1199 SUTTER AVENUE
BROOKLYN, NEW YORK

Remedial Action Work Plan

NYSDEC BCP Number: C224141

Prepared for:

AAA Sutter Realty, LLC
153-157 Seventh Street
Garden City, New York 11530

Prepared by:

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NOVEMBER, 2018

EnviroTrac
Environmental Services

CERTIFICATIONS

I, Dale Konas, certify that I am currently a NYS registered professional engineer 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).

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

STATE OF NEW YORK
DALE C. KONAS
No. 081035
LICENSED PROFESSIONAL ENGINEER

081035	11/6/18	
NYS Professional Engineer #	Date	Signature

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

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

Acronym	Definition
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	Dichloroethene
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-boc	Feet below top of well casing
Ft-bg	Feet below sidewalk grade
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
NGVD	National Geodetic Vertical Datum
NIOSH	National Institute for Occupational Safety and Health
NYCDEP	New York City Department of Environmental Protection
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
OSHA	Occupational Safety and Health Association
PCB	Polychlorinated Biphenyl
PCE	Perchloroethene, aka tetrachloroethene
PID	Photoionization detector

PP Metals	Priority Pollutant Metals
PPE	Personal protective equipment
QA/QC	Quality assurance / quality control
QAPP	Quality Assurance Project Plan
RAWP	Remedial Action Work Plan
RCNY	Rules of City of New York
RMO	Remedial Measure Objective
RE	Remedial Engineer
RI	Remedial Investigation
RSCOs	Recommended Soil Cleanup Objectives
RCUSCOs	6 NYCRR 375-6.8(b) Track 4 - Restricted Commercial Use Soil Cleanup Objectives
SB	Soil boring
SV	Soil vapor
SMP	Site Management Plan
SMMP	Soil/Materials Management Plan
SSDS	Sub-slab depressurization system
SVE	Soil vapor extraction
SVOC	Semi-volatile organic compound
TAL	Target Analyte List
TB	Trip blank
TCE	Trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCLP Limits	USEPA Maximum Concentrations of Contaminants for the Toxicity Characteristic
USEPA	United States Environmental Protection Agency

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 August 2, 2012, AAA Sutter Realty (the “Applicant”) entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) to investigate and remediate the Site located at 1199 Sutter Avenue, Brooklyn, New York (herein referred to as the Site) as a Participant. The BCA Site No. is C224141.

The Site is the easternmost unit within a retail building with the addresses 1199-1221 Sutter Avenue in Brooklyn, New York. The Site is bounded by Sutter Avenue to the south, Chestnut Street to the east, residential properties to the north and Crystal Street to the west. The Site contains a single-story commercial building along the southern portion and an asphalt parking lot covering the northern portion. Catch basins within the parking lot direct runoff into the municipal stormwater drainage system. The building at the Site is divided into five separate retail/office units.

A dry cleaner establishment formerly occupied the easternmost unit, which is currently occupied by a self-service laundromat. Sanitary waste and waste water from the laundromat are discharged to the municipal sewerage system located beneath Sutter Avenue. The building is underlain with a basement segmented for each retail unit with utilities, storage, and service rooms.

A sub-slab depressurization system (SSDS) was installed in the basements of the former dry cleaner and adjoining supermarket in May, 2017. The SSDS consists of eight (8) vapor extraction points and two (2) blowers mounted on the northern exterior wall.

Summary of the Remedial Investigation

Subsurface investigations and Interim Remedial Measures (IRMs) were conducted at the Site from January, 2009 through August, 2017, which included soil, soil vapor, ambient air, and groundwater sampling events, and insitu chemical oxidation (ISCO) injections. Below lists the previously performed investigations and IRMs for the Site.

- **Summary Letter of Phase II Subsurface Investigation, 1199-1221 Sutter Avenue, Brooklyn, New York. Atlantic Environmental Solutions, Inc., January 12, 2009;**
- **Phase II Subsurface Investigation, 1199-1221 Sutter Avenue, Brooklyn, New York. Associated Environmental Services, Ltd., May 19, 2009;**
- **Remedial Action Report, 1199-1221 Sutter Avenue, Brooklyn, New York. Associated Environmental Services, Ltd., January 29, 2010;**
- **Remedial Action Report Addendum, 1199-1221 Sutter Avenue, Brooklyn, New York. Associated Environmental Services, Ltd., March 24, 2010;**
- **Remedial Investigation Report, 1199-1221 Sutter Avenue, Brooklyn, New York. Associated Environmental Services, Ltd., July 23, 2015;**
- **Supplemental RIR, 1199-1221 Sutter Avenue, Brooklyn, New York. Associated Environmental Services, Ltd., July 6, 2016;**
- **On-site Soil Vapor Intrusion Report, 1199 Sutter Avenue, Brooklyn, New York. EnviroTrac, Ltd., May 2, 2017.**
- **Interim Remedial Measures Report, 1199 Sutter Avenue, Brooklyn, New York. EnviroTrac, Ltd., March 2, 2018.**

Soil

Soil samples were collected from the Site during the Phase II ESA, Supplemental Phase II ESA, Site Characterization, and Supplemental RIR. The soil sampling results showed that tetrachloroethene (PCE) and acetone were detected at concentrations that exceeded the 6 NYCRR Part 375 Subpart 375-6.8 Unrestricted Use Soil Cleanup Objectives (UUSCOs) in several borings located beneath the former dry cleaner and in the rear parking lot to the north of the former dry cleaner unit. Concentrations of PCE also exceeded the Residential Use SCO in one (1) boring and the Restricted Residential Use SCO in one (1) boring.

Groundwater

Groundwater samples were collected from the Site during the Phase II ESA, Supplemental Phase II ESA, two (2) IRM events, Site Characterization, RIR, Supplemental RIR, and other groundwater sampling events. Groundwater samples were also collected from the adjoining properties to the south and east during the Site Characterization, RIR, Supplemental RIR, IRM performed in 2017, and other groundwater sampling events. Groundwater samples were also collected from the adjoining properties to the south and east during the Site Characterization, RIR, and Supplemental RIR.

The groundwater monitoring results from 2009 to 2016 showed that PCE, trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), acetone, and chloroform were detected at concentrations that exceeded the NYSDEC Class GA Ambient Water Quality Standards and Guidance Values (GWQSs) in samples collected beneath the former dry cleaner, in the rear parking lot to the north of the former dry cleaner unit, to the south beneath the sidewalk along the northern and southern portions of Sutter Avenue, and on the adjoining property to the south (New York City Housing Authority apartment complex), across Sutter Avenue. The results of the investigations showed that CVOCs in groundwater exist beneath the Site and have migrated to the south, across Sutter Avenue. The groundwater concentrations detected in the wells across the street on the south side of Sutter Avenue were significantly lower than the concentrations detected in the wells at the Site.

From May 2017 to August 2017 as part of the 2017 IRM, four (4) rounds of groundwater sampling were performed to monitor conditions prior to and after ISCO injections were performed at the Site. Groundwater results indicated concentrations for PCE exceeded its NYSDEC GWQS of 5 ug/L for all sampling events in four (4) wells.

Soil Vapor Intrusion

Sub-slab soil vapor samples, soil gas samples, indoor air samples, and outdoor air samples were collected from the Site and in the vicinity of adjoining properties to the north, south, and east during the Site Characterization, RIR, and On-site Soil Vapor Intrusion Investigation Report. Access to the interior of the adjoining properties to the north (548 Chestnut Street, 552 Chestnut Street) and south (The New York City Housing Authority apartment building located along Euclid Avenue) was not obtained for any of the investigations, however, soil gas samples were collected in the vicinity of these properties with the exception of the recent On-site Soil Vapor Intrusion Investigation performed in March, 2017. The results were compared to the

NYSDOH Matrices A, B, and C included in the NYSDOH Guidance For Evaluating Soil Vapor Intrusion in the State of New York, October, 2006. The results of the investigations showed that vapors emanating from soil and groundwater located beneath the Site were infiltrating into the former dry cleaner unit and had the potential to infiltrate into the adjacent supermarket unit. Potential exposure to vapor sin the on-Site building will be mitigated through the installation and operation of an on-Site soil vapor extraction (SVE) system and the future operation of a sub-slab depressurization system (SSDS) when the SVE is discontinued.

Additionally, the 2017 on-Site soil vapor intrusion investigation results show that the indoor air and sub-slab soil vapor concentrations for PCE and TCE were significantly reduced when compared to the 2011 results. Based on the sub-slab soil vapor and indoor air results for TCE, mitigation beneath the former dry cleaner (current laundromat) was warranted.

Qualitative Human Health Exposure Assessment

The results of the remedial investigations provided sufficient data to complete a Qualitative Human Health Exposure Assessment which identified one (1) exposure pathway.

Site occupants will not be exposed to contaminated soil located beneath the Site via ingestion or dermal contact due to the existence of a Site cover in the form of the building and paved surfaces and planned application of Institutional Controls (ICs). During remedial activities, there is the potential for exposure to on-Site soils by Site workers performing the remedial activities, Site occupants, and the surrounding community. Measures will be implemented to limit or eliminate that exposure and will be included in the Health and Safety Plan and Community Air Monitoring Plan.

Site occupants will not be exposed to contaminated groundwater beneath or downgradient of the Site via ingestion or dermal contact since the Site and surrounding properties are provided drinking water from a public water supply.

The potential exposure pathway is the inhalation of vapors by on-Site occupants through SVI. The potential for off-Site inhalation of vapors is not considered to be an exposure pathway based on the results of the previous subsurface investigations. Based on the results of the previous investigations, there is the potential for an on-Site source area to the rear of the former dry cleaner. Potential exposure to vapors emanating from contaminated soil into the on-Site building has been and will continue to be mitigated through the installation of an on-Site soil vapor extraction (SVE) system and continued operation of the SSDS. Potential exposure to vapors emanating from contaminated groundwater into the on-Site building has been and will continue to be mitigated through the installation of an on-Site air sparge (AS) system.

Summary of the Remedy

There are no proposed redevelopment plans for the Site at this time. The proposed remedial action is to remediate soil and groundwater beneath the Site associated with the former operation of the dry cleaner which will be compliant with a 6NYCRR Part 375-6 Track 4 Cleanup and will meet the Restricted Residential Use Soil Cleanup Objectives (RCUSCO). The proposed remedial action will consist of the following:

1. A total of five (5) wells will be installed: Two (2) SVE wells: (1) located in the rear parking lot to the north of the former dry cleaner, and (2) in the front sidewalk to the south of the former dry cleaner. Three (3) Air Sparge (AS) wells: (1) located in the rear parking lot to the north of the former dry cleaner, (2) front sidewalk to the south of the former dry cleaner, and (3) basement of the of the former dry cleaner. The wells will be connected to a remediation shed located to the north of the former dry cleaner and the system effluent will discharge above the roof line of the building. Two (2) of the SSDS wells located in the basement of the former dry cleaner will be disconnected from the SSDS to function as SVE wells and connected to the remediation shed. The SVE/AS system will mitigate potential long-term exposure to VOCs found in the sub-slab vapor beneath the former dry cleaning unit and beneath the rear parking lot, and is considered an engineering control (EC);
2. The existing Site cover, consisting of the building and paved surfaces at the Site, will prevent exposure to contaminated soils prior to and subsequent to remedial activities, and is considered an EC;
3. Monitored natural attention (MNA) for groundwater will be assessed by sampling on a quarterly basis to track the degredation of on- and off-Site/downgradient contaminants in groundwater;

4. Imposition of engineering and institutional controls in the form of an environmental easement and Site Management Plan (SMP);
5. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State, and local rules and regulations for handling, transport, and disposal;
6. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State, and local rules and regulations.

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

AAA Sutter Realty, LLC entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in August 2, 2012, to investigate and remediate a -0.53 acre Site located at 1199 Sutter Avenue in Brooklyn, New York (herein referred to as the Site). AAA Sutter Realty, LLC is a Participant in the Brownfield Cleanup Program (BCP). The Site is presently utilized for commercial purposes. Future development of the property may include mixed commercial and residential uses. When completed, the Site will contain an electronics store, hair salon, deli, supermarket, and laundromat. Refer to the BCP application for additional details.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI) and previous subsurface investigations, performed between January 2009 and August 2017. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria, and guidance (SCG). The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and the New York State Department of Health (NYSDOH) have determined that this Site does pose a significant threat to human health or the environment. The Significant Threat Determination is provided in Appendix A. No wetlands or surface water bodies exist at the Site or at the adjoining properties. The RI for this Site did not identify fish and wildlife resources.

A Remedial Design Work Plan (RDWP) is included in Appendix B of this report.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the County of Kings, New York and is identified as Block 4248 and Lot 1 on the Brooklyn Tax Map. A United States Geological Survey (USGS) topographical quadrangle map (Figure 1) shows the Site location. The Site is situated on an approximately 0.53-acre area bounded by residential housing then Belmont Avenue to the north, Sutter Avenue and then New York City Housing Authority (NYCHA) Cypress Hills apartment complex to the south, Chestnut Street and then a US post office building to the east, and Crystal Street and then Cypress Hills Branch public library building to the west (see Figure 2). A boundary map is attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The 0.53-acre Site is fully described in Appendix C – Metes and Bounds.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated end use. The end use is described here to provide the basis for this assessment. The current use is the same – commercial retail use. The proposed future use of the property may include mixed commercial and residential use.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The land uses in the immediate vicinity of the Site are primarily for residential and municipal purposes. The Site is bordered to the north by residential housing, to the south by Sutter Avenue and then the NYCHA Cypress Hills apartment complex, to the east by Chestnut Street and then a US post office building, and to the west by Crystal Street and then the Cypress Hills Branch library building.

Based upon a review of the New York City Office of Environmental Remediation (NYCOER) Searchable Property Environmental E-Database (SPEED) there are no schools, hospitals or day care centers within 500 feet of the Site. In addition there were no rivers, streams, wetlands, or sensitive receptors identified within 500 feet of the Site.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Site Characterization Work Plan dated June 20, 2011, the Supplemental Site Characterization Work Plan dated January 16, 2014, the On-Site and Off-Site Soil Vapor Intrusion Work Plan dated December 16, 2016, and the IRM Work Plan dated March 28, 2017. Subsurface investigations were conducted at the Site between January, 2009 and August, 2017. A Remedial Investigation Report (RIR) was submitted to NYSDEC on July 28, 2015. A Supplemental RIR was submitted to the NYSDEC in July 6, 2016. An On-site Soil Vapor Intrusion Investigation Report was submitted to the NYSDEC in May 2, 2017. An IRM Report was submitted to the NYSDEC on March 2, 2018

2.1 SUMMARY REMEDIAL INVESTIGATIONS PERFORMED

This section provides a summary of all Remedial Investigation elements.

2.1.1. Borings and Wells

A total of 17 soil borings were installed during the course of the subsurface and remedial investigations. A total of two (2) soil gas wells were installed along the northeastern perimeter of the property and in the southern sidewalk along Sutter Avenue. A total of 18 monitoring wells were installed during the subsurface and remedial investigations. Shallow monitoring wells were installed to a depth of approximately 25 feet below grade, with the exception of MW-4S, which was installed to approximately 13 feet below grade in the basement of the former dry cleaner, and the deep wells were installed to an approximate depth of 40 feet below grade.

2.1.2 Samples Collected

Soil borings were advanced below grade using hydraulic direct-push technology. Soil cores were collected into acetate sleeves which were screened for indications of contamination. Soil samples were collected from the soil cores into laboratory-supplied glassware, labeled, and placed into an ice-filled cooler for delivery to the laboratory. Groundwater samples were collected from temporary borings and permanent monitoring wells via low-flow sampling methods into laboratory-supplied glassware, labeled, and placed into an ice-filled cooler for delivery to the laboratory. Sub-slab soil vapor and ambient air samples were collected into six-liter Summa Canisters equipped with time-specific flow controllers, labeled, and then delivered to the laboratory.

2.13 Chemical Analytical Work Performed

Sample Matrix	Sample identification	Analytical Testing
Soil	2009 - S1, S2, S3, S4, S5	VOCs – EPA 8260 SVOCs – EPA 8270
Groundwater	S2, S3	VOCs – EP 8260 SVOCs – EPA 8270
Soil	B-7, B-8	VOCs – EPA 8260
Groundwater	B-1, B-2, B-3, B-4, B-5, B-6, B-7, B-8, MW-1S, MW-1D, MW-2S, MW-2D, MW-3S, MW-3D, MW-4S, MW-4D, MW-5S,MW-5D, MW-6S, MW-6D, MW-7S, MW-7D, MW-8S, MW-8D	VOCs – EPA 8260
Soil Vapor/Ambient Air	SS-1, SSV-2, SSV-3, SSV-4, SSV-5, SSV-6, SSV-7, SSV-8, SSV-9, IA-1, OA-1, ASV-2, ASV-3, ASV-4, ASV-5, OA-2	VOCs- EPA TO-15
Soil	2016 - S4	VOCs – EPA 8260 SVOCs – EPA 8270 Pesticides – EPA 8081a Herbicides – EPA 8151a PCBs – EPA 8082a Target Analyte List Metals – EPA 6010b

Groundwater	MW-4S, MW-5S, MW-8S, MW-9S	VOCs – EPA 8260 SVOCs – EPA 8270 Pesticides – EPA 8081a Herbicides – EPA 8151a PCBs – EPA 8082a Target Analyte List Metals – EPA 6010b
Soil Vapor/Ambient Air	SS-1, IA-1, OA-1	VOCs TO-15
Groundwater	MW-1S, MW-2S, MW-5S, MW-8S, MW-10S, MW-11S	VOCs – EPA 8260
Soil Gas	SSV-10, SSV-11	VOCs TO-15

2.1.4 Documentation

Subsurface investigations and remedial activities were conducted at the Site from January 2009 through August 2017, which included soil, groundwater, soil vapor, and ambient air sampling events. The sampling locations are depicted in Figure 3 –Sampling Locations 2009-2017. The soil sampling results were compared to 6NYCRR Part 375-6.3 Unrestricted Use Soil Cleanup Objectives, and 6NYCRR Part 375-6.4 Residential Use, Restricted Residential Use, and Restricted Commercial Use Soil Cleanup Objectives, shown in Tables 1 and 2. The groundwater sampling results were compared to NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1 Class GA Ambient Water Quality Standards and Guidance Values, shown in Table 3. The indoor air sampling results were compared to NYSDOH Indoor Air Guidance Values, shown in Table 4. The results of the indoor air and sub-slab soil vapor sampling were compared to NYSDOH Soil Vapor Intrusion Decision Matrices A, B, and C, shown in Table 5.

Soil

Soil samples were collected from the Site during the Phase II ESA, Supplemental Phase II ESA, Site Characterization, and Supplemental RIR. The soil sampling results showed that tetrachloroethene (PCE) and acetone were detected at concentrations that exceeded the 6 NYCRR Part 375 Subpart 375-6.8 Unrestricted Use Soil Cleanup Objectives (UUSCOs) in several borings located beneath the former dry cleaner and in the rear parking lot to the north of the former dry cleaner unit. Concentrations of PCE also exceeded the Residential Use in boring S4 and the Restricted Residential Use in boring S3. Table 6 summarizes the historical VOC soil data from 2009 to 2016. Figure 4 summarizes the VOC soil data detected above the SCOs.

Groundwater

Groundwater samples were collected from the Site during the Phase II ESA, Supplemental Phase II ESA, two (2) IRM events, Site Characterization, RIR, Supplemental RIR, and other groundwater sampling events. Groundwater samples were also collected from the adjoining properties to the south and east during the Site Characterization, RIR, Supplemental RIR, IRM performed in 2017, and other groundwater sampling events. Groundwater samples were also collected from the adjoining properties to the south and east during the Site Characterization, RIR, and Supplemental RIR.

The groundwater monitoring results from 2009 to 2016 showed that PCE, trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), acetone, and chloroform were detected at concentrations that exceeded the NYSDEC Class GA Ambient Water Quality Standards and Guidance Values (GWQSs) in samples collected beneath the former dry cleaner, in the rear parking lot to the north of the former dry cleaner unit, to the south beneath the sidewalk along the northern and southern portions of Sutter Avenue, and on the adjoining property to the south (New York City Housing Authority apartment complex), across Sutter Avenue. The results of the investigations showed that CVOCs in groundwater exist beneath the Site and have migrated to the south, across Sutter Avenue. The groundwater concentrations detected in the wells across the street on the south side of Sutter Avenue were significantly lower than the concentrations detected in the wells at the Site. Table 7 summarizes the VOC groundwater data collected from 2009 to 2016. Figure 5 summarizes the VOC groundwater data collected from 2009 to 2016 detected over the NYSDEC GWQSs.

From May 2017 to August 2017 as part of the 2017 IRM, four (4) rounds of groundwater sampling were performed to monitor conditions prior to and after insitu chemical oxidation (ISCO) injections were performed at the Site. Prior to the ISCO injections, four (4) ISCO wells and two (2) monitoring wells were installed (MW-10S and MW-11S). MW-10S replaced MW-4S located in the basement of the former dry cleaner. The four (4) ISCO wells were also installed in the basement of the former dry cleaner. One (1) ISCO injection was performed following the baseline May, 2017 groundwater sampling event. Groundwater results indicated concentrations for PCE exceeded its NYSDEC GWQS of 5 ug/L for all sampling events in MW-1S, MW-5S, MW-10S, and MW-11S (wells in the basement and immediately south of former dry cleaner). The PCE concentrations for MW-2S were detected below its NYSDEC GWQS for all sampling events. The PCE concentrations for MW-8S were detected slightly above its NYSDEC GWQS in May and August, 2017, but below its NYSDEC GWQS in June and July, 2017. From May, 2017 to August, 2017, the concentration of PCE showed an overall decrease in monitoring wells MW-1S, MW-2s, and MW-8S. However, the PCE concentrations showed an overall increase in monitoring wells MW-10S and MW-11S. The PCE concentrations for MW-5S (located off-site, to the south and downgradient of the Site) were shown to initially decrease in May, 2017 followed by a slight increase to similar concentrations that were detected in April, 2016. Table 8 summarizes the VOC groundwater data from May, 2017 to August, 2017. Figure 6 summarizes the VOC groundwater data from May, 2017 to August, 2017 detected above the NYSDEC GWQSs.

Soil Vapor Intrusion

Sub-slab soil vapor samples, soil gas samples, indoor air samples, and outdoor air samples were collected from the Site and in the vicinity of adjoining properties to the north, south, and east during the Site Characterization, RIR, and On-site Soil Vapor Intrusion Investigation Report. Access to the interior of the adjoining properties to the north (548 Chestnut Street, 552 Chestnut Street) and south (The New York City Housing Authority apartment building located along Euclid Avenue) was not obtained for any of the investigations, however, soil gas samples were collected in the vicinity of these properties with the exception of the recent On-site Soil Vapor Intrusion Investigation performed in March, 2017. The results were compared to the NYSDOH Matrices A, B, and C included in the NYSDOH Guidance For Evaluating Soil Vapor

Intrusion in the State of New York, October, 2006. The results of all investigations showed that vapors emanating from soil and groundwater located beneath the Site were infiltrating into the former dry cleaner unit and had the potential to infiltrate into the adjacent supermarket unit. The results showed that no soil vapor intrusion (SVI) impacts were present in the other units within the Site building or in the vicinity of the adjoining properties to the north, south, and east. Table 9 summarizes the historical soil vapor data from 2009 to March, 2017. Table 10 summarizes the historical indoor and outdoor air data from 2009 to March, 2017. Figure 7 summarizes the soil vapor, indoor air, and outdoor air samples results from 2009 to March, 2017.

Additionally, the 2017 on-Site soil vapor intrusion investigation results show that the indoor air and sub-slab soil vapor concentrations for PCE and TCE were significantly reduced when compared to the 2011 results. Based on the sub-slab soil vapor and indoor air results for TCE, mitigation beneath the former dry cleaner (current laundromat) was warranted. Table 11 summarizes the soil gas well data from May, 2017 to August, 2017. Figure 8 summarizes the soil gas well data from May, 2017 to August, 2017.

2.2 SIGNIFICANT THREAT

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

2.3 SITE HISTORY

The following section provides a summary of the past uses of the Site as well as necessary and relevant information regarding the historical use of the property.

2.3.1 Past Uses and Ownership

The subject Site was vacant until at least 1951. The current building was erected at the Site circa 1960. The Site has remained largely unchanged since the building was erected. A dry cleaner was present at the Site from at least circa 1977 through sometime prior to 2001. The Site is currently occupied by an electronics store, hair salon, deli, supermarket, and laundromat. The

Site was formerly owned by CGB Realty, which purchased the Site circa 1983. In 2009, Mr. Tony Bileddo took ownership of the Site.

2.3.2 Summary of the Remedial Investigation

Subsurface investigations and Interim Remedial Measures (IRMs) were conducted at the Site from January, 2009 through August, 2017, which included soil, soil vapor, ambient air, and groundwater sampling events, and insitu chemical oxidation (ISCO) injections. Below lists the previously performed investigations and IRMs for the Site.

- **Summary Letter of Phase II Subsurface Investigation, 1199-1221 Sutter Avenue, Brooklyn, New York. Atlantic Environmental Solutions, Inc., January 12, 2009;**
- **Phase II Subsurface Investigation, 1199-1221 Sutter Avenue, Brooklyn, New York. Associated Environmental Services, Ltd., May 19, 2009;**
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- **Interim Remedial Measures Report, 1199 Sutter Avenue, Brooklyn, New York. EnviroTrac, Ltd., March 2, 2018.**

2.3.3 Sanborn Fire Insurance Maps

All Sanborn Fire Insurance Maps available for this Site were reviewed prior to preparation of the RAWP. Sanborn Fire Insurance Maps for the years 1887, 1908, 1928, 1951, 1965, 1968, 1977, 1979, 1980, 1982, 1987, 1988, 1989, 1991, 1993, 1994, 1995, 2001, 2002, 2003, 2004, 2005, 2006, and 2007 were reviewed. The Site is depicted as being vacant on the maps from 1887 through 1951. The current building is depicted on the 1965 map. A dry cleaner was shown at the Site from 1977 through 1995. The maps from 2001 through 2007 depict the Site as it exists today. The Sanborn Maps are presented in Appendix D.

2.4 GEOLOGICAL CONDITIONS

The Site is underlain by approximately 13 feet of unsaturated soil. Soil in the area of the Site is classified as Urban Land soil and consists of a mix of sand, silt, clay, gravel, and fill material. The saturated zone begins at approximately 13 feet below grade and is part of the Upper Glacial Aquifer, which is composed of outwash-plain deposits of stratified sand and gravel. The Upper Glacial Aquifer is the only formation considered in this investigation. Groundwater beneath the Site is characterized as Class GA indicating it has the potential to be used as a source of potable water. Based on USGS Long Island Groundwater Conditions, 2013, regional groundwater in the area of the Site flows generally to the south. Groundwater at the Site is not utilized as a source of potable water. A groundwater contour map is included in Figure 9. Figure 10 shows the hydrogeologic cross-section of Long Island aquifers. Soil borings, temporary wells, and permanent monitoring wells were installed within the Upper Glacial Aquifer to a maximum depth of 40 feet below grade.

2.5 CONTAMINATION CONDITIONS

2.5.1 Conceptual Model of Site Contamination

The most recent sampling events occurred in March, 2017 as part of an on-Site soil vapor intrusion investigation, and from May to August, 2017 as part of an IRM. Historical soil sampling occurred from 2009 to 2016. The results of the investigations showed that halogenated volatile organic compounds (VOCs) primarily consisting of PCE and its degradation products are associated with the former dry cleaner operations and were found in the on-Site soil, soil vapor, and groundwater. The highest levels of soil contamination were detected behind the unit formerly occupied by the dry cleaner at boring locations S-3 and S-4 (collected in 2016) at maximum concentrations of PCE at 37,500 micrograms per kilogram (ug/kg) and 15,000 ug/kg, respectively. The highest historical soil vapor concentration was detected in the sub-slab soil vapor sample collected from the basement of the former dry cleaner (SS-1) at a maximum concentration of PCE of 428,000 ug/mg3 of air (collected in 2011). Soil vapor concentrations were shown to decrease significantly for the March, 2017 on-Site soil vapor intrusion investigation for sample VP-1 with a concentration of PCE at 831 ug/m3 of air. The results were also compared to the NYSDOH Matrices A, B, and C. Based on the March, 2017 sub-slab soil vapor results for TCE, mitigation beneath the former dry cleaner (laundromat) was warranted. Elevated levels of groundwater contaminants were detected in the on-Site monitoring wells designated as MW-1S, MW-2S, MW-10S and MW-11S at a maximum concentration of PCE of 719 micrograms per liter (ug/l) in MW-10S during the most recent sampling event in August 2017. Additionally, the maximum concentration of TCE at 21.0 ug/l was observed in MW-10S during the May 2017 sampling.

The analytical data as part of the IRM, collected off-Site or near off-Site locations indicated that there were halogenated VOCs detected in the groundwater and soil vapor. These detected concentrations were significantly lower than the concentrations detected at the Site for soil vapor and lower than the concentrations detected at the Site for groundwater with the exception of PCE. The off-Site soil gas location was designated as SSV-11, across Sutter Avenue to the south of the Site. PCE was not detected in SSV-11. However, vinyl chloride was detected in sample SSV-11 with a maximum concentration of 25.8 ug/m3 in the July 2017 sampling event. Elevated levels of contaminants were detected in the off-Site monitoring wells designated as MW-5S and MW-8S both located to the south of the Site, across the street from Sutter Avenue and downgradient of the Site. The PCE concentrations for MW-5S were shown to initially decrease in May, 2017 followed by a slight increase to similar concentrations that were previously detected in April, 2016. The PCE concentration was detected slightly above its NYSDEC GWQS in MW-8S in May and August, 2017, but below its NYSDEC GWQS in June and July, 2017. The highest off-Site PCE concentration was detected at 258 ug/l in MW-5S.

2.5.2 Description of Areas of Concern

Based upon a review of historical documents, there were no underground storage tanks (USTs) present at the Site. A dry cleaner formerly occupied the easternmost unit of the building. Based upon data obtained during the previous investigations, it was determined that soil and groundwater exhibited concentrations of halogenated VOCs above NYSDEC UUSCOs at the Site and above NYSDEC Groundwater Standards at the Site and downgradient of the Site. NYSDEC Spill No. 0902686 was assigned to the Site on June 5, 2009 due to a release of PCE to the soil and groundwater. The spill was closed on July 15, 2010 when State Superfund P (potential) site project was applied to the site. The spill-related contamination is presently managed under the on-going BCP project.

Sub-slab soil vapor and soil gas concentrations were compared to the NYSDOH Matrices A, B and C and were determined to require mitigation for the potential of SVI of TCE into the basements of the former dry cleaner and adjoining supermarket units.

A suspected source area is present beneath the southern portion of the former dry cleaner and beneath the rear parking lot to the north of the former dry cleaner.

2.5.3 Identification of Standards, Criteria, and Guidance

The following standards, criteria, and guidance (SCG) values were utilized during the evaluation of the Site data for the purpose of remedy selection.

Soil

6 NYCRR Part 375-6.3 Unrestricted Use Soil Cleanup Objectives (UUSCOs) are presented in Table 1. 6 NYCRR Part 375-6.4 Restricted Use Soil Cleanup Objectives (RUSCO) are presented in Table 2.

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 are presented in Table 3.

Soil Vapor and Ambient Air

New York Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October, 2006. The NYSDOH Indoor Air Guidance Values are presented in Table 4. The NYSDOH Decision Matrices A, B and C are presented in Table 5.

