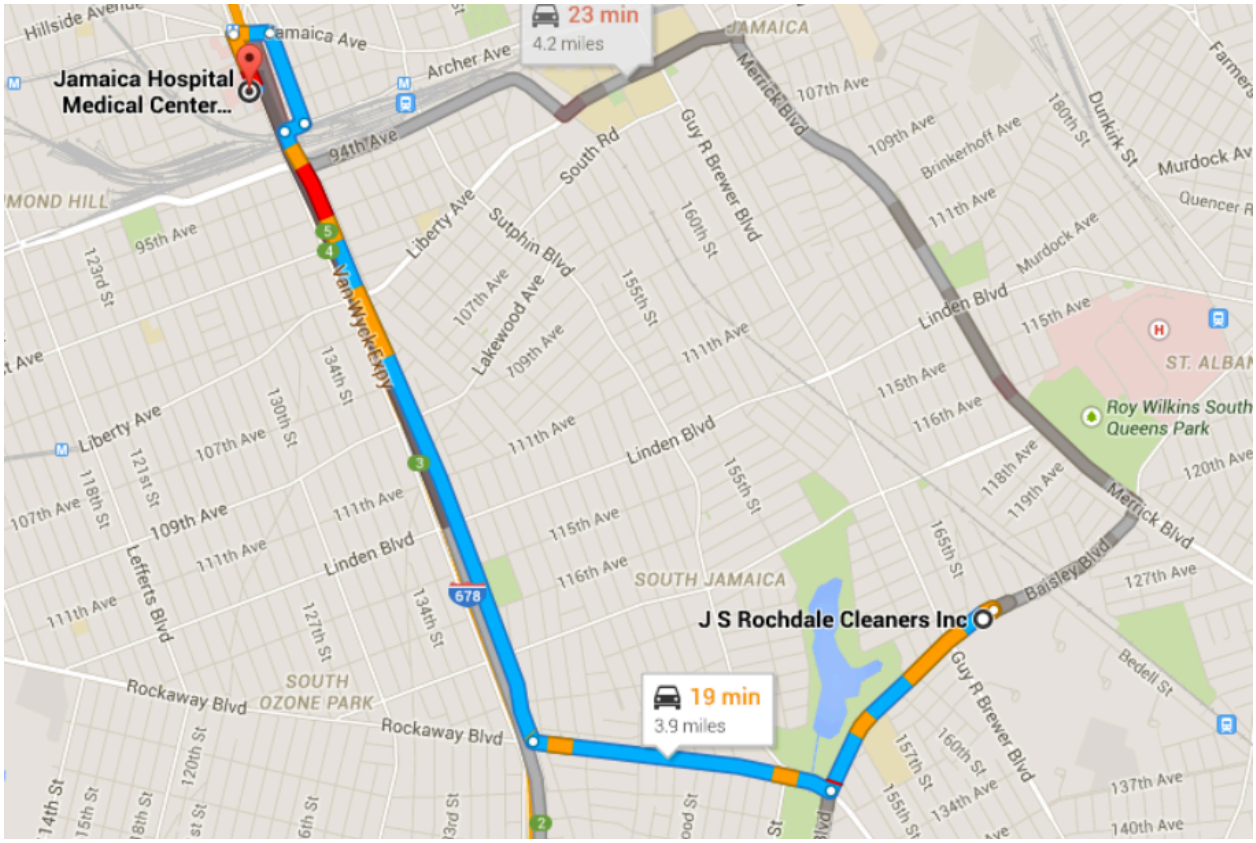
To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance.

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the HSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity. The workers should shower as soon as possible after leaving the site.
- Removal of potential contamination from PPE and equipment by blowing, shaking or any means that may disperse materials into the air is prohibited.
- Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat stress.
- Personnel will be cautioned to inform each other of symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract and heat stress.
- No excessive facial hair that interferes with a satisfactory fit of the face-piece of the respirator to the face will be allowed on personnel required to wear respiratory protective equipment.
- On-site personnel will be thoroughly briefed about the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communications methods.

11.0 EMERGENCY PROCEDURES

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the HSO will determine the nature of the emergency and will have someone call for an ambulance, if needed. If the nature of the injury is not serious—i.e., the person can be moved without expert emergency medical personnel—onsite personnel should drive him to a hospital. **The nearest emergency room is at Jamaica Hospital Medical Center located at 8900 VanWyck Expressway, Queens, NY 11418. Their phone number is (718) 206-6000.** The route to the hospital is shown and detailed on the next page.

11.1 Route to Hospital



Driving directions to **Jamaica Hospital Medical Center** from **165-50 Baisley Bloulevard, Queens, New York.**

Driving Directions

1. Head northeast on Baisley Blvd toward 166th St (456 feet).

2. Make a U-turn at 167th St (0.7 mile).

3. Turn right onto Rockaway Blvd (0.8 mile).

4. Turn right onto Van Wyck Blvd (2.1 mile).

5. Turn left onto Jamaica Ave (253 feet).

6. Turn left at the 1st cross street onto Van Wyck Blvd.

7. Destination will be on the right.

11.2 Emergency Contacts

There will be an on-site field phone. Emergency and contact telephone numbers are listed below:

Table 1 – Emergency Contacts

Ambulance	911
Emergency Room	(718) 963-8000
NYSDEC Spill Hotline	(800) 457-7362
NYSDEC Manager, Sondra Martinkat	(718) 482-4891
Tenen QEP, Mohamed Ahmed	(917) 612-6018
On-site Field Phone, Matthew Carroll	(646) 827-1061
Client representative, Claude Laborde	(347) 729-6553

12.0 TRAINING

All personnel performing the field activities involving hazardous waste, as determined by 40 CFR 262.11 and ECL 27-0903 or a "source area," as determined by DER-10 1.3(b)70, will have received the initial safety training required by 29 CFR, 1910.120. Current refresher training status also will be required for all personnel engaged in field activities.

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All field personnel must attend a training program covering the following areas:

- potential hazards that may be encountered;
- the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- the purpose and limitations of safety equipment; and
- protocols to enable field personnel to safely avoid or escape from emergencies.

Each member of the field crew will be instructed in the above objectives before he/she goes onto the site. The HSO will be responsible for conducting the training program.

13.0 MEDICAL SURVEILLANCE

All Tenen and subcontractor personnel performing field work involving subsurface disturbance involving hazardous waste, as determined by 40 CFR 262.11 and ECL 27-0903 or a "source area," as determined by DER-10 1.3(b)70, at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). The medical examination for Tenen employees will, at a minimum, be provided annually and upon termination of hazardous waste site work.

Appendix A

Acknowledgement of HASP

ACKNOWLEDGMENT OF HASP

Below is an affidavit that must be signed by all Tenen Environmental employees who enter the site. A copy of the HASP must be on-site at all times and will be kept by the HSO.

AFFIDAVIT

I have read the Construction Health and Safety Plan (CHASP) for the JS Cleaners Site in Queens, NY. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____

Appendix B

Injury Reporting Form (OSHA Form 300)

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

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ________________________

City ________________ State __________

Identify the person			Describe the case			Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
(A) Case no.	(B) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., Second degree burns on right forearm from acetylene torch)	Death (G)	Days away from work (H)	Remained at Work: Job transfer or restriction (I)	Remained at Work: Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
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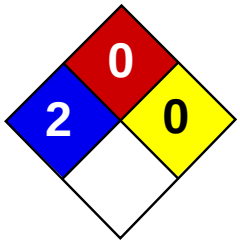
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
					Page totals	___	___	___	___	___	___	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Appendix C

Material Safety Data Sheets (MSDS)



Health	2
Fire	0
Reactivity	0
Personal Protection	G

Material Safety Data Sheet
Tetrachloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tetrachloroethylene

Catalog Codes: SLT3220

CAS#: 127-18-4

RTECS: KX3850000

TSCA: TSCA 8(b) inventory: Tetrachloroethylene

CI#: Not available.

Synonym: Perchloroethylene; 1,1,2,2-Tetrachloroethylene; Carbon bichloride; Carbon dichloride; Ankilostin; Didakene; Dilatin PT; Ethene, tetrachloro-; Ethylene tetrachloride; Perawin; Perchlor; Perclene; Perclene D; Percosolvel; Tetrachloroethene; Tetraleno; Tetralex; Tetravec; Tetroguer; Tetropil

Chemical Name: Ethylene, tetrachloro-

Chemical Formula: C2-Cl4

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Tetrachloroethylene	127-18-4	100

Toxicological Data on Ingredients: Tetrachloroethylene: ORAL (LD50): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC50): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC50): Acute: 5200 ppm 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (anticipated carcinogen) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, peripheral nervous system, respiratory tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 (ppm) from OSHA (PEL) [United States] TWA: 25 STEL: 100 (ppm) from ACGIH (TLV) [United States] TWA: 170 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal.

Taste: Not available.

Molecular Weight: 165.83 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 121.3°C (250.3°F)

Melting Point: -22.3°C (-8.1°F)

Critical Temperature: 347.1°C (656.8°F)

Specific Gravity: 1.6227 (Water = 1)

Vapor Pressure: 1.7 kPa (@ 20°C)

Vapor Density: 5.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 5 - 50 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.4

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Miscible with alcohol, ether, chloroform, benzene, hexane. It dissolves in most of the fixed and volatile oils. Solubility in water: 0.015 g/100 ml @ 25 deg. C It slowly decomposes in water to yield Trichloroacetic and Hydrochloric acids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Oxidized by strong oxidizing agents. Incompatible with sodium hydroxide, finely divided or powdered metals such as zinc, aluminum, magnesium, potassium, chemically active metals such as lithium, beryllium , barium. Protect from light.

Special Remarks on Corrosivity: Slowly corrodes aluminum, iron, and zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2629 mg/kg [Rat]. Acute dermal toxicity (LD50): >3228 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5200 4 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Publishe Lethal Dose/Conc: LDL [Rabbit] - Route: Oral; Dose: 5000 mg/kg LDL [Dog] - Route: Oral; Dose: 4000 mg/kg LDL [Cat] - Route: Oral; Dose: 4000 mg/kg

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects(teratogenic). May affect genetic material (mutagenic). May cause cancer.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation with possible dermal blistering or burns. Symtoms may include redness, itching, pain, and possible dermal blistering or burns. It may be absorbed through the skin with possible systemic effects. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts. Eyes: Contact causes transient eye irritation, lacrimation. Vapors cause eye/conjunctival irritation. Symptoms may include redness and pain. Inhalation: The main route to occupational exposure is by inhalation since it is readily absorbed through the lungs. It causes respiratory tract irritation, . It can affect behavior/central nervous system (CNS depressant and anesthesia ranging from slight inebriation to death, vertigo, somnolence, anxiety, headache, excitement, hallucinations, muscle incoordination, dizziness, lightheadness, disorentiation, seizures, enotional instability, stupor, coma). It may cause pulmonary edema Ingestion: It can cause nausea, vomiting, anorexia, diarrhea, bloody stool. It may affect the liver, urinary system (proteinuria, hematuria, renal failure, renal tubular disorder), heart (arrhythmias). It may affect behavior/central nervous system with symptoms similar to that of inhalation. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may result in excessive drying of the skin, and irritation. Ingestion/Inhalation: Chronic exposure can affect the liver(hepatitis,fatty liver degeneration), kidneys, spleen, and heart (irregular heartbeat/arrhythmias, cardiomyopathy, abnormal EEG), brain, behavior/ central nervous system/peripheral nervous system (impaired memory, numbness of extremeties, peripheral neuropathy and other

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 18.4 mg/l 96 hours [Fish (Fatthead Minnow)]. 18 mg/l 48 hours [Daphnia (daphnia)]. 5 mg/l 96 hours [Fish (Rainbow Trout)]. 13 mg/l 96 hours [Fish (Bluegill sunfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Tetrachloroethylene UNNA: 1897 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Tetrachloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Tetrachloroethylene Connecticut hazardous material survey.: Tetrachloroethylene Illinois toxic substances disclosure to employee act: Tetrachloroethylene Illinois chemical safety act: Tetrachloroethylene New York release reporting list: Tetrachloroethylene Rhode Island RTK hazardous substances: Tetrachloroethylene Pennsylvania RTK: Tetrachloroethylene Minnesota: Tetrachloroethylene Michigan critical material: Tetrachloroethylene Massachusetts RTK: Tetrachloroethylene Massachusetts spill list: Tetrachloroethylene New Jersey: Tetrachloroethylene New Jersey spill list: Tetrachloroethylene Louisiana spill reporting: Tetrachloroethylene California Director's List of Hazardous Substances: Tetrachloroethylene TSCA 8(b) inventory: Tetrachloroethylene TSCA 8(d) H and S data reporting: Tetrachloroethylene: Effective date: 6/1/87; Sunset date: 6/1/97 SARA 313 toxic chemical notification and release reporting: Tetrachloroethylene CERCLA: Hazardous substances.: Tetrachloroethylene: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S23- Do not breathe gas/fumes/vapour/spray S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:29 PM

Last Updated: 05/21/2013 12:00 PM

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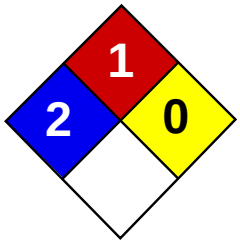

Material Safety Data Sheet
Trichloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroethylene

Catalog Codes: SLT3310, SLT2590

CAS#: 79-01-6

RTECS: KX4560000

TSCA: TSCA 8(b) inventory: Trichloroethylene

CI#: Not available.

Synonym:

Chemical Formula: C2HCl3

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Trichloroethylene	79-01-6	100

Toxicological Data on Ingredients: Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 420°C (788°F)

Flash Points: Not available.

Flammable Limits: LOWER: 8% UPPER: 10.5%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/

spray. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 50 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m3) from ACGIH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 131.39 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 86.7°C (188.1°F)

Melting Point: -87.1°C (-124.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.4649 (Water = 1)

Vapor Pressure: 58 mm of Hg (@ 20°C)

Vapor Density: 4.53 (Air = 1)

Volatility: Not available.

Odor Threshold: 20 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:
Easily soluble in methanol, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity:
Extremely corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human. Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Trichloroethylene : UN1710 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Trichloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:54 PM

Last Updated: 11/01/2010 12:00 PM

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Material Safety Data Sheet

Version 4.0
Revision Date 03/12/2010
Print Date 11/10/2011

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	4,4'-DDD PESTANAL,250 MG (2,2-BIS(4-CHL&
Product Number	:	35486
Brand	:	Fluka
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane
4,4′-DDD
TDE

Formula : $C_{14}H_{10}Cl_4$
Molecular Weight : 320.04 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane			
72-54-8	200-783-0	-	-

4. 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
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

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.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

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).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid

Safety data

pH	no data available
Melting point	94.0 - 96.0 °C (201.2 - 204.8 °F)
Boiling point	193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg)
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F)
Density	1.38 g/cm3
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.02

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - Hamster - > 5,000 mg/kg

TDLo Oral - Human - 428.5 mg/kg
Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg
Remarks: Cardiac:Other changes. Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli.

TDLo Oral - rat - 14 mg/kg
Remarks: Liver:Changes in liver weight. Endocrine:Estrogenic. Musculoskeletal:Other changes.

TDLo Oral - rat - 2,100 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex).

LD50 Dermal - rabbit - 1,200 mg/kg
Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

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

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	Harmful if absorbed through skin. May cause skin irritation.

Eyes May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: KI0700000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - other fish - 1.18 - 9 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
Indication of bioaccumulation.

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. 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: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Marine pollutant: No

IATA
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

	CAS-No.
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: 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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	

New Jersey Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. 2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	

16. OTHER INFORMATION

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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Version 4.1
Revision Date 02/02/2011
Print Date 11/10/2011

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene

Product Number : 35487
Brand : Fluka
Product Use : For laboratory research purposes.

Supplier : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Manufacturer : Sigma-Aldrich Corporation
3050 Spruce St.
St. Louis, Missouri 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Harmful by ingestion.

GHS Classification
Acute toxicity, Oral (Category 4)
Carcinogenicity (Category 2)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 4)

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.
H351 Suspected of causing cancer.
H400 Very toxic to aquatic life.
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.

HMIS Classification
Health hazard: 1
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 1

Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin Harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{14}H_8Cl_4$
Molecular Weight : 318.03 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene			
72-55-9	200-784-6	-	-

4. 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.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

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.

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.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

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).

Hand 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.

Eye 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 and 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.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid
Colour	no data available

Safety data

pH	no data available
Melting/freezing point	88.0 - 90.0 °C (190.4 - 194.0 °F)
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg)
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.51
Relative vapour density	no data available

Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents, Strong bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 880.0 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

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

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 0.2 - 0.3 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.03 - 0.04 mg/l - 96.0 h
	LC50 - Salmo salar (Atlantic salmon) - 0.05 - 0.18 mg/l - 96.0 h

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation	Gambusia affinis (Mosquito fish) - 33 d Bioconcentration factor (BCF): 12,037

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

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. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)
Reportable Quantity (RQ): 1 lbs
Marine pollutant:
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. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)
Marine pollutant: Marine pollutant

IATA
UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)

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

OSHA Hazards
Carcinogen, Harmful by ingestion.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: 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
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	

New Jersey Right To Know Components

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. 2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	CAS-No. 72-55-9	Revision Date

16. OTHER INFORMATION

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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

4,4'-DDT

sc-238975

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
4,4'-DDT

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA


SUPPLIER
Company: Santa Cruz Biotechnology, Inc.
Address:
2145 Delaware Ave
Santa Cruz, CA 95060
Telephone: 800.457.3801 or 831.457.3800
Emergency Tel: CHEMWATCH: From within the US and Canada: 877-715-9305
Emergency Tel: From outside the US and Canada: +800 2436 2255 (1-800-CHEMCALL) or call +613 9573 3112

PRODUCT USE
Insecticide for tobacco and cotton, pesticide (tussock moth). Intermediate

SYNONYMS
C14-H9-Cl5, "1, 1' -(2, 2, 2-trichloroethylidene) bis [4-chlorobenzene]", "1, 1' -(2, 2, 2-trichloroethylidene) bis [4-chlorobenzene]", "1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)ethane", "1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)ethane", "ethane, 1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)", "ethane, 1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)", "benzene, 1, 1' -(, 2, 2-trichloroethylidene)bis(4-chloro)-", "benzene, 1, 1' -(, 2, 2-trichloroethylidene)bis(4-chloro)-", "alpha, alpha-bis(p-chlorophenyl)-beta, beta, beta-trichloroethane", "1, 1-bis-(p-chlorophenyl)-2, 2, 2-trichloroethane", "1, 1-bis-(p-chlorophenyl)-2, 2, 2-trichloroethane", "2, 2-bis(p-chlorophenyl)-1, 1, 1-trichloroethane", "2, 2-bis(p-chlorophenyl)-1, 1, 1-trichloroethane", "p, p' -DDT", "p, p' -DDT", "diphenyl trichloroethane", dichlorodiphenyltrichloroethane, "p, p-dichlorodiphenyltrichloroethane", "p, p-dichlorodiphenyltrichloroethane", "4, 4' -dichlorodiphenyltrichloroethane", "4, 4' -dichlorodiphenyltrichloroethane", Agritan, Anofex, Arkotine, Azotox, "Bosan supra", Bovidermal, Chlorophenothane, Chlorophenotoxum, Citox, Clofenotane, Dedelo, Deoval, Ditoxan, Dibovan, Dicophane, Didigam, Didimac, Dodat, Dykol, Estonate, Genitox, Gesafid, Gesapon, Gesarex, Gesarol, Guesapon, Guesarol, Gyron, Havero-extra, Hildit, Ivoran, Ixodex, Kopsal, Mutoxin, Neocid, OMS-16, Parachlorodicum, Peb1, Pentachlorin, Zeidane, Zerdane, insecticide

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS


EMERGENCY OVERVIEW
RISK
Limited evidence of a carcinogenic effect.

Toxic: danger of serious damage to health by prolonged exposure if swallowed.
Toxic in contact with skin and if swallowed.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
■ Organochlorine pesticides excite the central nervous system, causing shortness of breath, cough, narrowing of airways and throat spasms. In the muscles it can cause twitches, spastic movements and seizures. Headache, dizziness and confusion may result as well as a feeling of warmth. Other symptoms include nausea, vomiting, diarrhea and difficulty in urination. There may be alterations in blood pressure or irregularities in heart rhythm. Delayed poisoning may occur after 30 minutes to several hours. Symptoms may include diarrhea, stomach pain, headache, dizziness, inco-ordination, "pins and needles", restlessness, irritability, confusion and tremors, progressing to stupor, coma and epilepsy-like or spastic seizures with frothing at the mouth, a contorted face, violent convulsions and limb stiffness. Tremors may spread from the face to the torso and limbs. Severe poisoning may cause continuous convulsion, fever, unconsciousness, labored breathing, rapid heartbeat and general depression; this is followed by lack of oxygen, collapse of breathing, and death. Kidney damage and inflammation and anemia has also been reported.
■ Earliest symptom of exposure to DDT is a prickling or tingling sensation in the mouth, tongue and lower face. This is followed by dizziness, abdominal pain, headache, nausea, vomiting, diarrhoea, mental confusion, a sense of apprehension, weakness, loss of muscle control and tremors. Higher exposures can cause severe convulsions followed by death.
Symptoms may occur within 30 minutes to 6 hours after exposure, depending upon the severity of the exposure. DDT and its analogues may cause gastrointestinal effects.