2.5.4 Soil/Fill Contamination

This section summarizes the soil analytical results obtained during the previous subsurface and remedial investigations from January, 2009 to April, 2016.

2.5.4.1 Summary of Soil/Fill Data

Soil samples collected during the previous subsurface and remedial investigations were analyzed for VOCs. A total of 17 soil borings were advanced at the property from 2009 to 2016. Soil was determined to be contaminated with PCE and its breakdown products beneath the southern portion of the former dry cleaner unit and in the parking lot located to the north of the former dry cleaner.

2.5.4.2 Comparison of Soil/Fill with SCGs

The data showed that PCE and acetone were detected at concentrations above the NYSDEC UUSCOs in S-3, S-4 (2016), and B-7, above the RRUSCO in S-4 (2016), and above the RRUSCO in S-3. However, all concentrations were detected below the NYSDEC RCUSCOs.

Table 6 shows exceedances from Track 1 Unrestricted SCOs for all soil/fill at the Site. Figure 4 is a spider map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill.

2.5.5 On-Site and Off-Site Groundwater Contamination

This section describes the groundwater analytical data obtained during the previous subsurface and remedial investigations from 2009 to 2017.

2.5.5.1 Summary of Groundwater Data

Non-aqueous phase liquid (NAPL) was not detected in any of the monitoring wells during the investigations. The depth to water at the Site is approximately 13 feet below grade. Groundwater sampling events occurred in 2009, 2010, 2011, 2016, and 2017, and samples were collected from 16 temporary and permanent groundwater wells. Halogenated solvents, including PCE and it breakdown products were shown to impact the groundwater beneath the former dry cleaner basement unit, to the immediate south of the unit beneath the sidewalk, and also downgradient of the Site to the south, across Sutter Avenue.

As part of the 2009 IRM, ISCO injections were performed at the Site in August, 2009 by Associated Environmental Services Inc. which included a four percent solution of potassium permanganate at twelve (12) locations within a grid pattern at and adjacent to the former dry cleaner unit. Groundwater samples collected following the injections showed an overall decreasing trend in groundwater contaminant concentrations. Contaminants were showed to slightly rebound in the following sampling events, however, the concentrations remained lower than the initial subsurface sampling results.

As part of the 2017 IRM, four (4) rounds of groundwater sampling were performed by EnviroTrac from May, 2017 to August, 2017 to monitor conditions prior to and after ISCO injections at the Site. The results of the 2017 IRM showed a slight decrease in halogenated solvent concentrations followed by a rebound back to initial concentrations.

2.5.5.2 Comparison of Groundwater with SCGs

For the groundwater sampling events from 2009 to 2016, VOCs in groundwater detected above NYSDEC GWQS included acetone, chloroform, cis-1,2-DCE, PCE, and TCE in wells MW-1S, MW-2S, MW-3S, MW-4S, MW-5S, and MW-8S. Slight exceedances of PCE were also detected in the deeper wells at MW-1D, MW-2D, MW-3D, and MW-4D. Table 7 summarizes the VOC groundwater sample results detected above NYSDEC GWQS from 2009 to 2016. Figure 5 shows the VOC groundwater sample results detected above the NYSDEC GWQS from 2009 to 2016.

For the 2017 IRM groundwater sampling event, groundwater results indicated concentrations for PCE exceeded its NYSDEC GWQS of 5 ug/L for all sampling events in wells MW-1S, MW-5S, MW-10S and MW-11S (wells in the basement and immediately south of former dry cleaner). The PCE concentrations for MW-2S were detected below its NYSDEC GWQS for all sampling events. The PCE concentration was detected slightly above its NYSDEC GWQS in MW-8S in May and August, 2017, but below its NYSDEC GWQS in June and July, 2017. From May, 2017 to August, 2017, the concentration of PCE showed an overall decrease in monitoring wells MW-1S, MW-2s, and MW-8S. However, the PCE concentrations show an overall increase in monitoring well MW-10S and MW-11S. The PCE concentrations for MW-5S (located off-site, to the south and downgradient of the Site) were shown to initially decrease in May, 2017 followed by a slight increase to similar concentrations that were detected in April, 2016. The maximum concentration of PCE at 719 ug/l was detected in MW-10S during the most recent sampling event in August, 2017. This concentration was the maximum concentration detected for all groundwater sampling rounds in 2017. Table 8 summarizes the VOC groundwater sample results detected above NYSDEC GWQS from May, 2017 to August, 2017. Figure 6 shows the VOC groundwater sample results detected above the NYSDEC GWQS from May, 2017 to August, 2017.

The PCE concentrations for MW-5S were shown to initially decrease in May, 2017 followed by a slight increase to similar concentrations that were detected in April, 2016. The PCE concentration was detected slightly above its NYSDEC GWQS in MW-8S in May and August, 2017, but below its NYSDEC GWQS in June and July, 2017. The highest off-Site PCE concentration was detected at 258 ug/l in MW-5S.

2.5.6 On-Site and Off-Site Soil Vapor Contamination

Five (5) sub-slab soil vapor samples designated as SSV-1, SSV-2, SSV-3, SSV-4, and SSV-5, and four (4) soil gas samples designated SSV-6, SSV-7, SSV-8, and SSV-9 were collected at the Site, near Site perimeter, and off-Site from 2011 to 2016. In addition, six (6) ambient air samples designated as IA-1, OA-1, ASV-2, ASV-3, ASV-4, ASV-5, and OA-2 were collected at the Site and near the Site perimeter. Several VOCs were detected in the sub-slab soil vapor, soil gas, indoor air, and outdoor air samples, and included PCE, TCE, cis-1,2-DCE, and vinyl chloride (VC).

An on-Site SVI investigation was performed at the Site on March 21, 2017. A sub-slab soil vapor sample designated as VP-1, indoor air sample designated as IA-1, and outdoor air sample designated as OA-1 were collected within and in the vicinity of the former dry cleaner (laundromat). Several VOCs were detected in the sub-slab soil vapor including PCE and TCE.

During May, 2017 to August, 2017 as part of the 2017 IRM, soil gas sampling was conducted in the northeast region of the Site, designated as SSV-10, and off-Site, located across Sutter Avenue, near the New York City Housing Authority (NYCHA) apartment building, designated SSV-11. Several VOCs were detected in the soil vapor wells including PCE and VC.

2.5.6.1 Comparison of Soil Vapor with SCGs

The indoor air results were compared to the NYSDOH Indoor Air Guidance Values. PCE detected in SS-1 collected in 2011, located in the basement of the former dry cleaner, exceeded its NYSDOH Indoor Air Guidance Value. The sub-slab soil vapor, soil gas, and indoor air results were also compared to the NYSDOH Matrices. Based on the Matrices, mitigation was required for the former dry cleaner unit (SS-1 and IA-1) and the adjoining supermarket unit (SSV-2 and ASV-2) to the west due to the concentrations of PCE, TCE, Cis-1,2-DCE, and VC in the sub-slab soil vapor and/or indoor air.

The indoor air results from the SVI performed in 2017 were compared to the NYSDOH Indoor Air Guidance Values. None of the indoor air results exceeded the NYSDOH Indoor Air Guidance Values. The results of were also compared to the 2011 sub-slab and indoor air sample results and a significant reduction in all detected VOCs was observed. The results were also compared to NYSDOH Matrices A, B and C. Due to the TCE concentration in the sub-slab at VP-1, mitigation was warranted.

During the July 2017 sampling as part of the 2017 IRM, PCE was detected in SSV-10 with a maximum concentration of 17.70 ug/m3. PCE was not detected in SSV-11. However, VC was detected in sample SSV-11 for the 2017 events with a maximum concentration of 25.8 ug/m3 observed in the July 2017 sampling event.

Soil vapor data collected from 2011 to 2017 is shown in Tables 9. Indoor air and outdoor air results from 2011 to 2017 are shown in Table 10. The 2017 IRM soil gas wells results are shown in Table 11. A spider map that indicates the locations of and summarizes soil vapor data is shown in Figures 5 and 6.

2.6 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.6.1 Qualitative Human Health Exposure Assessment

The qualitative exposure assessment evaluates the potential for populations to be exposed to Site contaminants. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from the 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 can include, building occupants, Site workers, trespassers, off-Site residents, and off-Site workers.

The following exposure pathways are considered incomplete:

Groundwater Ingestion

New York City Code and the environmental easement for the Site will prohibit the use of groundwater beneath the Site for potable purposes. The Site and surrounding area are provided potable water from a public water supply that does not derive its water from the Site or surrounding areas. Therefore, the ingestion of groundwater pathway is considered incomplete.

The following exposure pathways are considered complete:

Dermal Contact With Soil

During the installation of the SVE and AS wells beneath the building slab, in the rear parking lot, and in the front sidewalk, there is the potential for dermal contact with soil. The exposure would be reduced by implementation of the Health and Safety Plan (HASP), implementation of the Community Air Monitoring Plan (CAMP), dust suppression techniques, and creation of an exclusion zone within the work area around the SVE and AS wells. Site workers installing the SVE and AS wells will also be protected from dermal contact with soil by wearing the proper personal protective equipment (PPE) for the proposed remedial activities.

Inhalation of Vapors by Building Workers

Based upon the sub-slab soil vapor data obtained there is a concern for vapor migration into the building at the Site. Vapors beneath the slab may travel into the building through cracks and utility conduits and build up over time within the interior of the building where occupants can be exposed via inhalation. The operation of the SSDS and the selected remedy of installing a SVE/AS system will mitigate the potential for vapor intrusion into the building by removing contaminated vapors from beneath the building and surrounding area and discharging them above the roof line to the ambient air. Based upon a review of the NYCOER SPEED database there are no schools, hospitals, day care centers, or sensitive receptors within 500-feet of the Site.

2.6.2 Fish and Wildlife Remedial Impact Analysis

Based on the NYSDEC Environmental Resource Mapper, no freshwater wetlands or habitats of endangered, threatened, special, or concerned species exist at the Site. Therefore, since there are no ecological resources present at the Site, the contamination identified at the Site will have no impact on fish and wildlife.

2.7 INTERIM REMEDIAL ACTION

Between August 5, 2009 and August 24, 2009, a four percent solution of potassium permanganate was injected at 12 grid points within and adjacent to the former dry cleaner unit. The volume of solution injected at each point was conducted as per the manufacturer's recommendations based on the previous investigation's groundwater data.

A Geoprobe direct push rig was used to inject the potassium permanganate solution at intervals of 10, 15, 20, 35, and 40 feet below grade. The injections were performed by advancing the injection point to approximately 40 feet below grade, injecting the prescribed dose of reagent, extracting the injection point to the next interval, and injecting the reagent again. This process was repeated up to 10 feet below grade was reached. Backpressure from formation was encountered at 25 and 30 feet below grade impeding the infiltration of the potassium permanganate solution, therefore, the injections were not completed at these depths.

Groundwater samples collected following the injections in November, 2009, showed an overall decreasing trend in groundwater contaminant concentrations. Contaminants were showed to slightly rebound in the following groundwater sampling events, however, the concentrations remained lower than the initial subsurface sampling results.

As part of the 2017 IRM, ISCO injections using 40% sodium permanganate were performed in four (4) injections wells located in the basement of the former dry cleaner on May 25, 2017. The volume of solution injected at each point was conducted as per the manufacturer's recommendations based on the previous investigation's groundwater data.

From May to August, 2017, the SSDS system was installed and implemented in addition to installing eight (8) vapor collection points installed in the basements of the former dry cleaner (SVE/SSDS-7 and SVE/SSDS-8) and adjoining supermarket unit (SVE/SSDS-1 through SVE/SSDS-6), four (4) injections wells located in the basement, two (2) monitoring wells located inside the basement and on the sidewalk immediately south of the Site building (MW-10S and MW-11S, respectively), two (2) soils gas wells located in the northeast corner of the Site, and adjoining property to the south (SSV-10 and SSV-11 respectively) as part of the IRM.

Groundwater sampling results conducted after the ISCO injections indicated concentrations for PCE exceeded its NYSDEC GWQS of 5 ug/L for all sampling events in MW-1S, MW-5S, MW-10S and MW-11S (wells in the basement and immediately south of former dry cleaner). The PCE concentrations for MW-2S were detected below its NYSDEC GWQS for all sampling events. The PCE concentration was detected slightly above its NYSDEC GWQS in MW-8S in May and August, 2017, but below its NYSDEC GWQS in June and July, 2017. From May, 2017 to August, 2017, the concentration of PCE showed an overall decrease in monitoring wells MW-1S, MW-2s, and MW-8S. However, the PCE concentrations show an overall increase in monitoring well MW-10S and MW-11S. The PCE concentrations for MW-5S (located off-site, to the south and downgradient of the Site) were shown to initially decrease in May, 2017 followed by a slight increase to similar concentrations that were detected in April, 2016.

2.8 REMEDIAL ACTION OBJECTIVES

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

2.8.1 Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore groundwater aquifer, to the extent practicable, to pre-disposal/pre-release conditions.
- Prevent the discharge of contaminants to surface water.
- Remove the source of groundwater contamination.

2.8.2 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation through the terrestrial food chain.

2.8.3 Soil Vapor

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

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

Based upon the previous soil, soil gas, and groundwater analytical data and in consideration of the Participant's obligations, a Track 4 cleanup approach (restricted residential use with RCUSCOs) was deemed appropriate for achieving the RAOs in a more cost effective sustainable manner. The Track 4 cleanup would also be far less disruptive to the community. EnviroTrac requested approval from the NYSDEC to pursue a Track 4 cleanup. Approval has not been granted to date by the NYSDEC/NYSDOH.

The following Remedial Action standards, criteria, and guidance will be employed during the remedial activities.

- 6 NYCRR Part 376-6 Soil Cleanup Objectives;
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1;
- NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation – December, 2002 (or later version if available);
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004. General program guidance;
- NYSDOH Generic Community Air Monitoring Plan;
- NYS Waste Transporters Permits – 6 NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364.

3.1.1 Individual Evaluation of Remedial Alternatives

The remedial alternatives considered to address soil include the following:

1. No action.

The no action alternative is considered as a procedural requirement as a baseline to evaluate other alternatives. The Site would remain in its current condition, with no remedial activities conducted. Due to the presence of chemical concentrations exceeding regulatory criteria and related potential exposure concerns this alternative is not a viable remedy for soil, soil vapor, or groundwater as it would not achieve the RAOs or be protective of human health or the environment.

Factors considered during this analysis of this remedial alternative included the following:

- Protection of human health and the environment; Utilization of the no action alternative would allow for the existing conditions to remain at the Site. It does not provide any prevention for human exposure to contaminants and associated health risks at the site.
- Compliance with standards, criteria, and guidelines (SCGs); The no action alternative would not comply with any compliance SCGs.
- Short-term effectiveness and impacts; The no action alternative would not provide any effective short-term remedy to the existing conditions and associated impacts at the Site.
- Long-term effectiveness and permanence; The no action alternative would not provide any effective long-term or permanent remedy to the existing conditions and associated impacts at the Site.
- Reduction of toxicity, mobility, or volume of contaminated material; Utilization of the no action alternative would not provide any reduction in the toxicity, mobility, or volume of contaminated material present at the Site.
- Implementability; The no action alternative would be easily implemented.
- Cost effectiveness; There is no costs associated with the no action alternative.

2. BCP Track 1 – Unrestricted Use Cleanup Objective.

Under the BCP Track 1 Unrestricted Use Cleanup Objective, all contaminated soil at the Site would be excavated to bedrock or groundwater (whichever is shallower). Excavated material would be transported off-Site to a permitted facility for disposal pursuant to all federal, state, and local regulations. Post-excavation sampling would be conducted following excavation activities to verify all contaminated material has been removed. NYSDEC approved fill would be brought to the Site and used to backfill/re-grade the excavated area. Residual groundwater contamination would be managed through an ongoing monitoring natural attenuation (MNA) program.

Factors considered during this analysis of this remedial alternative included the following:

- Protection of human health and the environment; This alternative is protective of human health and the environment. Removal of all halogenated solvent-related VOC contaminants would eliminate the presence of these contaminants exceeding SCOs in soil and soil vapor. It is assumed that the parking lot to the rear of the former dry cleaner has been impacted and would require to be excavated and disposed off-Site. It is anticipated under this remedial alternative between approximately 6,500 tons of soil would be removed from the Site and disposed at an appropriately licensed and permitted facility. A MNA plan would be implemented for groundwater to ensure contaminant concentrations were reducing over time to SCO criteria.

- Compliance with SCGs; The alternative of removing all on-site impacted soil would result in a reduction of the toxicity, mobility, and volume of contaminants at the Site. It is further anticipated that the reduction of the toxicity, mobility, and volume of contaminants in the on-Site soil, that the contaminant concentrations in groundwater would also be reduced. As such, this alternative would be in compliance with the SCGs.

- Short-term effectiveness and impacts; The removal of all on-Site impacted soil would increase the short term risks for the community and the workers implementing the alternative through the disturbance of impacted soil. The risks would be minimized through the implementation of appropriate fill handling procedures, air monitoring, and dust suppression techniques. In addition, during the removal of the impacted material and replacement with clean fill, increased truck traffic would be experienced in the local neighborhood.

- Long-term effectiveness and permanence; The removal of all on-Site impacted soil would be an effective long-term remedy. The removal and disposal of all on-Site impacted soil would be a permanent remedy to address the impacted soil and contaminant concentrations in on-Site soil, soil vapor, and groundwater.

- Reduction of toxicity, mobility, or volume of contaminated material; Removal of all soil to bedrock or groundwater (whichever is shallower) would remove a large volume (possibly all) of the contaminated material, but could potentially leave some in place if contaminated soil is present below the water table.

- Implementability; This alternative could be implemented with the use of Site-appropriately sized construction equipment using tested and routinely employed technologies, procedures, and materials. Due to the large volume of soil that would be removed for off-Site disposal and replaced with clean fill from an off-Site source, and constraints imposed by neighboring properties and structures that would require sheeting and shoring of the excavation, this alternative would require significant time and would result to quality of life impacts to the local community (e.g., noise, truck traffic).

- Cost effectiveness; The estimated cost of this alternative is approximately \$3,398,450 as shown on Table 12. This cost includes removal of contaminated soil from beneath the rear parking lot to the north of the laundromat down to approximately 13 feet below grade, removal of soil beneath the former dry cleaner basement floor down to approximately five (5) feet below grade, proper off-Site disposal, backfill with clean material, and restoration of the rear parking lot and former dry cleaner basement floor.

3. BCP Track 4 – Restricted Residential Use Soil Cleanup Objective.

There are potential redevelopment plans to construct additional residential units on top of the existing building. Under the BCP Track 4 RCUSCO alternative, a SVE/AS system will be installed and operated at the Site with continued operation of the SSDS currently and in the future, which will constitute as an engineering control. Any on-Site subsurface soils would be left in place and managed with a cover (engineering control) consisting of the current building and pavement that would cover the remaining portions of the Site to eliminate potential exposure. In addition, institutional controls in the form of a NYSDEC Environmental Easement would be placed on the Site to restrict future use of the Site. A Site Management Plan (SMP) will provide provisions for ongoing maintenance and monitoring of the Site to ensure compliance with the established engineering and institutional controls. A MNA plan would be implemented for groundwater and performed on an annual basis. Groundwater samples would be laboratory analyzed for volatile organic compounds by US EPA Method 8260.

Factors considered during this analysis of this remedial alternative included the following:

- Protection of human health and the environment; This alternative is protective of human health and the environment. Removal of halogenated VOC vapors through the operation of a SVE system as an engineering control would significantly reduce or eliminate the presence of these contaminants exceeding SCOs in soil and soil vapor over time. Maintenance of the current Site cap (current building and pavement) as a protective barrier across the entire Site (engineering control) would prevent human exposure via ingestion and dermal contact to remaining soil-borne contaminants. To further protect human health any further invasive work would be performed in accordance with an NYSDEC-approved SMP, and certification of the engineering and institutional controls would be performed on an annual basis.
- Compliance with SCGs; This alternative would partly comply with chemical specific SCGs as significantly impacted areas would be addressed through the operation of a SVE/AS system engineering control. The maintenance of the current Site cap (engineering control) alternative would comply with DER-10's (Part 375 Restricted Residential criteria) requirements under Track 4 for a protective barrier to

prevent human exposure to the contaminants. This alternative would also be in compliance with location specific SCGs.

- Short-term effectiveness and impacts; This alternative would have short term impacts associated with construction of the engineering controls, including potential worker exposure to contaminated soil and groundwater. Work process (e.g. dust control) measures and protective clothing can be used to prevent such exposure and potential health risk from exposure. Air monitoring would be conducted during work that could result in potential exposure to these chemicals by the neighboring community and appropriate measures taken in real time to prevent such from occurring. Potential impacts to the community would be far less than for the Track 1 remedy.

- Long-term effectiveness and permanence; This alternative would be effective in meeting the RAOs. The engineered cover would be inspected and maintained over the long term with proper controls and repairs when necessary. While the SVE/AS system engineering control is not a permanent remedy for all contamination present at the Site it would significantly reduce chemical mass on-Site, and therefore, would reduce/eliminate migration of halogenated solvent contamination from the Site via groundwater flow. Institutional controls would be in place to restrict exposure to contaminated Site media during future invasive work. This alternative allows flexibility in the extent to which the Site can be developed with proper handling and disposal of excavated materials in concert with Site use restrictions.

- Reduction of toxicity, mobility, or volume of contaminated material; This alternative would reduce the toxicity, mobility, and volume of hazardous constituents in the soil though the operation of a SVE/AS system engineering control which would over time also reduce the toxicity, mobility, and volume of hazardous constituents in soil and groundwater. The maintenance of the engineered control (cap) would greatly reduce mobility of soil-borne contaminants.

- Implementability; This alternative could easily be implemented with the installation of two (2) SVE wells installed at the Site: (1) in the in the rear parking lot to the north of the former dry cleaner, and (2) in the sidewalk to the south of the former dry cleaner. Two (2) of the SSDS wells located in the basement, SSD-7 and SSD-8, will be disconnected from the SSDS to function as SVE wells connected to the SVE/AS system. The SVE wells would be connected to a blower in a remediation shed located to the north/rear of the former dry cleaner unit that would then discharge vapors above the roof line to the ambient air. Prior to discharge, vapors would be treated. Three (3) AS wells would be installed at the Site: (1) in the rear parking lot to the north of the former dry cleaners, (2) in the basement of the former dry cleaner, and (3) in the sidewalk to the south of the former dry cleaner unit. The AS wells would then be connected a compressor in a remediation shed located to the north/rear of the former dry cleaner unit.

- Cost effectiveness; The estimated cost of this alternative is approximately $713,400 over a 30 year period as shown on Table 13. This cost includes the installation of SVE wells, installation of the AS wells, a SVE/AS remediation shed, monthly and quarterly SVE/AS system operations, maintenance, and monitoring, annual SSDS certification, and quarterly groundwater monitoring.

3.2 SELECTION OF THE PREFERRED REMEDY

Based on the evaluation of remedial alternatives, a Track 4 remedial approach is proposed for the Site. The Track 4 remedial approach will include the following:

- Implementation of institutional controls; i.e., Site use restriction and a SMP including an environmental easement and provisions to implement a MNA plan to track ongoing reduction of contaminants in groundwater.

- Implementation of engineering controls including installation of an SVE/AS system to address on-Site source locations, and maintenance of the current on-Site cover/cap (current building and pavement) to prevent exposure to remaining soil contaminants.

3.2.1 Zoning;

The Site is currently zone C1-2 (commercial).

3.2.2 Applicable comprehensive community master plans or land use plans;

The Site has the potential for redevelopment to construct residential units on top of the existing building, is located in a Brownfield Opportunity Area and the remedy is consistent with the community plans.

3.2.2 Surrounding property uses;

Land use areas immediately adjacent to the Site are:

- To the north: residential properties located along Crystal Street and Chestnut Street.
- To the east: Chestnut Street, then the US Post Office building along Sutter Avenue.
- To the south: Sutter Avenue, then NYCHA Cypress Hill residential apartment complex along Sutter Avenue.
- To the west: Crystal Street, then Cypress Hills Branch Library along Sutter Avenue.

3.2.3 Citizen Participation;

The Citizen Participation Plan (CPP) is provided as part of this RAWP and enables citizens to participate more fully in the decisions that affect their health, environment and social well-being. The CPP is included in Appendix E.

Document repository has been established at the following location and contain all applicable project documents:

Cypress Hills Branch
Brooklyn Public Library
236 Crystal Street
Brooklyn, NY 11208
(718) 227-6004

3.2.4 Environmental Justice Concerns;

There are no plans for redevelopment or changes in zoning at the Site at this time. The selected remedy does not impose any environmental justice concerns on the Site or surrounding community. The remedy will address the environmental and health exposure concerns in a timely manner, and will have a limited impact on Site occupants and the community.

3.2.5 Land Use Designations;

The Site is utilized for commercial purposes. The adjoining properties to the north and south are utilized for residential purposes. The adjoining properties to the west and east are utilized for municipal purposes. There are no plans for redevelopment or changes in zoning at the Site at this time. Therefore, the selected remedy will not change the land use designation.

3.2.6 Population Growth Patterns;

There are no plans for redevelopment or changes in zoning at the Site at this time. Therefore, the selected remedy will not have an impact on population growth patterns.

3.2.7 Accessibility to Existing Infrastructure;

The selected remedy will not impede accessibility to existing infrastructure.

3.2.7 Proximity to Cultural Resources;

No cultural resources were identified at the Site or adjoining properties. Therefore, the selected remedy will not have an impact to cultural resources.

3.2.8 Proximity to Natural Resources;

Based on the NYSDEC Enviromapper database, no natural resources are present at the Site or adjoining properties. Therefore, the selected remedy will not have an impact on natural resources.

3.2.9 Off-Site Groundwater Impacts;

The SVE wells will be installed on-Site, above the water table. The AS wells will be installed on-Site, in the shallow groundwater. Groundwater at and downgradient of the Site have been determined to be impacted with halogenated solvents. The objective of the AS system is to remove halogenated solvents from on-Site groundwater and assist in reducing the flow of contaminants from the Site. The selected remedy also includes a MNA plan to track groundwater contaminants over time.

3.2.10 Proximity to Floodplains;

The Site is shown on FEMA Flood Map 3604970236F located in Zone X (area of minimal flood hazard). Therefore, the Site is not within the 100 or 500-year flood plain.

3.2.11 Geography and Geology of the Site; and

The Site is located at a topographic elevation of approximately 20 feet above mean sea level. The Site is underlain by soil characterized as Urban Land, which consists of a mixture of sand, silt, clay, gravel, and fill material. Any soil removed from the Site during the installation of the SVE and AS wells will be containerized in drums and properly disposed of off-Site. The selected remedy will not have an impact on the geography or geology of the Site.

3.2.12 Current Institutional Controls.

No institutional controls (ICs) are currently placed on the Site. Future ICs proposed for the Site include an environmental easement and a MNA plan to track groundwater contaminants over time. ICs for the Site will be managed by implementation of the SMP.

3.3 SUMMARY OF SELECTED REMEDIAL ACTIONS

There are no proposed redevelopment plans for the Site at this time. The proposed remedial action is to remediate soil and groundwater beneath the Site associated with the former operation of the dry cleaner which will be compliant with a 6NYCRR Part 375-6 Track 4 Cleanup and will meet the Restricted Residential Use Soil Cleanup Objectives (RCUSCO). The proposed remedial action will consist of the following:

1. A total of five (5) wells will be installed: Two (2) SVE wells: (1) located in the rear parking lot to the north of the former dry cleaner, and (2) in the front sidewalk to the south of the former dry cleaner. Three (3) Air Sparge (AS) wells: (1) located in the rear parking lot to the north of the former dry cleaner, (2) front sidewalk to the south of the former dry cleaner, and (3) basement of the of the former dry cleaner. The wells will be connected to a remediation shed located to the north of the former dry cleaner and the system effluent will discharge above the roof line of the building. Two (2) of the SSDS wells located in the basement of the former dry cleaner will be disconnected from the SSDS to function as SVE wells and connected to the remediation shed. The SVE/AS system will mitigate potential long-term exposure to VOCs found in the sub-slab vapor beneath the former dry cleaning unit and beneath the rear parking lot, and is considered an engineering control (EC);
2. The existing Site cover, consisting of the building and paved surfaces at the Site, will prevent exposure to contaminated soils prior to and subsequent to remedial activities, and is considered an EC;
3. Monitored natural attention (MNA) for groundwater will be assessed by sampling on a quarterly basis to track the degredation of on- and off-Site/downgradient contaminants in groundwater;
4. Imposition of engineering and institutional controls in the form of an environmental easement and Site Management Plan (SMP);
5. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State, and local rules and regulations for handling, transport, and disposal;

All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State, and local rules and regulations.

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.

4.0 REMEDIAL ACTION PROGRAM

4.1 GOVERNING DOCUMENTS

4.1.1 Site Specific Health & Safety Plan (HASP)

A Site specific HASP has been developed for the Site. The HASP is included in Appendix F.

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

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

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.

The Site Safety Coordinator will be Michael Clark, MS, CHMM. Michael Clark's resume is provided in Appendix I.

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

4.1.2 Quality Assurance Project Plan (QAPP)

An effluent grab vapor sample will be collected from the SVE system subsequent to start up to determine the concentrations of vapors at the point of discharge to determine if treatment is necessary. The vapor sample will be collected into a 6 L Summa Canister, delivered to Pace Analytical Services, Inc. located at 575 Broadhollow Road, Melville, New York 11747 and laboratory analyzed for VOCs by USEPA Method TO-15.

Groundwater samples will be collected from on and off-Site wells on a quarterly basis and laboratory analyzed for VOCs by USEPA Method 8260. The QAPP is provided in Appendix G.

4.1.3 Construction Quality Assurance Plan (CQAP)

The remedy entails the construction of a SVE/AS system to address soil, soil vapor, and groundwater contaminants at the Site. The RDWP for the SVE/AS system is included as Appendix B and provides information on the construction of the SVE/AS system. Dale Konas, PE of EnviroTrac is the key personnel for the system design and construction of the SVE/AS system. Mr. Konas' resume is provided in the RDWP and Appendix I..

On a monthly basis, tedlar bag air samples will be collected from the effluent discharge point and subsequently screened with a PID for the presence of VOCs. Should VOC levels be detected above the initial screening results collected during the SVE/SSDS Pilot Test in June, 2016, a tedlar bag air sample will be collected and delivered to Pace Analytical Services, Inc. in Melville, NY for analysis of VOCs by USEPA Method TO-15. Should the effluent discharge be above 0.5 pounds of total VOCs, adjustments will be made to the SVE system. Should the adjustments not remedy the situation, a treatment system will be installed within the remediation system shed. The NYSDEC will be notified in writing of any PID readings reported above the initial screening, any adjustments made to the SVE system, and any changes in construction made to the SVE system.

4.1.4 Investigation Derived Waste (IDW)

Investigation derived waste ("IDW") includes materials generated during the performance of the prescribed remedial actions that have been contaminated with COCs and require disposal. The anticipated IDW will include incidental personal protective equipment ("PPE"), soil (e.g., drill cuttings), well development purge water, and decontamination waste.

Contaminated PPE will be collected, double bagged, and properly disposed appropriately.

Drill cuttings, well purge water, and decontamination waste will be collected and containerized in properly labeled 55-gallon DOT-approved steel drums. IDW containers will be labeled and stored on-Site pending analytical waste characterization results required by the disposal facility. Any containerized wastes generated off-Site will be moved to the Site on the day of collection and securely stored pending analytical results.

The NYSDEC will be notified for approval regarding the proposed disposal facility prior to hauling any contaminated material off-Site. Following characterization through laboratory testing of chemical criteria specified by the NYSDEC approved off-Site facility permitted to accept the waste material (soil, well development water and decontamination waste) developed during the well installations, the material will be properly hauled from the Site under manifest by a duly licensed sub-contractor and disposed at the facility.

4.1.5 Storm-Water Pollution Prevention Plan (SWPPP)

The installation of the SVE/AS system will not require a SWPPP.

4.1.6 Community Air Monitoring Plan (CAMP)

The proposed remedy involves the installation of an SVE/AS system at the Site with continued operation of a SSDS currently and in the future. A SVE well and an AS wells will be installed outdoors to the rear of the former dry cleaner unit, a SVE well and an AS well are planned for installment in the sidewalk in front of the building to the south, and an AS well will be installed in the basement of the former dry cleaner unit. As such, the intended activities could pose a potential threat to the community. Real-time air monitoring for VOCs and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities. The CAMP is provided in Appendix H.

4.1.7 Contractors Site Operations Plan (SOP);

The Remedial Engineer has reviewed all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirms that they are in compliance with this RAWP. The Remedial Engineer is responsible to ensure that all later 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. The RDWP summarizes the installation of the SVE/AS system at the Site. The RDWP is provided as Appendix B.

4.1.8 Citizen Participation Plan

The Citizen Participation Plan (CPP) enables citizens to participate more fully in the decisions that affect their health, environment, and social well-being.

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

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

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

Document repository has been established at the following location and contain all applicable project documents:

Cypress Hills Branch
Brooklyn Public Library
236 Crystal Street
Brooklyn, NY 11208
(718) 227-6004

Hours of Operation:

Monday, Wednesday - Friday	10 a.m. - 6 p.m.
Tuesday	1 p.m. – 8 p.m.
Saturday	Closed
Sunday	Closed

Contact:

Rowshon Perveen, Director

4.2 GENERAL REMEDIAL CONSTRUCTION INFORMATION

4.2.1 Project Organization

A project organization chart is included in Figure 11.

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

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Dale Konas, P.E.. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the 1199 Sutter Avenue Site (NYSDEC BCA Index No.C24141). The Remedial Engineer will certify in the FER that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

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

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

The Remedial Engineer will provide the certifications listed in Section 10.1 in the FER.

4.2.3 Remedial Action Construction Schedule

The installation and startup of the SVE/AS system is expected to take approximately eight (8) to 12 weeks. Any variations will be reported to the DEC.

4.2.4 Work Hours

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

4.2.5 Site Security

The remedial activities entail the installation of an SVE/AS system at the Site with wells installed in the basement of the former dry cleaner, in the rear parking area to the north of the former dry cleaner, and in front of the Site building in the sidewalk to the south. Building personnel will be limited to using the basement area, parking lot to the north of the former dry cleaner and walking the sidewalk to the south of the Site while activities are being conducted. Barricades will be utilized for any activities that may affect sidewalk traffic.

4.2.6 Traffic Control

The remedy entails the installation of an SVE/AS system with wells installed in the basement of the former dry cleaner, supermarket units and in the rear parking lot to the north of the former dry cleaner unit and in front of the Site building on the sidewalk to the south. As such, sidewalk opening permits to install SVE/AS wells along the northeast of Sutter Avenue in front of the former dry cleaner.

4.2.7 Contingency Plan

Based upon the Site conditions encountered any deviations from the approved RAWP will be addressed in a contingency plan and submitted to DEC for approval.

4.2.8 Worker Training and Monitoring

All personnel will have the initial 40-hour HAZWOPER training as well as the annual 8-hour refresher course. Worker training and medical monitoring are covered in EnviroTrac's HASP included in Appendix F.

4.2.9 Agency Approvals

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

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

Sidewalk opening permits and sidewalk closure permits are required for the installation of the wells in the sidewalk to the south of the building. Once mitigation of soil vapors is no longer required at the Site, the wells will be decommissioned according to NYSDEC protocol. The system shed will be constructed at the EnviroTrac Yaphank, NY office and delivered to the Site for final installation, therefore, it is considered a temporary structure that will not be attached to the current building at the Site.

The proposed remedy will be applied based upon approval of the RAWP by the NYSDEC and NYSDOH.

4.2.10 NYSDEC BCP Signage

There are no redevelopment plans for the Site at this time. The installation of the SVE/AS system will take place in the basement of the former dry cleaner, in the sidewalk to the immediate south of the building, and in the rear parking area to the north of the former dry cleaner. Based upon the proposed remedy, signage will not be required.

4.2.11 Pre-Construction Meeting with NYSDEC

A pre-construction meeting will be coordinated with the NYSDEC project manager prior to initiating the remedy.

4.2.12 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in Table 15. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.2.13 Remedial Action Costs

The total estimated cost of the Remedial Action is $713,400 over a 30 year period. This will be revised based on actual costs and submitted as an Appendix to the FER.

4.3 SITE PREPARATION

4.3.1 Mobilization

During the remedial activities work trucks will be parked in the paved parking area along the rear of the Site.

4.3.2 Erosion and Sedimentation Controls

Based upon the nature of the remedy, erosion and sedimentation controls are not necessary.

4.3.3 Stabilized Construction Entrance(s)

The trucks will enter the rear of the Site along Crystal Street. The trucks will be on the asphalt parking area surface.

4.3.4 Utility Marker and Easements Layout

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.

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.

4.3.5 Sheeting and Shoring

There will be no use of sheeting or shoring as part of the remedy.

4.3.6 Equipment and Material Staging

Equipment to be utilized during the installation of the SVE/AS system will be staged in the basement beneath the former dry cleaner.

4.3.7 Decontamination Area

A decontamination area will not be required based upon the selected remedy.

4.3.8 Site Fencing

Site fencing may be required for the installation of the SVE and AS wells in the front sidewalk to the south of the building.

4.3.9 Demobilization

Upon completion of the installation of the SVE/AS system, the concrete floor, rear parking lot, and sidewalk will be repaired in the areas that the wells were installed and all equipment and materials will be removed from the Site.

4.4 REPORTING

All daily and monthly reports will be included in the FER.

4.4.1 Daily Reports

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

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

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

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

A Site map that shows a predefined alpha-numeric grid for use in identifying locations described in reports submitted to NYSDEC is attached in Figure 12.

The NYSDEC assigned project number will appear on all reports.

4.4.2 Monthly Reports

Monthly reports prepared in accordance with DER-10 Section 5.7(b) will be submitted to the NYSDEC and NYSDOH Project Managers within one (1) week following the end of the month of the reporting period and will include, at a minimum:

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

4.4.3 Other Reporting

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

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

4.4.4 Complaint Management Plan

Any complaints that are received will be reported to the NYSDEC. Based upon the nature of the complaint a revision to the proposed RAWP may be warranted in order to abate the condition.

4.4.5 Deviations from the Remedial Action Work Plan

During the implementation of the RAWP, any derivation from the RAWP will be reported to the RE. The RE or his representative will contact the NYSDEC project manager and determine if a deviation necessitates a formal RAWP modification and NYSDEC approval. If no formal approval is required, the deviation will be noted in the Site reports and explained in the final FER.

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

Since residual contaminated soil and groundwater/soil vapor will exist beneath the Site 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 hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a Site-specific SMP that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Site will have two (2) primary EC systems. These are: (1) the operation of a SVE/AS system; and (2) a composite cover system consisting of the existing building and pavement.

The FER will report residual contamination on the Site in tabular and map form. The remedy does not call for the removal of impacted soil. During the installation of the wells, soil will be required to be removed. The soil will be containerized in drums and staged on-Site. A waste characterization sample will be collected from the drums and submitted to an approved NYSDEC disposal facility. Upon approval, the drums will be picked up and transported off-Site for disposal. It is estimated that approximately four (4) to eight (8) 55-gallon drums of soil will be required to be removed.

5.1 SOIL CLEANUP OBJECTIVES

The soil cleanup objectives for the residual soil contamination remaining at the Site comply with the RCSCOs for the protection of groundwater. Table 6 and Figure 4 summarize the soil sampling results for the Site.

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

Groundwater samples will be collected as part of a MNA plan.

5.2.1 End-Point Sampling Frequency

No end point samples will be required to be collected from the Site.

5.2.2 Methodology

The groundwater samples will be collected quarterly from on and off-Site wells into laboratory-supplied glassware, labeled, placed into an ice-filled cooler, and delivered to Pace Analytical Services, LLC in Melville, NY for laboratory analysis of VOCs by USEPA Method 8260 with Category B Deliverables.

5.2.3 Reporting of Results

The groundwater sample results will be summarized in quarterly reports and provided to the NYSDEC and NYSDOH.

5.2.4 QA/QC

A trip blank and blind duplicate samples will be collected along with the groundwater samples. Matrix spike and matrix spike duplicates will be collected for every 20 samples that are collected. The samples will be laboratory analyzed in the same manner as the groundwater samples.

5.2.5 DUSR

A DUSR will be required for the groundwater samples.

5.2.6 Reporting of End-Point Data in FER

No end point samples will be required to be collected from the Site.

5.3 ESTIMATED MATERIAL REMOVAL QUANTITIES

It is estimated that four (4) to eight (8) 55-gallon drums of soil will need to be removed during the installation of the SVE/AS wells. The SVE/AS wells will be backfilled with Morie #2 well gravel. Refer to Figure 13 for the proposed SVE/AS system.

5.4 INVESTIGATION DERIVED WASTE (IDW)

Investigation derived waste ("IDW") includes materials generated during the performance of the prescribed remedial actions that have been contaminated with COCs and require disposal. The anticipated IDW will include incidental personal protective equipment ("PPE"), soil (e.g., drill cuttings), well development purge water, and decontamination waste.

Contaminated PPE will be collected, double bagged, and properly disposed as appropriate.

Drill cuttings, well purge water, and decontamination waste will be collected and containerized in properly labeled 55-gallon DOT-approved steel drums. IDW containers will be labeled and stored on-site pending analytical waste characterization results required by the disposal facility. Any containerized wastes generated off-Site will be moved to the Site on the day of collection and securely stored pending analytical results.

The NYSDEC will be notified for approval regarding the proposed disposal facility prior to hauling any contaminated material off-Site. Following characterization through laboratory testing of chemical criteria specified by the NYSDEC-approved off-site facility permitted to accept the waste material (soil, well development water and decontamination waste) developed during the well installations the material will be properly hauled from the Site under manifest by a duly licensed sub-contractor and disposed at the facility.

5.4.1 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 direction of the Remedial Engineer during all remedial excavations into known or potentially contaminated material. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

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

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

5.4.2 Stockpile Methods

The remedy does not call for the stockpiling of soil. Excavated soil will be placed into 55-gallon drums which will be disposed of off-Site subsequent to waste characterization sampling.

5.4.3 Materials Excavation and Load Out

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

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

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

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

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

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

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

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

5.4.4 Materials Transport Off-Site

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

5.4.5 Materials Disposal Off-Site

Disposal location established at a later date will be reported to the NYSDEC Project Manager.

The total quantity of material expected to be disposed off-Site is four (4) to eight (8) 55-gallon drums.

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

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

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Participant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York

State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

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

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

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

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

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

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

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

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

5.4.6 Materials Reuse On-Site

No soil or materials will be reused during the implementation of the remedy.

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

Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. A site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The site cover may consist of paved surface parking areas, sidewalks, or a soil cover. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

5.47 Fluids Management

Low-flow groundwater sampling methods will be applied during the quarterly MNA groundwater sampling events. Therefore, purge water will be generated and placed into 55-gallons drums. The drums will be stored on-Site and properly labeled until proper off-Site disposal.

5.4.8 Demarcation

No soil removal will be performed as part of this remedy. Therefore, demarcation of residual soil within an excavation is not required.

5.4.9 Backfill from Off-Site Sources

The wells will be backfilled with Morie #2 well gravel.

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

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

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

5.4.10 Stormwater Pollution Prevention

A Stormwater Pollution Prevention Plan is not required based upon the selected remedy.

5.4.11 Contingency Plan

If underground storage tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs). These analyses will not be limited to CP-51 parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

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

5.4.12 Community Air Monitoring Plan

Based upon the proposed remedy a Community Air Monitoring Plan (CAMP) is required. The CAMP provided in Appendix H addresses potential project air emissions into the off-Site community that may occur during the implementation of the project and is consistent with the NYSDOH Generic Community Air Monitoring Plan (DER-10 Appendix 1A) guidance for evaluation of potential airborne contaminant releases as a direct result of pre-design investigative and subsequent remedial activities.

5.4.13 Odor, Dust, and Nuisance Control Plan

The ambient air will be monitored with a PID during any intrusive activities, in addition the excavated soil will be screened. Dust particulate monitors will be utilized during the excavation activities.

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

5.4.13.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site and on-Site. Specific odor control methods to be used on a routine basis will include screening soils and ambient air with a PID. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Participant's Remedial Engineer, who is responsible for certifying the Final Engineering Report.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

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

5.4.13.2 Dust Control Plan

The proposed remedy will not generate a significant amount of dust and is being conducted in the rear parking lot, front/southern sidewalk, and basement of the former dry cleaner. Based upon particulate readings a mechanical fan may be employed to control the dust.

5.4.13.3 Other Nuisances

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

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Since residual contaminated soil, soil vapor, and groundwater will exist beneath the Site 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 hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a Site-specific SMP that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the Site) will have two (2) primary EC systems. These are: (1) an SVE/AS system and (2) a Site cap/cover system consisting of the existing pavement and concrete building slabs. A site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The site cover may consist of paved surface parking areas, sidewalks, or a soil cover. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

The FER will report residual contamination on the Site in tabular and map form. This will include presentation of exceedances of both Track 1 and Track 4 sites.

7.0 ENGINEERING CONTROLS: COMPOSITE COVER SYSTEM

A Site cap/cover system is proposed as part of the remedy. The existing Site cover, consisting of the current building and paved surfaces at the Site, will prevent exposure to contaminated soils prior to and subsequent to remedial activities. The Site cover is considered an engineering control. A site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The site cover may consist of paved surface parking areas, sidewalks, or a soil cover. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

8.0 ENGINEERING CONTROLS: TREATMENT SYSTEMS

8.1 Soil Vapor Extraction / Air Sparge System

Installation of a SVE/AS system will address soil contamination beneath the Site, mitigate soil vapor beneath the building, and remediate groundwater contamination beneath the Site. The SVE/AS system will be designed to operate with continued operation of a SSDS currently and in the future. A total of five (5) wells, three (3) AS wells and two (2) SVE wells, will be installed in the basement of the former dry cleaner, in the rear parking lot to the north of the former dry cleaner, and in the front sidewalk to the south of the former dry cleaner. The wells will be connected to a remediation system shed located to the north of the former dry cleaner and the system effluent will discharge above the roof line of the building. In addition, SSD-7 and SSD-8 will be disconnected from the SSDS and be used as SVE wells and connected to the SVE/AS system. The SVE/AS system will mitigate potential long-term exposure to VOCs found in the sub-slab vapor beneath the former dry cleaner, beneath the rear parking lot, and the beneath the front sidewalk to the south of the dry cleaner, and is considered an engineering control. Operation, maintenance, and monitoring (OMM) inspections will be performed on a weekly basis for the first month followed by monthly inspections thereafter. An initial effluent vapor sample will be collected from the SVE/AS system to determine if treatment of vapors is required. The sample will be laboratory analyzed for VOCs by US Environmental Protection Agency (EPA) Method TO-15 with Category B Deliverables. The results of the effluent vapor sample will also be reviewed by a third party and a Data Usability Summary Report (DUSR) will be provided. The weekly visits will consist of an overall system inspection, reading of system gauges, and effluent vapor screening with a calibrated PID. The proposed SVE/AS system construction and installation is summarized in the RDWP provided as Appendix B of this report, will be summarized in the FER, and will be operated and maintained through the SMP.

9.0 CRITERIA FOR COMPLETION OF REMEDIATION/TERMINATION OF REMEDIAL SYSTEMS

9.1 Composite Cover System

A composite cover system will include the existing building slabs and pavement and is a proposed part of the remedy. A site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The site cover may consist of paved surface parking areas, sidewalks, or a soil cover. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

9.2 Soil Vapor Extraction / Air Sparge (SVE/AS) System

The SVE/AS system will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the SVE/AS system may be submitted by the Site owner based on confirmatory data that justifies such request. Systems will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH.

9.3 Sub-slab Depressurization System (SSDS)

The SSDS system is already in place and will be continue to be operational in conjunction with the SVE/AS system. The SSDS system will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the system may be submitted by the Site owner after residual contamination concentrations in groundwater: (1) are cleaned up to levels below NYSDEC standards, (2) have become asymptotic over an extended period of time as mandated by the NYSDEC and the NYSDOH, or (3) if NYSDEC has determined that the SSDS has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the Site. Systems will remain in place and operational until permission to discontinue their use is granted in writing by NYSDEC and NYSDOH. These sampling/monitoring activities will adhere to stipulations outlined in the Monitoring Plan section of the SMP.

9.4 Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Monitoring activities will be outlined in the Monitoring Plan of the SMP.

9.5 Treatment systems

The soil, groundwater, and soil vapor contamination will be addressed through the installation and operation of a SVE/AS system. A total of five (5) wells, three (3) AS wells and two (2) SVE wells, will be installed in the basement of the former dry cleaner, in the rear parking lot to the north of the former dry cleaner, as well as on the front sidewalk of the Site to the south of the former dry cleaner. The SVE/AS wells will be connected to a system shed located to the north of the former dry cleaner and the system effluent will discharge above the roof line of the building. The SVE/AS system will mitigate potential long-term exposure to VOCs found in the sub-slab vapor beneath the former dry cleaner, beneath the rear parking lot, and beneath the sidewalk to the south, and is considered an engineering control. OMM inspections will be performed on a weekly basis for the first month followed by monthly inspections thereafter. The visits will consist of an overall system inspection, reading of system gauges, and effluent vapor screening with a calibrated PID. The proposed SVE/AS system construction and installation are summarized in the RDWP provided as Appendix B of this report, will be summarized in the FER, and will be operated and maintained through the SMP.

10.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site will have residual contamination remaining in place. ECs for the residual contamination have been incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a SMP.

A Site-specific Environmental Easement will be recorded with Kings County Office of the New York City Registrar to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all 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 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.

All as-built drawings, diagrams, calculation and manufacturer documentation for treatment systems will be presented in the FER.

10.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. As part of this remedy, an Environmental Easement approved by NYSDEC will be filed and recorded with the Kings County Office of the New York City Register. The Environmental Easement will be submitted as part of the FER.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the Kings County Office of the City Register before the Certificate of Completion can be issued by NYSDEC. A series of ICs are required under this remedy to implement, maintain and monitor these EC systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to commercial or future mixed commercial and residential use. These ICs are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. ICs can, generally, be subdivided between controls that support ECs, and those that place general restrictions on Site usage or other requirements. ICs in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

The ICs that support ECs 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 ECs must be operated and maintained as specified in this SMP;
- A composite cover system or Site cap consisting of asphalt pavement, concrete covered sidewalks, and concrete building slabs must be inspected, certified and maintained as required in the SMP;
- A SVE/AS system consisting of wells installed in the basements of the former dry cleaner, in the parking area to the rear of the former dry cleaner, and in the sidewalk to the south of the building must be inspected, certified, operated and maintained as required by the SMP;
- SSDS is already in place and will continue to operate in conjunction with the SVE/AS system;
- All ECs on the Site (Controlled Property) must be inspected and certified at a frequency and in a manner defined in the SMP;
- Soil vapor, 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 Site (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;
- ECs may not be discontinued without an amendment or extinguishment of the Environmental Easement.

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

- Vegetable gardens and farming on the Controlled Property are prohibited;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the SMP;
- The Controlled Property may be used for commercial use or mixed commercial or residential use, provided the long-term ECs and ICs included in the SMP are employed;
- The Controlled Property may not be used for a higher level of use, such as restricted residential use without an amendment or extinguishment of this Environmental Easement;
- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to

evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

10.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the FER 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 in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The Site owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the SMP are performed.

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

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

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The SMP will be based on a calendar year and will be due for submission to NYSDEC by September 1, 2018.

The SMP in the FER will include a monitoring plan for groundwater at the downgradient Site perimeter to evaluate Site-wide performance of the remedy. Appropriately placed groundwater monitor wells have been installed immediately downgradient of all VOC remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented.

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

11.0 FINAL ENGINEERING REPORT

A FER will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed maps of all sources. The FER 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 SMP (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.

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

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

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

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

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

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

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

11.1 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the FER. The certification will be signed by the Remedial Engineer Dale Konas who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped. The certification will include the following statements:

I, _________________________, am currently a registered professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 1199 Sutter Avenue Site (NYSDEC BCA Index No. C224141.

I certify that the Site description presented in this FER is identical to the Site descriptions presented in the Environmental Easement, the Site Management Plan, and the Brownfield Cleanup Agreement for 1199 Sutter Avenue and related amendments.

I certify that the Remedial Action Work Plan dated MAY----, 2018 and approved by the NYSDEC were implemented and that all requirements in those documents have been substantively complied with.

I certify that the remedial activities were observed by qualified environmental professionals under my supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and all operation and maintenance requirements applicable to the Site are contained in an Environmental Easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded. A Site Management Plan has been submitted by the Participant for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by the NYSDEC.

I certify that the export of all contaminated soil, fill, water or other material from the Site was performed in accordance with the Remedial Action Work Plan, and were taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws.

I certify that all import of soils from off-Site, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology and soil screening methodology defined in the Remedial Action Work Plan.

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

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

12.0 SCHEDULE

Activities	Organization	Anticipated Initiation	Anticipated Completion	Deliverable
RD/RAWP Review	NYSDEC/NYSDOH	June, 2018	June, 2018	Approved RD/RAWP by NYSDEC/NYSDOH
SVE/AS Draft Remedial Design Work Plan	EnviroTrac	June, 2018	June, 2018	RAWP
Draft Site Management Plan (SMP)	NYSDEC/NYSDOH	July, 2018	August, 2018	Approved SVE/AS Remedial Design Work Plan
SVE/AS Installation Complete	EnviroTrac	July, 2018	September, 2018	SVE/AS Performance Report
SVE/AS Performance Report Review	NYSDEC/NYSDOH	September, 2018	September, 2018	Approved SVE/AS Performance Report by NYSDEC/NYSDOH
SVE/AS Construction Completion Report (CCR)/Final Engineering Report (FER) SMP Approval	EnviroTrac	September, 2018	October, 2018	SVE/AS CCR/FER SMP
Approval of FER	NYSDEC/NYSDOH	October, 2018	November, 2018	Final FER
Development of Site Management Procedures	EnviroTrac	TBD	TBD	Implementation of SMP

It is estimated that it will take eight (8) to 12 weeks to install the SVE/AS system. Once the SVE/AS system is operating, weekly system inspection visits will be performed for a period of one month followed by monthly inspections. Groundwater MNA will be performed on a quarterly basis via low-flow groundwater sampling. Status Reports will be provided to the NYSDEC and the NYSDOH on a quarterly basis.

TABLES

Table 1
6 NYCRR Part 375-6(a) Unrestricted Use Soil Cleanup Objectives
1199-1221 Sutter Avenue, Brooklyn, New York
BCP #C224141

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

Table 1
6 NYCRR Part 375-6(a) Unrestricted Use Soil Cleanup Objectives
1199-1221 Sutter Avenue, Brooklyn, New York
BCP #C224141

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
Semivolatile organic compounds		
Acenaphthene	83-32-9	20
Acenapthylene [f]	208-96-8	100 [a]
Anthracene [f]	120-12-7	100 [a]
Benz(a)anthracene [f]	56-55-3	1[c]
Benzo(a)pyrene	50-32-8	1[c]
Benzo(b)fluoranthene[f]	205-99-2	1[c]
Benzo(g,h,i)perylene [f]	191-24-2	100
Benzo(k)fluoranthene[f]	207-08-9	0.8 [c]
Chrysene [f]	218-01-9	1[c]

Table 1
6 NYCRR Part 375-6(a) Unrestricted Use Soil Cleanup Objectives
1199-1221 Sutter Avenue, Brooklyn, New York
BCP #C224141

Dibenz(a,h)anthracene[f]	53-70-3	0.33 [b]
Fluoranthene [f]	206-44-0	100 [a]
Fluorene	86-73-7	30
Indeno(1,2,3-cd)pyrene [f]	193-39-5	0.5 [c]
m-Cresol [f]	108-39-4	0.33 [b]
Naphthalene [f]	91-20-3	12
o-Cresol [f]	95-48-7	0.33 [b]
p-Cresol [f]	106-44-5	0.33 [b]
Pentachlorophenol	87-86-5	0.8[b]
Phenanthrene [f]	85-01-8	100
Phenol	108-95-2	0.33[b]
Pyrene[f]	129-00-0	100
Volatile organic compounds		
1,1,1-Trichloroethane [f]	71-55-6	0.68
1,1-Dichloroethane [f]	75-34-3	0.27
1,1-Dichloroethene[f]	75-35-4	0.33
1,2-Dichlorobenzene[f]	95-50-1	1.1
1,2-Dichloroethane	107-06-2	0.02[c]
cis -1,2-Dichloroethene [f]	156-59-2	0.25
trans-1,2-Dichloroethene [f]	156-60-5	0.19
1,3-Dichlorobenzene[f]	541-73-1	2.4
1,4-Dichlorobenzene	106-46-7	1.8
1,4-Dioxane	123-91-1	0.1 [b]

Table 1
6 NYCRR Part 375-6(a) Unrestricted Use Soil Cleanup Objectives
1199-1221 Sutter Avenue, Brooklyn, New York
BCP #C224141

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	0.7
Trichloroethene	79-01-6	0.47
1,2,4-Trimethylbenzene [f]	95-63-6	3.6
1,3,5-Trimethylbenzene[f]	108-67-8	8.4
Vinyl chloride[f]	75-01-4	0.02
Xylene (mixed)	1330-20-7	0.26

UUSCOs are listed in parts per million (ppm)

Table 2

6NYCRR Part 375-6.4 Restricted Use Soil Cleanup Objectives

1199-1221 Sutter Avenue, Brooklyn, New York

BCP No. C224141

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
Metals							
Arsenic	7440-38-2	16[f]	16[f]	16[f]	16[f]	13[f]	16[f]
Barium	7440-39-3	350[f]	400	400	10,000 [d]	433	820
Beryllium	7440-41-7	14	72	590	2,700	10	47
Cadmium	7440-43-9	2.5[f]	4.3	9.3	60	4	7.5
Chromium, hexavalent [h]	18540-29-9	22	110	400	800	1[e]	19
Chromium, trivalent [h]	16065-83-1	36	180	1,500	6,800	41	NS
Copper	7440-50-8	270	270	270	10,000 [d]	50	1,720
Total Cyanide [h]		27	27	27	10,000 [d]	NS	40
Lead	7439-92-1	400	400	1,000	3,900	63[f]	450
Manganese	7439-96-5	2,000[f]	2,000[f]	10,000 [d]	10,000 [d]	1600[f]	2,000[f]
Total Mercury		0.81[j]	0.81[j]	2.8[j]	5.7[j]	0.18[f]	0.73
Nickel	7440-02-0	140	310	310	10,000 [d]	30	130
Selenium	7782-49-2	36	180	1,500	6,800	3.9[f]	4[f]
Silver	7440-22-4	36	180	1,500	6,800	2	8.3
Zinc	7440-66-6	2200	10,000 [d]	10,000 [d]	10,000 [d]	109[f]	2,480
PCBs/Pesticides							
2,4,5-TP Acid (Silvex)	93-72-1	58	100[a]	500[b]	1,000[c]	NS	3.8
4,4’-DDE	72-55-9	1.8	8.9	62	120	0.0033 [e]	17
4,4’-DDT	50-29-3	1.7	7.9	47	94	0.0033 [e]	136
4,4’- DDD	72-54-8	2.6	13	92	180	0.0033 [e]	14
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04[g]	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	5103-71-9	0.91	4.2	24	47	1.3	2.9

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
delta-BHC	319-86-8	100[a]	100[a]	500[b]	1,000[c]	0.04[g]	0.25
Dibenzofuran	132-64-9	14	59	350	1,000[c]	NS	210
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	959-98-8	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan II	33213-65-9	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan sulfate	1031-07-8	4.8[i]	24[i]	200[i]	920[i]	NS	1,000[c]
Endrin	72-20-8	2.2	11	89	410	0.014	0.06
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	1336-36-3	1	1	1	25	1	3.2
Semivolatiles							
Acenaphthene	83-32-9	100[a]	100[a]	500[b]	1,000[c]	20	98
Acenapthylene	208-96-8	100[a]	100[a]	500[b]	1,000[c]	NS	107
Anthracene	120-12-7	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benz(a)anthracene	56-55-3	1[f]	1[f]	5.6	11	NS	1[f]
Benzo(a)pyrene	50-32-8	1[f]	1[f]	1[f]	1.1	2.6	22
Benzo(b)fluoranthene	205-99-2	1[f]	1[f]	5.6	11	NS	1.7
Benzo(g,h,i)perylene	191-24-2	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benzo(k)fluoranthene	207-08-9	1	3.9	56	110	NS	1.7
Chrysene	218-01-9	1[f]	3.9	56	110	NS	1[f]
Dibenz(a,h)anthracene	53-70-3	0.33[e]	0.33[e]	0.56	1.1	NS	1,000[c]
Fluoranthene	206-44-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Fluorene	86-73-7	100[a]	100[a]	500[b]	1,000[c]	30	386
Indeno(1,2,3-cd)pyrene	193-39-5	0.5[f]	0.5[f]	5.6	11	NS	8.2
m-Cresol	108-39-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
Naphthalene	91-20-3	100[a]	100[a]	500[b]	1,000[c]	NS	12

Table 2
6NYCRR Part 375-6.4 Restricted Use Soil Cleanup Objectives
1199-1221 Sutter Avenue, Brooklyn, New York
BCP No. C224141

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
o-Cresol	95-48-7	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
p-Cresol	106-44-5	34	100[a]	500[b]	1,000[c]	NS	0.33[e]
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8[e]	0.8[e]
Phenanthrene	85-01-8	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Phenol	108-95-2	100[a]	100[a]	500[b]	1,000[c]	30	0.33[e]
Pyrene	129-00-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Volatiles							
1,1,1-Trichloroethane	71-55-6	100[a]	100[a]	500[b]	1,000[c]	NS	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27
1,1-Dichloroethene	75-35-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33
1,2-Dichlorobenzene	95-50-1	100[a]	100[a]	500[b]	1,000[c]	NS	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02[f]
cis-1,2-Dichloroethene	156-59-2	59	100[a]	500[b]	1,000[c]	NS	0.25
trans-1,2-Dichloroethene	156-60-5	100[a]	100[a]	500[b]	1,000[c]	NS	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1[e]	0.1[e]
Acetone	67-64-1	100[a]	100[b]	500[b]	1,000[c]	2.2	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06
Butylbenzene	104-51-8	100[a]	100[a]	500[b]	1,000[c]	NS	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76
Chlorobenzene	108-90-7	100[a]	100[a]	500[b]	1,000[c]	40	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1
Hexachlorobenzene	118-74-1	0.33[e]	1.2	6	12	NS	3.2
Methyl ethyl ketone	78-93-3	100[a]	100[a]	500[b]	1,000[c]	100[a]	0.12

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
Methyl tert-butyl ether	1634-04-4	62	100[a]	500[b]	1,000[c]	NS	0.93
Methylene chloride	75-09-2	51	100[a]	500[b]	1,000[c]	12	0.05
n-Propylbenzene	103-65-1	100[a]	100[a]	500[b]	1,000[c]	NS	3.9
sec-Butylbenzene	135-98-8	100[a]	100[a]	500[b]	1,000[c]	NS	11
tert-Butylbenzene	98-06-6	100[a]	100[a]	500[b]	1,000[c]	NS	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3
Toluene	108-88-3	100[a]	100[a]	500[b]	1,000[c]	36	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6
1,3,5- Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	1330-20-7	100[a]	100[a]	500[b]	1,000[c]	0.26	1.6

All soil cleanup objectives (SCOs) are in parts per million (ppm).
NS=Not specified. See Technical Support Document (TSD).