EYE

■ Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

SKIN

■ Skin contact with the material may produce toxic effects; systemic effectsmay result following absorption.
■ The material is not thought to be a skin irritant (as classified using animal models). Abrasive damage however, may result from prolonged exposures. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
■ Open cuts, abraded or irritated skin should not be exposed to this material.
■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
■ Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

CHRONIC HEALTH EFFECTS

■ There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.
There is some evidence to provide a presumption that human exposure to the material may result in impaired fertility on the basis of: some evidence in animal studies of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects but which is not a secondary non-specific consequence of other toxic effects.
The following chronic health effects can occur some time after exposure to DDT and can last for months or years. There is some evidence that it causes cancer in humans and it has been shown to cause liver cancer in animals.
DDT may damage the liver and kidneys, damage the developing fetus and decrease fertility in males and females, and cause central nervous system degeneration.
High doses of o,p'-DDT fed to immature female rats exert clear oestrogenic effects. Males fed 1 ppm o,p'-DDT from birth had significantly heavier bodies, testes and seminal vesicles at day 112. In a another study adult male rats treated with o,p'-DDT showed decreased corticosterone formed from progesterone in the adrenals and lowered unchanged progesterone. In brain metabolism, treatment with o,p'-DDT increased dihydrotestosterone from testosterone while androstenediol decreased. The authors concluded that the effects of o,p'-DDT administration are a decrease in plasma testosterone and in androgen biosynthesis, and an increase in plasma oestradiol.
Exposure to organochlorine pesticides for long periods can cause multiple nervous system infections and disorders involving the brain and autonomic nerves with headache, dizziness, "pins and needles", tremor in the limbs, disturbances in nerves supplying blood vessels, pain in the bowel and stiffening of the bile duct, rapid heartbeat, hollow heart sounds and a tight pain in the chest. There can be blood problems with loss of platelets and white blood cells, change in blood cell distribution, anemia, loss of appetite and weight. There may be disturbed behavior. Some organochlorines may have female sex hormone-like effects, causing withering of the testicles, reduced fertility and disturbed sexual activity.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

		Min	Max
Flammability:	1		

Toxicity:	3	
Body Contact:	3	
Reactivity:	1	
Chronic:	3	

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

NAME	CAS RN	%
DDT	50-29-3	>99
(dichlorodiphenyltrichloroethane)		

Section 4 - FIRST AID MEASURES

SWALLOWED

■
- Give a slurry of activated charcoal in water to drink. NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK.
- At least 3 tablespoons in a glass of water should be given.
- Although induction of vomiting may be recommended (IN CONSCIOUS PERSONS ONLY), such a first aid measure is dissuaded because to the risk of aspiration of stomach contents. (i) It is better to take the patient to a doctor who can decide on the necessity and method of emptying the stomach. (ii) Special circumstances may however exist; these include non- availability of charcoal and the ready availability of the doctor.

NOTE: If vomiting is induced, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear protective gloves when inducing vomiting.
- REFER FOR MEDICAL ATTENTION WITHOUT DELAY.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

(ICSC20305/20307).

EYE

■ If this product comes in contact with the eyes:
- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

■ If skin or hair contact occurs:
- Quickly but gently, wipe material off skin with a dry, clean cloth.
- Immediately remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
- Transport to hospital, or doctor.

INHALED

■
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

■ Organochlorines are well absorbed from the lungs, gastrointestinal tract and skin.
- Intoxication from acute oral exposures generally begins within 45 minutes to several hours.
- Diazepam is the anticonvulsant of choice. [Phenobarbitone, sodium phenobarbitone or in repeated convulsions sodium pentothal (2.5% solution) may also be given - calcium gluconate may also be helpful] (Manufacturers; David Gray and Hoechst)
- Usual methods of decontamination (Ipecac / lavage / charcoal / cathartics) are recommended within the first several hours following exposure.
- Dialysis, diuresis and hemoperfusion are ineffective because of extensive tissue binding and large volumes of distribution.
- There is no antidote.

[Ellenhorn and Barceloux: Medical Toxicology].

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not applicable
Upper Explosive Limit (%):	Not Available
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not Available

EXTINGUISHING MEDIA

■

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING

■

- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

■

- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO_2), hydrogen chloride, phosgene, other pyrolysis products typical of burning organic material.
May emit poisonous fumes.

FIRE INCOMPATIBILITY

■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:
Chemical goggles.
Gloves:
Respirator:
Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

■

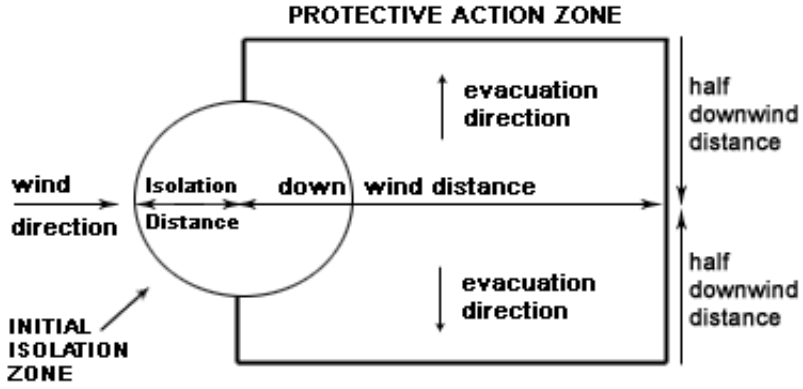
- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

MAJOR SPILLS

■

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)	
Isolation Distance	25 meters
Downwind Protection Distance	250 meters

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
5 Guide 151 is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

■

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS

■

- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):
- Removable head packaging;
- Cans with friction closures and
- low pressure tubes and cartridges may be used.

- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages * . - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage *. - * unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.

STORAGE REQUIREMENTS

■
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

X X + X X +

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US - California Permissible Exposure Limits for Chemical Contaminants	DDT (DDT; 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane)		1						
Canada - Ontario Occupational Exposure Limits	DDT (1,1,1-Trichloro-2,2-bis-(p-chlorophenyl)ethane)		1						
US - Minnesota Permissible Exposure Limits (PELs)	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Idaho - Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	DDT (Dichlorodiphenyltri-chloroethane (DDT))		1						
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	DDT (Dichlorodiphenyltri-chloroethane (DDT))		1						
US - Alaska Limits for Air Contaminants	DDT (Dichlorodiphenyl-trichloroethane (DDT))		1						
US - Michigan Exposure Limits for Air Contaminants	DDT (Dichlorodiphenyltri-chloroethane(DDT))		1						
US - Hawaii Air Contaminant Limits	DDT (DDT (Dichlorodiphenyl-trichloroethane))		1		3				
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	DDT (DDT (Dichlorodiphenyl-trichloroethane))	-	1	-	3				
US - Washington Permissible exposure limits of air contaminants	DDT (DDT (Dichlorodiphenyltri-chloroethane))		1		3				
Canada - Northwest Territories									

Canada - Northwest Territories Occupational Exposure Limits (English)	DDT (DDT (Dichlorodiphenyltrichloroethane))	1	3	
US ACGIH Threshold Limit Values (TLV)	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
US NIOSH Recommended Exposure Limits (RELs)	DDT	0.5		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	DDT (Dichlorodiphenyltrichloroethane (DDT))	1		
Canada - Nova Scotia Occupational Exposure Limits	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
Canada - Prince Edward Island Occupational Exposure Limits	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	DDT (Diesel fuel as total hydrocarbons, (vapour))	100	150	Skin
Canada - Alberta Occupational Exposure Limits	DDT (Diesel fuel, as total hydrocarbons)	100		
Canada - Alberta Occupational Exposure Limits	DDT (Kerosene/Jet fuels, as total hydrocarbon vapour)	200		
Canada - Alberta Occupational Exposure Limits	DDT (DDT (Dichlorodiphenyl trichloroethane))	1		
Canada - British Columbia Occupational Exposure Limits	DDT (DDT (Dichloro-diphenyltrichloroethane))	1		2B
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	DDT (DDT (Dichlorodiphenyltrichloro-ethane))	1	3	T20
US - Oregon Permissible Exposure Limits (Z1)	DDT (Dichlorodiphenyltrichloroethane (DDT))	1		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	DDT (DDT (Dichlorodiphenyltrichloroethane))	1		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	DDT (Dichlorodiphenyltri-chloroethane (DDT))	1		
Canada - British Columbia Occupational Exposure Limits	DDT (Diesel fuel, as total hydrocarbons, Inhalable)	100 (V)		Skin

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
DDT	500	

MATERIAL DATA

DDT:

■ for DDT:

The TLV-TWA is thought to provide a wide margin of safety in the prevention of acute poisoning and also is thought to be protective against the significant risk of accumulation in body stores.

Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

PERSONAL PROTECTION




Consult your EHS staff for recommendations

EYE

■
- Safety glasses with side shields
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.
Wear safety footwear or safety gumboots, eg. Rubber.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

OTHER

■
- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.

■
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

RESPIRATOR

■

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x PEL	P1	-	PAPR-P1
	Air-line*	-	-
50 x PEL	Air-line**	P2	PAPR-P2
100 x PEL	-	P3	-
		Air-line*	-
100+ x PEL	-	Air-line**	PAPR-P3

* - Negative pressure demand ** - Continuous flow
Explanation of Respirator Codes:
Class 1 low to medium absorption capacity filters.
Class 2 medium absorption capacity filters.
Class 3 high absorption capacity filters.
PAPR Powered Air Purifying Respirator (positive pressure) cartridge.
Type A for use against certain organic gases and vapors.
Type AX for use against low boiling point organic compounds (less than 65ºC).
Type B for use against certain inorganic gases and other acid gases and vapors.
Type E for use against sulfur dioxide and other acid gases and vapors.
Type K for use against ammonia and organic ammonia derivatives
Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.
Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.
Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

■
- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;
(b): filter respirators with absorption cartridge or canister of the right type;
(c): fresh-air hoods or masks
- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.

- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.
Does not mix with water.

State	Divided solid	Molecular Weight	354.48
Melting Range (°F)	227.3	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Immiscible
Flash Point (°F)	Not Available	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not applicable
Upper Explosive Limit (%)	Not Available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not Available	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Not applicable	Evaporation Rate	Not applicable
Gas group	IIA		

APPEARANCE

Colourless crystals or white to slightly off-white powder. Odourless or with slight aromatic odour. Insoluble in water; soluble in acetone, benzene, carbon tetrachloride, ether, kerosene, dioxane and pyridine. Since DDT is not biodegradable and is ecologically damaging, its agricultural use in the USA was prohibited in 1973.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

■

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

■

- Avoid strong bases.

Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

DDT

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 87 mg/kg	Nil Reported

Oral (human infant) LDLo: 150 mg/kg
Oral (man) TDLo: 6 mg/kg
Oral (human) TDLo: 16 mg/kg
Oral (human) LDLo: 500 mg/kg
Oral (human) TDLo: 5 mg/kg
Dermal (rat) LD50: 1931 mg/kg
Dermal (rabbit) LD50: 300 mg/kg

■ For DDT:

DDT is moderately to slightly toxic to studied mammalian species via the oral route. Toxicity will vary according to formulation . DDT is readily absorbed through the gastrointestinal tract, with increased absorption in the presence of fats .

One-time administration of DDT to rats at doses of 50 mg/kg led to decreased thyroid function and a single dose of 150 mg/kg led to increased blood levels of liver-produced enzymes and changes in the cellular chemistry in the central nervous system of monkeys. Single doses of 50-160 mg/kg produced tremors in rats, and single doses of 160 mg/kg produced hind leg paralysis in guinea pigs. Mice suffered convulsions following a one-time oral dose of 200 mg/kg. Single administrations of low doses to developing 10- day old mice are reported to have caused subtle effects on their neurological development .

DDT is slightly to practically non-toxic to test animals via the dermal route. It is not readily absorbed through the skin unless it is in solution.

It is thought that inhalation exposure to DDT will not result in significant absorption through the lung alveoli (tiny gas-exchange sacs) but rather that it is probably trapped in mucous secretions and swallowed by exposed individuals following the tracheo-bronchial clearance of secretions by the cilia.

Acute effects likely in humans due to low to moderate exposure may include nausea, diarrhoea, increased liver enzyme activity, irritation (of the eyes, nose or throat), disturbed gait, malaise and excitability; at higher doses, tremors and convulsions are possible. While adults appear to tolerate moderate to high ingested doses of up to 280 mg/kg, a case of fatal poisoning was seen in a child who ingested one ounce of a 5% DDT:kerosene solution.

Chronic toxicity: DDT has caused chronic effects on the nervous system, liver, kidneys,and immune systems in experimental animals. Effects on the nervous system observed in test animals include: tremors in rats at doses of 16-32 mg/kg/day over 26 weeks; tremors in mice at doses of 6.5-13mg/kg/day over 80-140 weeks; changes in cellular chemistry in the central nervous system of monkeys at doses of 10 mg/kg/day over 100 days, and loss of equilibrium in monkeys at doses of 50 mg/kg/day for up to 6 months.

The main effect on the liver seen in animal studies was localized liver damage. This effect was seen in rats given 3.75 mg/kg/day over 36 weeks, rats exposed to 5 mg/kg/day over 2 years and dogs at doses of 80 mg/kg/day over the course of 39 months. In many cases lower doses produced subtle changes in liver cell physiology, and in some cases higher doses produced more severe effects. In mice doses of 8.33 mg/kg/day over 28 days caused increased liver weight and increased liver enzyme activity . Liver enzymes are commonly involved in detoxification of foreign compounds, so it is unclear whether increased liver enzyme activity in itself would constitute an adverse effect. In some species (monkeys and hamsters), doses as high as 8-20 mg/kg/day caused no observed adverse effects over exposure periods as long as 3.5-7 years .

Kidney effects observed in animal studies include adrenal gland hemorrhage in dogs at doses of 138.5 mg/kg/day over 10 days and adrenal gland damage at 50 mg/kg day over 150 days in dogs. Kidney damage was also seen in rats at doses of 10 mg/kg/day over 27 months.

Immunological effects observed in test animals include: reduced antibody formation in mice following administration of 13 mg/kg/day for 3-12 weeks and reduced levels of immune cells in rats at doses of 1 mg/kg/day. No immune system effects were observed in mice at doses of 6.5 mg/kg/day for 3-12 weeks.

Dose levels at which effects were observed in test animals are very much higher than those which may be typically encountered by humans. Due to the persistence of DDT and its metabolites in the environment, very low levels may continue to be detected in foodstuffs grown in some areas of prior use. It has been suggested that, depending on patterns of international DDT use and trade, it is possible that dietary exposure levels may actually increase over time. Persons eating fish contaminated with DDT or metabolites may also be exposed via bioaccumulation of the compound in fish.

Even though current dietary levels are quite low, past and current exposures may result in measurable body burdens due to its persistence in the body. More information on the metabolism and storage of DDT and its metabolites in mammalian systems is provided below (Fate in Humans and Animals).

Adverse effects on the liver, kidney and immune system due to DDT exposure have not been demonstrated in humans in any of the studies which have been conducted to date .

Reproductive Effects: There is evidence that DDT causes reproductive effects in test animals. No reproductive effects were observed in rats at doses of 38 mg/kg/day administered at days 15-19 of gestation. In another study in rats, oral doses of 7.5 mg/kg/day for 36 weeks resulted in sterility . In rabbits, doses of 1 mg/kg/day administered on gestation days 4-7 resulted in decreased fetal weights and 10 mg/kg/day on days 7-9 of gestation resulted in increased resorptions. In mice, doses of 1.67 mg/kg/day resulted in decreased embryo implantation and irregularities in the estrus cycle over 28 weeks. It is thought that many of these observed effects may be the result of disruptions in the endocrine (hormonal) system.

Available epidemiological evidence from two studies does not indicate that reproductive effects have occurred in humans as a result of DDT exposure. No associations between maternal blood levels of DDT and miscarriage nor premature rupture of fetal membranes were observed in two separate studies. One study did report a significant association between maternal DDT blood levels and miscarriage, but the presence of other organochlorine chemicals (e.g., PCBs) in maternal blood which may have accounted for the effect make it impossible to attribute the effect to DDT and its metabolites.

Teratogenic Effects: There is evidence that DDT causes teratogenic effects in test animals as well. In mice, maternal doses of 26 mg/kg/day DDT from gestation through lactation resulted in impaired learning performance in maze tests. In a two-generational study of rats, 10 mg/kg/day resulted in abnormal tail development. Epidemiological evidence regarding the occurrence of teratogenic effects as a result of DDT exposure are unavailable. It seems unlikely that teratogenic effects will occur in humans due to DDT at likely exposure levels.

Mutagenic Effects: The evidence for mutagenicity and genotoxicity is contradictory. In only 1 out of 11 mutagenicity assays in various cell cultures and organisms did DDT show positive results . Results of in vitro and in vivo genotoxicity assays for chromosomal aberrations indicated that DDT was genotoxic in 8 out of 12 cases, and weakly genotoxic in 1 case .

In humans, blood cell cultures of men occupationally exposed to DDT showed an increase in chromosomal damage. In a separate study, significant increases in chromosomal damage were reported in workers who had direct and indirect occupational exposure to DDT . Thus it appears that DDT may have the potential to cause genotoxic effects in humans, but does not appear to be strongly mutagenic. It is unclear whether these effects may occur at exposure levels likely to be encountered by most people.

Carcinogenic Effects: The evidence regarding the carcinogenicity of DDT is equivocal. It has been shown to cause increased tumor production (mainly in the liver and lung) in test animals such as rats, mice and hamsters in some studies but not in others. In rats, liver tumors were induced in three separate studies at doses of 12.5 mg/kg/day over periods of 78 weeks to life, and thyroid tumors were induced at doses of 85 mg/kg/day over 78 weeks. In mice, lifetime doses of 0.4 mg/kg/day resulted in lung tumors in the second generation and leukemia in the third generation; liver tumors were induced at oral doses of 0.26 mg/kg/day in two separate studies over several generations. In hamsters, significant increases in adrenal gland tumors were

seen at doses of 83 mg/kg/day in females (but not males) , and in males (but not females) at doses of 40 mg/kg/day.
In other studies, however, no carcinogenic activity was observed in rats at doses less than 25 mg/kg/day; no carcinogenic activity was seen in mice with at doses of 3-23 mg/kg/day over an unspecified period, and in other hamster studies there have been no indications of carcinogenic effects.
The available epidemiological evidence regarding DDT's carcinogenicity in humans, when taken as a whole, does not suggest that DDT and its metabolites are carcinogenic in humans at likely dose levels. In several epidemiological studies, no significant associations were seen between DDT exposure and disease, but in one other study, a weak association was observed. In this latter study, which found a significant association between long-term, high DDT exposures and pancreatic cancers in chemical workers, there were questions raised as to the reliability of the medical records of a large proportion of the cancer cases.
Organ Toxicity: Acute human exposure data and animal studies reveal that DDT can affect the nervous system, liver, kidney. Increased tumor production in the liver and lung has been observed in test animals. An association with pancreatic cancer was suggested in humans in one study.
Fate in Humans & Animals: DDT is very slowly transformed in animal systems. Initial degradates in mammalian systems are 1,1-dichloro-2,2-bis(p-dichlorodiphenyl)ethylene (DDE) and 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane (DDD), which are very readily stored in fatty tissues. These compounds in turn are ultimately transformed into bis(dichlorodiphenyl) acetic acid (DDA) via other metabolites at a very slow rate. DDA, or conjugates of DDA, are readily excreted via the urine.
Levels of DDT or metabolites may occur in fatty tissues (e.g. fat cells, the brain, etc.) at levels of up to several hundred times that seen in the blood. DDT or metabolites may also be eliminated via mother's milk by lactating women.
WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.
ADI: 0.002 mg/kg/day
NOEL: 0.25 mg/kg/day

CARCINOGEN

DDT [p,p'-DDT]	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2B
Non-arsenical insecticides (occupational exposures in spraying and application of)	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2A
p,p'-Dichlorodiphenyltrichloroethane (DDT)	US EPA Carcinogens Listing	Carcinogenicity	B2
p,p'-Dichlorodiphenyltrichloroethane (DDT)	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	B2
DDT [Dichlorodiphenyltrichloroethane]	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A3
DDT	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
DDT (TOTAL)	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65-MC
DDT	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65
DDT (TOTAL)	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC
DDT [Dichlorodiphenyltrichloroethane]	US NIOSH Recommended Exposure Limits (RELs) - Carcinogens	Carcinogen	Ca

SKIN

DDT	Canada - Ontario Occupational Exposure Limits - Skin	Notes	Skin
DDT	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	Skin
DDT	Canada - Quebec Permissible Exposure Values for Airborne Contaminants - Skin (French)	Notes	Skin
DDT	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
DDT	US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants - Skin	Skin Designation	X
DDT	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
DDT	US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
DDT	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
DDT	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X
DDT	US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
DDT	ND	Skin Designation	X
DDT	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
DDT	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	X
DDT	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S
DDT	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:
DDT:

■ Daphnia magna EC50 (48hr.) (mg/l):	0.002- 0.00
■ Half- life Soil - High (hours):	1.40E+05
■ Half- life Soil - Low (hours):	17520