Footnotes

[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.

Table 3

NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1

Class GA Ambient Water Quality Standards and Guidance Values

1199-1221 Sutter Avenue, Brooklyn, New York

BCP No. C224141

(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
NYSDOH Indoor Air Guidance Values
1199-1221 Sutter Avenue, Brooklyn, New York
BCP No. C224141

New York State Department of Health Derived Indoor Air Guidance Values
(micrograms per cubic meter of air)

Chemical	Indoor Air Guidance Value
Tetrachloroethene	30
Trichloroethene	2

EnviroTrac
Environmental Services

Soil Vapor / Indoor Air Matrix A

May 2017

Analytes Assigned:
Trichloroethene (TCE), *cis*-1,2-Dichloroethene (*c*12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX A

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

MATRIX A Page 2 of 2

Soil Vapor / Indoor Air Matrix B

May 2017

Analytes Assigned:
Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX B

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

MATRIX B Page 2 of 2

Soil Vapor/Indoor Air Matrix C

May 2017

Analytes Assigned:
Vinyl Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)	
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX C

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

MATRIX C Page 2 of 2

Table 6

Historical Soil Sample Results Detected Above NYSDEC SCOs 2009 to April, 2016

1199 Sutter Avenue, Brooklyn, New York

BCA No. C224141

Sample Collection Depth	**10'**	**11'-12'**	**8-13'**	**8'-13'**	**5'-6'**	**9'-10'**	**NYSDEC Soil Cleanup Objectives**			
Sample Location	**S3**	**S4**	**B-7**	**B-8**	**B-10**	**B-12**	**Unrestricted Use**	**Residential Use**	**Restricted Residential Use**	**Restricted Commercial Use**
Sample Date	**1/6/2009**	**4/5/2016**	**4/1/2009**	**4/1/2009**	**7/27/2011**	**7/27/2011**				
Volatile Organic Compounds										
Acetone	ND	ND	ND	ND	**170**	**210**	50	100,000	100,000	500,000
Tetrachloroethene	**37,500**	**15,000**	**5,100**	1,200	640	560	1,300	5,500	19,000	150,000

Notes:

All results reported as parts per billion (ppb) / micrograms per kilogram (ug/kg).

Analysis performed in accordance with USEPA Method 8260.

ND - Not Detected above method detection limit

Bolded and shaded values indicate an exceedance of the New York State Department of Environmental Conservation (NYSDEC) Part 375 Soil Cleanup Objectives.

EnviroTrac Environmental Services

Table 7

Historical Groundwater Sample Results Detected Above NYSDEC GWQS 2009 to April, 2016

1199 Sutter Avenue, Brooklyn, New York

BCA No. 224141

Parameters	Sample Designation:	Corresponding Phase II Data	Monitoring Well							Corresponding Phase II Data	Monitoring Well						
		B-6	MW-1S				MW-1D			B-5	MW-2S				MW-2D		
	Date:	4/1/09	8/27/09	11/2/09	2/25/10	7/20/11	8/27/09	11/2/09	7/20/11	4/1/09	8/27/09	11/2/09	2/25/10	7/20/11	8/27/09	11/2/09	7/20/11
	NYSDEC GWQS																
Acetone	50	<2.00	<50.0	<50.0	<50.0	<10.0	<50.0	<50.0	<5.00	<2.00	<50.0	<50.0	<50.0	<5.00	<50.0	<50.0	<5.00
Chloroform	7	<1.00	<5.00	<5.00	<5.00	**30**	<5.00	<5.00	0.90	<1.00	<5.00	<5.00	<5.00	**13.0**	<5.00	<5.00	1.10
cis-1,2-Dichloroethene	5*	4.60	<5.00	<5.00	**5.82**	0.71 J	<5.00	<5.00	<5.00	**6.80**	<5.00	<5.00	<5.00	0.20 J	<5.00	<5.00	<5.00
Tetrachloroethene	5*	**380**	**98.3**	**48.2**	**172**	**84.0**	5	<5.00	**6.80**	**93.0**	**18.9**	<5.00	<5.00	**10.0**	<5.00	<5.00	**9.60**
Trichloroethene	5*	**14.0**	<5.00	<5.00	**8.37**	3.20	<5.00	<5.00	1.70	2.70	<5.00	<5.00	<5.00	0.36 J	<5.00	<5.00	0.95

Notes:

All data is in parts per billion (ppb) / micrograms per liter (ug/L)

NYSDEC GWQSs -New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guid

Bolded and shaded values indicate an exceedance of the NYSDEC GWQSs.

J = The concentration is estimated

* = The Principal Organic Contaminant Standard applies

Table 7

Historical Groundwater Sample Results Detected Above NYSDEC GWQS 2009 to April, 2016

1199 Sutter Avenue, Brooklyn, New York

BCA No. 224141

Parameters	Sample Designation:	Corresponding Phase II Data	Monitoring Well							Corresponding Phase II Data	Monitoring Well										
		S2	MW-3S				MW-3D			B-7	MW-4S					MW-4D		MW-5S		MW-8S	MW-9S
	Date:	1/6/09	8/27/09	11/2/09	2/25/10	7/20/11	8/27/09	11/2/09	7/20/11	4/1/09	8/27/09	11/2/09	2/25/10	7/20/11	4/6/16	8/27/09	11/2/09	7/20/11	4/6/16	4/6/16	4/6/16
	NYSDEC GWQS																				
Acetone	50	10.3	<50.0	<50.0	<50.0	<5.00	<50.0	<50.0	<5.00	<2.00	**577**	<50.0	<50.0	<12.0	<50.0	<50.0	<50.0	<12.0	<5.00	<5.00	<5.00
Chloroform	7	<0.14	<5.00	<5.00	<5.00	**14.0**	<5.00	<5.00	1.80	<1.00	**97.7**	<5.00	<5.00	**15**	3.00 J	<5.00	<5.00	**29.0**	2.40 J	3.3 0J	0.50 J
cis-1,2-Dichloroethene	5*	NA	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	0.34 J	**81.0**	<5.00	**16.9**	<5.00	4.30	2.60	<5.00	<5.00	**9.80**	**5.10**	0.34 J	<1.00
Tetrachloroethene	5*	**187**	<5.00	**14.9**	<5.00	0.73	<5.00	<5.00	**20.0**	**610**	**51.0**	**359**	**348**	**470**	**390**	**23.1**	<5.00	**98.0**	**200**	**12.0**	0.90 J
Trichloroethene	5*	1.50	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	1.10	**42.0**	<5.00	**20.4**	**11.9**	**14.0**	**14.0**	<5.00	<5.00	**5.20**	**10.0**	0.62 J	<1.00

Notes:

All data is in micrograms per liter (ug/L)

NYSDEC GWQSs -New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values

Bolded and shaded values indicate an exceedance of the NYSDEC GWQSs.

J = The concentration is estimated

* = The Principal Organic Contaminant Standard applies

EnviroTrac
Environmental Services

Table 8

VOC Groundwater Sample Results 2009 to August, 2017

1199 Sutter Avenue, Brooklyn, New York

BCA No. 224141

Parameters	Sample Designation:	Corresponding Phase II Data	Monitoring Well										
		B-6	MW-1S								MW-1D		
	Date:	4/1/09	8/27/09	11/2/09	2/25/10	7/20/11	5/17/17	6/27/17	7/27/17	8/29/17	8/27/09	11/2/09	7/20/11
	NYSDEC GWQS												
Acetone	50	<2.00	<50.0	<50.0	<50.0	<10.0	<5.00	NR	<5.00	18.4	<50.0	<50.0	<5.00
Chloroform	7	<1.00	<5.00	<5.00	<5.00	**30**	<1.00	<1.00	<1.00	<1.00	<5.00	<5.00	0.90
cis-1,2-Dichloroethene	5*	4.60	<5.00	<5.00	**5.82**	0.71 J	<1.00	<1.00	<1.00	<1.00	<5.00	<5.00	<5.00
Tetrachloroethene	5*	**380**	**98.3**	**48.2**	**172**	**84.0**	**49.5**	**46.1 J**	**24.9**	**21.7**	5	<5.00	**6.80**
Trichloroethene	5*	**14.0**	<5.00	<5.00	**8.37**	3.20	2.10	2.80	1.30	<1.00	<5.00	<5.00	1.70

Parameters	Corresponding Phase II Data	Monitoring Well										
	B-5	MW-2S								MW-2D		
	4/1/09	8/27/09	11/2/09	2/25/10	7/20/11	5/17/17	6/27/17	7/27/17	8/29/17	8/27/09	11/2/09	7/20/11
Acetone	<2.00	<50.0	<50.0	<50.0	<5.00	8.90	NR	<5.00	13.4	<50.0	<50.0	<5.00
Chloroform	<1.00	<5.00	<5.00	<5.00	**13.0**	<1.00	<1.00	<1.00	<1.00	<5.00	<5.00	1.10
cis-1,2-Dichloroethene	**6.80**	<5.00	<5.00	<5.00	0.20 J	<1.00	<1.00	<1.00	<1.00	<5.00	<5.00	<5.00
Tetrachloroethene	**93.0**	**18.9**	<5.00	<5.00	**10.0**	2.20	1.1 J	2.90	1.50	<5.00	<5.00	**9.60**
Trichloroethene	2.70	<5.00	<5.00	<5.00	0.36 J	<1.00	<1.00	<1.00	<1.00	<5.00	<5.00	0.95

Notes:

Only detected analytes are reported.

All data is in parts per billion (ppb) / micrograms per liter (ug/L)

NYSDEC GWQSs -New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values

Bolded and shaded values indicate an exceedance of the NYSDEC GWQSs.

J = The concentration is estimated

NA = Not Available

NR = Not Reported

* = The Principal Organic Contaminant Standard applies

** = The blind duplicate sample was named MW-15S on June 27, 2017.

Table 8

VOC Groundwater Sample Results 2009 to August, 2017

1199 Sutter Avenue, Brooklyn, New York

BCA No. 224141

Parameters	Sample Designation:	Corresponding Phase II Data	Monitoring Well							Corresponding Phase II Data	Monitoring Well							Monitoring Well					
		S2	MW-3S				MW-3D			B-7	MW-4S					MW-4D		MW-5S					
	Date:	1/6/09	8/27/09	11/2/09	2/25/10	7/20/11	8/27/09	11/2/09	7/20/11	4/1/09	8/27/09	11/2/09	2/25/10	7/20/11	4/6/16	8/27/09	11/2/09	7/20/11	4/6/16	5/17/17	6/27/17	7/27/17	8/29/17
	NYSDEC GWQS																						
Acetone	50	10.3	<50.0	<50.0	<50.0	<5.00	<50.0	<50.0	<5.00	<2.00	**577**	<50.0	<50.0	<12.0	<50.0	<50.0	<50.0	<12.0	<5.00	<5.00	NR	<5.00	17.6
Chloroform	7	<0.14	<5.00	<5.00	<5.00	**14.0**	<5.00	<5.00	1.80	<1.00	**97.7**	<5.00	<5.00	**15**	3.00 J	<5.00	<5.00	**29.0**	2.40 J	<1.00	<1.00	<1.00	<1.00
cis-1,2-Dichloroethene	5*	NA	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	0.34 J	**81.0**	<5.00	**16.9**	<5.00	4.30	2.60	<5.00	<5.00	**9.80**	**5.10**	<1.00	**5.30**	4.80	4.70
Tetrachloroethene	5*	**187**	<5.00	**14.9**	<5.00	0.73	<5.00	<5.00	**20.0**	**610**	**51.0**	**359**	**348**	**470**	**390**	**23.1**	<5.00	**98.0**	**200**	**122**	**128 J**	**136**	**258**
Trichloroethene	5*	1.50	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	1.10	**42.0**	<5.00	**20.4**	**11.9**	**14.0**	**14.0**	<5.00	<5.00	**5.20**	**10.0**	**7.40**	**8.20**	**7.30**	**9.60**

Notes:

Only detected analytes are reported.

All data is in micrograms per liter (ug/L)

NYSDEC GWQSs -New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values

Bolded and shaded values indicate an exceedance of the NYSDEC GWQSs.

J = The concentration is estimated

NA = Not Available

NR = Not Reported

* = The Principal Organic Contaminant Standard applies

** = The blind duplicate sample was named MW-15S on June 27, 2017.

Table 8

VOC Groundwater Sample Results 2009 to August, 2017

1199 Sutter Avenue, Brooklyn, New York

BCA No. 224141

Parameters	Sample Designation:	Monitoring Well																	
		MW-8S					MW-9S	MW-10S				Blind Duplicate (MW-10S)				MW-11S			
	Date:	4/6/16	5/17/17	6/27/17	7/27/17	8/29/17	4/6/16	5/17/17	6/27/17	7/27/17	8/29/17	5/17/17	6/27/2017**	7/27/17	8/29/17	5/17/17	6/27/17	7/27/17	8/29/17
	NYSDEC GWQS																		
Acetone	50	<5.00	<5.00	NR	<5.00	<5.00	<5.00	<5.00	NR	<5.00	12.4	<5.00	NR	<5.00	12.4	<5.00	NR	<5.00	9.00
Chloroform	7	3.3 0J	<1.00	<1.00	<1.00	<1.00	0.50 J	1.50	1.40	<1.00	<1.00	1.70	1.10	1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,2-Dichloroethene	5*	0.34 J	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	**6.10**	**5.10**	**5.30**	<1.00	**6.40**	4.20	**5.10**	<1.00	1.50	3.5 J	2.50
Tetrachloroethene	5*	**12.0**	**5.50**	4.3 J	4.40	**8.40**	0.90 J	**575**	**363 J**	**441**	**719**	**435**	**337**	**428**	**712**	**24.1**	**37.4 J**	**86.7 J**	**105**
Trichloroethene	5*	0.62 J	<1.00	<1.00	<1.00	<1.00	<1.00	**21.0**	**16.2**	**13.4**	**16.2**	**19.8**	**18.1**	**13.3**	**15.9**	1.10	2.00	3.40	4.70 J

Notes:

Only detected analytes are reported.

All data is in micrograms per liter (ug/L)

NYSDEC GWQSs -New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values

Bolded and shaded values indicate an exceedance of the NYSDEC GWQSs.

J = The concentration is estimated

NA = Not Available

NR = Not Reported

* = The Principal Organic Contaminant Standard applies

** = The blind duplicate sample was named MW-15S on June 27, 2017.

Table 9

Historical Soil Vapor Results 2009 to March, 2017

1199 Sutter Avenue, Brooklyn, New York

BCA No. 224141

Sample ID:	**SS-1**	**VP-1**	**SSV-2**	**SSV-3**	**SSV-4**	**SSV-5**	**SSV-6**	**SSV-7**	**SSV-8**	**SSV-9**
Sample Date:	**7/20/11**	**3/21/17**	**4/21/14**	**4/21/14**	**4/21/14**	**4/21/14**	**4/21/14**	**4/21/14**	**4/6/16**	**4/6/16**
Media:	**Sub-Slab**	**Sub-Slab**	**Indoor Air**	**Sub-Slab**	**Sub-Slab**	**Sub-Slab**	**Soil Gas**	**Soil Gas**	**Soil Gas**	**Soil Gas**
Location:	**Former Dry Cleaner**	**Former Dry Cleaner**	**Supermarket**	**Dentist Office**	**Nail Salon**	**Deli**	**Rear Parking Lot**	**Sidewalk Across Sutter Ave**	**Rear Parking Lot**	**Sidewalk Across Chestnut St**
Parameter:										
Propylene	--	--	--	--	--	--	--	--	191	131
Dichlorodifluoromethane	--	5.82	--	9.2	9.05	4.32	--	3.16	4.99	--
Chloromethane	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	795	--	--	--	--	--	--	--	--	--
1,3-Butadiene	--	--	--	8.5	15	1.67	2.99	1.37	20.6	13.7
2-Hexanone	--	--	--	--	--	--	--	--	323	97.0
Chloroethane	--	1.75	--	0.161	0.063	0.087	--	--	--	--
Ethanol	--	--	--	--	--	--	--	--	--	--
Acetone	--	36.7	--	--	--	--	--	--	995	356
Trichlorofluoromethane	--	16.7	--	5.61	4.07	5.62	--	--	2.35	1.39
Isopropanol	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	--	--	--	--	--	--	--	--	1.64	--
Freon 113	3,720	--	--	0.537	0.69	0.606	--	--	--	--
trans-1,2-Dichloroethene	390	22.8	--	--	--	--	--	--	--	--
1,1-Dichloroethane	380	--	--	--	--	--	--	--	--	--
2-Butanone	--	3.51	--	--	--	--	--	--	4,480	1,550
cis-1,2-Dichloroethene	3,830	30.5	--	--	--	0.163	--	--	--	--
Ethyl Acetate	--	--	--	--	--	--	--	--	--	--
Chloroform	444	61.5	222	2.57	6.79	18.6	--	--	4.71	--
Tetrahydrofuran	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	538	--	--	0.271	--	0.409	--	--	--	--
n-Hexane	--	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	4,020	--	--	0.207	0.235	--	--	--	--	--
Benzene	--	3.8	--	3.35	6.71	4.92	--	4.54	5.49	5.78
Carbon Tetrachloride	--	--	--	--	--	0.176	--	--	--	0.28
Cyclohexane	--	--	--	--	--	--	--	--	--	1.97
Bromodichloromethane	--	--	--	--	--	--	--	--	--	--
Trichloroethene	9,730	399 E	677	--	0.167	2.09	7.69	--	--	--
2,2,4-Trimethylpentane	--	--	--	--	--	--	--	--	--	--
Heptane	--	--	--	--	--	--	--	--	23.1	4.79
Toluene	757	7.29	40.7	43.3	45.6	55.4	59.2	50.5	29.3	10.4
Tetrachloroethene	428,000	831 E	20,100	0.678	16.4	2.9	214	--	1.96	13.3
Ethylbenzene	330	1.23	11	11.3	14.6	13.0	11.4	11.2	6.55	4.23
p+m Xylenes	--	4.44	41	46.9	59.9	52.6	41	42.3	18.3	13.0
Styrene	262	--	--	0.485	0.553	0.528	--	--	--	--
o Xylene	--	1.46		15.9	27.1	17.7	13.9	14.2	6.16	4.73
4-Ethyltoluene	--	--	--	5.9	6.49	6.24	--	4.23	--	--
1,3,5-Trimethylbenzene	--	--	--	5.75	6.49	5.95	--	4.18	--	--
1,2,4-Trimethylbenzene	--	1.42	16	21.5	23.9	22.9	9.83	15.1	--	4.09
1,4-Dichlorobenzene	--	--	--	--	--	--	--	--	--	--

Notes:

All concentrations provided in micrograms per cubic meter (ug/m^3)

-- Detected Below the Laboratory Method Detection Limit

E - Value estimated

EnviroTrac Environmental Services

Table 10
Historical Indoor Results 2009 to March, 2017
1199 Sutter Avenue, Brooklyn, New York
BCA No. 224141

Parameter:	Sample Designation:	IA-1	IA-1	OA-1	ASV-2	ASV-3	ASV-4	ASV-5	OA-1	OA-2	OA-1
	Sampling Date:	7/20/11	3/21/17	7/20/11	4/21/14	4/21/14	4/21/14	4/21/14	4/21/14	4/6/16	3/21/17
	Sample Media:	Indoor Air	Indoor Air	Outdoor Air	Indoor Air	Indoor Air	Indoor Air	Indoor Air	Outdoor Air	Outdoor Air	Outdoor Air
	Location:	Former Dry Cleaner	Former Dry Cleaner	Rear Parking Lot	Supermarket	Dentist Office	Nail Salon	Deli	Rear Parking Lot	Rear Parking Lot	Parking Area, Rear of Former Dry Cleaner
	NYSDOH Indoor Air Guidance Value										
Propylene	NA	1.91	--	--	--	--	--	--	--	1.46	--
Dichlorodifluoromethane	NA	3.81	2.22	2.38	6.03	2.18	3.45	4.29	2.78	1.66	2.15
Chloromethane	NA	3.45	1.00	1.2	1.94	1.73	1.68	1.52	1.18	--	0.94
Vinyl Chloride	NA	--	--	--	--	--	--	--	--	--	--
1,3-Butadiene	NA	--	--	--	0.173	0.407	0.341	0.192	0.201	--	--
2-Hexanone	NA	--	--	--	--	--	--	--	--	--	--
Chloroethane	NA	--	--	--	0.124	0.092	0.069	0.063	0.069	--	--
Ethanol	NA	920	--	14.9	--	--	--	--	--	7.87	--
Acetone	NA	--	7.79	6.44	--	--	--	--	--	4.04	9.56
Trichlorofluoromethane	NA	27.8	2.41	1.4	8.99	7.19	5.55	6.18	2.49	1.53	1.27
Isopropanol	NA	61.4	--	1.81	--	--	--	--	--	1.16	--
Methylene Chloride	60	--	1.15	--	--	--	7.5	4.79	12.9	--	0.88
Freon 113	NA	--	--	--	0.636	0.713	0.636	0.981	0.621	--	--
trans-1,2-Dichloroethene	NA	--	--	--	--	--	--	--	0.135	--	--
1,1-Dichloroethane	NA	--	--	--	--	--	--	--	--	--	--
2-Butanone	NA	16.5	1.06	2.13	--	--	--	--	--	--	1.60
cis-1,2-Dichloroethene	NA	--	--	--	--	--	--	--	--	--	--
Ethyl Acetate	NA	8.11	--	--	--	--	--	--	--	--	--
Chloroform	NA	38.4	3.21	--	8.74	8.06	4.88	4.88	0.156	--	--
Tetrahydrofuran	NA	17.5	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	NA	--	--	--	--	--	--	--	1.64	--	--
n-Hexane	NA	7.79	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	NA	--	--	--	--	--	--	--	--	--	--
Benzene	NA	3.77	1.24	0.831	1.38	1.44	1.33	1.03	11.1	1.44	1.35
Carbon Tetrachloride	NA	--	--	--	0.566	0.516	0.484	0.497	0.384	0.55	--
Cyclohexane	NA	2.11	--	--	--	--	--	--	--	--	--
Bromodichloromethane	NA	1.67	--	--	0.174	0.194	--	0.141	--	--	--
Trichloroethene	2	1.27	--	--	--	0.113	--	--	--	--	--
2,2,4-Trimethylpentane	NA	1.63	--	--	--	--	--	--	--	--	--
Heptane	NA	5.04	--	--	--	--	--	--	--	--	--
Toluene	NA	11.4	3.55	1.96	10.9	14.7	39.2	5.88	73.1	--	3.07
Tetrachloroethene	30	**68.5**	3.60	--	1.89	0.983	0.976	0.685	0.156	--	--
Ethylbenzene	NA	1.7	--	--	1.34	1.35	2.01	0.786	9.73	--	--
p+m Xylenes	NA	6.34	1.84	--	5.21	4.86	6.04	2.81	37.2	--	1.85
Styrene	NA	--	--	--	0.856	0.732	0.728	0.366	0.298	--	--
o Xylene	NA	2.96	--	--	2.16	1.83	2.25	1.16	11.4	--	--
4-Ethyltoluene	NA	1.9	--	--	1.20	1.29	1.42	0.787	3.26	--	--
1,3,5-Trimethylbenzene	NA	2.9	--	--	1.23	1.34	1.47	0.846	3.62	--	--
1,2,4-trimethylbenzene	NA	8.65	--	--	4.36	4.49	4.51	2.85	12.3	--	--
1,4-Dichlorobenzene	NA	2.84	--	--	1.05	0.613	0.601	0.367	--	--	--

Notes:
All concentrations provided in micrograms per cubic meter (ug/m^3)
-- Detected Below the Laboratory Method Detection Limit
NA - Not Applicable/Not Available
NYSDOH - New York State Department of Health
Bolded and shaded values indicate exceedance of the NYSDOH Indoor Air Guidance Values.

EnviroTrac
Environmental Services

Table 11
VOC Soil Gas Sample Results May, 2017 to August, 2017
1199 Sutter Avenue, Brooklyn, New York
BCA No. 224141

Sample Designation	SSV-10				SSV-11				Blind Duplicate			
Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017	5/17/2017	6/27/2017	7/27/2017	8/29/2017	5/17/2017	6/27/2017	7/27/2017	8/29/2017
1,3,5-Trimethylbenzene	1.97	2.15	2.41	5.81	2.81	< 3.93	< 3.93	7.30 D	2.31	1.89	< 0 .98	2.00
1,2,4-Trichlorobenzene	< 1.48 J	< 1.48 J	< 1.48	< 1.48 J	< 1.48 J	< 5.94 J	< 5.94	< 5.49	< 1.48	< 1.48	< 1.48	1.62 S
1,2,4-Trimethylbenzene	7.63	7.27	2.41	23.40	9.53	5.80	9.75 D	24.6 D	8.82	6.76	2.22	7.66
1,3-Dichlorobenzene	3.68	8.95	2.06	< 0.91	5.51	7.86 D	8.92 D	< 4.81	4.77	5.95	1.90	< 1.20
1,4-Dichlorobenzene	2.66	3.87	< 1.20	2.25	2.87	< 4.81	5.1 D	< 4.81	2.95	3.53	< 1.20	3.87
Acetone	60.60	33.30	39.90	25.50	778 D	< 1.90	< 1.90	< 1.90	78.50	22.10	41.40	38.70
Benzene	4.28	1.77	2.34	3.02	17.10	4.65 D	20.4 D	26.3 D	3.27	2.58	1.86	3.55
Carbon Disulfide	1.31	2.72	1.81	0.80	62.00	< 2.49	5.59 D	5.03 D	1.16	2.13	1.61	0.63
Chloromethane	1.01	< 0.41 J	< 0.41	< 0.41	< 0.41	< 1.65	6.75 D	< 1.65	1.17	< 0.41	0.442	< 0.41
Dichlorodifluoromethane	1.94	2.90 S	2.56	3.91	< 0.99	< 3.96	< 3.96	< 3.96	2.07	2.27	2.55	3.58
Ethylbenzene	2.50	5.20	1.25	7.91	7.16	3.77 D	6.15 D	11.4 D	2.74	4.56	1.42	3.89
Methyl butyl ketone	< 0.82	1.41	1.05	0.94 S+	50.5 S	< 3.28	< 3.28	< 3.28 J	0.96 S	< 0.82	1.34	< 0.82
Methyl ethyl ketone	18.90	17.60	13.60	13.1 S	434 D	8.82 D	46.2 D	15.3 D	27.30	13.40	10.70	19.4 S
Methyl isobutyl ketone	< 0.82	1.82	< 0.82	1.27	0.82	< 3.28	< 3.28	< 3.28 J	0.97	1.59	< 0.82	2.24
Methylene Chloride	< 0.78	< 0.78	< 0.78	6.83	< 0.78	< 3.11	< 3.11	< 3.11	< 0.78	< 0.78	< 0.78	3.53
Styrene	< 0.85	1.29	1.37	1.75	< 0.86 J	< 3.41	< 3.41	< 3.41	< 0.85	1.11	1.51	1.00
Tetrachloroethylene	2.43	9.99	17.70	14.40	< 1.36	< 4.550	16.60	< 5.43	< 1.36	10.80	18.60	< 1.36
Toluene	9.47	13.00	13.80	25.40	18.90	9.90 D	16.6 D	27.5 D	9.04	11.80	21.00	18.30
Trichlorfluoromethane	< 1.12	2.79	2.07	3.21	< 1.12	< 4.50	< 4.50	< 4.50	1.20	2.08	2.15	3.05
Vinyl Chloride	< 0.51	< 0.51	< 0.51	< 0.51	19.60	< 2.04	25.8 D	24.3 D	<0.51	<0.51	< 0.51	ND
m&p-Xylenes	9.99	21.10	5.19	34.10	29.50	14.2 D	24.5 D	44.6 D	10.50	19.10	5.62	14.00
o-Xylene	3.98	7.12	2.13	11.80	10.10	5.0 D	11.2 D	18.9 D	4.70	6.37	2.33	5.33

Notes:

Only detected analytes are reported.

All data is in parts per billion (ppb) / micrograms per cubic meter of air (ug/m^3)

ND = Not Detected

S = Recovery outside of the control limits for this analyte

D = Results for dilution

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Environmental Services

Table 12: Cost Estimate for Track 1 Cleanup Objective
Unrestricted Use Alternative

1199 Sutter Avenue, Brooklyn, NY
BCA Site No. 224141

Item	Quantity	Units	Unit Cost	Total Cost
2009 Estimated IRM Costs	1	L.S.	$50,000	$50,000
2017 Estimated IRM Costs	1	L.S.	$60,500	$60,500
Develop RAWP	1	L.S.	$5,000	$5,000
Implement RAWP				
Removal of soil from rear parking lot and beneath basement slab within former dry cleaner				
Labor				
Site Supervision	40	Days	$1,250	$50,000
Crew Labor for Excavation and Material Handling	40	Days	$5,000	$200,000
Engineering/Permits/Reporting/PM	0.5	L.S.	$100,000	$50,000
Contingency (10%)	1	L.S.	$30,000	$30,000
				$330,000
Subcontractor/Materials/Equipment				
Install 280 l.f. of Sheeting	1	L.S.	$750,000	$750,000
Excavator / Loader / Skid Steer	2	month	$25,000	$50,000
Dewatering Equipment	3	month	$15,000	$45,000
Miscellaneous Expenses	3	month	$15,000	$45,000
Soil Disposal - Beneath Basement - Non-Haz	2800	tons	$140	$392,000
Soil Disposal - Parking Lot - Hazardous	3700	tons	$275	$1,017,500
Backfill to Grade	9000	tons	$35	$315,000
Community Air Monitoring Plan	1	L.S.	$25,000	$25,000
Contingency (10%)	1	L.S.	$150,000	$150,000
Markup	10%	L.S.	$278,950	$278,950
				$3,068,450
Total Capital Cost				**$3,398,450**

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Environmental Services

Table 13: Cost Estimate for Track 4 Cleanup Objective
Installation and Operation of a SVE/AS System

1199 Sutter Avenue, Brooklyn, NY
BCA Site No. 224141

Item	Quantity	Units	Unit Cost	Total Cost
2009 Estimated IRM Costs	1	L.S.	$50,000	$50,000
2017 Estimated IRM Costs	1	L.S.	$60,500	$60,500
Develop RAWP	1	L.S.	$5,000	$5,000
Engineering Controls				
Installation of SVE/AS remediation				
system at the site (2 SVE wells and 4 AS wells)	1	L.S.	$115,000	$115,000
Institutional Controls				
Develop Site Management Plan	1	L.S.	$8,500	$8,500
Develop Final Engineering Report	1	L.S.	$8,500	$8,500
Environmental Easement	1	L.S.	$6,000	$6,000
Baseline Groundwater Sampling	1	L.S.	$3,750	$3,750
Total Capital Cost				**$257,250**
5 Year Annual Operation Maintenance & Monitoring (OM&M):				
Monthly site visist	12	Yr	$900	$3,600
Quarterly SVE sampling	4	Yr	$1,250	$5,000
Quarterly groundwater monitoring*	4	Yr	$3,750	$15,000
Carbon and purge water disposal	1	Yr	$5,000	$5,000
Miscellaneous expenses	1	Yr	$8,000	$8,000
Annual site monitoring and SSDS certification	1	Yr	$6,000	$6,000
Annual OM&M Cost (Operating the Remediation System and SSDS)				$42,600
5 Year Period OM&M Cost (Operating the Remediation System and SSDS)				$213,000
25 Year Annual Operation Maintenance & Monitoring (OM&M)				
Miscellaneous expenses	1	Yr	$3,000	$3,000
Annual site monitoring and SSDS certification	1	Yr	$6,000	$6,000
Annual OM&M Cost (Operating the SSDS)				$9,000
25 Year Period OM&M Cost (Operating the SSDS)				$225,000
Number of Years:				30
Interest Rate:				5%
OM&M Present Worth (PW):				**$459,900**
Total Present Worth (PW): Capital Cost + OM&M PW				**$717,150**

__**Notes:**__

* = 6 groundwater samples plus QA/QC for VOCs with CAT B deliverables and DUSR preparation. Includes purgewater management.