■ Half- life Air - High (hours):	177
■ Half- life Air - Low (hours):	17.7
■ Half- life Surface water - High (hours):	8400
■ Half- life Surface water - Low (hours):	168
■ Half- life Ground water - High (hours):	2.70E+05
■ Half- life Ground water - Low (hours):	384
■ Aqueous biodegradation - Aerobic - High (hours):	1.37E+05
■ Aqueous biodegradation - Aerobic - Low (hours):	17520
■ Aqueous biodegradation - Anaerobic - High (hours):	2400
■ Aqueous biodegradation - Anaerobic - Low (hours):	384
■ Aqueous biodegradation - Removal secondary treatment - High (hours):	100%
■ Photolysis maximum light absorption - High (nano- m):	<282
■ Photooxidation half- life water - High (hours):	8400
■ Photooxidation half- life water - Low (hours):	168
■ Photooxidation half- life air - High (hours):	177
■ Photooxidation half- life air - Low (hours):	17.7
■ First order hydrolysis half- life (hours):	1.94E+05

■ Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
■ Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
■ For DDT
log Kow : 6.19
Half-life (hr) air: 170
Half-life (hr) H2O surface water: 5500
Half-life (hr) soil: 17000
BCF : 12000-40000
Environmental fate:
Breakdown in Soil and Groundwater: DDT is very highly persistent in the environment, with a reported half life of between 2-15 years and is immobile in most soils. Routes of loss and degradation include runoff, volatilization, photolysis and biodegradation (aerobic and anaerobic). These processes generally occur only very slowly. Breakdown products in the soil environment are DDE and DDD, which are also highly persistent and have similar chemical and physical properties.
Due to its extremely low solubility in water, DDT will be retained to a greater degree by soils and soil fractions with higher proportions of soil organic matter. It may accumulate in the top soil layer in situations where heavy applications are (or were) made annually; e.g., for apples. Generally DDT is tightly sorbed by soil organic matter, but it (along with its metabolites) has been detected in many locations in soil and groundwater where it may be available to organisms. This is probably due to its high persistence; although it is immobile or only very slightly mobile, over very long periods of time it may be able to eventually leach into groundwater, especially in soils with little soil organic matter.
Residues at the surface of the soil are much more likely to be broken down or otherwise dissipated than those below several inches. Studies in Arizona have shown that volatilization losses may be significant and rapid in soils with very low organic matter content (desert soils) and high irradiance of sunlight, with volatilization losses reported as high as 50% in 5 months . In other soils (Hood River and Medford) this rate may be as low as 17- 18% over 5 years . Volatilisation loss will vary with the amount of DDT applied, proportion of soil organic matter, proximity to soil-air interface and the amount of sunlight .
Breakdown of Chemical in Surface Water: DDT may reach surface waters primarily by runoff, atmospheric transport, drift, or by direct application (e.g. to control mosquito-borne malaria). The reported half-life for DDT in the water environment is 56 days in lake water and approximately 28 days in river water . The main pathways for loss are volatilization, photodegradation, adsorption to water-borne particulates and sedimentation. Aquatic organisms, as noted above, also readily take up and store DDT and its metabolites. Field and laboratory studies in the United Kingdom demonstrated that very little breakdown of DDT occurred in estuary sediments over the course of 46 days .
Breakdown of Chemical in Vegetation: DDT does not appear to be taken up or stored by plants to a great extent. It was not translocated into alfalfa or soybean plants, and only trace amounts of DDT or its metabolites were observed in carrots, radishes and turnips all grown in DDT-treated soils . Some accumulation was reported in grain, maize and rice-plants, but little translocation occurred and residues were located primarily in the roots
Ecotoxicity:
Effects on Birds:
Bird dietary LD50: mallard duck 2240 mg/kg, Japanese quail 841 mg/kg, pheasant 1334 mg/kg
Reported dietary LD50s in such species as bobwhite quail, California quail, red-winged blackbird, cardinal, house sparrow, blue jay, sandhill crane and clapper rail also indicate slight toxicity both in acute 5-day trials and over longer periods of up to 100 days In birds, exposure to DDT occurs mainly through the food web through predation on aquatic and/or terrestrial species having body burdens of DDT, such as fish, earthworms and other birds .
There has been much concern over chronic exposure of bird species to DDT and effects on reproduction, especially eggshell thinning and embryo deaths . The mechanisms of eggshell thinning are not fully understood. It is thought that this may occur from the major metabolite, DDE, and that predator species of birds are the most sensitive to these effects . Laboratory studies on bird reproduction have demonstrated the potential of DDT and DDE to cause subtle effects on courtship behavior, delays in pairing and egg laying and decreases in egg weight in ring doves and Bengalese finches . The implications of these for long-term survival and reproduction of wild bird species is unclear.
There is evidence that synergism may be possible between DDT's metabolites and organophosphate (cholinesterase-inhibiting) pesticides to produce greater toxicity to the nervous system and higher mortality Aroclor (polychlorinated biphenyls, or PCBs) may result in additive effects on eggshell thinning .
Effects on Aquatic Species
Fish LC50 (96 h): coho salmon 4 ug/l, rainbow trout 8.7 ug/l, northern pike 2.7 ug/l, black bullhead 4.8 ug/l, bluegill sunfish 8.6 ug/l, largemouth bass 1.5 ug/l, walleye 2.9 ug/l, fathead minnow 21.5 ug/l, channel catfish 12.2 ug/l, largemouth bass 1.5 ug/l, guppy 56 ug/l
DDT is very highly toxic to many aquatic invertebrate species. Reported 96-hour LC50s in various aquatic invertebrates (e.g., stoneflies, midges, crayfish, sow bugs) range from 0.18 ug/L to 7.0 ug/L, and 48-hour LC50s are 4.7 ug/L for daphnids and 15 ug/L for sea shrimp . Other reported 96-hour LC50s for various aquatic invertebrate species are from 1.8 ug/L to 54 ug/L . Early developmental stages are more susceptible than adults to DDT's effects . The reversibility of some effects, as well as the

development of some resistance, may be possible in some aquatic invertebrates .
DDT is very highly toxic to fish species as well. . Observed toxicity in coho and chinook salmon was greater in smaller fish than in larger . It is reported that DDT levels of 1 ng/L were sufficient to affect the hatching of coho salmon eggs DDT may be moderately toxic to some amphibian species and larval stages are probably more susceptible than adults
In addition to acute toxic effects, DDT may bioaccumulate significantly in fish and other aquatic species, leading to long-term exposure. This occurs mainly through uptake from sediment and water into aquatic flora and fauna, and also fish . Fish uptake of DDT from the water will be size-dependent with smaller fish taking up relatively more than larger fish . A half- time for elimination of DDT from rainbow trout was estimated to be 160 days .
The reported bioconcentration factor for DDT is 1,000 to 1,000,000 in various aquatic species, and bioaccumulation may occur in some species at very low environmental concentrations . Bioaccumulation may also result in exposure to species which prey on fish or other aquatic organisms (e.g., birds of prey).
Effects on Other Animals (Nontarget species)
Earthworms are not susceptible to acute effects of DDT and its metabolites at levels higher than those likely to be found in the environment, but they may serve as an exposure source to species that feed on them. DDT is non-toxic to bees; the reported topical LD50 for DDT in honeybees is 27 ug/bee . Laboratory studies indicate that bats may be affected by DDT released from stored body fat during long migratory periods.
■ Outbreaks of poisoning from food contaminated with organochlorines are characterized by headache, nausea, vomiting, restlessness, irritability, vertigo, muscle twitching, confusion, stupor, coma and convulsions.
The organochlorine pesticides are highly soluble in lipids and most organic solvents but have low water solubilities and low vapor pressure.
Adsorption in various soils depends strongly on the presence of soil organic matter. Once adsorbed they do not readily desorb. Such compounds do not as a consequence leach or diffuse in soils and transport to the hydrosphere from contaminated soils will be largely as a result of the erosion of soil particles or sediments, rather than by desorption and dissolution.
When organochlorines are poorly adsorbed, as in sandy soils, vaporization losses are significant. Volatilization from water or soil may also occur.
The actual evaporation rate depends on factors such as temperature, soil properties, soil water content and other physicochemical properties such as water solubility and degree of adsorption. The importance of soil moisture in volatilization led to the use of the term "co-distillation".
The effect observed in soil however is more accurately described as displacement of the sorbed pesticides by water molecules. As a result compounds which otherwise possess low water solubility are quite volatile from water.
Degradation of the organochlorines is slow compared to other classes of insecticide and in soil and water is due mainly to the action of micro- organisms. Pathways include dechlorination and dehydrochlorination. Oxidation is only moderately important. Epoxidations and rearrangements are common amongst the cyclodiene pesticides. These rearrangement reactions produce complicated "cage-like" structures that are toxic.
Bioaccumulation of the some organochlorines (notably DDT and dieldrin) are higher in aquatic ecosystems than in terrestrial ecosystems. Physicochemical properties such as high lipid solubility, low water solubility and chemical stability are the most significant factors behind such bioaccumulation.
The effects of bioaccumulation are manifest at the top of the food chain where, for example, predatory fish and birds, suffer from acute and chronic toxicity and reproductive failures. Effects may range from obvious toxicity to subtle behavioral changes. Evidence exists that the population effects are reversible with time.
■ DO NOT discharge into sewer or waterways.
■ The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l
* Classification of Substances as Ecotoxic (Dangerous to the Environment)
Appendix 8, Table 1
Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
DDT	HIGH	HIGH	HIGH	LOW

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

B. Component Waste Numbers
When DDT is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U061 (waste code T).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
¦ Puncture containers to prevent re-use and bury at an authorized landfill.
Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

DOT:

Symbols:	None	Hazard class or Division:	6.1
Identification Numbers:	UN2761	PG:	III
Label Codes:	6.1	Special provisions:	IB8, IP3, T1, TP33
Packaging: Exceptions:	153	Packaging: Non-bulk:	213
Packaging: Exceptions:	153	Quantity limitations: Passenger aircraft/rail:	100 kg
Quantity Limitations: Cargo aircraft only:	200 kg	Vessel stowage: Location:	A
Vessel stowage: Other:	40	S.M.P.:	Severe

Hazardous materials descriptions and proper shipping names: Organochlorine pesticides, solid, toxic

Air Transport IATA:

ICAO/IATA Class:	6.1	ICAO/IATA Subrisk:	None
UN/ID Number:	2761	Packing Group:	III
Special provisions:	A3		

Shipping Name: ORGANOCHLORINE PESTICIDE, SOLID, TOXIC *(CONTAINS DDT)

Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	None
UN Number:	2761	Packing Group:	III
EMS Number:	F-A,S-A	Special provisions:	61 223 274 944
Limited Quantities:	5 kg		

Shipping Name: ORGANOCHLORINE PESTICIDE, SOLID, TOXIC(contains DDT)

Section 15 - REGULATORY INFORMATION

DDT (CAS: 50-29-3) is found on the following regulatory lists;

"Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","Canada Environmental Protection Act (CEPA) 1999 - Schedule 1 Toxic Substances List","Canada Environmental Protection Act (CEPA) 1999 - Schedule 3 Export Control List - Part 2 Substances Subject to Notification or Consent","Canada Environmental Quality Guidelines (EQGs) Water: Aquatic life","Canada Prohibited Toxic Substances (English)","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","OECD Representative List of High Production Volume (HPV) Chemicals","OSPAR List of Substances of Possible Concern","United Nations List of Prior Informed Consent Chemicals - French","United Nations List of Prior Informed Consent Chemicals - Spanish","United Nations List of Prior Informed Consent Chemicals (English)","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which production, use or other presence must be reported","US - California Environmental Health Standards for the Management of Hazardous Waste - List of Organic Persistent and Bioaccumulative Toxic Substances and Their STLC & TTLC Values","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity","US - California Proposition 65 - Reproductive Toxicity","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Massachusetts Oil & Hazardous Material List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Hazardous Constituents","US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Class A toxic air pollutants: Known and Probable Carcinogens","US - Washington Dangerous waste constituents list","US - Washington Discarded Chemical Products List - ""U"" Chemical Products","US - Washington Permissible exposure limits of air contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)","US CERCLA Priority List of Hazardous Substances","US CERCLA Top 20 Priority List of Hazardous Substances","US CWA (Clean Water Act) - List of Hazardous Substances","US CWA (Clean Water Act) - Priority Pollutants","US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances","US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA Carcinogens Listing","US EPA National Priorities List - Superfund Chemical Data Matrix (SCDM) - Hazard Ranking System - Hazardous Substance Benchmarks","US National Toxicology Program (NTP) 11th Report Part B. Reasonably Anticipated to be a Human Carcinogen","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US RCRA (Resource Conservation & Recovery Act) - Appendix IX to Part 264 Ground-Water Monitoring List 1","US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261","US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Inorganic and Organic Constituents 1","US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes","US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards","US Toxic Substances Control Act (TSCA) - Inventory","US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements","US

TSCA Section 5(a)(2) - Significant New Use Rules (SNURs)","WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Inhalation may produce health damage*.
■ May affect fertility*.
* (limited evidence).

REPRODUCTIVE HEALTH GUIDELINES

■ Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
DDT	0.01 mg/m3	1000	R	3	-

■ These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise. CR = Cancer Risk/10000; UF = Uncertainty factor: TLV believed to be adequate to protect reproductive health: LOD: Limit of detection Toxic endpoints have also been identified as: D = Developmental; R = Reproductive; TC = Transplacental carcinogen Jankovic J., Drake F.: A Screening Method for Occupational Reproductive Health Risk: American Industrial Hygiene Association Journal 57: 641-649 (1996).

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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Monsanto
Material Safety Data

POLYCHLORINATED BIPHENYLS (PCBs)

Emergency Phone No.
(Call Collect)
314-694-1000

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: POLYCHLORINATED BIPHENYLS (PCBs)
Aroclor® Series 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, 1268
Therminol® FR Series

MSDS Number: M00018515 Date: 12/95

Chemical Family: Chlorinated Hydrocarbons
Chemical Name: Polychlorinated biphenyls
Synonyms: PCBs, Chlorodiphenyls, Chlorinated biphenyls

Trade Names/Common Names:

PYRANOL® and INERTEEN® are trade names for commonly used dielectric fluids that may have contained varying amounts of PCBs as well as other components including chlorinated benzenes.

ASKAREL is the generic name for a broad class of fire resistant synthetic chlorinated hydrocarbons and mixtures used as dielectric fluids that commonly contained about 30 - 70% PCBs. Some ASKAREL fluids contained 99% or greater PCBs and some contained no PCBs.

PYDRAUL® is the trade name for hydraulic fluids that, prior to 1972, may have contained varying amounts of PCBs and other components including phosphate esters.

The product names/trade names are representative of several commonly used Monsanto products (or products formulated with Monsanto products). Other trademarked PCB products were marketed by Monsanto and other manufacturers. PCBs were also manufactured and sold by several European and Japanese companies. Contact the manufacturer of the trademarked product, if not in this listing, to determine if the formulation contained PCBs.

In 1972, Monsanto restricted sales of PCBs to applications involving only closed electrical systems, (transformers and capacitors). In 1977, all manufacturing and sales were voluntarily terminated. In 1979, EPA restricted the manufacture, processing, use, and distribution of PCBs to specifically exempted and authorized activities.

MONSANTO COMPANY, 800 N. LINDBERGH BLVD., ST. LOUIS, MO 63167

FOR CHEMICAL EMERGENCY, SPILL, LEAK, FIRE, EXPOSURE, OR ACCIDENT
Call CHEMTREC - Day or Night - 1-800-424-9300 Toll free in the continental U.S., Hawaii, Puerto Rico, Canada, Alaska, or Virgin Islands. For calls originating elsewhere: 202-483-7616 (collect calls accepted)

For additional nonemergency information, call: 314-694-3344.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemically, commercial PCBs are defined as a series of technical mixtures, consisting of many isomers and compounds that vary from mobile, oily liquids to white crystalline solids and hard noncrystalline resins. Technical products vary in composition, in the degree of chlorination, and possibly according to batch.

The mixtures generally used contain an average of 3 atoms of chlorine per molecule (42% chlorine) to 5 atoms of chlorine per module (54% chlorine). They were used as components of dielectric fluids in transformers and capacitors. Prior to 1972, PCB applications included heat transfer media, hydraulic, and other industrial fluids, plasticizers, carbonless copy paper, paints, inks, and adhesives.

Component	CAS No.
chlorinated biphenyl	1336-36-3
Aroclor 1016	12674-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5
Aroclor 1262	37324-23-5
Aroclor 1268	11100-14-4

There are also CAS Numbers for individual PCB congeners and for mixtures of Aroclor® products.

PCBs are identified as hazardous chemicals under criteria of the OSHA Hazard Communication Standard (29 CFR Part 1910.1200). PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Annual Report on Carcinogens (Seventh).

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance and Odor: PCB mixtures range in form and color from clear to amber liquids to white crystalline solids. They have a mild, distinctive odor and are not volatile at room temperature. Refer to Section 9 for details.

WARNING!
CAUSES EYE IRRITATION
MAY CAUSE SKIN IRRITATION

PROCESSING AT ELEVATED TEMPERATURES MAY RELEASE VAPORS OR FUMES WHICH MAY CAUSE RESPIRATORY TRACT IRRITATION

POTENTIAL HEALTH EFFECTS

Likely Routes of Exposure: Skin contact and inhalation of heated vapors

Eye Contact: Causes moderate irritation based on worker experience.

Skin Contact: Prolonged or repeated contact may result in redness, dry skin and defatting based on human experience. A potential exists for developing chloracne. PCBs can be absorbed through intact skin.

Inhalation: Due to the low volatility of PCBs, exposure to this material in ambient conditions is not expected to produce adverse health effects. However, at elevated processing temperatures, PCBs may produce a vapor that may cause respiratory tract irritation if inhaled based on human experience.

Ingestion: No more than slightly toxic based on acute animal toxicity studies. Coughing, choking and shortness of breath may occur if liquid material is accidentally drawn into the lungs during swallowing or vomiting.

Other: Numerous epidemiological studies of humans, both occupationally exposed and nonworker environmentally exposed populations, have not demonstrated any causal relationship between PCB exposure and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs at high dosage can cause skin symptoms; however, these subside upon removal of the exposure source.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

IF IN EYES, immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from skin and clothing.

IF ON SKIN, immediately flush the area with plenty of water. Wash skin gently with soap as soon as it is available. Get medical attention if irritation persists.

IF INHALED, remove person to fresh air. If breathing is difficult, get medical attention.

IF SWALLOWED, do NOT induce vomiting. Rinse mouth with water. Get medical attention. Contact a Poison Control Center. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

NOTE TO PHYSICIANS: Hot PCBs may cause thermal burn. If electrical equipment arcs between conductors, PCBs or other chlorinated hydrocarbon dielectric fluids may decompose to produce hydrochloric acid (HCl), a respiratory irritant. If large amounts are swallowed, gastric lavage may be considered.

5. FIRE FIGHTING MEASURES

Flash Point: 284 degrees F (140 degrees C) or higher depending on the chlorination level of the Aroclor product

Fire Point: 349 degrees F (176 degrees C) or higher depending on the chlorination level of the Aroclor product

NOTE: Refer to Section 9 for individual flash points and fire points.

Extinguishing Media: Extinguish fire using agent suitable for surrounding fire. Use dry chemical, foam, carbon dioxide or water spray. Water may be ineffective. Use water spray to keep fire-exposed containers or transformer cool.

PCBs are fire-resistant compounds. They may decompose to form CO, CO2, HCl, phenolics, aldehydes, and other toxic combustion products under severe conditions such as exposure to flame or hot surfaces.

Dielectric fluids having PCBs and chlorinated benzenes as components have been reported to produce polychlorinated dibenzo-p-dioxins (PCDDs) and furans (PCDFs) during fire situations involving electrical equipment. At temperatures in the range of 600-650 degrees C in the presence of excess oxygen, PCBs may form polychlorinated dibenzofurans (PCDFs). Laboratory studies under similar conditions have demonstrated that PCBs do not produce polychlorinated dibenzo-p-dioxins (PCDDs).

Federal regulations require all PCB transformers to be registered with fire response personnel.

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

Fire Fighting Equipment: Fire fighters and others exposed to products of combustion should wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

6. ACCIDENTAL RELEASE MEASURES

Cleanup and disposal of liquid PCBs and other PCB items are strictly regulated by the federal government. The regulations are found at 40 CFR Part 761. Consult these regulations as well as applicable state and local regulations prior to any cleanup or disposal of PCBs, PCB items, or PCB contaminated items.

If PCBs leak or are spilled, the following steps should be taken immediately:

All nonessential personnel should leave the leak or spill area.

The area should be adequately ventilated to prevent the accumulation of vapors.

The spill/leak should be contained. Loss to sewer systems, navigable waterways, and streams should be prevented. Spills/leaks should be removed promptly by means of absorptive material, such as sawdust, vermiculite, dry sand, clay, dirt or other similar materials, or trapped and removed by pumping or other suitable means (traps, drip-pans, trays, etc.).

Personnel entering the spill or leak area should be furnished with appropriate personal protective equipment and clothing as needed. Refer to Section 8 for personal protection equipment and clothing.