EnviroTrac Environmental Services

Table 14

Emergency Contacts

1199-1221 Sutter Avenue, Brooklyn, New York

BCP No. C224141

Emergency contacts are provided below:

Site Contact:	Anthony Billedo AAA Sutter Realty	516-742-2713
Remedial Engineer:	Dale Konas EnviroTrac	631-924-3001
Sr. Project Manager:	Joseph Byrnes EnviroTrac	631-924-3001
Project Manager:	Tracy Wall EnviroTrac	631-924-3001

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FIGURES

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TOPOGRAPHIC MAP

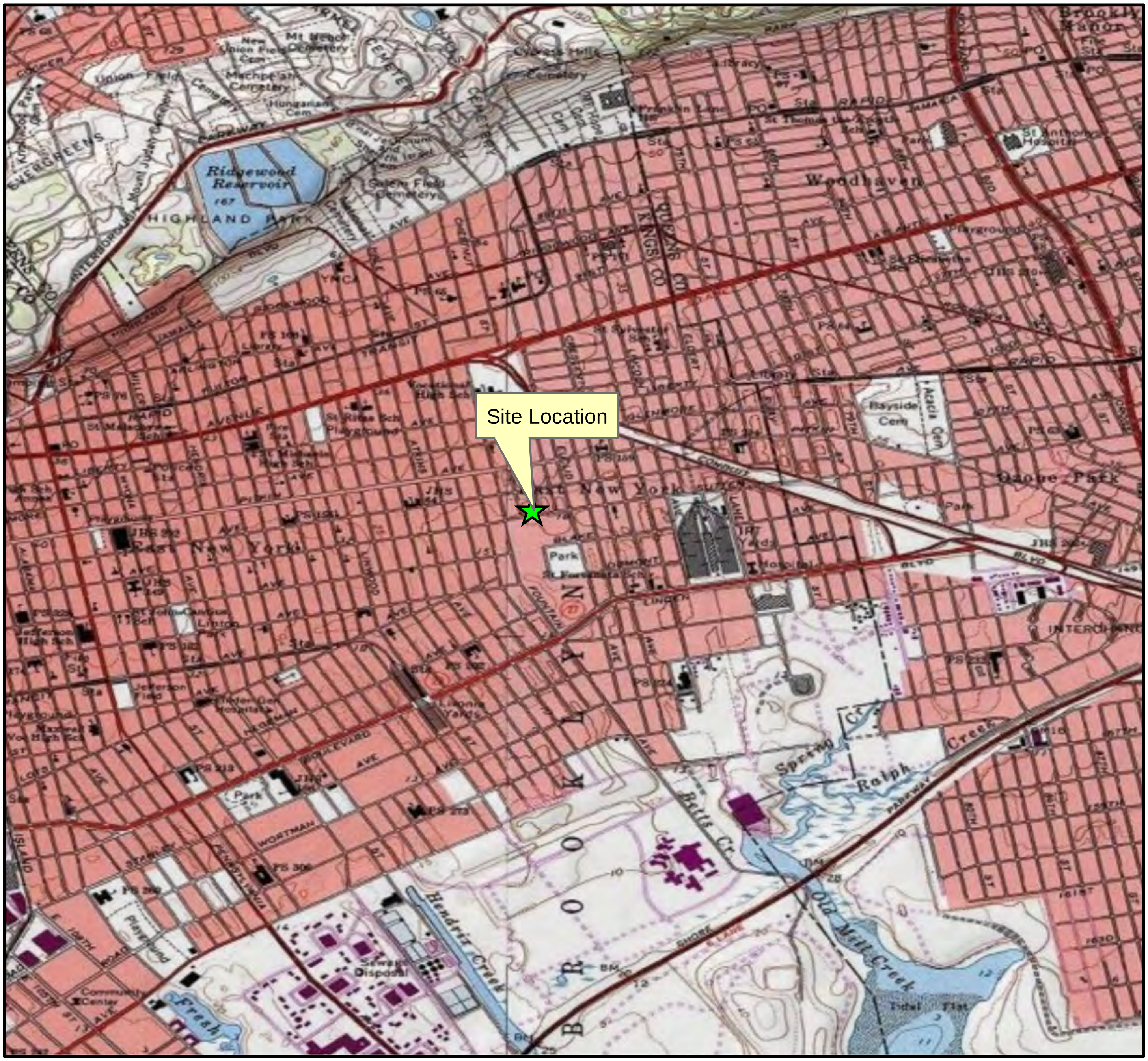
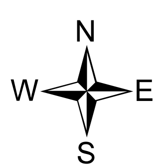


Figure 1
Topographic Map

1199 Sutter Avenue
Brooklyn, NY 11208

USGS Quadrangle:
Brooklyn

Approx. Elevation:
19 feet



EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631-924-3001 F:631-924-5001

SURROUNDING LAND USE MAP

Figure 2
Surrounding Land Use Map

1199 Sutter Avenue
Brooklyn, NY 11208

N
W E
S

EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631-924-3001 F:631-924-5001

EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924-3001 FAX: (631)924-5001

DATE: 6/20/2018

REVISED BY: BS

1199 SUTTER AVENUE
BROOKLYN, NEW YORK

SAMPLE AND INJECTION LOCATIONS 2009 – 2017

FIGURE #
3

LEGEND:

BCP AGREEMENT SITE PROPERTY OUTLINE

SOIL BORING

NOTES:

RESULTS SHOWN EXCEED NYDEC UNRESTRICTED USE SOIL CLEANUP OBJECTIVES (UUSCO).

ALL RESULTS IN PARTS PER BILLION (ug/kg)

EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924-3001 FAX: (631)924-5001

0 20 40
SCALE IN FEET

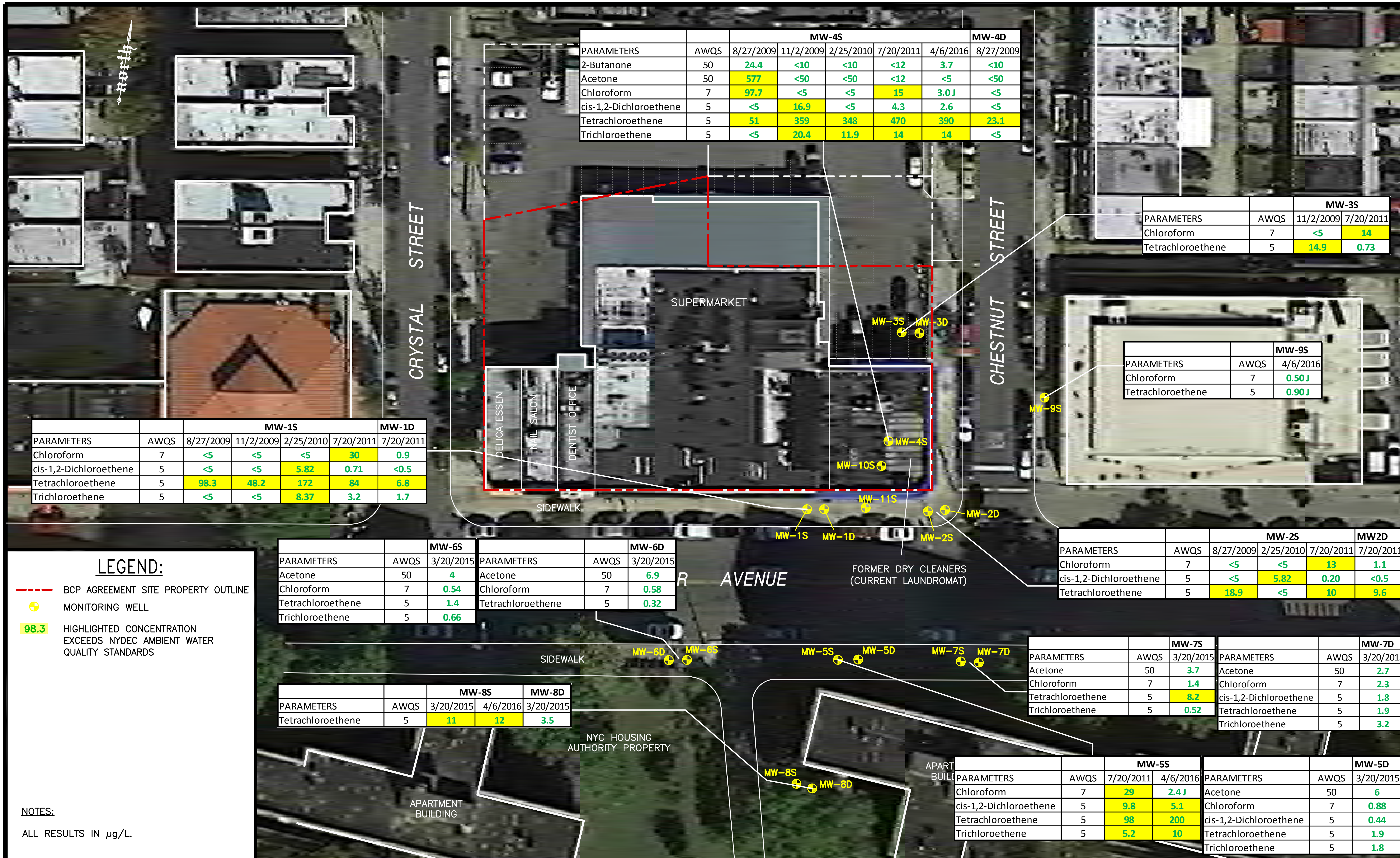
DATE: 6/20/2018

REVISED BY: BS

1199 SUTTER AVENUE
BROOKLYN, NEW YORK

SOIL DATA DETECTED ABOVE NYSDEC SCOs

FIGURE #
4



PARAMETERS	AWQS	MW-4S 8/27/2009	MW-4S 11/2/2009	MW-4S 2/25/2010	MW-4S 7/20/2011	MW-4S 4/6/2016	MW-4D 8/27/2009
2-Butanone	50	24.4	<10	<10	<12	3.7	<10
Acetone	50	577	<50	<50	<12	<5	<50
Chloroform	7	97.7	<5	<5	15	3.0 J	<5
cis-1,2-Dichloroethene	5	<5	16.9	<5	4.3	2.6	<5
Tetrachloroethene	5	51	359	348	470	390	23.1
Trichloroethene	5	<5	20.4	11.9	14	14	<5

PARAMETERS	AWQS	MW-3S 11/2/2009	MW-3S 7/20/2011
Chloroform	7	<5	14
Tetrachloroethene	5	14.9	0.73

PARAMETERS	AWQS	MW-9S 4/6/2016
Chloroform	7	0.50 J
Tetrachloroethene	5	0.90 J

PARAMETERS	AWQS	MW-1S 8/27/2009	MW-1S 11/2/2009	MW-1S 2/25/2010	MW-1S 7/20/2011	MW-1D 7/20/2011
Chloroform	7	<5	<5	<5	30	0.9
cis-1,2-Dichloroethene	5	<5	<5	5.82	0.71	<0.5
Tetrachloroethene	5	98.3	48.2	172	84	6.8
Trichloroethene	5	<5	<5	8.37	3.2	1.7

PARAMETERS	AWQS	MW-2S 8/27/2009	MW-2S 2/25/2010	MW-2S 7/20/2011	MW2D 7/20/2011
Chloroform	7	<5	<5	13	1.1
cis-1,2-Dichloroethene	5	<5	5.82	0.20	<0.5
Tetrachloroethene	5	18.9	<5	10	9.6

PARAMETERS	AWQS	MW-6S 3/20/2015
Acetone	50	4
Chloroform	7	0.54
Tetrachloroethene	5	1.4
Trichloroethene	5	0.66

PARAMETERS	AWQS	MW-6D 3/20/2015
Acetone	50	6.9
Chloroform	7	0.58
Tetrachloroethene	5	0.32

PARAMETERS	AWQS	MW-7S 3/20/2015
Acetone	50	3.7
Chloroform	7	1.4
Tetrachloroethene	5	8.2
Trichloroethene	5	0.52

PARAMETERS	AWQS	MW-7D 3/20/2015
Acetone	50	2.7
Chloroform	7	2.3
cis-1,2-Dichloroethene	5	1.8
Tetrachloroethene	5	1.9
Trichloroethene	5	3.2

PARAMETERS	AWQS	MW-8S 3/20/2015	MW-8S 4/6/2016	MW-8D 3/20/2015
Tetrachloroethene	5	11	12	3.5

PARAMETERS	AWQS	MW-5S 7/20/2011	MW-5S 4/6/2016
Chloroform	7	29	2.4 J
cis-1,2-Dichloroethene	5	9.8	5.1
Tetrachloroethene	5	98	200
Trichloroethene	5	5.2	10

PARAMETERS	AWQS	MW-5D 3/20/2015
Acetone	50	6
Chloroform	7	0.88
cis-1,2-Dichloroethene	5	0.44
Tetrachloroethene	5	1.9
Trichloroethene	5	1.8

LEGEND:

- BCP AGREEMENT SITE PROPERTY OUTLINE
- MONITORING WELL
- 98.3 HIGHLIGHTED CONCENTRATION EXCEEDS NYDEC AMBIENT WATER QUALITY STANDARDS

NOTES:

ALL RESULTS IN μg/L.

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GROUNDWATER ABOVE STANDARDS MAP
JANUARY 2009 – APRIL 2016

FIGURE # 5

Sample ID	MW-10S				NYSDEC Groundwater Standards
Sample Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017	
Volatile Organic Compounds *(in micrograms per liter)*					
cis-1,2-Dichloroethylene	ND	**6.1**	**5.1**	**5.3**	5*
Tetrachloroethene	**575**	**363**	**441**	**719**	5*
Trichloroethene	**21.0**	**16.2**	**13.4**	**16.2**	5*

Sample ID	MW-11S				NYSDEC Groundwater Standards
Sample Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017	
Volatile Organic Compounds *(in micrograms per liter)*					
cis-1,2-Dichloroethylene	ND	1.5	3.5	2.5	5*
Tetrachloroethene	**24.1**	**37.4**	**86.7**	**105**	5*
Trichloroethene	1.1	2.0	3.4	4.7	5*

Sample ID	MW-1S				NYSDEC Groundwater Standards
Sample Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017	
Volatile Organic Compounds *(in micrograms per liter)*					
cis-1,2-Dichloroethylene	ND	ND	ND	ND	5*
Tetrachloroethene	**49.5**	**46.1**	**24.9**	**21.7**	5*
Trichloroethene	2.1	2.8	1.3	ND	5*

Sample ID	MW-2S				NYSDEC Groundwater Standards
Sample Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017	
Volatile Organic Compounds *(in micrograms per liter)*					
cis-1,2-Dichloroethylene	ND	ND	ND	ND	5*
Tetrachloroethene	2.2	1.1	2.9	1.5	5*
Trichloroethene	ND	ND	ND	ND	5*

Sample ID	MW-5S				NYSDEC Groundwater Standards
Sample Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017	
Volatile Organic Compounds *(in micrograms per liter)*					
cis-1,2-Dichloroethylene	ND	**5.3**	4.8	ND	5*
Tetrachloroethene	**122**	**128**	**136**	**258**	5*
Trichloroethene	**7.4**	**8.2**	**7.3**	**9.6**	5*

Sample ID	MW-8S				NYSDEC Groundwater Standards
Sample Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017	
Volatile Organic Compounds *(in micrograms per liter)*					
cis-1,2-Dichloroethylene	ND	ND	ND	ND	5*
Tetrachloroethene	**5.5**	4.3	4.4	**8.4**	5*
Trichloroethene	ND	ND	ND	ND	5*

LEGEND:

- BCP AGREEMENT SITE PROPERTY OUTLINE
- MONITORING WELL
- ND NOT DETECTED
- * THE PRINCIPAL ORGANIC COMPOUND STANDARD APPLIES

NOTES:

ONLY DETECTED ANALYTES ARE REPORTED.

BOLD VALUES INDICATE AN EXCEEDANCE OF THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) CLASS GA AMBIENT WATER QUALITY STANDARDS.

RESULTS GIVEN IN MICROGRAMS PER LITER (µg/L).

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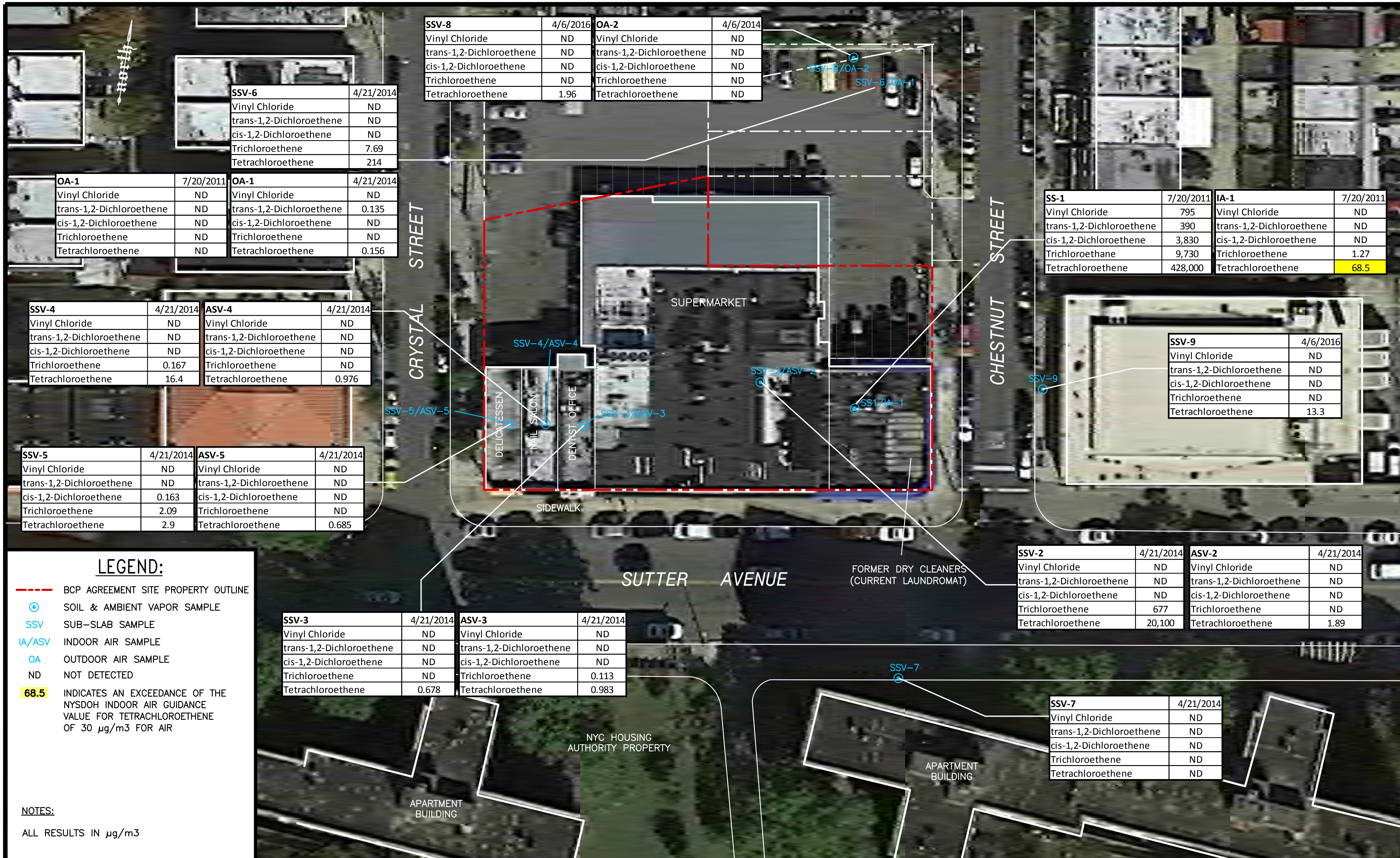
GROUNDWATER ABOVE STANDARDS MAP
MAY 2017 – AUGUST 2017

FIGURE #
6



SSV-8	4/6/2016
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	1.96

OA-2	4/6/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	ND

SSV-6	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	7.69
Tetrachloroethene	214

OA-1	7/20/2011
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	ND

OA-1	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	0.135
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	0.156

SS-1	7/20/2011
Vinyl Chloride	795
trans-1,2-Dichloroethene	390
cis-1,2-Dichloroethene	3,830
Trichloroethane	9,730
Tetrachloroethene	428,000

IA-1	7/20/2011
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	1.27
Tetrachloroethene	68.5

SSV-4	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	0.167
Tetrachloroethene	16.4

ASV-4	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	0.976

SSV-9	4/6/2016
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	13.3

SSV-5	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	0.163
Trichloroethene	2.09
Tetrachloroethene	2.9

ASV-5	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	0.685

SSV-2	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	677
Tetrachloroethene	20,100

ASV-2	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	1.89

SSV-3	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	0.678

ASV-3	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	0.113
Tetrachloroethene	0.983

SSV-7	4/21/2014
Vinyl Chloride	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	ND

LEGEND:

- BCP AGREEMENT SITE PROPERTY OUTLINE
- SOIL & AMBIENT VAPOR SAMPLE
- SSV — SUB-SLAB SAMPLE
- IA/ASV — INDOOR AIR SAMPLE
- OA — OUTDOOR AIR SAMPLE
- ND — NOT DETECTED
- 68.5 — INDICATES AN EXCEEDANCE OF THE NYSDOH INDOOR AIR GUIDANCE VALUE FOR TETRACHLOROETHENE OF 30 μg/m3 FOR AIR

NOTES:

ALL RESULTS IN μg/m3

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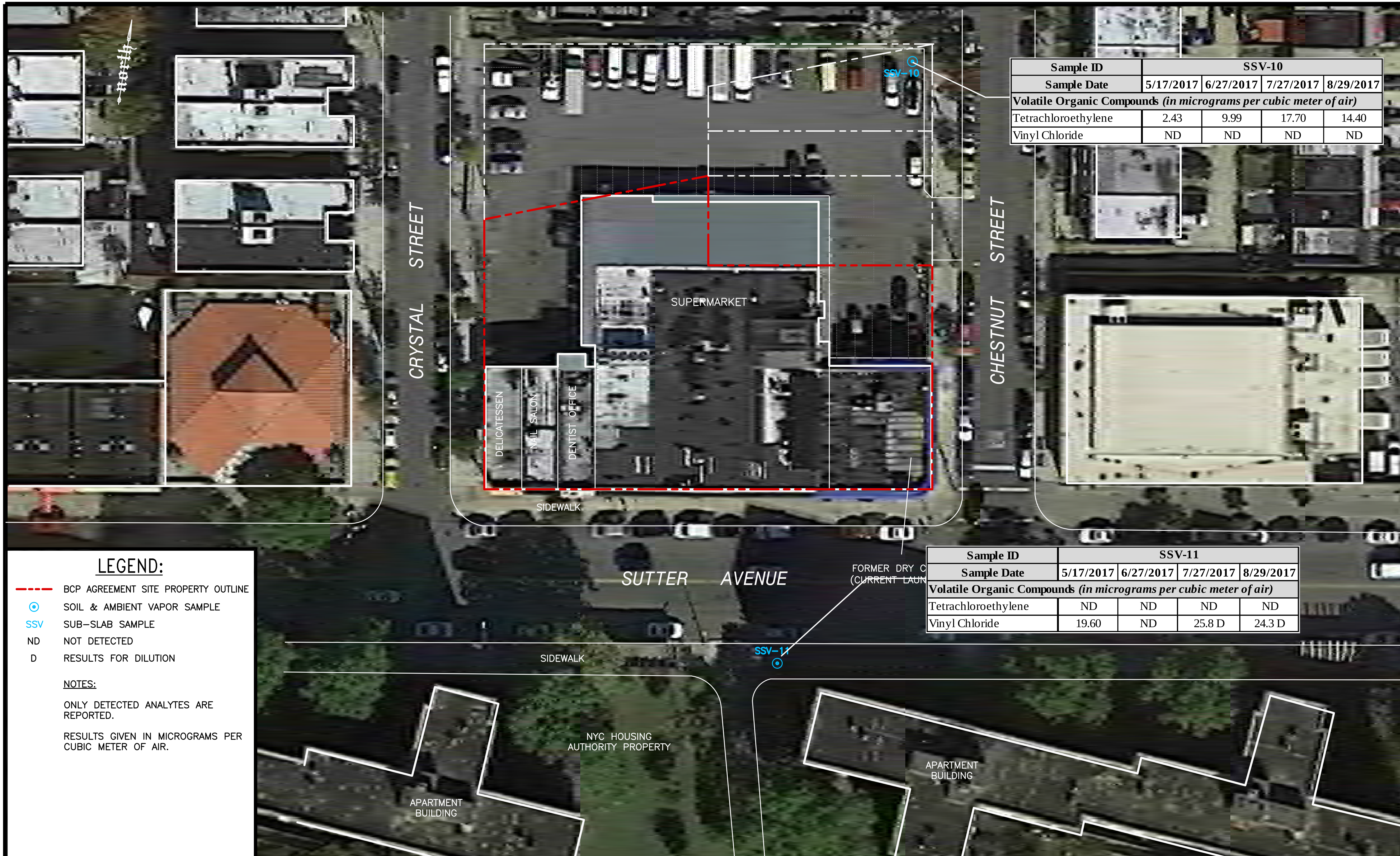
SOIL VAPOR/AMBIENT AIR DATA MAP
JULY 2011 – MARCH 2017

FIGURE #
7



Sample ID	SSV-10			
Sample Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017
Volatile Organic Compounds *(in micrograms per cubic meter of air)*				
Tetrachloroethylene	2.43	9.99	17.70	14.40
Vinyl Chloride	ND	ND	ND	ND

Sample ID	SSV-11			
Sample Date	5/17/2017	6/27/2017	7/27/2017	8/29/2017
Volatile Organic Compounds *(in micrograms per cubic meter of air)*				
Tetrachloroethylene	ND	ND	ND	ND
Vinyl Chloride	19.60	ND	25.8 D	24.3 D

LEGEND:

- BCP AGREEMENT SITE PROPERTY OUTLINE
- SOIL & AMBIENT VAPOR SAMPLE
- SSV — SUB-SLAB SAMPLE
- ND — NOT DETECTED
- D — RESULTS FOR DILUTION

NOTES:

ONLY DETECTED ANALYTES ARE REPORTED.

RESULTS GIVEN IN MICROGRAMS PER CUBIC METER OF AIR.

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SOIL GAS WELL DATA MAP
MAY 2017 – AUGUST 2017

FIGURE #
8

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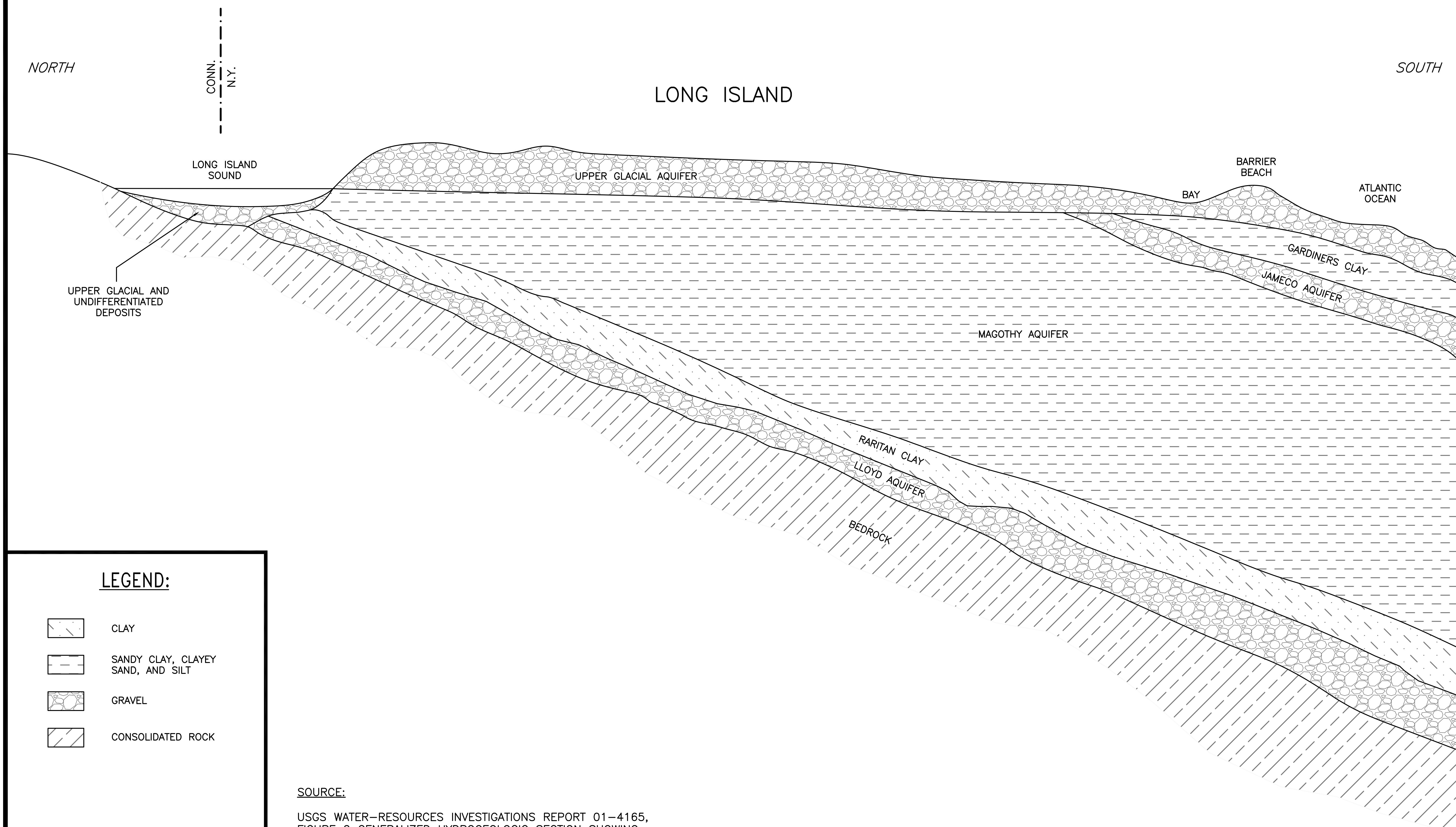
GROUNDWATER CONTOUR MAP

FIGURE #
9



LEGEND:

- CLAY
- SANDY CLAY, CLAYEY SAND, AND SILT
- GRAVEL
- CONSOLIDATED ROCK

SOURCE:

USGS WATER-RESOURCES INVESTIGATIONS REPORT 01-4165, FIGURE 2 GENERALIZED HYDROGEOLOGIC SECTION SHOWING MAJOR AQUIFERS AND CONFINING UNITS ON LONG ISLAND, N.Y.