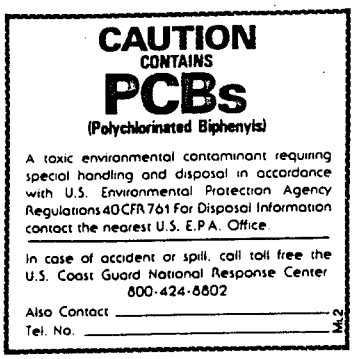
Personnel trained in emergency procedures and protected against attendant hazards should shut off sources of PCBs, clean up spills, control and repair leaks, and fight fires in PCB areas.

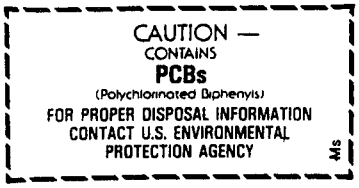
Refer to Section 13 for disposal information and Sections 14 and 15 for information regarding reportable quantity, and Section 7 for marking information.

7. HANDLING AND STORAGE

Care should be taken to prevent entry into the environment through spills, leakage, use vaporization, or disposal of liquid or containers. Avoid prolonged breathing of vapors or mists. Avoid contact with eyes or prolonged contact with skin. If skin contact occurs, remove by washing with soap and water. Following eye contact, flush with water. In case of spillage onto clothing, the clothing should be removed as soon as practical, skin washed, and clothing laundered. Comply with all federal, state, and local regulations.

Federal regulations under the Toxic Substances Control Act require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be marked (check regulations, 40 CFR 761, for details).





Storage: The storage of PCB items or equipment (those containing 50 ppm or greater PCBs) and PCB waste is strictly regulated by 40 CFR Part 761. The storage time is limited, the storage area must meet physical requirements, and the area must be labeled.

Avoid contact with eyes.
Wash thoroughly after handling.
Avoid breathing processing fumes or vapors.
Process using adequate ventilation.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection: Wear chemical splash goggles and have eye baths available where there is significant potential for eye contact.

Skin Protection: Wear appropriate protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine the appropriate type glove for a given application. Wear chemical goggles, face shield, and chemical resistant clothing such as a rubber apron when splashing is likely. Wash immediately if skin is contacted. Remove contaminated clothing promptly and launder before reuse. Clean protective equipment before reuse. Provide a safety shower at any location where skin contact can occur. Wash thoroughly after handling.

ATTENTION! Repeated or prolonged skin contact may cause chloracne in some people.

Respiratory Protection: Avoid breathing vapor, mist, or dust. Use NIOSH/MSHA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended when airborne exposure limits are exceeded and, if used, replaces the need for face shield and/or chemical splash goggles. Consult respirator manufacturer to determine the type of equipment for a given application. The respirator use limitations specified by NIOSH/MSHA or the manufacturer must be observed. High airborne concentrations may require use of self-contained breathing apparatus or supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR Part 1910.134.

ATTENTION! Repeated or prolonged inhalation may cause chloracne in some people.

Ventilation: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of vapor or mist, such as open process equipment.

Airborne Exposure Limits:

Product: Chlorodiphenyl (42% chlorine)

OSHA PEL: 1 mg/m^3 8-hour time-weighted average - Skin*
ACGIH TLV: 1 mg/m^3 8-hour time-weighted average - Skin*

Product: Chlorodiphenyl (54% chlorine)

OSHA PEL: 0.5 mg/m^3 8-hour time-weighted average - Skin*
ACGIH TLV: 0.5 mg/m^3 8-hour time-weighted average - Skin*

*For Skin notation see Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Government Industrial Hygienists, 1995-1996.

9. PHYSICAL AND CHEMICAL PROPERTIES

PROPERTIES OF SELECTED AROCLORS*							
PROPERTY	**1016**	**1221**	**1232**	**1242**	**1248**	**1254**	**1260**
Color (APHA)	40	100	100	100	100	100	150
Physical state	mobile oil	mobile oil	mobile oil	mobile oil	mobile oil	viscous liquid	sticky resin
Stability	inert	inert	inert	inert	inert	inert	inert
Density (lb/gal 25°C)	11.40	9.85	10.55	11.50	12.04	12.82	13.50
Specific gravity x/15.5°C	1.36-1.37 x-25°	1.18-1.19 x-25°	1.27-1.28 x-25°	1.30-1.39 x-25°	1.40-1.41 x-65°	1.49-1.50 x-65°	1.55-1.56 x-90°
Distillation range (°C)	323-356	275-320	290-325	325-366	340-375	365-390	385-420
Acidity mg KOH/g, maximum	.010	.014	.014	.015	.010	.010	.014
Fire point (°C)	none to boiling point	176	238	none to boiling point	none to boiling point	none to boiling point	none to boiling point
Flash point (°C)	170	141-150	152-154	176-180	193-196	none	none
Vapor pressure (mm Hg @ 100°F)	NA	NA	0.005	0.001	0.00037	0.00006	NA
Viscosity (Saybolt Univ. Sec. @ 100°F) (centistokes)	71-81 13-16	38-41 3.6-4.6	44-51 5.5-7.7	82-92 16-19	185-240 42-52	1800-2500 390-540	— —

NA—*Not Available*

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Stability: PCBs are very stable, fire-resistant compounds.
Materials to Avoid: None
Hazardous Decomposition
Products: PCBs may decompose to form CO, CO_2, HCl, phenolics, aldehydes, and other toxic combustion products under severe conditions such as exposure to flame or hot surface.
Hazardous Polymerization: Does not occur.

11. TOXICOLOGICAL INFORMATION

Data from laboratory studies conducted by Monsanto and from the available scientific literature are summarized below.
Single exposure (acute) studies indicate:
Oral - Slightly Toxic (Rat LD50 - 8.65 g/kg for 42% chlorinated; 11.9 g/kg for 54% chlorinated)

The liquid products and their vapors are moderately irritating to eye tissues. Animal experiments of varying duration and at different air concentrations show that for similar exposure conditions, the 54% chlorinated material produces more liver injury than the 42% chlorinated material.

There are literature reports that PCBs can impair reproductive functions in monkeys. The National Cancer Institute (NCI) performed a study in 1977 using Aroclor 1254 with both sexes of rats. NCI stated that the PCB, Aroclor 1254, was not carcinogenic under the conditions of their bioassay. There is sufficient evidence in the scientific literature to conclude that Aroclor 1260 can cause liver cancer when fed to rodents at high doses. Similar experiments with less chlorinated PCB products have produced negative or equivocal results.

The consistent finding in animal studies is that PCBs produce liver injury following prolonged and repeated exposure by any route, if the exposure is of sufficient degree and duration. Liver injury is produced first, and by exposures that are less than those reported to cause cancer in rodents. Therefore, exposure by all routes should be kept sufficiently low to prevent liver injury.

Numerous epidemiological studies of humans, both occupationally exposed and nonworker environmentally exposed population, have not demonstrated any causal relationship between PCB exposure and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs at high dosage can cause skin symptoms; however, these subside upon removal of the exposure source.

PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Seventh Annual Report on Carcinogens.

12. ECOLOGICAL INFORMATION

Care should be taken to prevent entry of PCBs into the environment through spills, leakage, use, vaporization or disposal of liquid or solids. PCBs can accumulate in the environment and can adversely affect some animals and aquatic life. In general, PCBs have low solubility in water, are strongly bound to soils and sediments, and are slowly degraded by natural processes in the environment.

13. DISPOSAL CONSIDERATIONS

The disposal of PCB items or equipment (those containing 50 ppm or greater PCBs) and PCB wastes is strictly regulated by 40 CFR Part 761. For example, all wastes and residues containing PCBs (wiping cloths, absorbent material, used disposable protective gloves and clothing, etc.) should be collected, placed in proper containers, marked and disposed of in the manner prescribed by EPA regulations (40 CFR Part 761) and applicable state and local regulations.

14. TRANSPORT INFORMATION

The data provided in this section are for information only. Please apply the appropriate regulations to properly classify a shipment for transportation.

DOT Classification:	IF WEIGHT OF PCBs TO BE SHIPPED IS OVER ONE POUND, THE FOLLOWING CLASSIFICATION AND LABEL APPLY.	
DOT Label:	LIQUID:	Environmentally Hazardous Substance, liquid, n.o.s. (Contains PCB), 9, UN 3082, III
	SOLID:	Environmentally Hazardous Substance, solid, n.o.s. (Contains PCB), 9, UN 3077, III
DOT Label:	Class: 9	
DOT Reportable Quantity:	One Pound	
IMO Classification:	Polychlorinated Biphenyls, IMO Class 9, UN 2315, II IMO Page 9034, EMS 6.1-02	
IATA/ICAO Classification:	Polychlorinated Biphenyls, 9, UN2315, II	

15. REGULATORY INFORMATION

For regulatory purposes, under the Toxic Substances Control Act, the term "PCBs" refers to a chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such a substance (40 CFR Part 761).

TSCA Inventory: not listed.

Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370): Immediate, Delayed.
SARA Section 313 Toxic Chemical(s): Listed-1993 (De Minimis concentration 0.1%.)

Reportable Quantity (RQ) under DOT (49 CFR) and CERCLA Regulations: 1 lb. (polychlorinated biphenyls) PCBs.

Release of more than 1 (one) pound of PCBs to the environment requires notification to the National Response Center (800-424-8802 or 202-426-2675).

Various state and local regulations may require immediate reporting of PCB spills and may also define spill cleanup levels. Consult your attorney or appropriate regulatory officials for information relating to spill reporting and spill cleanup.

16. OTHER INFORMATION

Reason for revision: Conversion to the 16 section format. Supersedes MSDS dated 10/88.

FOR ADDITIONAL NONEMERGENCY INFORMATION, CONTACT:

Gary W. Mappes
Manager, Product & Environmental Safety

Robert G. Kaley, II
Director, Environmental Affairs

Monsanto Company
800 North Lindbergh Boulevard
St. Louis, MO 63167
(314) 694-3344

Material Safety Data Sheet

Version 4.2
Revision Date 10/29/2012
Print Date 02/25/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Barium
Product Number	:	237094
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Water Reactive, Irritant

GHS Classification
Substances, which in contact with water, emit flammable gases (Category 2)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H261	In contact with water releases flammable gases.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

Precautionary statement(s)

P231 + P232	Handle under inert gas. Protect from moisture.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P422	Store contents under inert gas.

HMIS Classification

Health hazard:	2
Flammability:	3
Physical hazards:	1

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	1
Special hazard.:	W

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula	:	Ba
Molecular Weight	:	137.33 g/mol

Component		Concentration
Barium		
CAS-No.	7440-39-3	-
EC-No.	231-149-1	

4. 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
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Suitable extinguishing media
Dry powder Carbon dioxide (CO2)

Extinguishing media which shall not be used for safety reasons
Water

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Barium oxide

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Barium	7440-39-3	TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye, skin, & Gastrointestinal irritation Muscular stimulation Not classifiable as a human carcinogen			

Personal protective equipment

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).

Hand 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.

Eye 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 and body protection
impervious clothing, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	Rods
Colour	grey

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 725 °C (1,337 °F) - lit.
Boiling point	1,640 °C (2,984 °F) - lit.
Flash point	not applicable
Ignition temperature	no data available

Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	3.6 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Reacts violently with water.

Conditions to avoid
Exposure to moisture.

Materials to avoid
Oxidizing agents, Water, acids, Oxygen, Chlorinated solvents, Carbon dioxide (CO2), Halogens, Halogenated hydrocarbon, Alcohols, Sulphur compounds, Hydrogen sulfide gas

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Barium oxide
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
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:	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

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
Stomach/intestinal disorders, Nausea, Vomiting, Drowsiness, Dizziness, Gastrointestinal disturbance, Weakness, Tremors, Seizures.

Synergistic effects
no data available

Additional Information
RTECS: CQ8370000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 500 mg/l - 96 h
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 500 mg/l - 96 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. 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: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1400 Class: 4.3 Packing group: II EMS-No: F-G, S-O
Proper shipping name: BARIUM
Marine pollutant: No

IATA
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium

15. REGULATORY INFORMATION

OSHA Hazards
Water Reactive, Irritant

SARA 302 Components
SARA 302: 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
Barium	7440-39-3	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

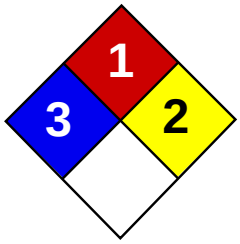
California Prop. 65 Components

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

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.



Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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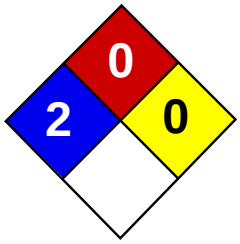

Material Safety Data Sheet
Beryllium AA Standard MSDS

Section 1: Chemical Product and Company Identification

Product Name: Beryllium AA Standard

Catalog Codes: SLB2068

CAS#: Mixture.

RTECS: Not applicable.

TSCA: TSCA 8(b) inventory: Beryllium; Nitric acid, 70%; Water

CI#: Not applicable.

Synonym:

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Beryllium	7440-41-7	0.1
Water	7732-18-5	98.5
Nitric acid, fuming	7697-37-2	1.4

Toxicological Data on Ingredients: Beryllium LD50: Not available. LC50: Not available. Nitric acid, fuming LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Severe over-exposure can result in death.

Potential Chronic Health Effects:
Hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Non-sensitizer for skin. CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Some evidence.) by NTP

[Beryllium]. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of reducing materials, of combustible materials, of organic materials.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Oxidizing material. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Keep away from combustible material.. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Separate from acids, alkalies, reducing agents and combustibles. See NFPA 43A, Code for the Storage of Liquid and Solid Oxidizers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
Beryllium TWA: 0.002 CEIL: 0.02 Nitric acid, fuming TWA: 2 CEIL: 4 TWA: 5 CEIL: 10 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: Not applicable.

Color: Not available.

pH (1% soln/water): Acidic.

Boiling Point: The lowest known value is 82.6 (180.7°F) (Nitric acid, fuming). Weighted average: 99.76°C (211.6°F)

Melting Point: May start to solidify at -41.6°C (-42.9°F) based on data for: Nitric acid, fuming.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1 (Water = 1)

Vapor Pressure: The highest known value is 6 kPa (@ 20°C) (Nitric acid, fuming). Weighted average: 2.35 kPa (@ 20°C)

Vapor Density: The highest known value is 0.62 (Air = 1) (Water).

Volatility: Not available.

Odor Threshold: The highest known value is 0.29 ppm (Nitric acid, fuming)

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Slightly reactive to reactive with reducing agents, combustible materials, organic materials, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Some evidence.) by NTP [Beryllium].

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Corrosive liquid, n.o.s. (Nitric acid, Beryllium Acetate, solution) (Nitric acid, fuming) UNNA: UN1760 PG: II

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Beryllium California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Beryllium Pennsylvania RTK: Beryllium; Nitric acid, 70% Massachusetts RTK: Beryllium; Nitric acid, 70% TSCA 8(b) inventory: Beryllium; Nitric acid, 70%; Water SARA 302/304/311/312 extremely hazardous substances: Nitric acid, 70% SARA 313 toxic chemical notification and release reporting: Beryllium 0.1%; Nitric acid, 70% 2% CERCLA: Hazardous substances.: Beryllium; Nitric acid, 70%;

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS C: Oxidizing material. CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R23- Toxic by inhalation. R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 04:21 PM

Last Updated: 05/21/2013 12:00 PM

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MSDS - COPPER

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1 - PRODUCT IDENTIFICATION

PRODUCT NAME: COPPER
FORMULA: CU
FORMULA WT: 63.55
CAS NO.: 07440-50-8
NIOSH/RTECS NO.: GL5325000
COMMON SYNONYMS: BRONZE POWDER; C.I. 77400; ARWOOD COPPER
PRODUCT CODES: 1732,1736,1720,1714,1728
EFFECTIVE: 06/25/86
REVISION #02

PRECAUTIONARY LABELLING
BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 0 NONE
FLAMMABILITY - 0 NONE
REACTIVITY - 0 NONE
CONTACT - 1 SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

CAUTION
MAY CAUSE IRRITATION
DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

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2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
COPPER	90-100	07440-50-8

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3 - PHYSICAL DATA

BOILING POINT: 2595 C (4703 F)
VAPOR PRESSURE(MM HG): N/A

MELTING POINT: 1083 C (1981 F)
VAPOR DENSITY(AIR=1): N/A

SPECIFIC GRAVITY: 8.92 (H2O=1)
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: REDDISH, LUSTROUS, MALLEABLE METAL.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
  USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

TOXIC GASES PRODUCED
  COPPER FUMES

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 1.0 MG/M3 (PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
  DUST MAY CAUSE SNEEZING AND COUGHING.
  DUST MAY IRRITATE SKIN OR EYES.
  PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
  INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS,
  GASTROINTESTINAL IRRITATION.
  NOTE: PRODUCT IS A SOLID MASS; HOWEVER, WARNINGS ARE BASED ON INHALATION
  DUST, MIST OR FUME EMISSIONS THAT ARE POSSIBLE DURING MANUFACTURING OR
  CHEMICAL REACTIONS.

TARGET ORGANS
  NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
  NONE IDENTIFIED

ROUTES OF ENTRY
  NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES
  INGESTION: IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE
     LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.
  INHALATION: IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE THE EXPOSED
     PERSON TO FRESH AIR. GET MEDICAL ATTENTION.
  EYE CONTACT: IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15
     MINUTES. GET MEDICAL ATTENTION.
  SKIN CONTACT: IMMEDIATELY WASH WITH PLENTY OF SOAP AND WATER FOR AT LEAST
     15 MINUTES.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE

INCOMPATIBLES: STRONG ACIDS, ACTIVE HALOGEN COMPOUNDS, CHLORINE,
FLUORINE, IODINE, BROMINE, AMMONIA

DECOMPOSITION PRODUCTS: COPPER FUMES

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING. CAREFULLY SWEEP UP AND REMOVE.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A DUST/MIST RESPIRATOR IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
EYE/SKIN PROTECTION:	SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	COPPER, HEAVY FOIL
HAZARD CLASS	ORM-E
LABELS	NONE
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	CHEMICALS, N.O.S. (NON-REGULATED)

CALEDON LABORATORY CHEMICALS

MATERIAL SAFETY DATA SHEET

MANGANESE, METAL

PRODUCT CODE NUMBER(S): 4940-1

PRODUCT IDENTIFICATION

Chemical Name and Synonyms: *Manganese, metal*
Chemical Family: *Metal*
Chemical Formula: *Mn*
Product Use: *Laboratory reagent*
Manufacturer's Name and Address:
Caledon Laboratories Ltd.
40 Armstrong Avenue
Georgetown, Ontario L7G 4R9
Telephone No: *(905) 877-0101*
Fax No: *(905) 877-6666*
Emergency Telephone No: *CANUTEC (613) 996-6666*

HAZARDOUS INGREDIENTS OF MATERIALS

Ingredients	*%*	*TLV Units*	*CAS No.*
Manganese	*>99*	*0.2 mg/m^3*	*7439-96-5*

PHYSICAL DATA

Physical State: *Solid*
Odour and Appearance: *Metallic-grey chunks or black, shiny powder, odourless*
Odour Threshold (ppm): *Not applicable*
Vapour Pressure (mm Hg): *~0*
Vapour Density (Air = 1): *Not applicable*
Evaporation Rate: *Not applicable*
Boiling Point (degrees C): *1962°C*
Melting Point (degrees C): *1244°C*
pH: *Not applicable*
Specific Gravity: *0.72 @ 20°C*
Coefficient of Water/Oil distribution: *Not applicable*

SHIPPING DESCRIPTION

UN: *Not regulated*
T.D.G. Class: *Not regulated*
Pkg. Group: *Not regulated*

REACTIVITY DATA

Chemical Stability: *Stable*
Incompatibility with other substances: *May react vigoroulsy or violently with acids, bases, halogens, phosphorus, sulfur oxides. Reacts slowly with water, more rapidly with steam, and with acids or alkalis, to release flammable/explosive hydrogen gas. Reacts violently with halogenated products. As powder, can ignite spontaneously under certain conditions.*
Reactivity: *Avoid gemeration of dust, excessive heat and ignition sources, and all incompatible materials.*
Hazardous Decomposition Products: *Flammable/ explosve hydrogen gas.*

FIRE AND EXPLOSION DATA

Flammability: *Solid not combustible. Dust or powder is flammable in contact with an ignition source. Dust can form explosive mixtures with air.*
Extinguishing Media: *Dry chemical powder, class "D" extinguisher, dry sand. Water may be used as a spray or fog, liberally applied. Fight fire from upwind, from a safe distance.Firefighters must wear protective equipment and clothing sufficient to prevent inhalation of dust or fumes, and contact with skin and eyes.*
Flash Point (Method Used): *Not available*
Autoignition Temperature: *Not available*
Upper Flammable Limit (% by volume): *Not available*
Lower Flammable Limit (% by volume): *Not available*
Hazardous Combustion Products: *Emits toxic fumes under fire conditions.*
Sensitivity to Impact: *None*
Sensitivity to Static discharge: *Mixtures of dust with air may be sensitive under certain conditions, when ignited by an electrostatic or other high-voltage spark, or other ignition source.*

TOXICOLOGICAL PROPERTIES AND HEALTH DATA

Toxicological Data:

LD_{50}: *(oral, rat) 9 gm/kg*
LC_{50}: *Not available*

Effects of Acute Exposure to Product:

Inhaled: *Inhalation of dust or vapour may cause irritation, shortness of breath, coughing. Inhalation of high concentrations can cause "metal fume fever" with headache, metallic taste in the mouth, cough, thirst, shortness of breath, fever, pains in the legs and chest. Recovery occurs within two days after exposure is terminated, and there are no known permanent effects.*
In contact with skin: *May cause mechanical irritation with redness and itching.*
In contact with eyes: *May cause mechanical irritation, with redness, tearing, itching. May cause mild abrasion of cornea.*
Ingested: *Not generally considered toxic by ingestion, but large amounts may cause gastrointestinal disturbances, wi,\th metallic taste in mouth, nausea, vomiting and diarrhea, abdominal pain.*

Effects of Chronic Exposure to Product:

Chronic manganese poisoning involves the central nervous system with languor, sleepines, weakness in the legs, a spastic gait and tendency to fall, mask-like appearance of the face, and emotional disturbances such as uncontrollable laughter.