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DRAWING IS NOT TO SCALE

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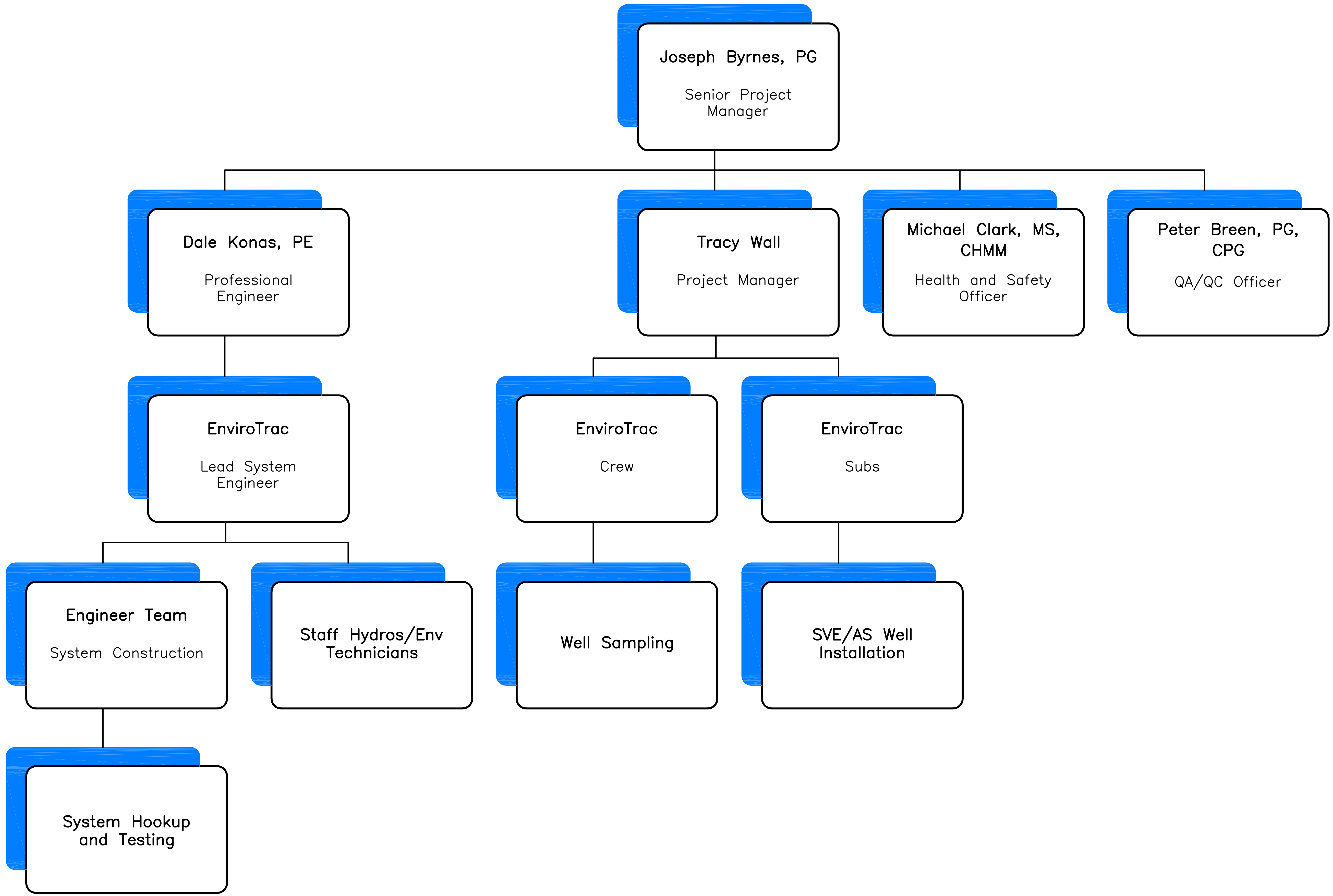
GENERALIZED HYDROGEOLOGIC CROSS-SECTION SHOWING LONG ISLAND AQUIFERS

FIGURE # 10



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REVISION DATE: 7/2/2018

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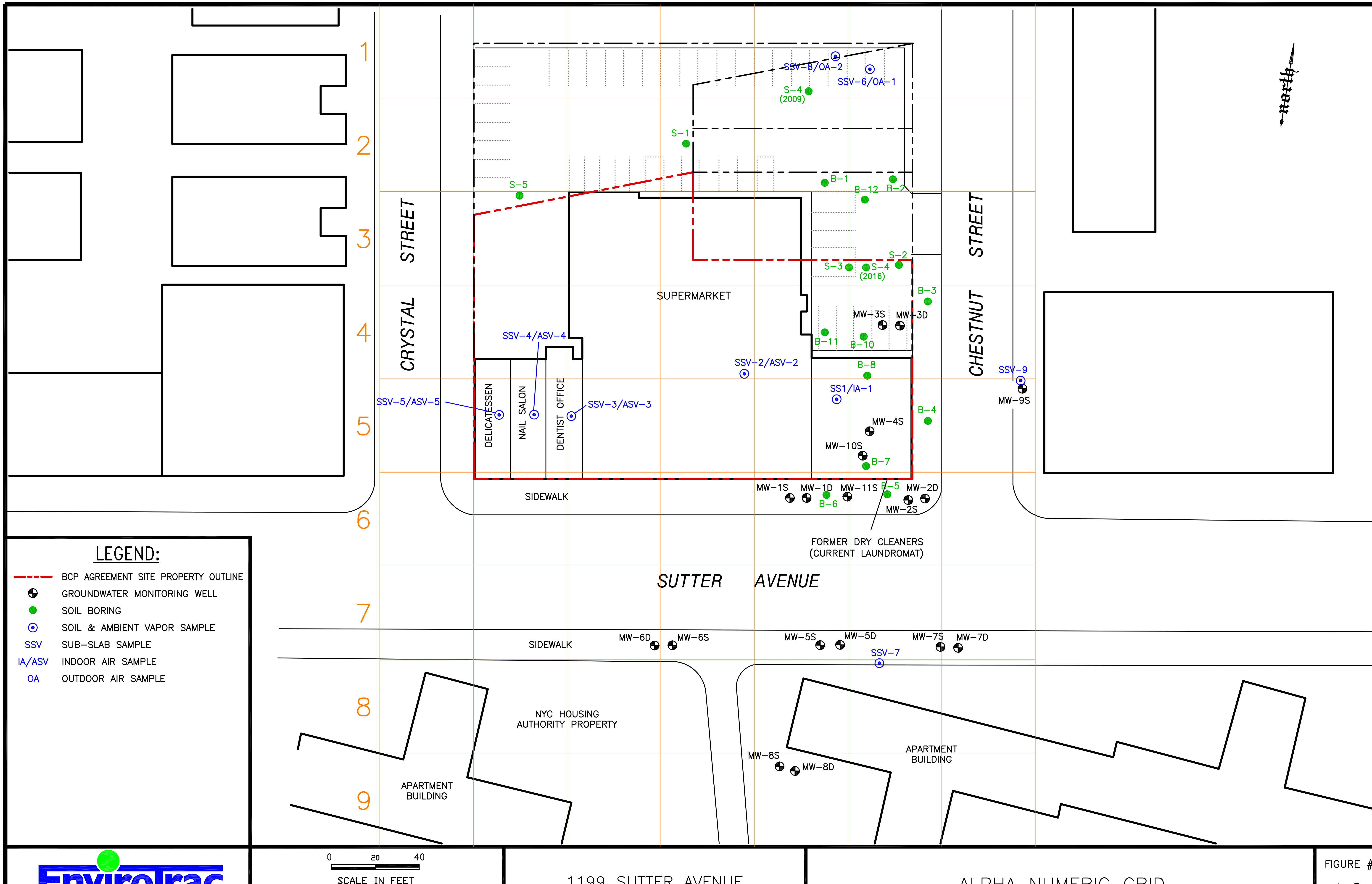
BROOKLYN, NEW YORK

PROJECT ORGANIZATIONAL CHART

FIGURE #
11



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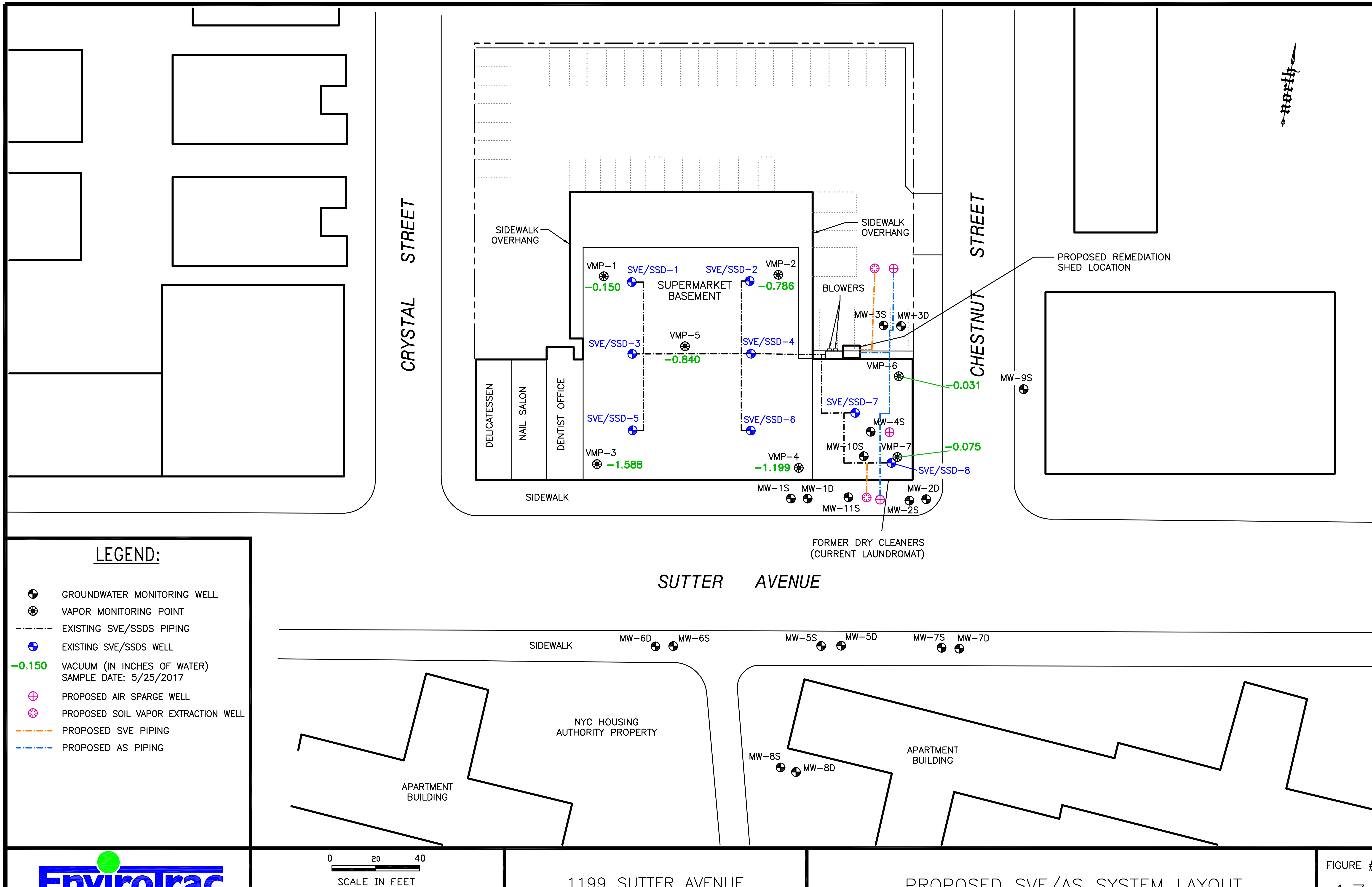
ALPHA NUMERIC GRID

FIGURE #
12



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DATE: 3/20/2018

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1199 SUTTER AVENUE
BROOKLYN, NEW YORK

PROPOSED SVE/AS SYSTEM LAYOUT

FIGURE # 13

APPENDICES

APPENDIX A

Significant Threat Determination

APPENDIX B

Remedial Design Work Plan

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Environmental Services

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Remedial Design Work Plan (RDWP)

Soil Vapor Extraction (SVE) & Air Sparge (AS) System

Site:

1199 Sutter Avenue
Brooklyn, New York 11208
BCP Site No. C224141

Prepared for:

AAA Sutter Realty LLC
153-157 Seventh Street
Garden City, New York 11530

Prepared by:

EnviroTrac Engineering PE PC
5 Old Dock Road
Yaphank, NY 11980

July 2018

CERTIFICATIONS

I, Dale Konas, certify that I am currently a NYS-registered Professional Engineer and that this Remedial Design Work Plan was prepared in accordance with applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

DRAFT

081035

NYS Professional Engineer No. Date Signature

Table of Contents

DRAFT

DRAFT

Figures

Attachments

DRAFT

SOIL VAPOR EXTRACTION & SUB-SLAB DEPRESSURIZATION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

Install a Soil Vapor Extraction (SVE) and Air Sparge (AS) System to address impacted soil and groundwater below the property building, parking area, and to the south of the building beneath the sidewalk. System components include the installation of a network of two (2) 2-inch schedule 40 PVC SVE wells located in the asphalt parking area, and the sidewalk to the south of the former dry cleaner unit. Also, the two (2) existing 4-inch schedule 40 PVC SSDS vent wells in the basement of the former dry cleaner will be disconnected from the existing SSDS and connected to the remediation system. Three (3) 2-inch schedule 40 PVC AS wells will be installed in the rear parking lot, in the basement of the former dry cleaner, and in the sidewalk to the south of the former dry cleaner unit. The SVE and AS wells in the sidewalk will be piped beneath the sidewalk and through the basement wall of the former dry cleaner unit. These pipes and the piping associated with the SSDS piping and AS piping located in the basement of the former dry cleaner unit will be connected to system piping routed through individual laterals that are mounted along the building basement ceiling and then routed through the exterior building wall. The exterior SVE well and AS well will be plumbed into the system via subsurface piping that will be installed in a utility trench and then day lighted adjacent to the system enclosure. Each of the four (4) SVE well piping laterals will run into the system enclosure that houses the SVE equipment, and then combine into a 3-inch diameter common header. Each of the three (3) AS well piping laterals will run into the system enclosure that houses the AS equipment, and combine into a 2-inch diameter common header. The SVE discharge of the system will exit the system enclosure and then will continue up to a location above the roof line, where it will vent to atmosphere. The system enclosure will house any system components, including the vacuum blower, moisture separator, filters, compressor, control panel, and any ancillary instrumentation. All system components shall be installed as indicated, specified and required within the following sections. A site plan indicating the radius of influence of the proposed SVE/AS systems are shown in Figure 1.

The SVE portion of the design was prepared based on the results of the SVE pilot study that was conducted on June 1, 2016. The results of this pilot test indicated that a full scale SVE system capable of a total flow rate of 100 cfm @ 40.0 “H_2O vacuum would provide sufficient vacuum to the underlying soil to provide optimal coverage. With an extraction point network consisting of four (4) wells, a 30-foot radius of influence would be generated. A copy of the SVE and SSDS Pilot Study Report (EnviroTrac, June 2016) is included in Attachment A.

Prior to AS system construction and during well installation, a pilot test will be performed on the AS well located in the rear parking lot to determine radius of influence and compressor size. A copy of the AS Pilot Test Work Plan is provided as Attachment B.

1.02 STANDARDS AND REGULATIONS

A. Comply with applicable portions of the Building Code of the City of New York, regulations set forth by the New York State Department of Environmental Conservation (DEC) (DER-10), and New York State Department of Health (DOH). Where requirements for products, materials, equipment, methods and other portion of the work specified herein exceed minimum requirements of City of New York Building Code, contractor shall comply with such requirements specified herein, unless specifically approved otherwise.

B. Standards listed below are referenced in this section.

1. American Society for Testing and Materials (ASTM)

2. American Standards Association (ASA)

3. American National Standards Institute (ANSI)

1.03 AIR EMISSIONS

As per the memorandum issued by the NYSDEC ("Substantive Compliance with Air Requirements", February 28, 2003), any remedial system under a DEC program is exempt for air permitting. However, all systems must demonstrate that they comply with the substantive regulation. In the case of the proposed SVE system, based on discharge sampling completed during the pilot test event and the SVE/SSD system performance specification, off-gas treatment will not be required to satisfy this requirement. Although it is not anticipated, in the event that future sampling results indicate the need for off-gas treatment, the system can be retrofitted to accommodate treatment in in order to bring the system back into regulatory compliance. A copy of the NYSDEC memorandum, the site data sheet, and the calculation sheet for the anticipated emission calculations can be seen in Attachment G.

PART 2 - PRODUCTS

2.01 MATERIALS AND ACCESSORIES FOR SVE SYSTEM

A. SUBSURFACE GAS VAPOR COLLECTION PIPE NETWORK, APPURTANCES, AND BUILDING PENETRATION PIPE

1. Polyvinyl Chloride (PVC) Pressure Pipe:

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PVC pipe for gas vapor collection applications for underground installation shall be 2-inch diameter schedule 40 pipe for individual extraction point piping and 4-inch diameter Schedule 40 pipe for the common header. The solid header piping shall be constructed of Schedule 40 PVC and shall be installed as shown in within the design drawings. For the 2-inch pipe, Raw, unslotted pipe shall have a wall thickness of 0.154-inches, a max working pressure of 166 psi @ 73 degrees F and weigh approximately 69.5 lbs/100-feet. For the 4-inch pipe, Raw, unslotted pipe shall have a wall thickness of 0.237-inches, a max working pressure of 133 psi @ 73 degrees F and weigh approximately 201 lbs/100-feet. Joints shall be solvent-welded, flanged, or threaded (NPT).

B. FITTINGS

1. Fittings for PVC Pipe:

a. All fittings shall be of the same manufacturer, material, class, and schedule as the pipe. Any required threaded joints shall be provided with Teflon tape or flange joints with nitrile or urethane gaskets.
b. Solvent cement joints for the pipe and pipe installation shall be made in accordance with the manufacturer's recommendations and ASTM D2855.

C. VALVES

1. Butterfly Valves:

Where applicable, 4inch system valves shall be butterfly style valves and appropriately connected to match the corresponding system piping diameter. Each valve shall be flange connected with wafer style body and ANSI 125 bolt pattern. The body and disc of each valve shall be constructed of PVC and the stem shall be 410 stainless steel. The boot liner shall be EPDM with ISO 5211 mounting pads. The valve shall be hand lever actuated with a 9 position throttle plate. The hand lever shall also be equipped with a lockout hole. Each butterfly valve shall be model Sure-Tuff BYCS-Series, manufactured by Hayward Flow Control.

2. Ball Valves:

Where applicable, all 2-inch system valves shall be ball valves and appropriately connected to match the corresponding system piping diameter. Each valve shall be solvent weld connected with full port style body. The body and ball of each valve shall be constructed of PVC with PTFE seats and double O-ring stem seals. The valve shall be hand lever actuated with a ¼ turn operation. Each ball valve shall be model TB Series True Union Ball Valve, manufactured by Hayward Flow Control.

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D. SLEEVES FOR PIPES

1. Sheet metal sleeves shall be 20 gauge.
2. Pipe sleeves shall be service weight cast iron pipe or schedule 40 galvanized steel pipe.
3. Fire stop penetration materials for sealing sleeves shall be listed by Underwriters Laboratories and shall have Material and Equipment Acceptance (MEA) approval.
4. Material for sealing spaces between pipe and sleeve through foundation walls below grade shall be Link- Seal Type "C" as manufactured by Thunderline Corp; Belleville, Mich. Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve. Links shall be loosely assembled with bolts to form a continuous rubber bolt around the pipe with a pressure plate under each bolt head and nut. Link-Seal pressure plates shall be Type "C" (insulating type) to provide for electrical insulation and cathodic protection.
5. Materials for sealing space between each pipe and sleeve through non-fire rated exterior walls above grade shall be Non-shrinking cement.
6. Waterproof sleeves shall be Link-Seal Wall Sleeve as manufactured by Thunderline Corp, or MetraSeal wall sleeve by the Metraflex Co.

E. SVE COMPONENTS

1. **Vacuum Blower:** Airtech Inc., Model 3BA1500-7AT16, (2.0 HP, 240/460V, 3 PH, TEFC), or equal. The vacuum blower will be capable of 100 cfm @ 50 "H_2O vacuum. Construction shall be cast aluminum with outboard bearings. Motor shall be TEFC with class F insulation, UL recognized, and CE compliant. A sample manufacturer's cut sheet for the blower can be seen in Attachment C.
2. **Moisture Separator:** ESD Waste2Water Inc., Model AWS80, 47-gallon (working volume), 3" inlet, 3" outlet, 8" cleanout. Moisture separator shall be equipped with a normally closed high liquid level float switch mounted in a 2" diameter external liquid level sight glass. The unit will also be fitted with a 1" manual drain valve located at the bottom sidewall of the tank. A sample manufacturer's cut sheet for the moisture separator can be seen in Attachment D.
3. **In-line Filter**: Solberg Manufacturing Inc., Model CSL-239-300C, 3" inlet, 3" outlet, max flow rate 300 cfm. Unit shall include a 5-micron polyester filter element with a 750 cfm rating. A sample manufacturer's cut sheet for the filter can be seen in Attachment E.
4. **Vacuum Relief Valve:** Airtech Inc., Model VC-81-Z, 2" FPT connection, stainless steel construction, adjustable vacuum set point. A sample manufacturer's cut sheet for the relief valve can be seen in Attachment F.

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5. **Vacuum Gauges**: McMaster-Carr, Model/Part No. 4106K1, 2½" diameter dial, Accuracy = +/-1.5% full scale, ¼" NPT brass connection, Black painted steel case with acrylic lens. Individual manifold laterals shall have 0-30 "H_2O range and system blower inlet shall have 0-100 "H_2O range.

6. **Control Panel**: A fully functional, discreet logic, electrical control panel shall be provided to operate the AS-SVE system and each individual component. The control panel shall be capable of providing the on/off function of the vacuum blower and compressor, and provide alarm conditions for each motor failure and a high liquid level in the moisture separator. Properly sized motor starters with an integral thermal overload relay will be provided to relay power to the vacuum blower and compressor. The front face of the panel shall include a hand-off-auto switches to operate the blower and compressor, and a three-way switch that can be used to clear any latching alarm conditions or test the functionality of the panel indicator lights. Two (2) green lights will be provided to indicate that the vacuum blower or compressor is operating. Additionally, one (1) red light will be provided to indicate a high liquid level alarm condition in the moisture separator and one (2) red lights to indicate a motor failure alarm (vacuum blower or compressor motor thermal overload). The control panel enclosure shall be constructed of painted steel and have a NEMA 4X rating.

F. GENERAL

- Provide additional installation accessories as necessary.
- Ensure accessories are from same manufacturer as product.

2.02 MATERIALS AND ACCESSORIES FOR AS SYSTEM

A. SUBSURFACE GAS VAPOR COLLECTION PIPE NETWORK, APPURTANCES, AND BUILDING PENETRATION PIPE

1. Polyvinyl Chloride (PVC) Pressure Pipe:

PVC pipe for gas vapor collection applications for underground installation shall be 1.5-inch diameter schedule 40 pipe for individual extraction point piping and 2-inch diameter Schedule 40 pipe for the common header. The solid header piping shall be constructed of Schedule 40 PVC and shall be installed as shown in within the design drawings. For the 2-inch pipe, Raw, unslotted pipe shall have a wall thickness of 0.154-inches, a max working pressure of 166 psi @ 73 degrees F and weigh approximately 69.5 lbs/100-feet. For the 1.5-inch pipe, Raw, unslotted pipe shall have a wall thickness of 0.145-inches, a max working pressure of 198 psi @ 73 degrees F and weigh approximately 51.8 lbs/100-feet. Joints shall be solvent-welded, flanged, or threaded (NPT).

B. FITTINGS

1. Fittings for PVC Pipe:

a. All fittings shall be of the same manufacturer, material, class, and schedule as the pipe. Any required threaded joints shall be provided with Teflon tape or flange joints with nitrile or urethane gaskets.

b. Solvent cement joints for the pipe and pipe installation shall be made in accordance with the manufacturer's recommendations and ASTM D2855.

C. VALVES

1. Ball Valves:

All AS valves shall be 1.5-inch ball valves and appropriately connected to match the corresponding system piping diameter. Each valve shall be solvent weld connected with full port style body. The body and ball of each valve shall be constructed of PVC with PTFE seats and double O-ring stem seals. The valve shall be hand lever actuated with a ¼ turn operation. Each ball valve shall be model TB Series True Union Ball Valve, manufactured by Hayward Flow Control.

D. SLEEVES FOR PIPES

1. Sheet metal sleeves shall be 20 gauge.

2. Pipe sleeves shall be service weight cast iron pipe or schedule 40 galvanized steel pipe.

3. Fire stop penetration materials for sealing sleeves shall be listed by Underwriters Laboratories and shall have Material and Equipment Acceptance (MEA) approval.

4. Material for sealing spaces between pipe and sleeve through foundation walls below grade shall be Link- Seal Type "C" as manufactured by Thunderline Corp; Belleville, Mich. Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve. Links shall be loosely assembled with bolts to form a continuous rubber bolt around the pipe with a pressure plate under each bolt head and nut. Link-Seal pressure plates shall be Type "C" (insulating type) to provide for electrical insulation and cathodic protection.

5. Materials for sealing space between each pipe and sleeve through non-fire rated exterior walls above grade shall be Non-shrinking cement.

6. Waterproof sleeves shall be Link-Seal Wall Sleeve as manufactured by Thunderline Corp, or MetraSeal wall sleeve by the Metraflex Co.

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E. AS COMPONENTS

1. Compressor: The compressor size, performance requirements, and make/model shall be determined based on the pilot study that will be conducted once the AS wells have been installed.

2. Air Cooled After-Cooler: The after-cooler size, performance requirements, and make/model shall be determined based on the pilot study that will be conducted once the AS wells have been installed.

3. Pressure Gauges: McMaster-Carr, Model/Part No. 4053K15, 2½" diameter dial, Accuracy = +/-1% full scale, ¼" NPT brass connection, 304 stainless steel case with acrylic lens. Individual manifold laterals shall have 0-30 psi range and system blower inlet shall have 0-60 psi range.

4. GENERAL

- Provide additional installation accessories as necessary.
- Ensure accessories are from same manufacturer as product.

PART 3 - EXECUTION

3.01 INSTALLATION OF AS-SVE SYSTEM

All components of the SVE and AS Systems shall be installed as specified in the within these Specifications and Plans.

A. INSTALLATION OF SVE WELLS

A total of two (2) extraction wells shall be installed at the locations indicated as "SVE-1 and SVE-2" as shown in the Figure 1.

The contractor shall adhere to all federal, state and local laws and regulations associated with constructing wells and shall obtain required permits, markouts, and protection of utilities, traffic controls, safety, and security. New York 811 shall be called a minimum of 3-days prior to well installation. Well locations shall be carefully selected after visual inspection of relevant marked out, and overhead utilities, if present. Each location shall be pre-cleared utilizing soft dig techniques to a depth of 4-feet below grade. Boreholes shall not be left unfinished or uncovered at the end of each day.

The borehole for the extraction wells shall be advanced utilizing hollow stem auger methods (CME LC60 Rig or approved alternates). Casing and screen shall be installed plumb and concentric with the borehole. Equipment shall be decontaminated in-between each bore hole and prior to demobilization from the

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project site. Decontamination shall include all drilling tools, including hollow stem augers, drill pipe, drill bits, casings, screens, weighted tapes and probes.

Wells shall be constructed in accordance with the dimensional drawings presented as “SVE Well Detail”, Figure 3. Riser pipe and well screen shall be constructed of 2-inch schedule 40 PVC flush joint. Slotted well screen shall have .020-inch slot openings and the bottom of the screen shall be fitted with a PVC end cap set at the required depth below grade. The well will be drilled to the minimum depth required. The screen shall extend to the bottom of the borehole and surrounded with silica well sand the full length of the screen. A 1-foot bentonite seal shall be place above the silica well sand. The well shall be finished to 6-inches below grade with cement/bentonite grout. At grade, the well shall be finished with a flush mount, 8” bolt down steel manhole set within a concrete pad.

B. INSTALLATION OF AS WELLS

A total of two (2) AS wells shall be installed at the locations indicated as “AS-1 and AS-3” as shown in the Figure 1.

The contractor shall adhere to all federal, state and local laws and regulations associated with constructing wells and shall obtain required permits, markouts, and protection of utilities, traffic controls, safety, and security. New York 811 shall be called a minimum of 3-days prior to well installation. Well locations shall be carefully selected after visual inspection of relevant marked out, and overhead utilities, if present. Each location shall be pre-cleared utilizing soft dig techniques to a depth of 4-feet below grade. Boreholes shall not be left unfinished or uncovered at the end of each day.

The borehole for the AS wells shall be advanced utilizing hollow stem auger methods (CME LC60 Rig or approved alternates). Casing and screen shall be installed plumb and concentric with the borehole. Equipment shall be decontaminated in-between each borehole and prior to demobilization from the project site. Decontamination shall include all drilling tools, including hollow stem augers, drill pipe, drill bits, casings, screens, weighted tapes and probes.

Wells shall be constructed in accordance with the dimensional drawings presented as “AS Well Detail”, Figure 3. Riser pipe and well screen shall be constructed of 2-inch schedule 40 PVC flush joint. Slotted well screen shall have .020-inch slot openings and the bottom of the screen shall be fitted with a PVC end cap set at the required depth below grade. The well will be drilled to the minimum depth required. The screen shall extend to the bottom of the borehole and surrounded with silica well sand the full length of the screen. A 2-foot bentonite seal shall be place above the silica well sand. The well shall be finished to 6-inches below grade with cement/bentonite grout. At grade, the well shall be finished with a flush mount, 8” bolt down steel manhole set within a concrete pad.

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C. INSTALLATION OF AS/SVE SYSTEM

Individual extraction and air sparge pipe laterals shall extend from each of the extraction wells or air sparge wells and route to common headers located in the AS/SVE system enclosure that will be installed on the exterior of the building. Each lateral will be routed along the basement ceiling to a location near the east exterior wall of the building and will be constructed of 2-inch schedule 40 PVC pipe for the SVE and 1.5-inch schedule 40 PVC for the air sparge lines. Care will be made to ensure that all interior piping is placed and routed in a best effort to reduce intrusion into the interior space of the building. Each of the three (3) extraction pipes and two (2) AS pipes leading from the interior of the building, will penetrate the exterior wall and will exit the building approximately 1-foot above the existing exterior grade on the north side (rear) of the dry cleaner portion of the building. The one (1) extraction pipe and one (1) AS pipe leading from the wells located in the parking area will be routed through a utility trench to the north exterior wall of the building and daylight through the existing concrete sidewalk.