Carcinogenicity: *Not listed as a carcinogen by NTP, IARC, OSHA.*

Teratogenicity: *Prolonged oral administration to rats produced fetotoxicity.*
Reproductive Effects: *Men exposed to manganese dust showed decreased fertility (RTECS No. OO9275000).*
Mutagenicity: *Prolonged oral administration to rats produced mutagenic effects.*
Synergistic Products: *None known*

PREVENTIVE MEASURES

Engineering Controls: *Local explosion-proof exhaust system.*
Respiratory Protection: *Dust mask. Up to 10 mg/m^3 (dust, not fume): NIOSH approved dust and mist respirator. Up to 25 mg/m^3 (dust, not fume): continuous-flow supplied-air respirator. Up to 50 mg/m^3: full face-piece respirator with high-efficiency particulate filters, or continuous-flow or powered supplied-air respirator with tight-fitting face-piece. Up to 500 mg/m^3: positive-pressure supplied-air respirator. For higher or unknown concentrations, as in fire or spill conditions, positive pressure, full face-piece self-contained breathing apparatus, or positive pressure, full face-piece supplied-air respirator, with an auxiliary positive pressure self-contained breathing apparatus.*
Eye Protection: *Chemical safety glasses. Do not wear contact lenses when working with chemicals.*
Skin Protection: *Rubber or plastic gloves. Other protective clothing, labcoat, sleeves sufficient to limit contact*
Other Personal Protective Equipment: *Safety shower and eye-wash fountain in work area.*
Leak and Spill Procedure: *Elminate ignition sources if dust is present. Cleanup personnel must be thoroughly trained in the hazards of this material and its safe handling, and must wear protective equipment and clothing sufficient to prevent inhalation of dust or fumes, and contact with skin and eyes. Use non-sparking tools. Gather up in a manner that does not raise dust. Recycle if possible. Transfer what cannot be recycled into container and arrange removal by disposal company. After thorough clean up, wash site of spillage thoroughly with water and detergent.*
Waste Disposal: *Follow all federal, provincial and local regulations for disposal.*
Handling Procedures and Equipment: *Workers using this chemical must be properly trained in its hazards and its safe use, and must wear appropriate prorective equipment and clothing. Avoid generating dust. If there is dust, keep away from heat, sparks, and all sources of ignition; avoid the accumulation of static charge, use anti-sparking tools and ground and bond equipment and containers. Use the smallest amount possible for the purpose, in a designated area with adequate ventilation. Use good housekeeping to prevent accumulations of dust. Avoid contact with skin and eyes. Avoid inhalation. Wash thoroughly after handling. Empty containers may contain hazardous resdiues, treat with caution.*
Storage Requirements: *Store in suitable, labelled containers, in a cool, dry, well-ventilated area, out of direct sunlight and away from incompatible materials. Keep away from water, and isolate from air. Keep containers tightly closed when not in use and when empty. Protect from damage.*

FIRST AID MEASURES

Specific Measures:

Eyes: *Flush eyes thoroughly with gently running water, holding eyelids open while flushing, for five to ten (5-10) minutes, or until no trace of chemical remains. Get medical advice if irritation develops.*
Skin: *Remove contaminated clothing. Brush or wipe off dry material. Flush skin with plenty of running water until no evidence of chemical remains. If irritation develops get medical attention.*
Inhalation: *Remove to fresh air. Give oxygen and get medical attention for any breathing difficulty.*
Ingestion: *If victim is alert and not convulsing, give 1 to 2 glasses of water to drink to dilute material. If discomfort occurs, or if a large amount has been ingested, obtain medical attention.*

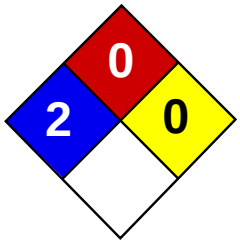
REFERENCES USED

CCINFO disc: Cheminfo, MSDS's
Budavari: The Merck Index, 12th ed., 1997
Sax, Lewis: Hawley's Condensed Chemical Dictionary, 11th ed., 1987
Sax: Dangerous Properties of Industrial Materials, 5th ed., 1979
Suppliers' Material Safety Data Sheets

ADDITIONAL INFORMATION

Date Issued: *August 19, 1991*
Revision: *February 2011*
MSDS: *4940-1*
Proposed WHMIS Designation: *B4; D2A*

Prepared by: Caledon Laboratories Ltd. (905) 877-0101



Material Safety Data Sheet
Nickel metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nickel metal

Catalog Codes: SLN2296, SLN1342, SLN1954

CAS#: 7440-02-0

RTECS: QR5950000

TSCA: TSCA 8(b) inventory: Nickel metal

CI#: Not applicable.

Synonym: Nickel Metal shot; Nickel metal foil.

Chemical Name: Nickel

Chemical Formula: Ni

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

Toxicological Data on Ingredients: Nickel metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to skin. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

Special Remarks on Explosion Hazards:
Material in powder form, capable of creating a dust explosion. Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode. Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion. Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable. TWA: 0.5 (mg/m3) [United Kingdom (UK)] TWA: 1 (mg/m3) from OSHA (PEL) [United States] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid. Lustrous solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 58.71 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 2730°C (4946°F)

Melting Point: 1455°C (2651°F)

Critical Temperature: Not available.

Specific Gravity: Density: 8.908 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water. Insoluble in Ammonia. Soluble in dilute Nitric Acid. Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, combustible materials, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + indusorial earth.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. Causes damage to the following organs: skin. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose/Conc: LDL [Rat] - Route: Oral; Dose: 5000 mg/kg LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Nickel dust and fume can irritate skin. Eyes: Nickel dust and fume can irritate eyes. Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis. Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased cornary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation). Chronic Potential Health Effects: Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis. Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count). Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy.

Chronic ingestion of NIckel may also affect respiration and cause pneumoconiosis or fibrosis. Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal Connecticut hazardous material survey.: Nickel metal Illinois toxic substances disclosure to employee act: Nickel metal Illinois chemical safety act: Nickel metal New York release reporting list: Nickel metal Rhode Island RTK hazardous substances: Nickel metal Pennsylvania RTK: Nickel metal Michigan critical material: Nickel metal Massachusetts RTK: Nickel metal Massachusetts spill list: Nickel metal New Jersey: Nickel metal New Jersey spill list: Nickel metal Louisiana spill reporting: Nickel metal California Director's List of Hazardous Substances: Nickel metal TSCA 8(b) inventory: Nickel metal

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R43- May cause sensitization by skin contact. S22- Do not breathe dust. S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:42 PM

Last Updated: 05/21/2013 12:00 PM

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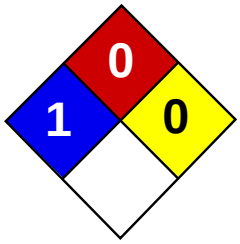

Material Safety Data Sheet
Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

Toxicological Data on Ingredients: Lead LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.05 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m3) from OSHA (PEL) [United States] TWA: 0.03 (mg/m3) from NIOSH [United States] TWA: 0.05 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

pH (1% soln/water): Not applicable.

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungsby mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually abssorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, deliriuim, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead cholic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/01/2010 12:00 PM

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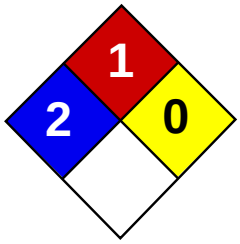

Material Safety Data Sheet
Selenium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Selenium

Catalog Codes: SLS2629

CAS#: 7782-49-2

RTECS: VS7700000

TSCA: TSCA 8(b) inventory: Selenium

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Se

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Selenium	7782-49-2	100

Toxicological Data on Ingredients: Selenium: ORAL (LD50): Acute: 6700 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.2 (mg/m3) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 78.96 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 684.9°C (1264.8°F)

Melting Point: 217°C (422.6°F)

Critical Temperature: Not available.

Specific Gravity: 4.81 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 6700 mg/kg [Rat].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in animal. Excreted in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Selenium powder : UN2658 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Selenium Massachusetts RTK: Selenium TSCA 8(b) inventory: Selenium SARA 313 toxic chemical notification and release reporting: Selenium CERCLA: Hazardous substances.: Selenium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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Appendix D
Soil / Materials Management Plan

SOIL/MATERIALS MANAGEMENT PLAN

for
HIP Cleaners- Rochdale Village
Remedial Action Work Plan

165-50 Baisley Boulevard, Jamaica
Block 12495, portion of Lot 2
BCP Site # C241166

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
Rochdale Village, Inc.
169-55 137th Avenue
Queens, New York 11434

Prepared by:
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1.0 INTRODUCTION

This Soil/Materials Management Plan (SMMP) has been developed for the Remedial Action Work Plan (RAWP) prepared for HIP Cleaners (the Site).

The Site is located at 165-50 Baisley Boulevard, in the Jamaica neighborhood of Queens, NY. The Site is currently vacant; the previous occupant, a dry cleaner (JS Cleaners), ceased operations in January 2017. The Site is located within the Rochdale Village Mall (Mall #1), part of a larger community development and housing complex known as Rochdale Village.

The HIP Cleaners (the Site) is located in the Rochdale Village Mall #2 at 169-47 137th Avenue in the Jamaica Section of Queens, New York. The HIP Cleaners is an active dry cleaning facility, located in a 3,330 square foot (sf) retail space within a strip mall in Rochdale Village community. Rochdale Village community is a 115-acre area, which includes twenty 14-story residential apartment buildings with associated management office, power plant, community center, maintenance and public safety building, two retail malls (Mall #1 and #2), medical offices, gasoline station, open space and parking areas. HIP Cleaners is the leaseholder for the current tenant space and has conducted dry cleaning operations at the Site since 1967.

1.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional or experienced field geologist under the supervision of the Remedial Engineer (RE) and will be reported in the Final Engineering Report (FER). Soil Screening will be performed during all remedial and development excavations into known or potentially contaminated material regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of a COC.

1.2 Soil Staging Methods

Excavated soil from the sub-slab depressurization system (SSDS) pits and soil vapor excavation (SVE) system (including trenching) will be placed in 55-gallon drums. While drums are on-site and work is occurring, they will be inspected daily. All drum management will be compliant with applicable laws and regulations.

1.3 Characterization of Excavated Materials

Soil/fill or other excavated media that is transported off the Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils are not proposed for reuse on-Site.

1.4 Materials Excavation, Load-Out and Departure

The RE overseeing the remedial activities, or a qualified environmental professional under his/her supervision, will:

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

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials. Mechanical processing of historical fill and contaminated soil on the Site is prohibited.

1.5 Off-Site Materials Transport

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364.

Trucks removing drums from the Site will be loaded within the parking lot located at the back entrance of the Site. Trucks will exit Rochdale Village and make a right on 137th Ave, followed by a right on Rockaway Boulevard. Trucks will head west on Rockaway Boulevard to the Van Wyck Expressway.

These are the most appropriate routes and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) limiting total distance to major highways; (d) promoting safety in access to highways; and, (e) overall safety in transport. All trucks loaded with Site materials will exit the vicinity of the Site using only the most-current New York City Department of Transportation (NYCDOT)-approved truck routes (currently the 2015 New York City Truck Route Map).

All trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 Materials Disposal Off-Site

To document that the disposal of regulated material exported from the Site complies with applicable laws and regulations, the following documentation will be established and reported by the RE for each disposal destination used in this project:

(1) a letter from the RE or Applicant to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the RE or Applicant, and will include as an attachment a summary of all chemical data for the material being transported; and
(2) a letter from each disposal facility stating it is in receipt of the correspondence, (1) above, and is approved to accept the material.

These documents will be included in the FER. The FER will include an itemized account of the destination of all material removed from the Site during the remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the FER.

All soil, fill and other waste excavated and removed from the Site will be managed as regulated material (municipal solid waste per 6NYCRR Part 360-1.2) and will be disposed in accordance with applicable laws and regulations. Historic fill and material that does not meet Track 1 Unrestricted Use soil cleanup objectives (SCOs) is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility). Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Up to ten 55-gallon drums of soil is proposed for off-Site disposal. Final disposal facilities will be identified to NYSDEC prior to shipping material to any facility. Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the FER. Hazardous wastes derived from on-Site will be stored, transported and disposed of in compliance with applicable laws and regulations.

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

1.7 Materials Reuse

Soil reuse is not proposed on-Site.

1.8 Import of Backfill Soil from Off-Site Sources

Approximately three cubic yards of soil is expected to be needed for backfill and cover after trenching in support of the SVE system well network. Import of materials will be in compliance with: (1) the Part 375-6.7(d) and (2) all Federal, State and local rules and regulations for handling and transport of material.

The following presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. The backfill and cover soil quality objectives will meet Protection of Groundwater SCOs.

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

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

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with applicable City, State and Federal laws and requirements. The source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed will be reported to NYSDEC at the end of construction activities and before obtaining a Certificate of Occupancy or Department of Building Letter of Completion.

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

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

Composite and discrete samples of imported material will be taken consistent with Table 5.4(e)10 of DER-10. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be reported to NYSDEC at the end of construction activities and before obtaining a Certificate of Occupancy or Department of Building Letter of Completion. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.9 Fluids Management

Dewatering is not contemplated during implementation of the RAWP.

1.10 Stormwater Pollution Prevention

Stormwater pollution prevention practices are not required.

1.11 Erosion and Sediment Control Measures

All work will be completed in the at grade building and erosion and sediment control measures are not required.

1.12 Contingency Plan

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

1.13 Odor, Dust and Nuisance Control

A Site-specific Community Air Monitoring Plan (CAMP) is included in the Health and Safety Plan (HASP) included as Appendix C of the RAWP.

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

Dust Control

Dust management during invasive on-Site work will include, as necessary:

- Use of a dedicated water spray method at suitable supply and pressure for any soil disturbances; and,
- Identification of air intakes on adjoining residential properties.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. Where nuisance dust emissions have developed during remedial work and cannot be corrected, use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices will be considered. NYSDEC will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the RE.

Other Nuisances

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

Appendix E
Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN

for
HIP Cleaners
Remedial Action Work Plan

165-50 Baisley Boulevard, Jamaica
Block 12495, portion of Lot 2
BCP Site # C241166

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
Rochdale Village, Inc.
169-55 137th Avenue
Queens, New York 11434

Prepared by:
TENEN ENVIRONMENTAL
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Appendix A – Resumes

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been developed for the Remedial Action Work Plan (RAWP) prepared for HIP Cleaners (the Site).

The HIP Cleaners (the Site) is located in the Rochdale Village Mall #2 at 169-47 137th Avenue in the Jamaica Section of Queens, New York. The HIP Cleaners is an active dry cleaning facility, located in a 3,330 square foot (sf) retail space within a strip mall in Rochdale Village community. Rochdale Village community is a 115-acre area, which includes twenty 14-story residential apartment buildings with associated management office, power plant, community center, maintenance and public safety building, two retail malls (Mall #1 and #2), medical offices, gasoline station, open space and parking areas. HIP Cleaners is the leaseholder for the current tenant space and has conducted dry cleaning operations at the Site since 1967.

1.1 Project Scope and QAPP Objective

The proposed scope of work includes the following:

- installation of an active sub-slab depressurization (SSDS);
- installation of a soil vapor extraction system;
- ISCO treatment via encapsulant reactant technology; and
- post-remedial groundwater sampling.

The objective of the QAPP is to detail the policies, organization, objectives, functional activities and specific quality assurance/quality control activities designed to achieve the data quality goals or objectives of the Remedial Action Work Plan (RAWP). This QAPP addresses how the acquisition and handling of samples and reporting of data will be documented for quality control (QC) purposes. Specifically, this QAPP addresses the following:

- The procedures to be used to collect, preserve, package, and transport samples;
- Field data collection and record keeping;
- Data management;
- Chain-of-custody procedures; and,
- Determination of precision, accuracy, completeness, representativeness, decision rules, comparability and level of quality control effort.

2.0 PROJECT ORGANIZATION

The personnel detailed are responsible for the implementation of the QAPP. Tenen Environmental, LLC (Tenen) will implement the Remedial Action Work Plan (RAWP) on behalf of Rochdale Village (the Participant) once it has been approved by the New York State Department of Environmental Conservation (NYSDEC).

The Remedial Engineer for the project will be Mr. Matthew Carroll, P.E. Mr. Carroll is an environmental engineer experienced in all aspects of site assessment and development and implementation of remedial strategies. His experience involves projects from inception through investigation, remediation and closure. His expertise includes soil, soil vapor and groundwater remediation; remedial selection and design; field/health and safety oversight and preparation of work plans and reports to satisfy the requirements of various regulatory agencies. Mr. Carroll received his Bachelor of Engineering from Stevens Institute of Technology and Bachelor of Science in Chemistry from New York University and is a New York State professional engineer; his resume is included in Appendix A.

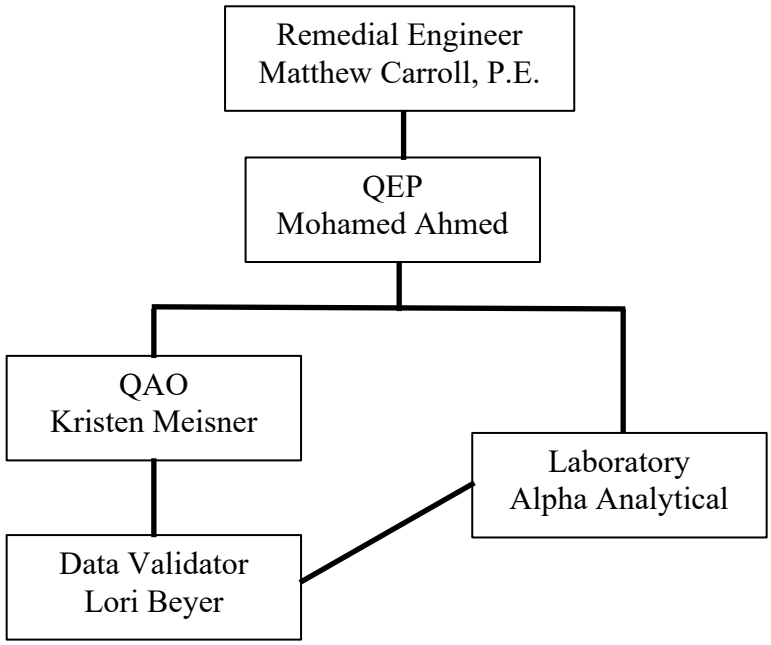
The Project Manager and Qualified Environmental Professional (QEP) will be Mohamed Ahmed, Ph.D., CPG, principal at Tenen. Dr. Ahmed is a certified professional geologist with over 20 years of experience in the New York City metropolitan area. He has designed and implemented subsurface investigations and is proficient in groundwater modeling, design of groundwater treatment systems, and soil remediation. He has managed numerous projects focused on compliance with the requirements of the New York State Brownfield Cleanup Program and spills programs and the New York City E-designation program. Dr. Ahmed also has extensive experience in conducting regulatory negotiations with the New York State Department of Environmental Conservation, the New York City Department of Environmental Protection, the NYC Office of Housing Preservation and Development, and the Mayor's Office of Environmental Remediation. Dr. Ahmed holds advanced degrees in geology and Earth and Environmental Sciences from Brooklyn College and the Graduate Center of the City University of New York; his resume is included in Appendix A.

The Quality Assurance Officer will be Ms. Kristen Meisner, E.I.T. Ms. Meisner is an environmental engineer with experience in soil, groundwater and soil vapor sampling techniques and data analysis, remedial systems, and environmental permitting. While with a national consulting firm, Ms. Meisner designed and implemented environmental investigations, designed remedial systems and performed watershed analyses for the U.S. Army Corps of Engineers. Her prior experience has involved projects related to the Spill Prevention, Control, and Countermeasure (SPCC) and Petroleum Bulk Storage (PBS) plan requirements. She has also prepared environmental permits for air, stormwater and wastewater under the NPDES, RCRA, SARA Title II, Title V, OSHA and Discharge Monitoring programs. Ms. Meisner is an Engineer-in-Training in New York State and holds a Bachelor of Science in Environmental Engineering from the University of New Hampshire; her resume is included in Appendix A.

In addition, Tenen will utilize subcontractors for laboratory services (Alpha Analytical of Westborough, MA) and data validation (L.A.B. Validation Corp. of East Northport, NY). The

resume for the Data Usability Summary Report (DUSR) preparer, Ms. Lori Beyer, is included in Appendix A.

An organization chart for the implementation of the RAWP and QAPP is below.



3.0 SAMPLING AND DECONTAMINATION PROCEDURES

A detailed description of the procedures to be used during this program for collection of post-remedial groundwater samples is provided below. Proposed groundwater sample locations are shown on Figure 8 of the RAWP. Proposed pre-design sampling locations are shown on Figure 6. An Analytical Methods/Quality Assurance Summary is provided in Table 1, included in Section 3.11.

3.1 Level of Effort for QC Samples

Field blank, trip blank, field duplicate and matrix spike (MS) / matrix spike duplicate (MSD) samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. Each type of QC sample is discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.

- Duplicate samples are analyzed to check for sampling and analytical reproducibility.

- MS/MSD samples provide information about the effect of the sample matrix on the digestion and measurement methodology.

The general level of QC effort will be one field duplicate and one field blank (when non-dedicated equipment is used) for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD for every 20 or fewer investigative samples of a given matrix. One trip blank will be included along with each sample delivery group of volatile organic compound (VOC) samples.

The analytical laboratory, Alpha Analytical, is certified under the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) as LabIDs 11148 and 11627. NYSDEC Analytical Services Protocol (ASP) Category B deliverables will be prepared by the laboratory.

3.2 Sample Handling

Samples will either be picked up by the laboratory, delivered to the laboratory in person by the sampler, or transported to the laboratory by overnight courier. All samples will be shipped to the laboratory to arrive within 48 hours after collection, and the laboratory will adhere to the analytical holding times for these analyses, as listed in the current version of the New York State Analytical Services Protocol (ASP).

3.3 Custody Procedures

Sample custody will be controlled and maintained through the chain-of-custody procedures. The chain of custody is the means by which the possession and handling of samples is tracked from the site to the laboratory. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site. The following sections (Sections 3.4 and 3.5) describe procedures for maintaining sample custody from the time samples are collected to the time they are received by the analytical laboratory.

3.4 Sample Storage

Samples will be stored in secure limited-access areas. Walk-in coolers or refrigerators will be maintained at 4°C, +/- 2°C, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location, if necessary.

3.5 Sample Custody

Sample custody is defined by this QAPP as the following:

- The sample is in someone's actual possession;
- The sample is in someone's view after being in his or her physical possession;
- The sample was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering; or,
- The sample is placed in a designated and secured area.

Samples will be removed from storage areas by the sample custodian or laboratory personnel and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure.

Laboratory documentation used to establish chain of custody and sample identification may include the following:

- Field chains of custody or other paperwork that arrives with the sample;
- Laboratory chain of custody;
- Sample labels or tags attached to each sample container;
- Sample custody seals;
- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books, filled out in legible handwriting, and signed and dated by the chemist;
- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist;
- Sample storage log (same as the laboratory chain of custody); and,

- Sample disposition log, which documents sample disposal by a contracted waste disposal company.

3.6 Sample Tracking

All samples will be maintained in the appropriate coolers prior to and after analysis. Laboratory analysts will remove and return their samples, as needed. Samples that require internal chain of custody procedures will be relinquished to the analysts by the sample custodians. The analyst and sample custodian will sign the original chain of custody relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original chain of custody returning sample custody to the sample custodian. Sample extracts will be relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department will track internal chain of custody through their logbooks/spreadsheets.

Any change in the sample during the time of custody will be noted on the chain of custody (e.g., sample breakage or depletion).

3.7 Groundwater Sampling

Prior to sample collection, static water levels will be measured and recorded from all monitoring wells. Monitoring wells will also be gauged for the presence of non-aqueous phase liquid (NAPL). In the event that NAPL is detected, Tenen will record the thickness and will not collect a sample. If NAPL is not detected, Tenen will purge and sample monitoring wells using low-flow/minimal drawdown purge and sample collection procedures (bladder pump system). Prior to sample collection, groundwater will be evacuated from each well at a low-flow rate (typically less than 0.1 L/min). Field measurements for pH, temperature, turbidity, dissolved oxygen, specific conductance, oxidation-reduction potential and water level, as well as visual and olfactory field observations, will be periodically recorded and monitored for stabilization. Purging will be considered complete when pH, specific conductivity, dissolved oxygen and temperature stabilize and when turbidity measurements fall below 50 Nephelometric Turbidity Units (NTU) or become stable above 50 NTU.

Stability is defined as variation between field measurements of 10 percent or less and no overall upward or downward trend in the measurements. Upon stabilization of field parameters, groundwater samples will be collected and analyzed as discussed below.

Wells will be purged and sampled using dedicated pump tubing following low-flow/minimal drawdown purge and sample collection procedures, as described above. The pump and bladder will be decontaminated between samples.

Groundwater samples will be collected for VOC analysis through dedicated tubing. Prior to, and immediately following collection of groundwater samples, field measurements for pH, specific conductance, temperature, dissolved oxygen, turbidity and depth-to-water, as well as visual and olfactory field observations will be recorded. All collected groundwater samples will be placed in

pre-cleaned, pre-preserved laboratory provided sample bottles, cooled to 4 degrees-C in the field, and transported under chain-of-custody command to the designated laboratory for analysis.

All groundwater samples will be analyzed for TCL VOCs. A Category B data package will be provided.

3.8 Analytical Methods/Quality Assurance Summary Table

A summary of the analytical methods and quality assurance methods are included in Table 1, below.

Table 1
Analytical Methods/Quality Assurance Summary

Matrix	Proposed Samples	QA/QC Samples				Total # Samples	Analytical Parameter	Method	Preservative	Holding Time	Container
		TB	FB	DUP	MS/MSD						
Post Remedial Groundwater	3	1	1	1	1	7	VOCs	8260	Cool to 4°C, pH<2 with HCl	14 days	(3) 40 mL clear glass vials

TB – Trip Blank
FB – Field Blank
DUP – Duplicate
°C – degrees Celsius
mL – milliliter
L – liter

3.9 Decontamination

Where possible, samples will be collected using new, dedicated sampling equipment so that decontamination is not required. All non-dedicated equipment will be decontaminated between boring locations using potable tap water and a phosphate-free detergent (e.g., Alconox) and/or a steam cleaner. All non-dedicated sampling equipment will also have a final rinse with deionized water. Decontamination water will be collected and disposed as investigation-derived waste (IDW).

3.10 Data Review and Reporting

The NYSDEC ASP Category B data package will be validated by an independent data validation subconsultant and a DUSR summarizing the results of the data validation process will be prepared. All reported analytical results will be qualified as necessary by the data validation and will be reviewed and compared against background concentrations and/or applicable New York State criteria:

Groundwater – NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Ambient Water Quality Standards and Guidance Values (AWQS); and,
Soil Vapor, Indoor Air and Ambient Air – NYSDOH Air Guidance Values (AGVs) and Decision Matrices, as applicable, and ambient air sample results.

A report documenting the Remedial Action implementation will be prepared, and will describe Site conditions and document applicable observations made during the sample collection. In addition, the report will include a description of the sampling procedures, tabulated sample results and an assessment of the data and conclusions. The laboratory data packages, DUSR, geologic logs, well construction diagrams, and field notes will be included in the report as appendices. All data will also be submitted electronically to NYSDEC via the Environmental Information Management System (EIMS) in EqUIS format.

The data will be presented in accordance with Section 5.8(c) of the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (2010).

Appendix A

Resumes

Matthew Carroll, P.E.
Environmental Engineer/Principal

Experience Summary

Matthew Carroll is an environmental engineer experienced in all aspects of site assessment and development and implementation of remedial strategies. He has managed projects from inception through investigation, remediation and closure. His expertise includes soil, soil gas, and groundwater remediation, preparation of cost estimates, remedial alternative selection and design, soil characterization for disposal, field safety oversight, and preparation of work plans and reports to satisfy New York and New Jersey state requirements, and New York City "e" designation and restrictive declarations. Mr. Carroll's project management experience includes past management of a New York City School Construction Authority hazardous materials contract. He is responsible for all engineering work performed by Tenen and is currently the project manager and remedial engineer for several New York State Brownfield Cleanup Program sites.

Selected Project Experience

470 Kent Avenue, Brooklyn
As project manager, supported the client in due diligence and transactional activities, including a Phase I ESA, preliminary site investigation, and remedial cost estimate; preparation of BCP application and remedial investigation work plan. The former manufactured gas plant, sugar refinery and lumberyard will be developed as a mixed-use project with market rate and affordable housing and public waterfront access. As remedial engineer, will be responsible for development of remedial alternatives and oversight and certification of all remedial activities.

500 Exterior Street, Bronx
Designed and implemented the investigation of this former lumberyard and auto repair shop that will be redeveloped as mixed use development with an affordable housing component; prepared BCP application and subsequent work plans and reports. Designed a remedial strategy incorporating both interim remedial measures (IRMs) and remediation during the development phase.

Gateway Elton I and II, Brooklyn
Conducted soil disposal characterization, prepared Remedial Action Work Plans and designed methane mitigation systems for two phases of a nine-building residential development and commercial space; prepared and oversaw implementation of a Stormwater Pollution Prevention Plan during construction and prepared and certified the remedial closure reports for the project.

Affordable Housing Development, Rye, NY
Consultant to the City of Rye on environmental issues pertaining to a county-owned development site slated for an afford senior housing; reviewed environmental documentation for the project and prepared summary memorandum for City Council review; recommended engineering controls to address potential exposure to petroleum constituents, presented report findings at public meetings and currently providing ongoing environmental support during project implementation.

Queens West Development BCP Site, Long Island City, New York
Assistant Project Manager for two developers involved in the site.

- Responsible for oversight of remediation under the New York State Brownfield Cleanup Program
- Technical review of work plans and reports and coordination of the Applicant's investigation and oversight efforts
- Provided input for mass calculations and well placement for an in-situ oxidation remedy implemented on a proposed development parcel and within a City street
- Conducted technical review of work pertaining to a former refinery. Documents reviewed included work plans for characterization and contaminant delineation; pilot test (chemical oxidation); remediation (excavation and groundwater treatment). Managed field personnel conducting full time oversight and prepared progress summaries for distribution to project team
- Following implementation of remedial action, implemented the Site Management Plan and installation/design of engineering controls (SSDS, vapor barrier/concrete slab, NAPL recovery). Also responsible for coordination with NYSDEC

Brownfield Cleanup Program Redevelopment Sites – West Side, New York City
Managed remediation of a development consisting of four parcels being addressed under one or more State and city regulatory programs (NYS Brownfield Cleanup Program, NYS Spills, and NYC "e" designation program). Remediation includes soil removal, screening and disposal; treatment of groundwater during construction dewatering and implementation of a worker health and safety plan and community air monitoring plan (HASP/CAMP)

Managed an additional BCP site, supported the Applicant in coordination with MTA to create station access for the planned No. 7 subway extension; also provided support the client in coordination with Amtrak to obtain access for remedial activities on the portion of the site that is within an Amtrak easement. The site will eventually be used for construction of a mixed-use high-rise building.

BCP Site, Downtown Brooklyn, New York
Performed investigation on off-site properties and designed an SSDS for an adjacent building, retrofitting the system within the constraints of the existing structure; coordinated the installation of the indoor HVAC controls and vapor barrier; provided input to the design of a SVE system to address soil vapor issues on the site.

West Chelsea Brownfield Cleanup Program Site
Designed an in-situ remediation program and sub-slab depressurization system to address contamination remaining under the High Line Viaduct; SSDS design included specification of sub-grade components, fan modeling and selection, identifying exhaust location within building constraints and performance modeling; prepared the Operations Maintenance and Monitoring Plan and Site Management Plan sections pertaining to the SSDS.

Historic Creosote Spill Remediation – Queens, New York – New York State Voluntary Cleanup Program
Modeled contamination volume and extent and prepared mass estimates of historic fill constituents and creosote-related contamination; designed a soil vapor extraction (SVE) and dewatering system to address historic creosote release both above and below static

water table; coordinated with the Metropolitan Transit Authority and prepared drawings to secure approval to drill in the area of MTA subway tunnels.

NYSDEC Spill Site– Far West Side, Manhattan
Provided support to client during negotiations with a major oil company regarding allocation of remedial costs. Worked with client's attorney to develop a regulatory strategy to address the client's obligations under the NYSDEC Spills Program and the New York City "e" designation requirements.

Affordable Housing Site, Brooklyn, New York
Modified prior work plans for soil, soil vapor and groundwater investigation to address requirements for site entry into the New York City Brownfield Cleanup Program. Prepared technical basis for use of prior data previously disallowed by OER. Currently conducting site investigation.

New York City School Construction Authority Hazardous Materials Contract
Provided work scopes and cost estimates, managed and implemented concurrent projects, including Phase I site assessments, Phase II soil, groundwater and soil gas investigations, review of contractor bid documents, preparation of SEQR documents, specifications and field oversight for above- and underground storage tank removal, and emergency response and spill control.

Former Manufacturing Facility, Hoboken, New Jersey
Evaluated site investigation data to support a revision of the current property use to unrestricted; modified the John & Ettinger vapor intrusion model to apply the model to a site-specific, mixed use commercial/residential development; implemented a Remedial Action Work Plan that included the characterization, removal and separation of 9,500 cubic yards of historic fill; designed and implemented a groundwater characterization/delineation program using a real-time Triad approach; designed and implemented an innovative chemical oxidation technology for the property.

F**ormer Varnish Manufacturer – Newark, New Jersey**
Prepared a Phase I environmental site assessment; implemented soil and groundwater sampling to assess presence of petroleum and chlorinated compounds; prepared alternate cost remediation scenarios for settlement purposes and implemented a groundwater investigation plan, including pump tests and piezometer installation to assess the effect of subsurface utilities and unique drainage pathways upon contaminant transport.

Education and Certifications

Professional Engineer, New York
Bachelor of Engineering, Environmental; Stevens Institute of Technology, 2002
Bachelor of Science, Chemistry, New York University, 2002
Technical and Regulatory Training in Underground Storage Tanks, Cook College, Rutgers University, 2006

Mohamed Ahmed, Ph.D., C.P.G.
Sr. Geologist/Principal

Experience Summary

Mohamed Ahmed is a certified professional geologist with nearly 23 years of experience in the New York City metropolitan area. He has designed and implemented subsurface investigations and is proficient in groundwater modeling, design of groundwater treatment systems and soil remediation. He has managed numerous projects focused on compliance with the New York State Brownfield Cleanup and Spills programs and the New York City "e" designation program. Dr. Ahmed also has extensive experience in conducting regulatory negotiations with the New York State Department of Environmental Conservation, the NYC Office of Housing Preservation and Development, and the Mayor's Office of Environmental Remediation.

Selected Project Experience

Willoughby Square, Downtown Brooklyn
As Project Manager, directs all regulatory interaction and investigation on this joint public-private sector redevelopment that will include a public park and four-level underground parking garage. Prepared the remedial investigation work plan and remedial action work plan, conducted investigation activities and waste characterization, and negotiated with the NYC Department of Environmental Protection and the Mayor's Office of Environmental Remediation to transition the site into the NYC Voluntary Cleanup Program.

School Facility, Borough Park, Brooklyn
Managed all regulatory agency coordination, work plan and report preparation and remedial oversight; worked with OER to determine measures to retroactively address the hazardous materials and air quality E-designations on a previously constructed school building and prepared supporting documentation to justify the use of electrical units rather than natural gas.

LGA Hotel Site, East Elmhurst, Queens
Project manager for all work conducted at this former gasoline service station which is being remediated under the NYS Brownfield Cleanup Program; technical oversight of work plans, reports, and design and implementation of field and soil disposal characterization.

436 10th Avenue, Manhattan
As project manager and technical lead, assisted client in developing remedial cost estimates used for property transaction, developed regulatory strategy to address NYS Spills and NYC E-designation requirements, and currently overseeing remedial activities which include removal and disposal of petroleum-contaminated bedrock and dewatering and disposal of impacted groundwater.

Brownfield Cleanup Program Site, Downtown Brooklyn
Managed investigation and remediation under the BCP program for a proposed mixed-use development; designed the remedial investigation and prepared the remedial action work plan which includes an SVE system monitored natural attenuation. Prepared remedial cost

estimates for several scenarios. The project will include a 53-story mixed-use structure and parking garage.

Queens West Development, Long Island City
Directed project team and subcontractors for soil investigation/remediation studies on multiple properties; provided technical support for negotiations with NYSDEC during investigation and remediation.

Former Creosote Site, Long Island City
Designed and implemented a complex investigation to assess the nature and extent of historic creosote contamination at this former industrial site; conducted studies to optimize recovery of LNAPL and DNAPL and developed strategies using bioremediation and natural attenuation in conjunction with conventional remedial approaches. Performed pilot tests for soil vapor extraction system design and coordinated with NYSDEC and NYSDOH to implement sub-slab soil vapor sampling.

NYSDEC Spill Site – Far West Side, Manhattan
Developed a detailed remedial cost estimate for to support client negotiations with a major oil company. The estimate included costs pertaining to: chipping, removal and disposal of petroleum-impacted bedrock; removal/disposal of recycled concrete; costs for dewatering and disposal of impacted groundwater during construction; and design and installation of a vapor barrier below the redevelopment.

Active Industrial Facility, Newburgh, New York
Designed remedial investigation of soil and groundwater contaminated with trichloroethane; performed soil vapor pilot test and pump test to aid in design of soil and groundwater remediation alternatives; conducted sub-slab vapor sampling in accordance with NYSDOH guidance.

Former Dry Cleaning Facility, New York City
Conducted soil and groundwater investigations, designed and installed a soil vapor extraction system and performed extensive testing of indoor air. Negotiated the scope of the RI and IRM with NYSDEC.

Waterfront Redevelopment, Yonkers, NY
Designed and performed geophysics survey of six parcels to determine locations of subsurface features; supervised test pit excavation to confirm geophysics results and evaluate and classify soil conditions prior to development activities.

Prince's Point, Staten Island, New York
Performed soil, groundwater and sediment sampling to delineate the extent of contamination; used field-screening techniques to control analytical costs and supervised soil excavation and disposal.

Apartment Complex, New York City, New York
Coordinated with Con Edison, the owner of the adjacent property and NYSDEC to determine oil recovery protocol; assessed hydrogeological conditions and conducted pilot tests to design cost-effective recovery system; designed and supervised installation of recovery system.

Publications

"Impact of Toxic Waste Dumping on the Submarine Environment: A Case Study from the New York Bight". Northeastern Geology and Environmental Sciences, V. 21, No. 12, p. 102-120. (With G. Friedman)

Metals Fluxes Across the Water/Sediment Interface and the Influence of pH. Northeastern Geology and Environmental Sciences, in press. (With G. Friedman)

"Water and Organic Waste Near Dumping Ground in the New York Bight". International Journal of Coal Geology, volume 43. (With G. Friedman)

Education and Certifications

Ph.D., Earth and Environmental Sciences, Graduate Center of the City of New York (2001)
M.Ph., Earth and Environmental Sciences, City University of New York (1998)
M.A. Geology, Brooklyn College (1993)
B.S. Geology, Alexandria University, Egypt (1982)

American Institute of Professional Geologists, Certified Professional Geologist, 1997-2015

L.A.B. Validation Corp., 14 West Point Drive, East Northport, New York 11731

Lori A. Beyer

SUMMARY: General Manager/Laboratory Director with a solid technical background combined with Management experience in environmental testing industry. Outstanding organizational, leadership, communication and technical skills. Customer focused, quality oriented professional with consistently high marks in customer/employee satisfaction.

EXPERIENCE:

1998-Present L.A.B. Validation Corporation, 14 West Point Drive, East Northport, NY
President

- Perform Data Validation activities relating to laboratory generated Organic and Inorganic Environmental Data.

1998-Present American Analytical Laboratories, LLC. 56 Toledo Street, Farmingdale, NY
Laboratory Director/Technical Director

- Plan, direct and control the operation, development and implementation of programs for the entire laboratory in order to meet AAL's financial and operational performance standards.
- Ensures that all operations are in compliance with AAL's QA manual and other appropriate regulatory requirements.
- Actively maintains a safe and healthy working environmental that is demanded by local laws/regulations.
- Monitors and manages group's performance with respect to data quality, on time delivery, safety, analyst development/goal achievement and any other key performance indices.
- Reviews work for accuracy and completeness prior to release of results to customers.

1996-1998 Nytest Environmental, Inc. (NEI) Port Washington, New York
General Manager

- Responsible for controlling the operation of an 18,000 square foot facility to meet NEI's financial and operational performance standards.
- Management of 65 FTEs including Sales and Operations
- Ensure that all operations are in compliance with NEI's QA procedures
- Ensures that productivity indicators, staffing levels and other cost factors are held within established guidelines
- Maintains a quantified model of laboratory's capacity and uses this model as the basis for controlling the flow of work into and through the lab so as to ensure that customer requirements and lab's revenue and contribution targets are achieved.

1994-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
Technical Project Manager

- Responsible for the coordination and implementation of environmental testing programs requirements between NEI and their customers
- Supervise Customer Service Department
- Assist in the development of major proposals
- Complete management of all Federal and State Contracts and assigned commercial contracts
- Provide technical assistance to the customer, including data validation and interpretation
- Review and implement Project specific QAPP's.