Each extraction pipe will then combine into one 4-inch diameter manifold header inside the equipment enclosure and then route into the system moisture separator. Air leaving the moisture separator will then be routed through an in-line particle filter and then into the inlet of the vacuum blower. The effluent air stream piping will then be extended vertically up the exterior wall of the building to a location above the roof line of the building to its discharge point. The vent riser will terminate at least 1-foot above the surface of the roof at a location at least 10-feet away from any window or other opening into the conditioned space of the building that is less than 2-feet below the exhaust point, and 10-feet away from any adjoining or adjacent buildings. All piping shall be schedule 40 PVC pipe. Details of the SVE system configuration can be seen in Figure 2.

Each air sparge pipe will combine into one 2-inch diameter manifold header inside the equipment enclosure and then route to the outlet of the aftercooler. The piping will continue upstream to the outlet of the air sparge compressor. The inlet of the compressor will be routed to a location within the enclosure and open to ambient air. All piping between the compressor and the after-cooler shall be schedule 40 galvanized steel and all other piping shall be schedule 40 PVC pipe. Details of the AS system configuration can be seen in Figure 2.

All interior riser pipe, beginning at the floor slab elevation and continuing to the point where the pipe penetrates the building exterior foundation wall, shall be clearly and permanently labeled and read as such:

“CAUTION: ACTIVE VENT SYSTEM”

D. PIPING (GENERAL)

1. The run and arrangements of all pipes shall be approximately as shown in the Figures or specified and as directed during installation, and shall be as straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and neatly spaced. No pipe shall be

installed where the headroom will be interfered with unless the conditions are such that it is unavoidable and permission is obtained from the property owner. Offsets will be permitted where walls reduce in thickness or beams interfere with direct runs; offsets shall be made at an angle of 45 degrees to the vertical; in no case shall the space between the pipes, partitions, walls, etc., exceed 5". All exposed risers shall be erected plumb, standing free, close to and parallel with walls and other pipes and be uniformly spaced. All horizontal runs of piping hung from structural floor, slab or floor beams shall be erected as closely as possible to bottom of floor slabs, ceilings, or I-beams as the case may be. In no case shall the headroom, beneath the pipe, be less than (7'-0") where the pipe is installed more than (1'-0") from wall, partition, etc., except where piping is required to be installed in Boiler Room and Mechanical spaces above floor. Horizontal piping shall be so graded as to drain back to each individual extraction point. All piping shall be installed with ample space for pipe covering.

2. Roughing underground or concealed in the floor or wall construction shall be properly installed, tested and inspected before any of the roughing is covered up. Should any work be covered up before being inspected and tested, it shall be uncovered and recovered at the expense of the Contractor. Plugged fittings shall be installed when called for. Reducer fittings or bushings shall be used in making reductions in sizes of pipes.

E. PIPING JOINTS

1. Threaded Joints

The joints piping shall be screwed joints of full length and threads shall be NPT. All pipes shall be screwed close up to their shoulders, not to leave more than 3 threads exposed. The use of lamp wick is prohibited in threaded joints. All burrs shall be removed. Pipe joint cement or Teflon tape shall be used only on male threads.

2. Solvent-cementing:

a) Remove all burrs, chips, filings, and other debris from the pipe i.d. and o.d. before joining.

b) All pipe ends should be beveled to minimize the chances of wiping the solvent cement from the i.d. of the fitting as the pipe is socketed. Beveling can be done with the coarse file or beveling tool.

c) Using a clean, dry cotton rag, wipe away all loose dirt and moisture from the i.d. and o.d. of the pipe end and the i.d. of the fitting. Do not attempt to solvent-cement wet surfaces.

d) Using a natural-bristle brush about one-half the width of the pipe diameter to be joined, apply primer freely to the inner fitting socket. Keep the surface wet by continuously brushing the entire surface for 5 to 15 seconds. Redip the applicators as necessary, but avoid puddling inside the fitting. Reapply primer to the fitting socket.

e) Apply primer to the pipe surface in the same manner, making sure that the length of pipe evenly covered is at least equal to the fitting socket depth.

f) Using a second clean natural-bristle brush one-half the size of the pipe diameter, apply a heavy coat of solvent cement to the male end of the pipe. Next apply a liberal coat of solvent cement to the inside of the socket using straight outward strokes to keep excess cement out of the socket.

g) While both surfaces are still wet with solvent cement, insert the pipe into the socket with a twisting motion. The pipe must go to the bottom of the socket. The application of solvent cement to pipe and fitting, and the insertion of pipe into the fitting, should be completed in less than 1 minute. Hold the joints together for approximately 30 seconds until both surfaces are firmly gripped.

h) After solvent-cementing, hold joints together for 30 seconds until both surfaces are firmly gripped. Allow proper set time before disturbing joints. The initial set time prior to installation is as follows:

Temperature Range	**Pipe Sizes 1/4”- 1/2”**	**Pipe Sizes 1½”-3”**	**Pipe Sizes 4”-8”**	**Pipe Sizes 10”-16”**	**Pipe Sizes 18”-24”**
60°-100°F	15 Min.	30 Min.	1 Hr.	2 Hr.	3 Hr.
40°-60°F	1 Hr.	2 Hr.	4 Hr.	8 Hr.	12 Hr.
0°-40°F	3 Hr.	6 Hr.	12 Hr.	24 Hr.	36 Hr.

F. SLEEVES FOR PIPES

1. General: All plumbing pipes passing through floors, roofs, walls, partitions, furring, beams, trenches, and wherever else indicated on the drawings shall be provided with sleeves. Where plumbing pipes pass through potentially wet floors that do not have membrane waterproofing such as toilet rooms, cafeteria kitchens, serving areas, dish washing room, janitor's sink closet, mechanical equipment rooms, pipe chases and areas that are provided with fire protection sprinkler systems, the Contractor shall install sleeves of galvanized steel pipe with welded clips or equivalent at bottom ends for securing sleeves to form work and shall project one inch above finished floors, and shall be caulked watertight.

2. For interior walls and floors and for pipes through roof, the space between each installed pipe and its sleeve shall be sealed with a three hour rated fire stop penetration material. Fire stop materials shall be installed in accordance with the instructions of the manufacturer.

3. Sheet Metal Sleeves

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a. Sleeves for pipes passing through floors, partitions, hung or furred ceilings, shall be installed with 1/2" maximum clearance all around pipes. Each sleeve for a pipe passing through an interior floor slab shall be fitted with a one-inch flange, or equivalent, at the bottom end for the purpose of securing it to the form work or sheet metal deck.

The sleeve shall finish flush with the top of the finished floor. Sleeves for pipes passing through partitions, hung or furred ceilings shall be of one-piece construction and shall finish flush with the finished surface.

b. Sleeves installed for pipes passing through vent ducts shall be securely fastened, soldered and made airtight.

4. Pipe Sleeve: Install pipe sleeves for pipes passing through roofs, concrete beams, utility trenches, grade beams, brick walls, foundation walls and floor slabs on earth. Sleeves shall be installed with 1/2" maximum clearance all around pipe and shall finish flush with the surfaces penetrated. Pipe sleeves for pipes through roof shall be made of service weight cast iron only.

3.02 PIPE AND FITTING SCHEDULE

A. Soil Vapor Extraction System

PVC pipe Schedule 40 with flanged, threaded, or welded joints (Exterior)

B. Air Sparge System

PVC pipe Schedule 40 with welded joints (Interior & Exterior)

3.03 PROTECTION

It is the responsibility of the Contractor to ensure that no damage occurs to components of the SVE and AS Systems prior to, during or following installation of system, or during any subsequent performance of construction for the facility as identified on the drawings and specifications. This includes the installation of all subsurface utilities required for the operation of building systems.

END OF SECTION

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FIGURES

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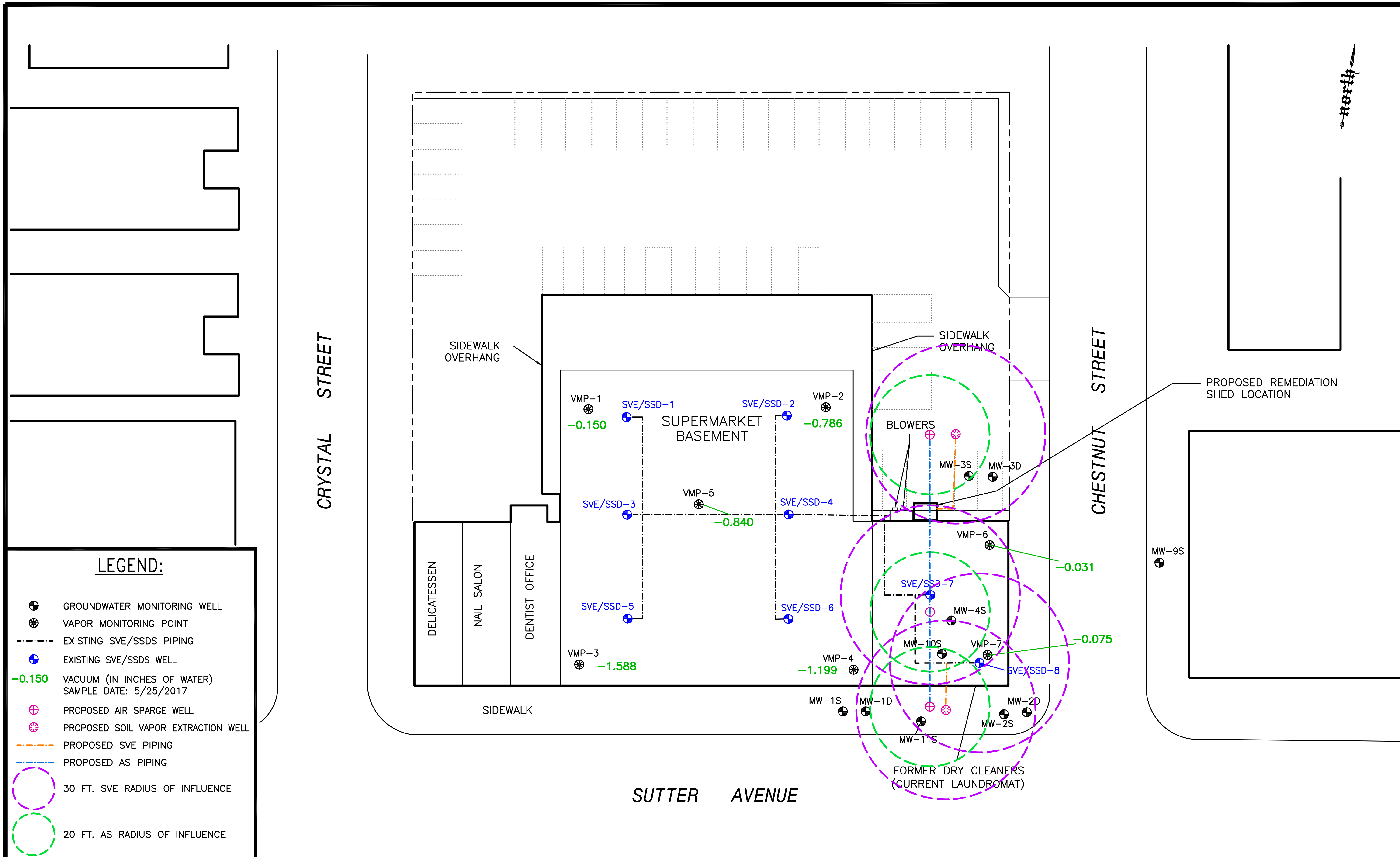

EnviroTrac ENVIRONMENTAL SERVICES
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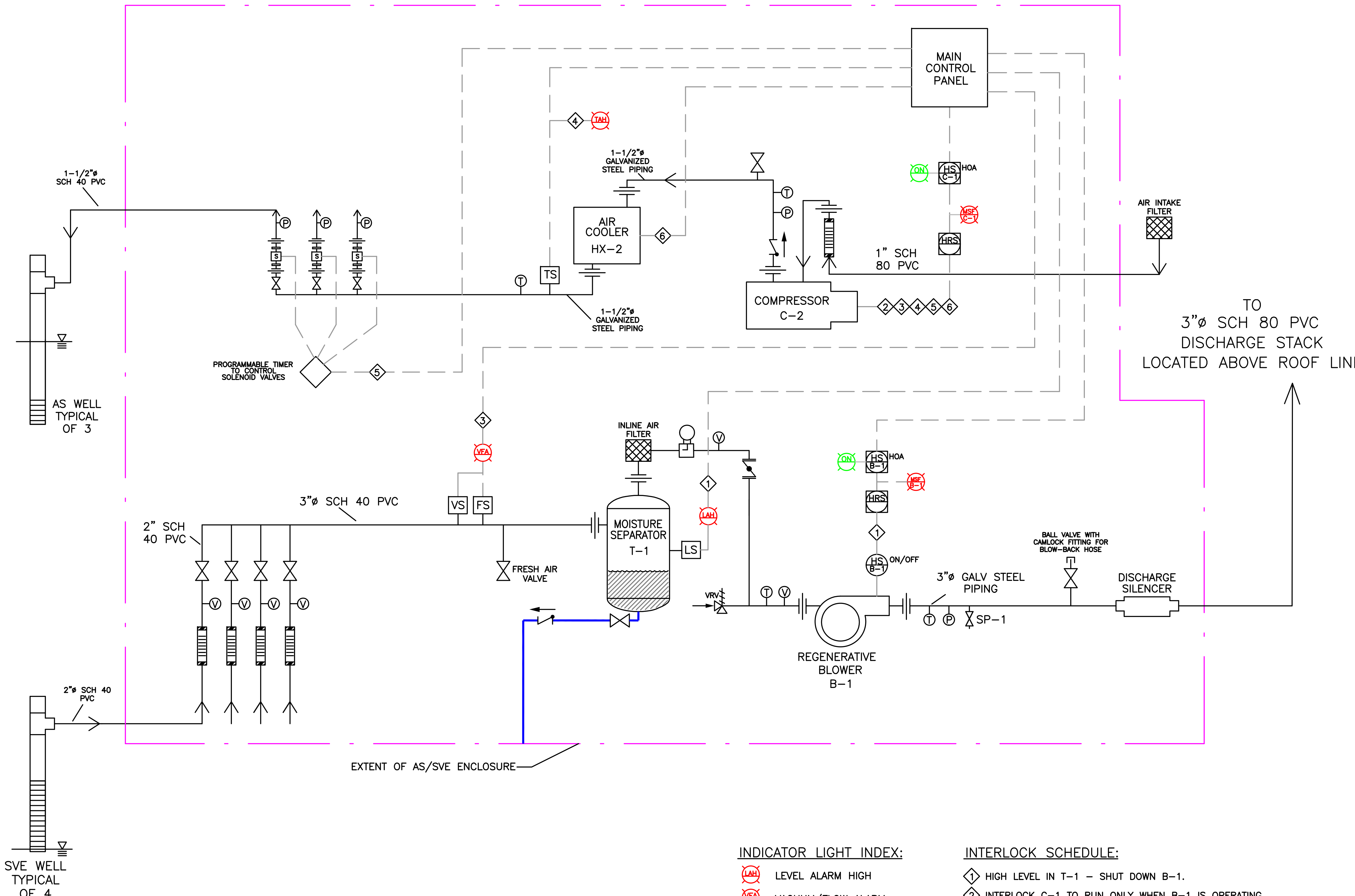
DATE: 7/26/2018 REVISED BY: BS

1199 SUTTER AVENUE
BROOKLYN, NEW YORK

SITE PLAN SHOWING SVE/AS RADIUS OF INFLUENCE

FIGURE # 1



SYSTEM LEGEND:

- VACUUM GAUGE
- TEMPERATURE GAUGE
- PRESSURE GAUGE
- VENTURI FLOW METER
- REDUCER
- LEVEL SWITCH
- BALL VALVE
- SAMPLE PORT
- VACUUM RELIEF VALVE
- CHECK VALVE
- FLOW/ANEMOMETER PORT
- SIGHT GLASS
- UNION
- HAND SWITCH ON PANEL
- RUN TIME METER
- CONTROL PANEL INDICATOR
- CONTROL PANEL INTERLOCK
- ELECTRIC LINE
- AIR FLOW DIRECTION
- ENCLOSURE LIMITS

INDICATOR LIGHT INDEX:

- LAH LEVEL ALARM HIGH
- VFA VACUUM/FLOW ALARM
- TAH TEMPERATURE ALARM HIGH
- MSF MOTOR STARTER FAILURE
- ON MOTOR RUN INDICATOR

INTERLOCK SCHEDULE:

1. HIGH LEVEL IN T-1 – SHUT DOWN B-1.
2. INTERLOCK C-1 TO RUN ONLY WHEN B-1 IS OPERATING.
3. LOW VACUUM OR FLOW ON SVE MANIFOLD – SHUT DOWN C-1.
4. HIGH TEMPERATURE – SHUT DOWN C-1.
5. INTERLOCK C-1 TO ONLY OPERATE ALONG WITH PROGRAMMED SOLENOID VALVE CYCLE TIMES.
6. INTERLOCK HX-1 TO RUN ONLY WHEN C-1 IS OPERATING.

DRAWN/REVISED BY: DK
REVISION DATE: JUL 26, 2018

FIGURE: 2

DRAWING TITLE

AIR SPARGE / SOIL VAPOR EXTRACTION SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM

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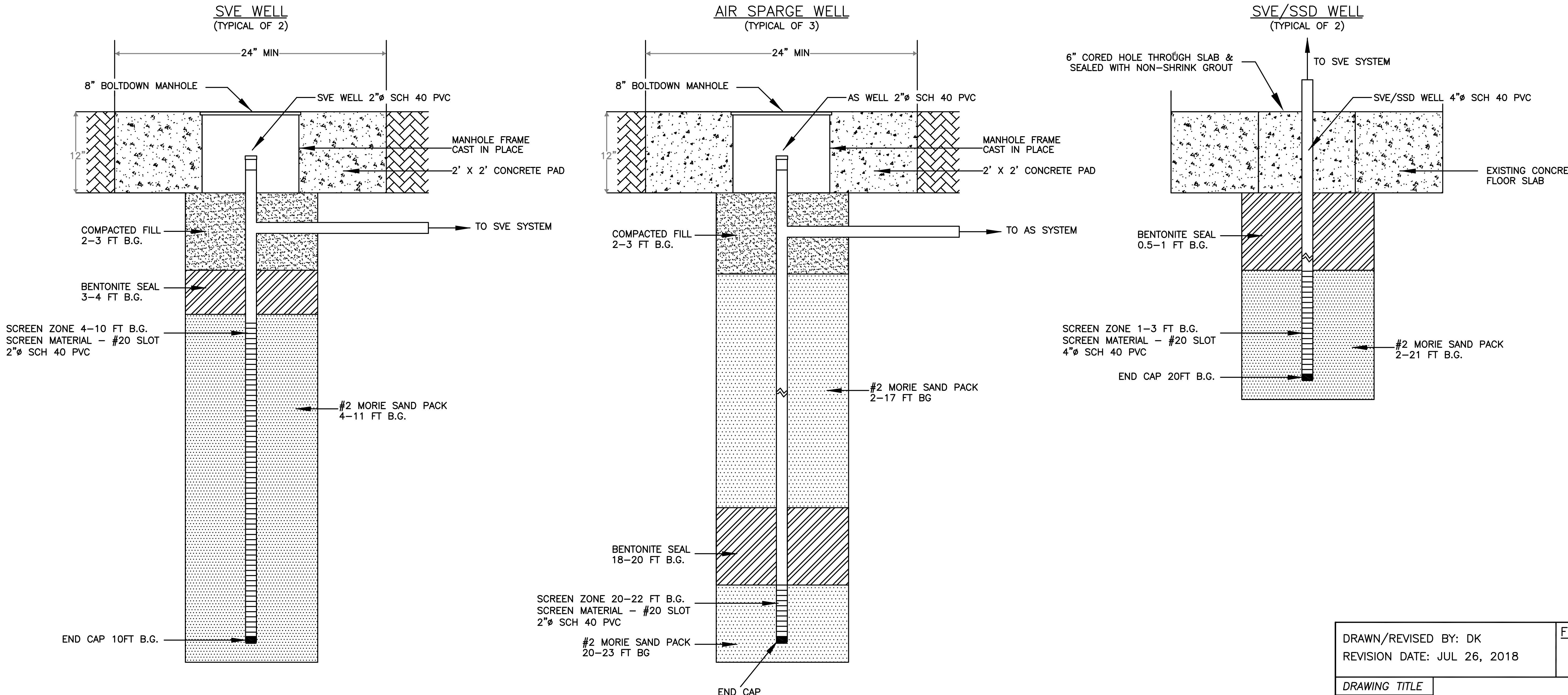

DRAWN/REVISED BY: DK
REVISION DATE: JUL 26, 2018

FIGURE: 3

DRAWING TITLE

EXISTING SSD/SVE WELL & PROPOSED AS & SVE WELL DETAILS

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ATTACHMENT A

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Soil Vapor Extraction (SVE) & Sub-Slab Depressurization System (SSDS) Pilot Test Report

Site:

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Brooklyn, New York 11208
BCP Site No. C224141

Prepared for:

AAA Sutter Realty LLC
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Prepared by:

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June 2016

Soil Vapor Extraction (SVE) and Sub-Slab Depressurization System (SSDS) Pilot Study Report

Popular Hand Laundry, Brooklyn, New York.

PURPOSE

This report is intended to summarize the results of the SVE and SSDS pilot study that was conducted by EnviroTrac on June 1, 2016. The purpose of the test was to determine the feasibility of implementing a full scale SVE system to address any impacted soil below the existing building and parking area. Additional analysis was performed to evaluate the potential of an SSD system as a viable means of mitigation throughout the existing building structure. The intent of the remedial/mitigation strategy is to convert the SVE system into an SSD system once the remedial effort has been completed. The results of this study were used to determine the feasibility of each technology, as well as determining the required operating parameters and layout for each system.

TECHNICAL SCOPE OF WORK PERFORMED

1. Pilot Test Equipment

For the purpose of the pilot test, EnviroTrac mobilized it's mobile SVE system equipment to conduct the study at two representative locations. The mobile system consists a regenerative vacuum blower mounted to a mobile steel skid. The test skid also includes a vacuum gauge, inline filter, vacuum relief valve, flow port, sample port, recirculation/fresh air valve, and associated piping and discharge stack. Major system components of the existing SVE system are described below.

Soil Vapor Extraction Equipment:

- Extraction Blower – Airtech Inc. Model #3BA1500-7AS35, Regenerative Vacuum Blower (2.5 HP, 115/230V, 1 Phase).
  - Max Flow: 150 SCFM
  - Max Vac: 72 "H_2O

Additional Test Equipment

- TSI Handheld Air Velocity/Vacuum Meter – Model 8386A

2. Test Wells

To facilitate the pilot study, two (2) temporary test wells were installed in the basement of the building, one in the supermarket and one in the dry cleaners. Each point was installed by using a 5-inch diameter concrete core drill through the existing basement concrete floor slab. An approximately 1-foot deep void space was then hand excavated at each point and a 4-inch diameter PVC pipe inserted to a depth of 1-inch below the bottom elevation of the floor slab. The annulus between the concrete core hole and the PVC pipe was sealed using a non-VOC clay putty. A flexible hose was then routed from the test blower to the top of the PVC pipe at each test point. The location of each test point can be seen in Figure 1.

SVE/SSD TESTING METHODOLOGY

Throughout the pilot study each temporary extraction well was tested individually. Prior to starting the test, a flexible hose was routed from the extraction well to the mobile test blower, which was staged in the parking area on the exterior of the building. In order to monitor the sub-slab vacuum response of the test, several temporary vacuum monitoring points were installed through the concrete floor slab, extending radially outward from each test point. During the test, the vacuum blower was configured to operate at four different steps of increasing flow and vacuum. Throttling of the blower was carried out by making adjustments to the mobile system piping manifold control valve as well as bleeding excess flow through the system fresh air inlet valve. During each step, operating parameters such as applied flow, vacuum, and sub-slab vacuum responses were recorded. The applied extraction well flow and vacuum were measured from a monitoring point located in the extraction piping several feet above where the piping penetrates the floor slab. The wellhead vacuum and extraction flow rate for each step were recorded as the following:

<u>SVE/SSD-1</u>

- Step 1 – 25.0 "H_2O Wellhead Vacuum, 14.0 scfm Extraction Flow Rate.
- Step 2 – 15.0 "H_2O Wellhead Vacuum, 12.5 scfm Extraction Flow Rate.
- Step 3 – 10.0 "H_2O Wellhead Vacuum, 11.0 scfm Extraction Flow Rate.
- Step 4 – 5.0 "H_2O Wellhead Vacuum, 10.3 scfm Extraction Flow Rate.

<u>SVE/SSD-2</u>

- Step 1 – 5.0 "H_2O Wellhead Vacuum, 17.0 scfm Extraction Flow Rate.
- Step 2 – 10.0 "H_2O Wellhead Vacuum, 20.0 scfm Extraction Flow Rate.
- Step 3 – 15.0 "H_2O Wellhead Vacuum, 19.5 scfm Extraction Flow Rate.
- Step 4 – 25.0 "H_2O Wellhead Vacuum, 29.5 scfm Extraction Flow Rate.

During each step vacuum influence was recorded from all monitoring points utilizing a handheld digital manometer. For each step the operating conditions were allowed to sufficiently stabilize at a steady state condition prior to the recording of any readings.

PILOT TESTING RESULTS

The field data collected during the SVE/SSD pilot test is included as an attachment to this report. Flow and vacuum readings were recorded during each step of the SSDS test, while vacuum influence was measured at each observation point. A copy of the pilot test data analysis from each test well, along with the associated data plots are included in the attachments of this report.

1. SVE Results

In order to determine the performance requirements at each proposed SVE extraction point, the pilot test data is used to generate a plot of sub-slab vacuum response vs. distance. From this plot the effective Radius of Influence (ROI) of each of the four test steps of the pilot study is determined by finding the radial distance where a best fit logarithmic line plot of the data intersects the line y = 0.1 "H_2O vacuum response. For SVE/SSD-1 a minimum of 18.0 "H_2O vacuum at a minimum flow rate of 13 cfm and for SVE/SSD-2 a minimum of 20.0 "H_2O vacuum at a minimum flow rate of 25 cfm from each well, would be required to meet the minimum radius of influence (ROI) (~30 feet) to achieve complete coverage of the building footprint.

2. SSD Results

In order to determine the performance requirements at each proposed SSD extraction point, the pilot test data is used to generate a plot of sub-slab vacuum response vs. distance. From this plot the effective Radius of Influence (ROI) of each of the four test steps of the pilot study is determined by finding the radial distance where a best fit logarithmic line plot of the data intersects the line y = 0.02 "H_2O(~5 pascals) vacuum response. For SVE/SSD-1 a minimum of 9.0 "H_2O vacuum at a minimum flow rate of 12 cfm and for SVE/SSD-2 a minimum of 7.5 "H_2O vacuum at a minimum flow rate of 18 cfm from each well, would be required to meet the minimum radius of influence (ROI) (~30 feet) to achieve complete coverage of the building footprint.

CONCLUSIONS

1. Soil Vapor Extraction

Based on the results tabulated, the pilot testing performed demonstrates that a full scale SVE system can serve as an effective means of remediation for the existing site. If a target ROI of 30 feet is selected for each proposed extraction point, it was determined that a minimum vacuum of ~20.0 “H_2O and an air flow rate of ~25 CFM would need to be applied at each point. Appropriate consideration will be addressed concerning the number and spacing of the extraction points.

Recommended Design Parameters (each extraction point):

- Target Radius of Influence (ROI): 30 feet
- Applied Vacuum: 20.0 “H_2O
- Applied Flow Rate: 25 CFM

Recommended Design Parameters (Total System Performance, 8 Wells):

- Target Radius of Influence (ROI): 30 feet (per well)
- Applied Vacuum: 40.0 “H_2O (inc. 20 “H_2O for system losses)
- Applied Flow Rate: 200 CFM

2. Sub-Slab Depressurization

Based on the results tabulated, the pilot testing performed demonstrates that a full scale SSD system can serve as an effective means of mitigation for the existing site building. If a target ROI of 30 feet is selected for each proposed extraction point, it was determined that a minimum vacuum of ~9.0 “H_2O and an air flow rate of ~18 CFM would need to be applied at each point. Appropriate consideration will be addressed concerning the number and spacing of the extraction points.