1995-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
Corporate QA/QC Officer

- Responsible for the implementation of QA practices as required in the NJDEP and EPA Contracts
- Primary contact for NJDEP QA/QC issues including SOP preparation, review and approval
- Responsible for review, verification and adherence to the Contract requirements and NEI QA Plan

1992-1994 Nytest Environmental, Inc. (NEI) Port Washington, New York
Data Review Manager

- Responsible for the accurate compilation, review and delivery of analytical data to the company's customers. Directly and effectively supervised a department of 22 personnel.
- Managed activities of the data processing software including method development, form creation, and production
- Implement new protocol requirements for report and data management formats
- Maintained control of data storage/archival areas as EPA/CLP document control officer

1987-1991 Nytest Environmental, Inc. (NEI) Port Washington, New York
Data Review Specialist

- Responsible for the review of GC, GC/MS, Metals and Wet Chemistry data in accordance with regulatory requirements
- Proficient with USEPA, NYSDEC, NJDEP and NEESA requirements
- Review data generated in accordance with SW846, NYSDEC ASP, EPA/CLP and 40 CFR Methodologies

1986-1987 Nytest Environmental, Inc (NEI) Port Washington, New York
GC/MS VOA Analyst

EDUCATION:

1982-1985 State University of New York at Stony Brook, New York; BS Biology/Biochemistry
1981-1982 University of Delaware; Biology/Chemistry
5/91 Rutgers University; Mass Spectral Data Interpretation Course, GC/MS Training
8/92 Westchester Community College; Organic Data Validation Course
9/93 Westchester Community College; Inorganic Data Validation Course

Westchester Community College

Professional Development Center

Awards this Certificate of Achievement To

LORI BEYER

for Successfully Completing

ORGANIC DATA VALIDATION COURSE (35 HOURS)

Dr. John Samuelian

Date AUGUST 1992

Assistant Dean
Professional Development Center

President

The Professional Development Center

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

Westchester Community College

Professional Development Center

Awards this Certificate of Achievement To

LORI BEYER

for Successfully Completing

INORGANIC DATA VALIDATION

Instructor: Dale Boshart

Date MARCH 1993

Assistant Dean
Professional Development Center

President

The Professional Development Center

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

July 8, 1992

Ms. Elaine Sall
Program Coordinator
Westchester Community College
Valhalla, NY 10595-1698

Dear Elaine,

Thank you for your letter of June 29, 1992. I have reviewed the course outline for organic data validation, qualifications for teachers and qualifications for students. The course that you propose to offer would be deemed equivalent to that which is offered by EPA. The individuals who successfully complete the course and pass the final written exam would be acceptable to perform the task of organic data validation for the Department of Environmental Conservation, Division of Hazardous Waste Remediation.

As we have discussed in our conversation of July 7, 1992, you will forward to me prior to the August course deadline, the differences between the EPA SOW/90 and the NYSDEC ASP 12/91. You stated these differences will be compiled by Mr. John Samulian.

I strongly encourage you to offer an inorganic data validation course. I anticipate the same list of candidates would be interested in an inorganic validation course as well, since most of the data to be validated consists of both organic and inorganic data.

Thank you for you efforts and please contact me if I can be of any further assistance.

Sincerely,

Maureen P. Serafini

Maureen P. Serafini
Environmental Chemist II
Division of Hazardous Waste
Remediation

The Professional
Development Center
AT
WESTCHESTER COMMUNITY COLLEGE

914 285-6619

October 2, 1992

Ms. Lori Beyer
3 sparkill Drive
East Northport, NY 11731

Dear Ms. Beyer:

Congratulations upon successful completion of the Organic Data Validation course held August 17 - 21, 1992, through Westchester Community College, Professional Development Center. This course has been deemed by New York State Department of Environmental Conservation as equivalent to EPA's Organic Data Validation Course.

Enclosed is your Certificate. Holders of this Certificate are deemed competent to perform organic data validation for the New York State DEC Division of Hazardous Waste Remediation.

The Professional Development Center at Westchester Community College plans to continue to offer courses and seminars which will be valuable to environmental engineers, chemists and related personnel. Current plans include a TCLP seminar on November 17th and a conference on Environmental Monitoring Regulations on November 18th.

We look forward to seeing you again soon at another environmental program or event. Again, congratulations.

Very truly yours,

Passing Grade is 70%
Your Grade is 99%

Elaine Sall
Program Coordinator

ES/bf

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

The Professional
Development Center
AT
WESTCHESTER COMMUNITY COLLEGE

914 285-6619

June 21, 1993

Dear Ms. Beyer:

Enclosed is your graded final examination in the Inorganic Data Validation course you completed this past March. A score of 70% was required in order to receive a certificate of satisfactory completion. Persons holding this certificate are deemed acceptable to perform Inorganic Data Validation for the New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation.

I am also enclosing a course evaluation for you to complete if you have not already done so. The information you provide will greatly aid us in structuring further courses. We wish to make these course offerings as relevant, targeted and comprehensive as possible. Your evaluation is vital to that end.

Congratulations on your achievement. I look forward to seeing you again at another professional conference or course. We will be co-sponsoring an environmental monitoring conference on October 21, 1993 with the New York Water Pollution Control Association, Lower Hudson Chapter, at IBM's Yorktown Heights, NY site. Information regarding this event will be going out in August.

Very truly yours,

Elaine Sall

Elaine Sall
Program Coordinator

ES/bf

Enclosures

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

Appendix F
Sub-Slab Depressurization System (SSDS) Design

SECTION 025000
SITE REMEDIATION

PART 1 INTRODUCTION

1.1 SECTION INCLUDES
A. All labor, materials, equipment and incidentals that are required to furnish and install a sub-slab depressurization system (SSDS) as shown, specified, and required to complete the Work.

1.2 TABLE OF CONTENTS
A. This specification is arranged as follows:

PART 1 - INTRODUCTION
- 1.1 Section Includes
- 1.2 Table of Contents
- 1.3 Disclosed Documents
- 1.4 Related Sections
- 1.5 Background

PART 2 - SYSTEM REQUIREMENTS
- 2.1 General Requirements
- 2.2 Quality Control
- 2.3 Product Requirements
- 2.4 Product delivery, storage and Handling Requirements

PART 3 INSTALLATION
- 3.1Protecting Installed Construction
- 3.2 Field Engineering
- 3.3Existing Conditions
- 3.4 Sub-Slab System
- 3.5 Above-Ground System
- 3.6 Testing of Equipment and Starting of the System
- 3.7 Close-Out Procedures
- 3.8 Active SSDS Alternate Items

1.3 DISCLOSED DOCUMENTS
One relevant document has been prepared for the Site that relate to this Section:

A. Interim Remedial Measures (IRM) Work Plan, dated March 2017 by Matthew M. Carroll, PE and Tenen Environmental, submitted to the New York State Department of Environmental Conservation (NYSDEC). Appendix C includes the layout for the off-Site sub-slab depressurization system (SSDS) within the Rochdale Village Mall #2 commercial spaces, as updated from time to time.

1.4 BACKGROUND
The Site is in the NYSDEC Brownfield Cleanup Program (BCP) as Site #C241166. The RAWP include the installation of an SSDS, which is described in this Section. Other Agency requirements are detailed in the Disclosed Documents.

PART 2 SYSTEM REQUIREMENTS

2.1 GENERAL REQUIREMENTS
1. See drawings X-100 and X-101 for pressure test locations and SSDS layouts below and above the slab, respectively.

2. See drawing X-102 for the SSDS layout on the roof.
3. See drawing X-103 for SSDS details.
4. As shown on the drawings, there is one systems with two suction pits.
5. The term "Engineer" shall mean a representative of the Remedial Engineer for the project.
6. The term "provide" means furnish and install complete and ready for intended use, as applicable in each instance. All materials and equipment shown, specified and/or required for the intended use shall be furnished and installed.
7. Any proposed changes to the SSDS must be approved in writing by the Engineer.
8. In strict accordance with all applicable codes, regulations and ordinances having jurisdiction, Contractor shall give all notices and comply with all codes, laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance and execution of the work. Electrical systems shall be installed in accordance with all applicable municipal and state jurisdictional codes, the National Electric Code and utility company specifications. All work shall be performed in strict adherence with the latest editions of the BOCA National Building Codes, the State of New York Uniform Construction Code and the Occupations Safety & Health Administration (OSHA) regulations. All materials, workmanship and construction shall conform to all current prevailing state, county, municipal and/or utility company specifications, standards and requirements.
9. The Contractor shall identify, apply for and obtain and pay all fees for licenses, permits, approvals and insurance required from federal, state and local governmental and public agencies and authorities as necessary to perform the work. The Contractor shall provide indemnification to public and private agencies and authorities as necessary to perform the work.
10. If any law, regulation or the plans have contradicting requirements, then the most stringent requirement shall apply, as determined by the Engineer.
11. Contractor's responsibilities include arranging for inspections and obtaining the Engineer's approval prior to finalization of work.
12. The Contractor shall supervise and direct the work using the best construction skills and attention. The Contractor shall be solely responsible and have control over construction means, methods, techniques, sequences and procedures. The Contractor shall be solely responsible for coordination all portions of the work.
13. The Contractor shall furnish all labor, equipment, materials, supplies, facilities, water, power and incidentals as necessary to construct and fully complete the work as shown, as specified and as directed by the Engineer. The Contractor shall be responsible for performing all the work described and shown including items not specifically identified as required to complete the work as to provide a complete SSDS, ready for use.
14. The SSDS shall be installed in accordance with the specifications controlling the mechanical, electrical and plumbing contracts.
15. Label all accessible components of the SSDS (including but not limited to the above-grade piping where exposed or concealed above the ceiling) with permanent letter as follows: "COMPONENT OF THE SUB-SLAB DEPRESSURIZATION SYSTEM – DO NOT ALTER OR DISCONNECT".

2.2 QUALITY CONTROL

1. Contractor's responsibilities include arranging inspections and obtaining the Engineer's approval prior to concealment of work. At a minimum, inspection of the Owner or it's approved representative of all components of the SSDS shall be required and the Contractor shall be required to obtain approval of all components of the SSDS by the

Owner or it's approved representative upon completion of installation. Additional inspections, examination and quality control measure may be required as per manufacturers' recommendation and are the responsibility of the Contractor. The Owner reserves the right to perform additional inspection or quality control tests as deemed necessary by the Owner at any point during the installation process at no additional cost to the Owner.

2. Pre-installation Meeting; The Contractor shall arrange for and convene a pre-installation meeting prior to the start of work of this Section to review installation procedures, protection, and coordination with other work. The meeting shall be held on a date that is a minimum of ten business days prior to start of the work of this Section.
3. Whenever construction work is in progress or preparation, the Contractor shall permit access and inspection and shall provide proper and necessary facilities to representatives of the Owner, Engineer and regulatory agencies. Contractor shall fully cooperate with all testing performed the Owner or Engineer during construction and shall not make any claims for additional time or payment for cooperating fully.

2.3 PRODUCT REQUIREMENTS

1. All materials and equipment furnished shall be new, in first-class condition, supplied directly from original equipment manufacturers or approved distributers and installed in accordance with manufacturer's recommendations.

2.4 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

Deliver products to the site in manufacturers' original packaging, with labels clearly identifying product and manufacturer.

1. Store materials in a clean and dry area in accordance with manufacturers' instructions.
2. Protect materials during handling and installation to prevent damage.
3. Examine all equipment and materials before installation. Do no install any equipment or material that is found to be defective.

PART 3 INSTALLATION

1. Equipment and materials shall be installed in accordance with the requirements herein, as shown on the drawings, in accordance with manufacturers' specifications and recommendations and with applicable building code requirements.
2. Contractor shall permanently support all SSDS components in accordance with building code requirements.
3. Contractor shall perform all required wiring and electrical work for fully functioning SSDS.

3.1 PROTECTING INSTALLED CONSTRUCTION

1. It is the sole responsibility of the Contractor to ensure that no damage occurs to components of the SSDS prior to, during or following installation of the SSDS. Any damages to the SSDS during performance of the work shall be repaired and tested at no additional cost to the Owner.

3.2 FIELD ENGINEERING

1. Contractor shall be solely responsible for all locations, dimensions and elevations. No data other than written order of the Engineer shall justify departure from the dimensions and elevations required by the drawings.
2. Contractor shall employ or retain at the location of the work, a field Engineer or superintendence capable of performing engineering tasks required of the Contractor.

3.3 EXISTING CONDITIONS

1. Contractor shall become fully acquainted with the conditions as they exist in order that the restrictions attending the work are understood. All areas and dimensions of the drawings shall be verified by the Contractor at the site. Failure of the Contractor to examine the site shall not relieve the Contractor from any obligation.
2. All conditions and dimensions shall be verified by the Contractor prior to the start of construction. It is the Contractor's responsibility to report to the Owner, in writing, significant variations or discrepancies from the conditions noted or implied, immediately upon discovery of such conditions and prior to scheduling the work.

3.4 SUB-SLAB SYSTEM

1. Install eleven suction pits as shown on drawings X-100 and X-103.
2. Slope all solid horizontal pipes a minimum 2% uniformly toward suction pits, so as to not allow for water pooling in the portions of solid pipe.
3. Connect sub-slab piping to a vertical riser extending through the roof.
4. Obtain Engineer's approval prior to re-installating the concrete slab at the suction pits and installing the pressure monitoring points.
5. Geotextile fabric to be placed on properly compacted and prepared subgrade within the suction pits shall be a non-woven polypropylene type, Mirafi N-series product type 140NL or approved equal having the following properties.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	lbs (N)	120 (534)	120 (534)
Grab Tensile Elongation	ASTM D4632	%	50	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	50 (223)	50 (223)
CBR Puncture Strength	ASTM D6241	lbs (N)	310 (1380)	
Apparent Opening Size (AOS)[1]	ASTM D4751	U.S. Sieve (mm)	70 (0.212)	
Permittivity	ASTM D4491	sec^{-1}	1.7	
Flow Rate	ASTM D4491	$gal/min/ft^2$ ($l/min/m^2$)	135 (5500)	
UV Resistance (at 500 hours)[2]	ASTM D4355	% strength retained	70	

[1] ASTM D4751: AOS is a Maximum Opening Diameter Value
[2] Modified

6. Washed gravel layer shall be ¾-inch washed stone with 100% passing the 2-inch sieve and 0% passing the ¾-inch sieve, by weight. Gravel layer to be placed on the geotextile fabric.
7. Consult with Engineer for blower test prior to construction of vertical riser outside of building.
8. Locations of monitoring points may be changed upon approval from Engineer.
9. Monitoring points shall be installed through the floor slab as shown on Drawing X-103.
10. Monitoring points shall consist of the sub-slab vapor probe kit manufactured by AMS product #52954 or approved equal. The monitoring points shall be installed through the cellar slab. Penetrations through floor slab for monitoring points shall be air-tight and completed monitoring points shall be air-tight, preventing the potential for migration of gas from the sub-slab into the building.
11. The screen and/or opening of the sub-slab monitoring points shall be installed within two inches of the bottom of the slab.

3.5 ABOVE-GROUND SYSTEM

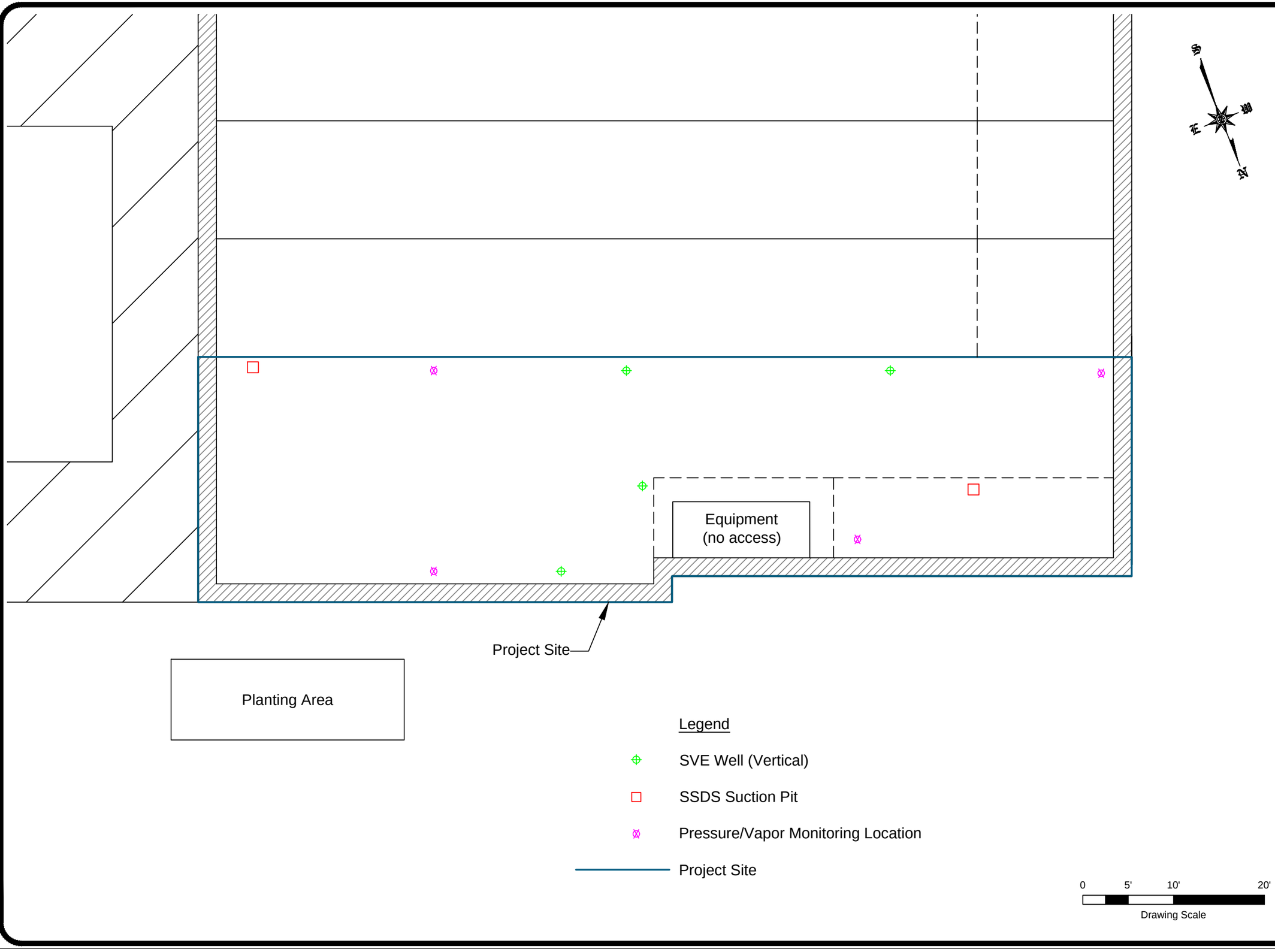
1. Slope all horizontal above-ground pipes a minimum 1% uniformly to vertical riser.

2. Connect vertical riser to exterior suction fan on roof.
3. Continuous tape labeling on riser pipe beginning at the floor slab elevation, within each floor level and continuing to the installation of the suction fan above roof penetration shall be permanently installed on riser, shall indicate flow direction and shall read "CAUTION: DO NOT TAP OR PUNCTURE. SUBSURFACE VAPOR VENT PIPE. NOT FOR DOMESTIC USE."
4. Furnish, install test and place pressure gauge and switch, valves and suction fan in service in accordance with manufacturers' recommendations and accessories as required for a complete and fully functional installation.
5. The pressure monitor and switch and suction fan shall be as directed by Engineer subsequent to blower test. Items specified below are typical and should not be furnished without written approval by Engineer.
6. The pressure monitor shall be a Wika pressure indicator, model 612.20 Part 9747724 or approved equivalent.
7. The pressure switch shall be an Ashcroft pressure switch, watertight enclosure, product model B4-24-B-000-NEG50"H20 or approved equal.
8. The pressure switch shall activate a local alarm at low pressure. The Engineer shall establish set point in the field.
9. The suction fan shall be a Plastec direct-drive suction fan product model PLA 20 X52P or approved equivalent with Weather Hood Enclosed Pedestal (PLA WH3). The discharge position shall be CCW90.
10. Valves shall be 6-inch diameter cast iron butterfly valves with hand levers as manufactured by Saunders, Xomox, Crane or approved equivalent.
11. Provide local power disconnect switch near suction fan as required by code.
12. Power requirements for motor are: 115/208-230 volt.
13. A flexible connector shall be installed on the suction fan inlet. A transition type flexible outlet connector shall be furnished and installed on the suction fan outlet.
14. Exhaust discharge shall by a minimum 2-feet above the roof.
15. Exhaust discharge point shall be at least 25-feet from any building operable openings, air intakes, supply registers or adjoining or adjacent buildings. Exhaust pipe shall terminate in a vertical position above the roof.
16. Remote alarm shall be the building security system. The alarm panel shall include warning lights, audible alarm and an appropriate enclosure. The remote alarm shall be configured such that if the pressure falls below the set point, the remote alarm will be activated.
17. Remote visual alarm shall be labeled as follows: "Sub-slab gas venting system alarm. Fan malfunction if lit. Service immediately."

3.7 CLOSE-OUT PROCEDURES

1. Contractor shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces; remove labels, tags, packing materials and other foreign items or substances from interior and exterior surfaces, equipment, signs and lettering.
2. At the time of substantial completion, an inspection shall be held with the Owner and Engineer. At this time, the Contractor shall also provide any manufacturers' Owner's manuals and warranties.
3. Legally transport and dispose of off-site all generated waste.

END OF SECTION



SITE

HIP Cleaners
Rochdale Village
169-47 137th Avenue
Jamaica, Queens

CONSULTANT

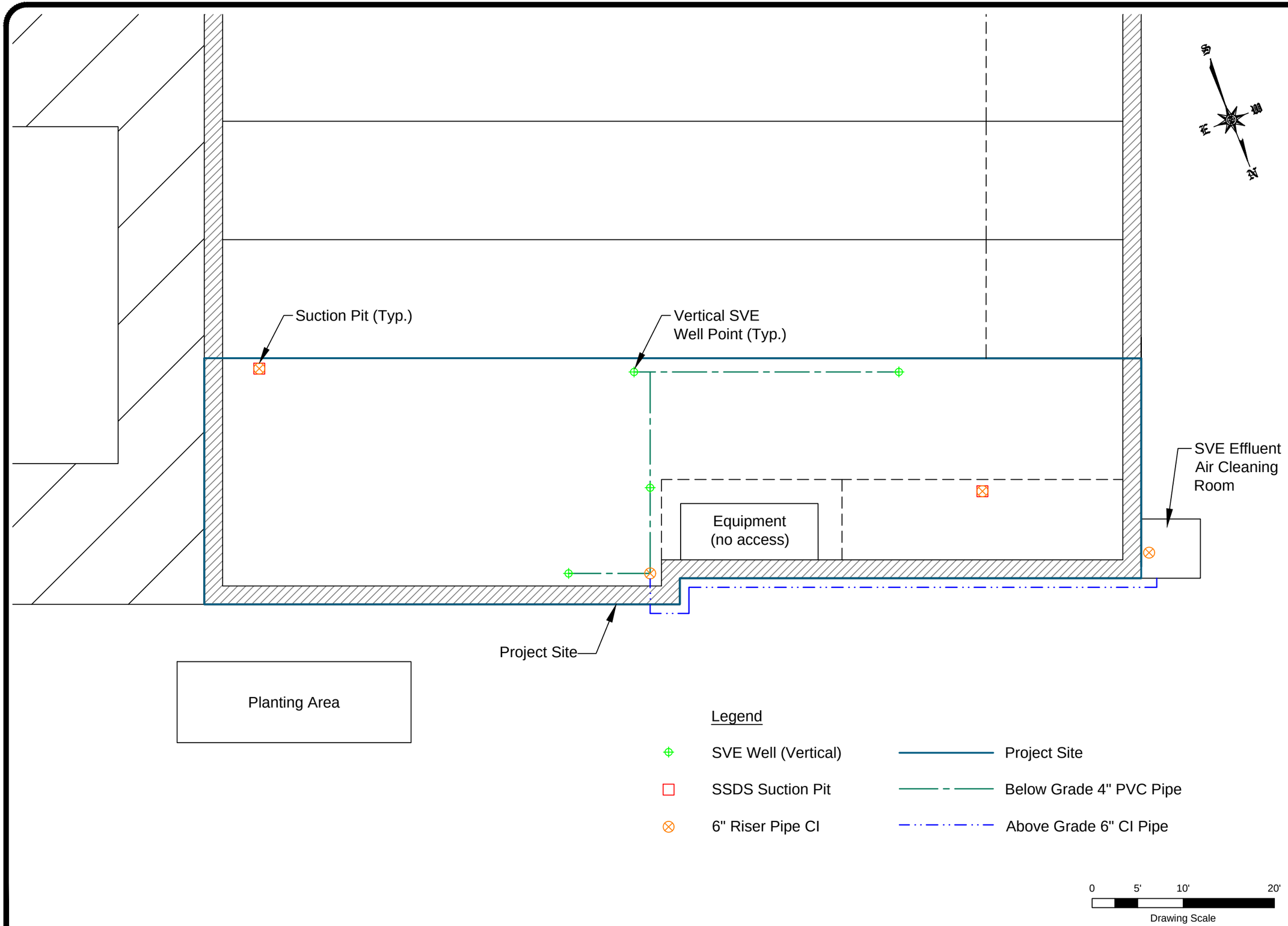
TENEN ENVIRONMENTAL

TENEN ENVIRONMENTAL, LLC
121 West 27th Street
Suite 702
New York, NY 10001
O: 646-606-2332
F: 646-606-2379

DRAWN BY	CHECKED BY	DATE	SCALE:
LM	KM	March 2019	As Noted

DRAWING TITLE: SVE and SSDS Layout

DRAWING NO.: X-100



SITE

HIP Cleaners
Rochdale Village
169-47 137th Avenue
Jamaica, Queens

CONSULTANT

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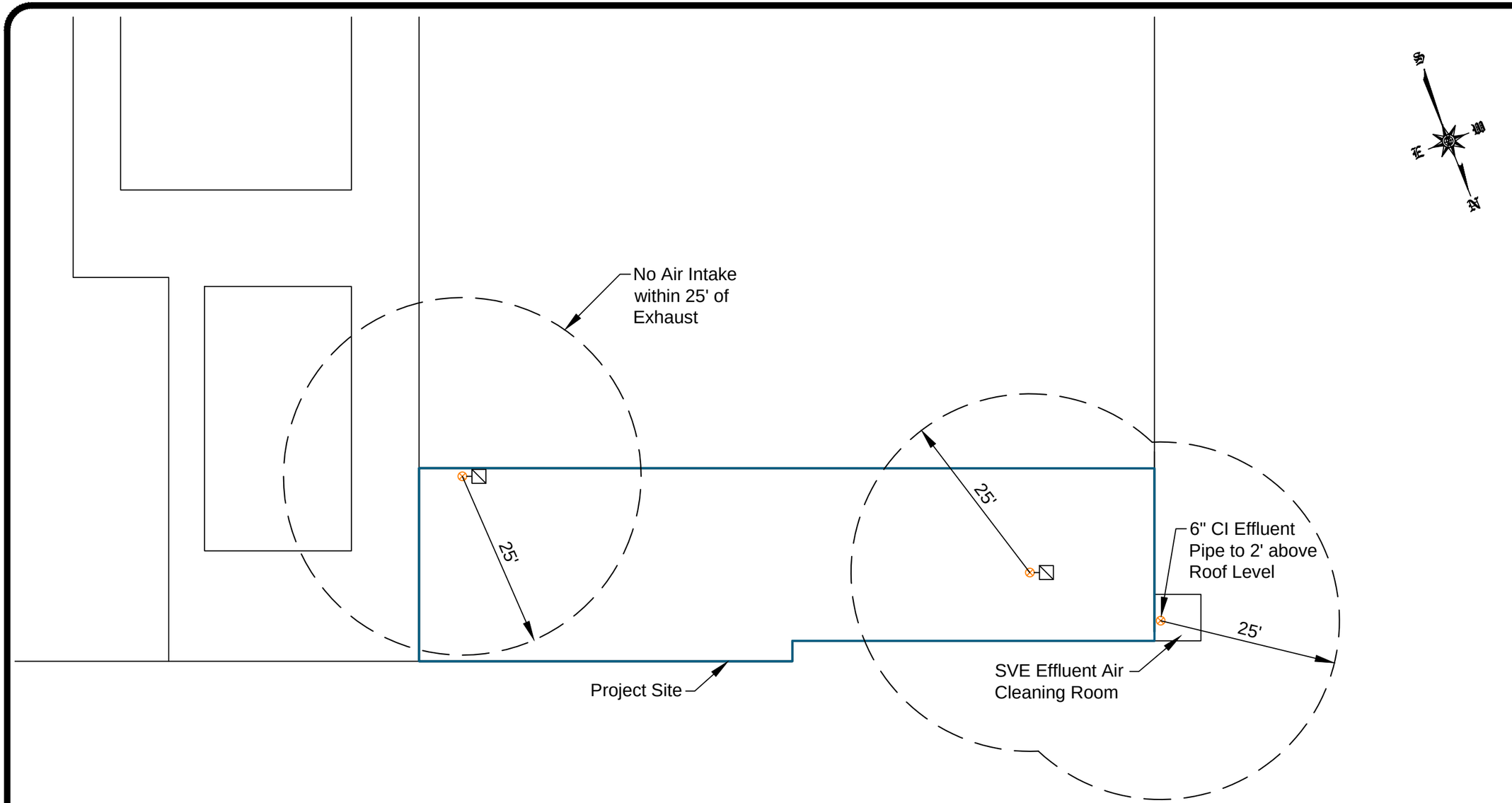
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	KM	March 2019	As Noted

DRAWING TITLE: SSDS/SVE Piping Layout

DRAWING NO.: X-101



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LM	KM	March 2019	As Noted

DRAWING TITLE: Roof Layout

DRAWING NO.: X-102

Appendix G
Draft Operations, Maintenance and Monitoring (OM&M) Plan

OPERATIONS, MAINTENANCE & MONITORING (OM&M) PLAN

SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS) and SOIL VAPOR EXTRACTION (SVE) SYSTEM

for
HIP Cleaners- Rochdale Village
Remedial Action Work Plan

165-50 Baisley Boulevard, Jamaica
Block 12495, portion of Lot 2
BCP Site # C241166

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
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May 2019

OPERATIONS, MAINTENANCE AND MONITORING (OM&M) PLAN

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OPERATIONS, MAINTENANCE AND MONITORING (OM&M) PLAN

1.0 INTRODUCTION

This Operations, Maintenance and Monitoring (OM&M) Plan has been developed to detail the engineering controls (ECs) implemented as part of the Remedial Action Work Plan prepared for JS Cleaners (the Site).

The HIP Cleaners (the Site) is located in the Rochdale Village Mall #2 at 169-47 137th Avenue in the Jamaica Section of Queens, New York. The HIP Cleaners is an active dry cleaning facility, located in a 3,330 square foot (sf) retail space within a strip mall in Rochdale Village community. Rochdale Village community is a 115-acre area, which includes twenty 14-story residential apartment buildings with associated management office, power plant, community center, maintenance and public safety building, two retail malls (Mall #1 and #2), medical offices, gasoline station, open space and parking areas. HIP Cleaners is the leaseholder for the current tenant space and has conducted dry cleaning operations at the Site since 1967.

1.1 Background

Environmental investigations at the Site have documented elevated concentrations of chlorinated solvents in the sub-slab soil vapor and soil. There is the potential for an indoor air intrusion condition.

In order to address the potential for indoor air quality impacts from the soil and sub-slab soil vapor, an active sub-slab depressurization system (SSDS) and soil vapor extraction system (SVE) has been designed and will be incorporated into the current building plan.

1.2 Summary of Engineering Controls (ECs)

Engineering Controls (ECs) to address residual contamination through physical protective measures at the Site have been incorporated to ensure that the Site remains protective of public health and the environment.

A sub-slab depressurization system (SSDS) is in the process of being installed below the current slab within Mall #2. This SSDS system will extend to the Site. The principal components of the SSDS are a layer of gravel beneath the basement slab, two suction pits within the gravel layer, solid-construction piping from each suction pit to an exterior suction fan on the roof and monitoring points through the basement slab. The goal of the system was to create a pressure differential of at least -0.002 inches of water column (in-wc) between the at grade floor and sub-slab environments. A visual and audible alarm will be installed in the basement to notify the building management if the pressure at the suction fan has dropped below 50% of the start-up pressure. The system was designed in general accordance with NYSDOH's Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 (NYSDOH Soil Vapor Guidance).

Addtionally, a soil vapor extraction (SVE) system will be installed to treat impacts in the soil below HIP Cleaners. A minimum of four vertical SVE wells will be installed around the areas of documented PCE contamination to approximately three feet above the depth of groundwater, to be determined in field. The SVE system is designed to treat the on-site soil, incorporating an assumed radius of influence (ROI) across the Site. Given the assumed soil permeability of historic fill and no intervals of varying permeabilities, a maximum ROI of 25 feet is proposed. Pressure/vapor monitoring locations will be installed at assumed ROI extents. A vacuum reading of 0.1 in-wc induced at these locations will be considered an acceptable value indicating that the vacuum is being appropriately induced within the extraction wells. The proposed SVE layouts and details are included on drawings X-100 through X-103, included in Appendix F.

The extraction wells will be connected with PVC piping via trenching. Above grade cast iron piping will be routed to the back of the building and connected to a vacuum blower. A blower test will be completed to appropriately size the fan. The SVE exhaust stream will be sampled prior to system start up and air cleaning requirements will be designed subsequent to sample analysis.

2.0 Engineering Control Operations

Four permanent ECs are being incorporated into the building as part of this IRM Work Plan to address potential soil vapor intrusion at the Site. The ECs are:

- an active sub-slab depressurization system (SSDS);
- a soil vapor extraction system;
- a composite cover system; and,
- post-remedial groundwater monitoring.

General design drawings and specifications are included in the Appendices.

2.1 Sub-Slab Depressurization System (SSDS)

The SSDS will reduce the potential for soil vapor migration into the building. The SSDS will be inspected at specific intervals as defined in this OM&M.

2.2 Soil Vapor Extraction (SVE) System

The SVE system will treat the remaining chlorinated volatile impacts in the soil. The SVE will be inspected at specific intervals as defined in this OM&M.

2.3 Composite Cover System

Exposure to soil, groundwater, and soil vapor would be prevented by a composite cover system that will be maintained the Site. The composite cover system will be the existing concrete building slab.

2.4 Groundwater Monitoring

Long-term monitoring (eight quarterly events) of the groundwater will be conducted to confirm groundwater concentrations. All quarterly monitoring samples will be analyzed for VOCs.

While post-remedial groundwater monitoring is part of the selected remedy, it is presented as an EC because it will continue after the Final Engineering Report (FER) and Site Management Plan (SMP) are submitted.

3.0 Routine Maintenance and Monitoring

EC inspections will be performed by a person knowledgeable with the mechanical systems present in the building and familiar with the property and may include a building or property superintendent.

3.1 EC Inspection Frequency

Site inspection and certification for performance of the active SSDS will be performed on a schedule detailed in the Final Engineering Report (FER) and reported in a Periodic Review Report (PRR).

3.2 EC Inspection Components

The EC inspections will evaluate the following:

- continued performance of ECs as designed;
- compliance with this SMP;
- continued achievement of remedial performance criteria;
- accuracy and completeness of Site records;
- necessity for any changes to the remedial systems; and
- general Site conditions at the time of inspection.

In the event of an emergency, such as a natural disaster or an unforeseen failure of any of the ECs, an inspection of the ECs will be conducted by a Qualified Environmental Professional (QEP), as defined by NYSDEC.

3.3 EC Inspections

3.3.1 Sub-Slab Depressurization System (SSDS)

EC inspections of the SSDS components shall include the following:

- Observe visible components (fan, vacuum alarm/monitor, vacuum gauge, tubing, riser pipe, etc.) for physical wear, damage and operational issues, and replace as necessary;
- Remove any blockages in vacuum monitor and gauge tubing and riser pipe taps;
- Verify operation of vacuum monitor by disconnecting tubing from riser pipe and noting if the building notification system goes into alarm mode;
- Verify operation of vacuum gauge by disconnecting tubing from riser pipe and noting if the indicator moves to zero (check high and low pressure ports to see if they are plugged correctly);
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness;
- Inspect condition of muffler (if installed) at end of outlet pipe; and
- Inspect power to fan by operating dedicated switch.

3.3.2 SVE System

EC inspections of the SVE system components shall include the following:

- Observe visible components (fan, vacuum alarm/monitor, vacuum gauge, tubing, riser pipe, air cleaning filters etc.) for physical wear, damage and operational issues, and replace as necessary;
- Remove any blockages in vacuum monitor and gauge tubing and riser pipe taps;
- Verify operation of vacuum monitor by disconnecting tubing from riser pipe and noting if the building notification system goes into alarm mode;
- Verify operation of vacuum gauge by disconnecting tubing from riser pipe and noting if the indicator moves to zero (check high and low pressure ports to see if they are plugged correctly);
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness;
- Inspect air cleaning (if required) for operational issues;
- Inspect condition of muffler (if installed) at end of outlet pipe; and
- Inspect power to fan by operating dedicated switch.

3.3.3 Composite Cover System

EC inspections of the composite cover shall include observations of the concrete building slab if present. The composite cover will be inspected for cracks, holes or other openings that will provide access to the soil/fill below the cover. If any cracks, holes or other openings are observed in the composite cover during the EC inspection, the inspector will make a recommendation that such cracks, holes or openings be immediately filled and/or sealed as necessary.

3.4 Inspection Reporting

EC inspections will be performed by a person with knowledge of the mechanical systems present in the building and familiar with the property. Inspection results will be reported to NYSDEC in a PRR.

3.5 Certifications

The results of the EC inspections will be certified at the time of the inspection and the signed certifications included in the PRR.

The Inspection Certification will certify whether:

- on-site ECs are unchanged from the previous certification;
- on-site ECs remain in-place and effective;
- on-site ECs are performing as designed; and
- anything has occurred that would impair the ability of the controls to protect public health and the environment.

4.0 EMERGENCY CONTACT NUMBERS

In the event of any emergency condition pertaining to any EC, the current Owner's representative(s) should contact the appropriate parties from the contact list below. Prompt contact should also be made to a Qualified Environmental Professional (QEP), as defined by NYSDEC. These emergency contact lists must be maintained in an easily accessible location at the Site.

Emergency Contact Numbers

Contact	Number
Medical, Fire and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Project Contact Numbers

Contact	Number
Matthew Carroll Tenen Environmental	(646) 606-2332

Appendix A

Sub-Slab Depressurization System and Soil Vapor Extraction System

Appendix A-1

SSDS and SVE Design – As-Built

Appendix A-2

SSDS and SVE Operation – Routine Operating Procedures

Sub-Slab Depressurization System (SSDS) and Soil Vapor Extraction (SVE)

Routine Operating Procedures

The long-term operation and maintenance program described below shall continue throughout the life cycle of the sub-slab depressurization system (SSDS) and soil vapor extraction (SVE) system to ensure a proper working order. The long-term operation and maintenance program for the major SSDS and SVE components includes manufacturer's recommendations for the reinstallation of SSDS and SVE components if modifications to the existing system need to be made, inspection procedures, an operation schedule, typical routine maintenance activities and schedules, and troubleshooting. Refer to Section 3.3.3 for an overall inspection procedure of the SSDS.

The alarm system, described below, shall run continuously and only be disconnected for routine maintenance and inspection activities or replacement. The system includes the following:

- vacuum gauge/switch (Ashcroft pressure switch, watertight enclosure, product model B4-24-B-000-NEG50"H20
- building alarm system, activated through network interface device (NID) box

In case there is a need to relocate the vacuum gauge/switch, the new location shall ensure that the vacuum gauge/switch remains in close proximity to the riser pipe and is installed correctly. If the vacuum gauge is not indicating a vacuum while the SSDS and SVE are on, make sure that the tubing connected to the riser pipe is connected to the low pressure port. High pressure ports on the vacuum gauge/switch should be vented to atmosphere.

The vacuum gauge/switch does not require lubrication or periodic servicing. The vacuum gauge is not field serviceable and should be returned to the manufacturer or supplier if repair is needed. Repairs or alterations made to the vacuum gauge/switch by others will void the unit's warranty. The vacuum gauge/switch is factory calibrated and cannot be recalibrated in the field. The installation and operating instructions for the vacuum alarm/monitor have been included in Appendix A-3.

When testing the vacuum alarm/monitor, the tubing that connects the vacuum alarm/monitor to the riser pipe shall be disconnected and the low set point raised above the current reading. If the vacuum alarm/monitor is powered at the time of disconnecting the tubing from the riser pipe, the building system will go into alarm. The building system should go back on-line when the tubing is reconnected to the riser pipe. If the building system is in alarm when there is a vacuum present in the riser pipe, inspect the tubing and riser pipe tap to ensure that there are no blockages. If there is a blockage in either the tubing or the riser pipe tap, remove the blockage and retest the vacuum alarm/monitor.

Common troubleshooting tips that can be followed if the vacuum gauge/switch will not indicate a vacuum or is sluggish include the following:

- The pressure ports (high or low) are not hooked up correctly;
- The fittings or sensing lines are blocked, pinched or leaking;
- The cover is loose;
- The pressure sensor is improperly located;
- The ambient temperature is too low (below 20ºC).

The Industrial Plastic Fan direct-drive suction fan model 180 (CDD180) with a 1 horsepower Premium Efficiency BALDOR motor shall operate continuously and only be turned off for routine maintenance and inspection activities or replacement. The SSDS fan and motor shall not be left on the system piping without electrical power for more than 48 hours due to possible fan failure that could result from this non-operational storage. The SSDS fan unit does not require periodic servicing and should be returned to the manufacturer or supplier for service. Repairs or alterations made to the SSDS fan unit by others will void the unit's warranty. The installation and operating instructions for the SSDS fan unit have been included in Appendix A-4.

Appendix A-3

SSDS and SVE Vacuum Gauge and Switch – Installation and Operating Instructions

Appendix A-4

SSDS and SVE Fan and Motor – Installation and Operating Instructions