Recommended Design Parameters (each extraction point):

- Target Radius of Influence (ROI): 30 feet
- Applied Vacuum: 9.0 “H_2O
- Applied Flow Rate: 18 CFM

Recommended Design Parameters (Total System Performance, 7 Wells):

- Target Radius of Influence (ROI): 30 feet (per well)
- Applied Vacuum: 11.0 “H_2O (inc. 20% SF for system losses)
- Applied Flow Rate: 126 CFM

FIGURES

- Figure 1: Site Plan

ATTACHMENTS

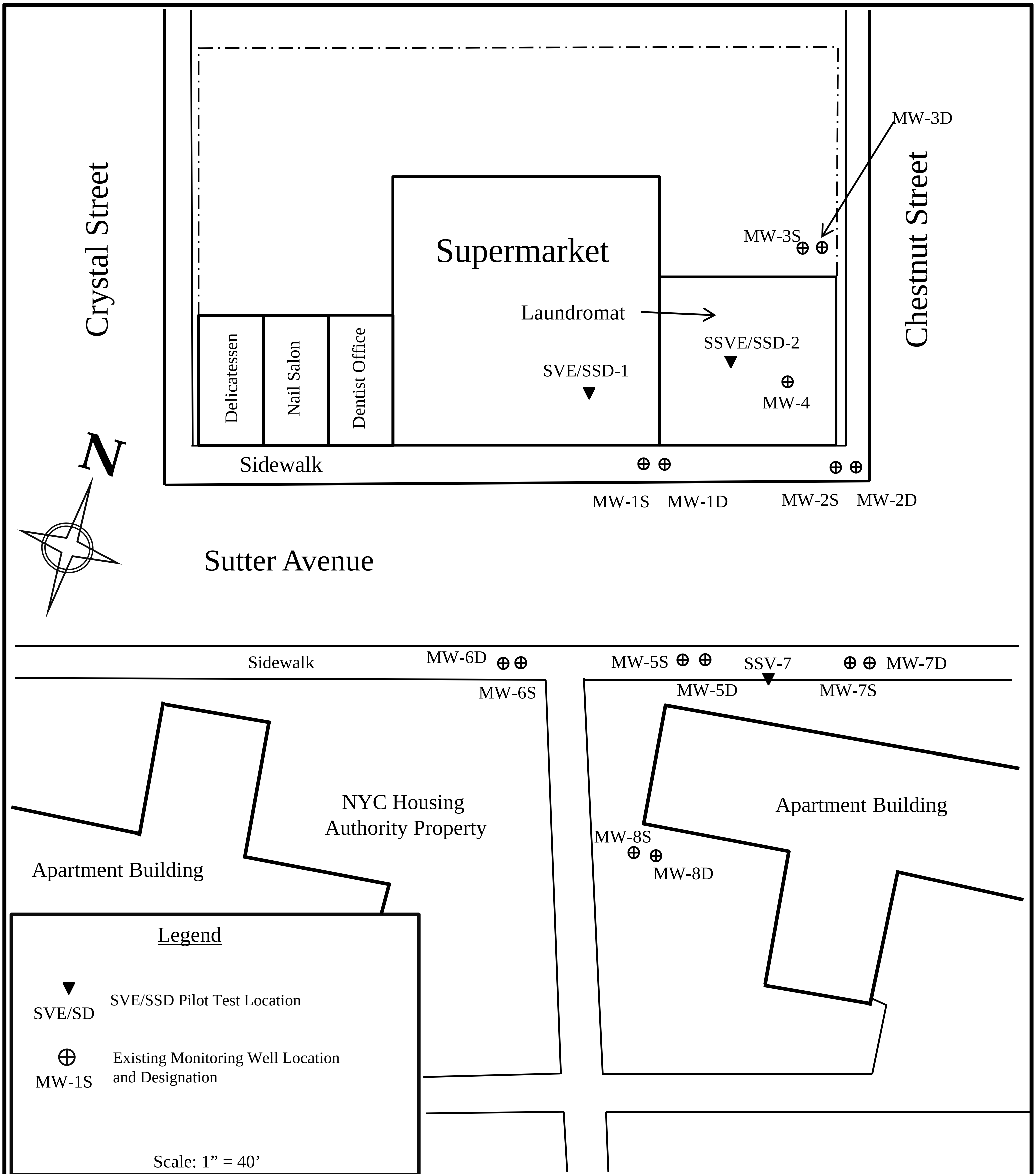
1. SVE/SSD-1: Pilot Test Data – Field Measurements
2. SVE/SSD-1: SVE Test Data Analysis
3. SVE/SSD-1: Plot: SVE Vacuum Response vs. Monitoring Point Distance

4. SVE/SSD-1: Plot: SVE Radius of Influence vs. Applied Vacuum
5. SVE/SSD-1: Plot: SVE Applied Flow vs. Applied Vacuum
6. SVE/SSD-1: SSD Test Data Analysis
7. SVE/SSD-1: Plot: SSD Vacuum Response vs. Monitoring Point Distance
8. SVE/SSD-1: Plot: SSD Radius of Influence vs. Applied Vacuum
9. SVE/SSD-1: Plot: SSD Applied Flow vs. Applied Vacuum
10. SVE/SSD-2: Pilot Test Data – Field Measurements
11. SVE/SSD-2: SVE Test Data Analysis
12. SVE/SSD-2: Plot: SVE Vacuum Response vs. Monitoring Point Distance
13. SVE/SSD-2: Plot: SVE Radius of Influence vs. Applied Vacuum
14. SVE/SSD-2: Plot: SVE Applied Flow vs. Applied Vacuum
15. SVE/SSD-2: SSD Test Data Analysis
16. SVE/SSD-2: Plot: SSD Vacuum Response vs. Monitoring Point Distance
17. SVE/SSD-2: Plot: SSD Radius of Influence vs. Applied Vacuum
18. SVE/SSD-2: Plot: SSD Applied Flow vs. Applied Vacuum

REFERENCES

1. ASTM E1465-08a “Standard Practice for Radon Control Options”
2. ASTM E2121-13 “Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings”

FIGURES



EnviroTrac
Environmental Services

1199-1221 Sutter Avenue
Brooklyn, New York

Figure 1
Site Plan

ATTACHMENTS

Soil Vapor Extraction (SVE) & Sub-Slab Depressurization (SSD) Pilot Test Data

Site Name: **1199-1221 Sutter Avenue**
BROOKLYN, NY

Test Date: 6/1/2016

Personnel: DW

Weather: Sun 80 F

Extraction Well

SVE/SSDS-1

	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well
	V1-5'	V1-10'	V1-15'	V1-25'	V1-30'	V1-40'	
	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)
	5	10	15	25	30	40	

	Well Head Vac "H20		Flow (scfm)		Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "H_{21}	Vacuum "H_{22}	Vacuum "H_{23}
	25.0		14		-4.860	-2.300	-1.120	-0.350	-0.170	-0.090	
	15.0		12.5		-3.300	-1.510	-0.710	-0.210	-0.120	-0.060	
	10.0		11		-2.350	-1.100	-0.520	-0.180	-0.070	-0.040	
	5.0		10.3		-1.210	-0.510	-0.250	-0.100	-0.050	-0.020	

Comment / Notes:

SVE/SSD-1 Temporary test point installed in basement of supermarket

Summary of SVE/SSDS Pilot Test
1199-1221 Sutter Avenue
BROOKLYN, NY

SVE Analysis: SVE-1

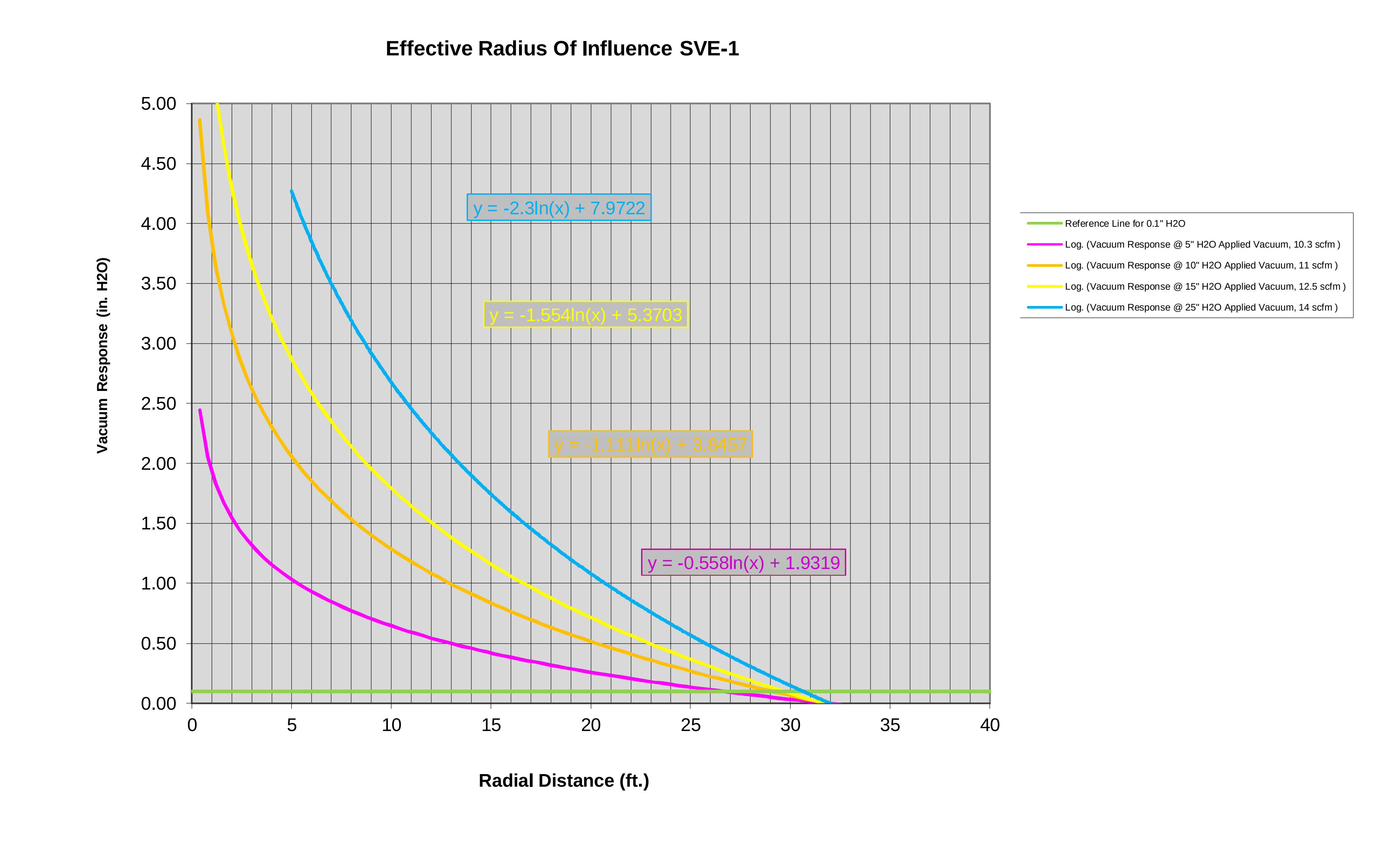
Test Date:	6/1/2016
Performed By:	EnviroTrac - DW
Extraction Point:	**SVE/SSDS-1**
Test Duration (min.):	2 hr
Wellhead Vacuum ("H2O):	5 to 25
Wellhead Flow (scfm):	10.3 to14

SVE/SSDS-1

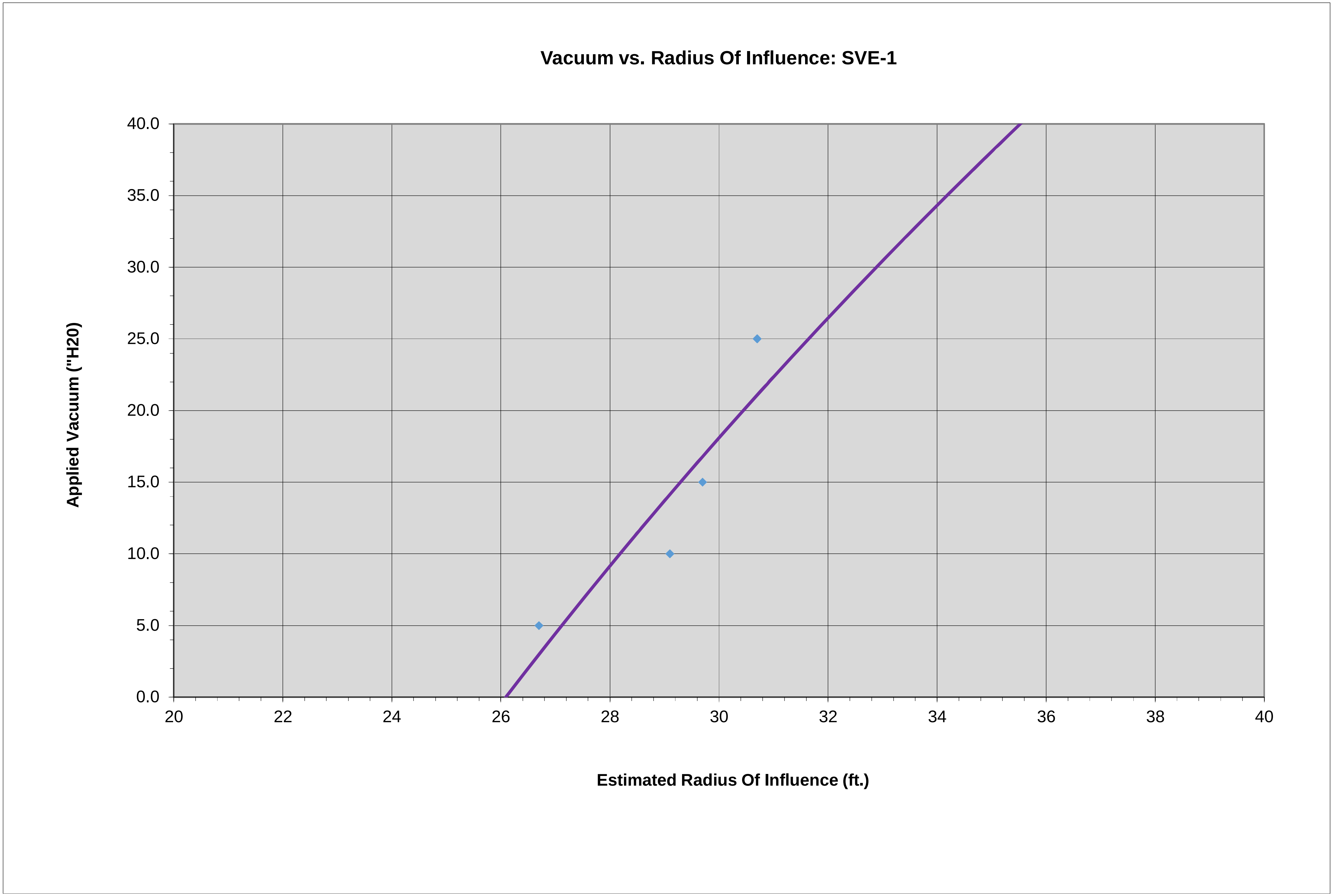
Radial Distance (ft.)	Vacuum Response @ 5" H2O Applied Vacuum, 10.3 scfm	Vacuum Response @ 10" H2O Applied Vacuum, 11 scfm	Vacuum Response @ 15" H2O Applied Vacuum, 12.5 scfm	Vacuum Response @ 25" H2O Applied Vacuum, 14 scfm	Reference Line for 0.1" H2O	TEST POINT ID
5	1.210	2.350	3.300	4.860	0.1	V1-5'
10	0.510	1.100	1.510	2.300	0.1	V1-10'
15	0.250	0.520	0.710	1.120	0.1	V1-15'
25	0.100	0.180	0.210	0.350	0.1	V1-25'
30	0.050	0.070	0.120	0.170	0.1	V1-30'
40	0.020	0.040	0.060	0.090	0.1	V1-40'

Est. ROI (ft.)	Vacuum ("H2O)	Flow (scfm)
26.7	5.0	10.3
29.1	10.0	11.0
29.7	15.0	12.5
30.7	25.0	14.0

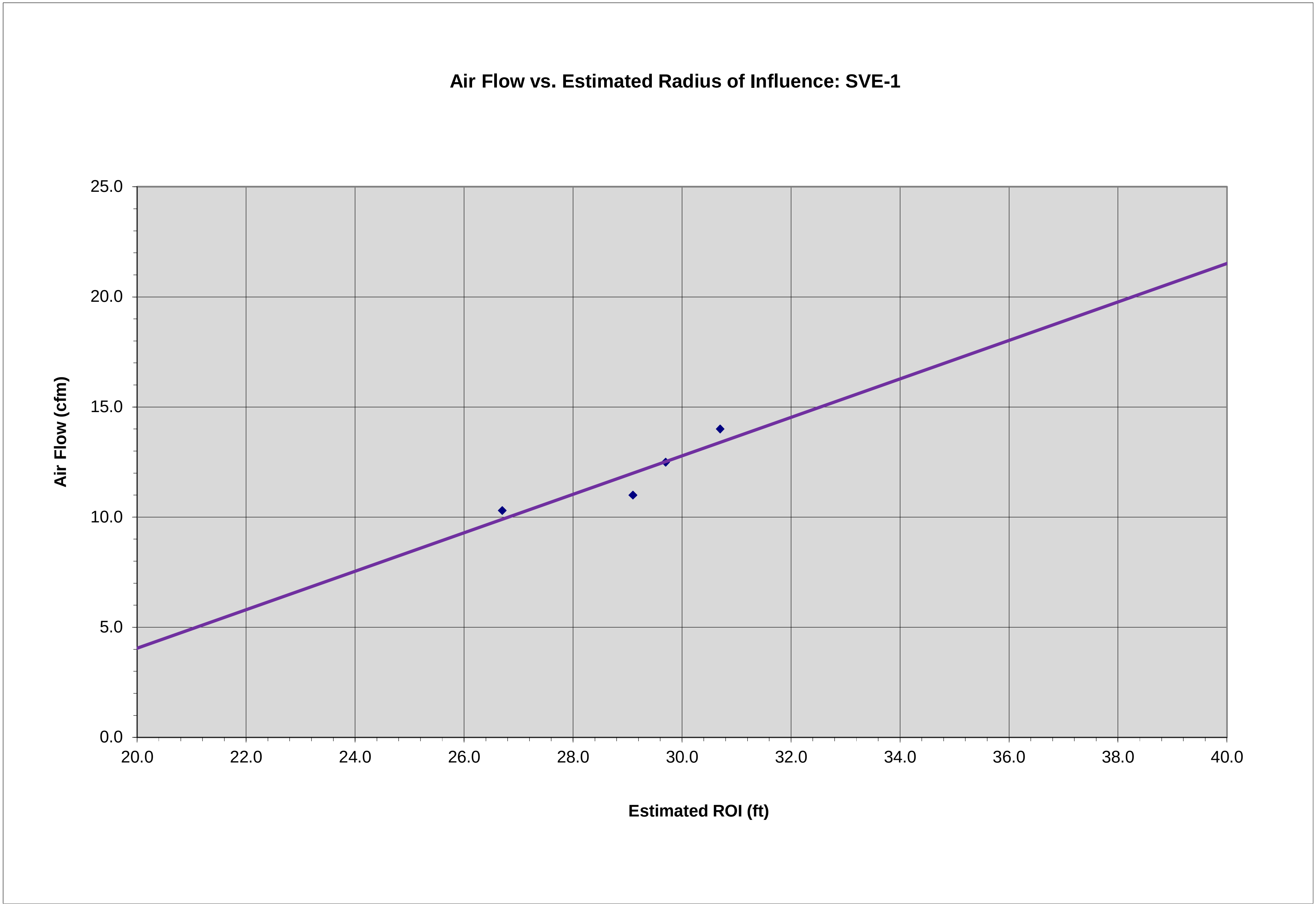
Design Parameters (Per Extraction Well) (ROI = 30 ft)	
Flow (cfm):	13
Vacuum ("H2O):	18



Effective Radius Of Influence SVE-1
Vacuum Response (in. H2O)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0
5
10
15
20
25
30
35
40
Radial Distance (ft.)
y = -2.3ln(x) + 7.9722
y = -1.554ln(x) + 5.3703
y = -1.111ln(x) + 3.8457
y = -0.558ln(x) + 1.9319
Reference Line for 0.1" H2O
Log. (Vacuum Response @ 5" H2O Applied Vacuum, 10.3 scfm)
Log. (Vacuum Response @ 10" H2O Applied Vacuum, 11 scfm)
Log. (Vacuum Response @ 15" H2O Applied Vacuum, 12.5 scfm)
Log. (Vacuum Response @ 25" H2O Applied Vacuum, 14 scfm)



Vacuum vs. Radius Of Influence: SVE-1
Applied Vacuum ("H20)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
20
22
24
26
28
30
32
34
36
38
40
Estimated Radius Of Influence (ft.)



Air Flow vs. Estimated Radius of Influence: SVE-1
Air Flow (cfm)
25.0
20.0
15.0
10.0
5.0
0.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
36.0
38.0
40.0
Estimated ROI (ft)

Summary of SVE/SSDS Pilot Test
1199-1221 Sutter Avenue
BROOKLYN, NY

SSD Analysis: SSD-1

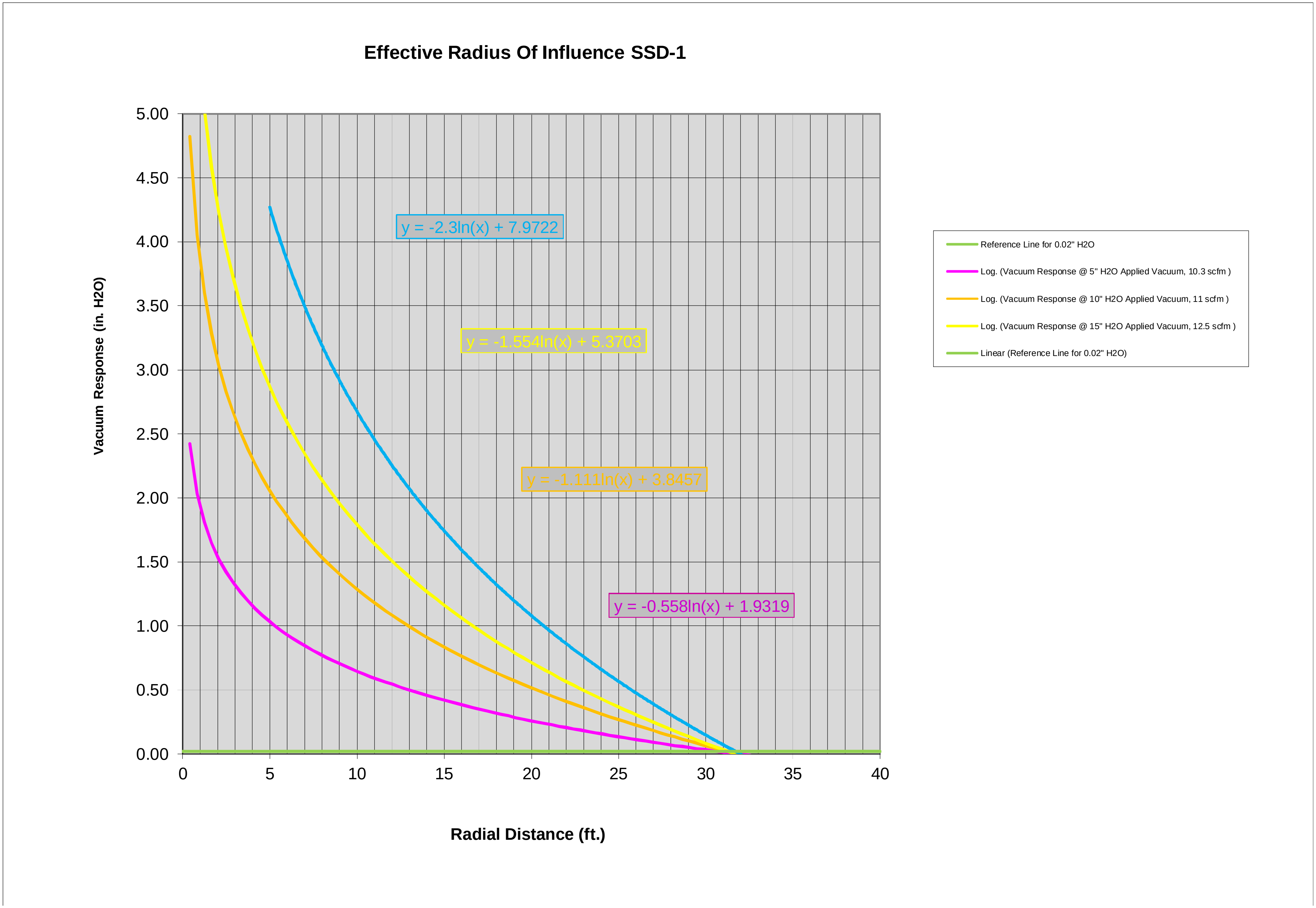
Test Date:	6/1/2016
Performed By:	EnviroTrac - DW
Extraction Point:	**SVE/SSDS #1**
Test Duration (min.):	2 hr
Wellhead Vacuum ("H2O):	5 to 25
Wellhead Flow (scfm):	10.3 to14

SVE/SSDS-1

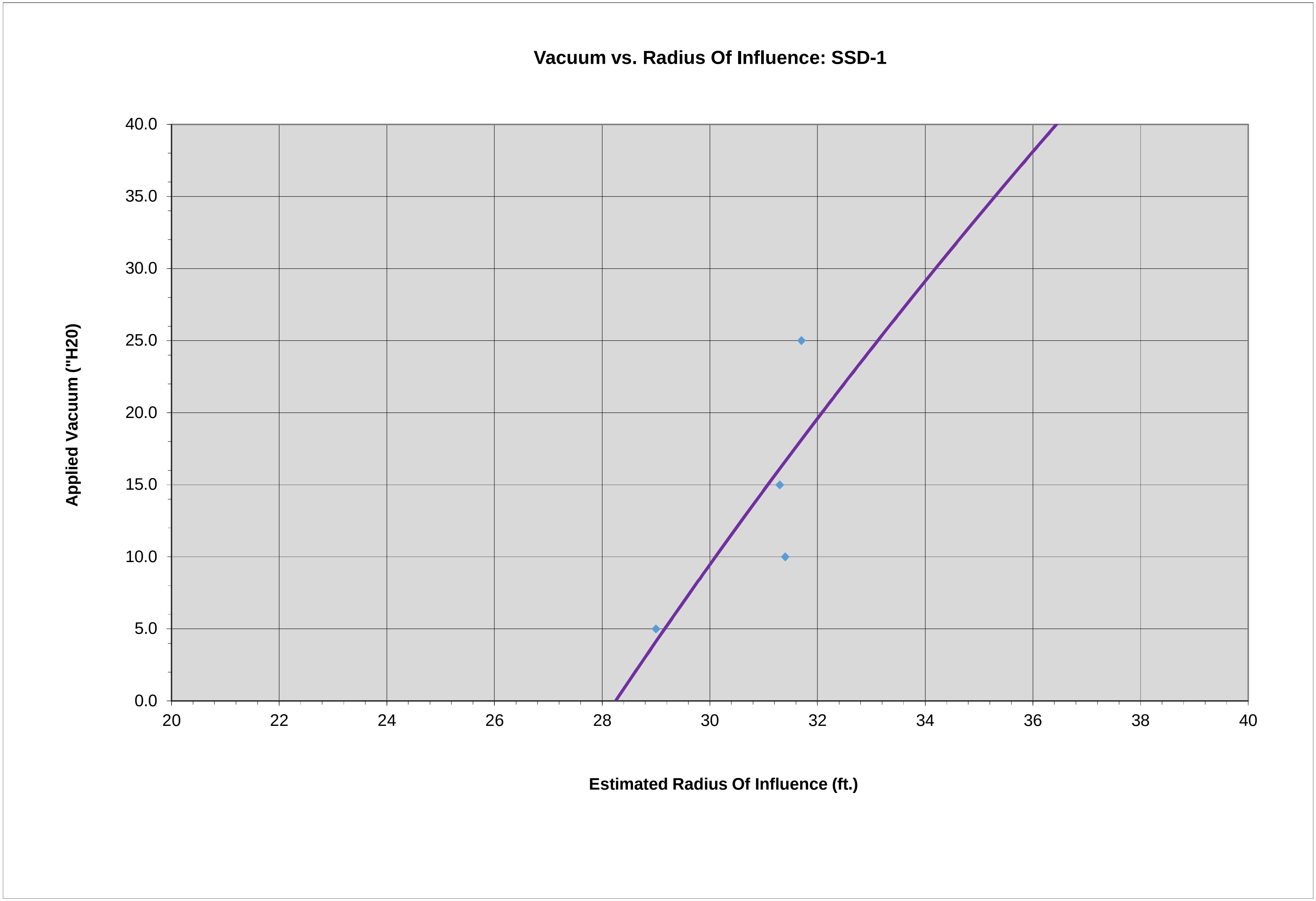
Radial Distance (ft.)	Vacuum Response @ 5" H2O Applied Vacuum, 10.3 scfm	Vacuum Response @ 10" H2O Applied Vacuum, 11 scfm	Vacuum Response @ 15" H2O Applied Vacuum, 12.5 scfm	Vacuum Response @ 25" H2O Applied Vacuum, 14 scfm	Reference Line for 0.02" H2O	TEST POINT ID
5	1.210	2.350	3.300	4.860	0.02	V1-5'
10	0.510	1.100	1.510	2.300	0.02	V1-10'
15	0.250	0.520	0.710	1.120	0.02	V1-15'
25	0.100	0.180	0.210	0.350	0.02	V1-25'
30	0.050	0.070	0.120	0.170	0.02	V1-30'
40	0.020	0.040	0.060	0.090	0.02	V1-40'

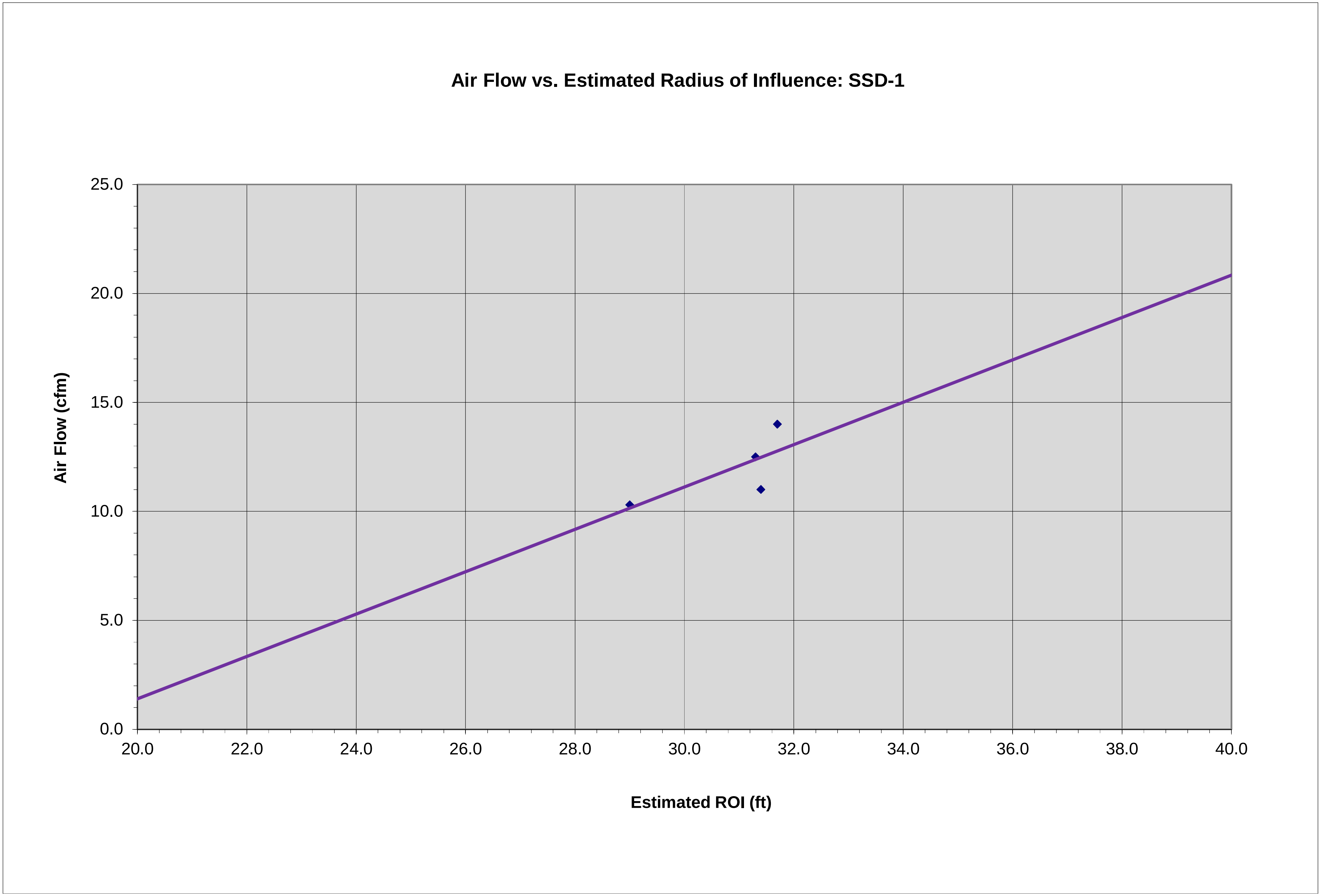
Est. ROI (ft.)	Vacuum ("H2O)	Flow (scfm)
29.0	5.0	10.3
31.4	10.0	11.0
31.3	15.0	12.5
31.7	25.0	14.0

Design Parameters (Per Extraction Well) (ROI = 30 ft)	
Flow (cfm):	12
Vacuum ("H2O):	9



Effective Radius Of Influence SSD-1
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Vacuum Response (in. H2O)
0
5
10
15
20
25
30
35
40
Radial Distance (ft.)
y = -2.3ln(x) + 7.9722
y = -1.554ln(x) + 5.3703
y = -1.111ln(x) + 3.8457
y = -0.558ln(x) + 1.9319
Reference Line for 0.02" H2O
Log. (Vacuum Response @ 5" H2O Applied Vacuum, 10.3 scfm)
Log. (Vacuum Response @ 10" H2O Applied Vacuum, 11 scfm)
Log. (Vacuum Response @ 15" H2O Applied Vacuum, 12.5 scfm)
Linear (Reference Line for 0.02" H2O)


Vacuum vs. Radius Of Influence: SSD-1
Applied Vacuum ("H20)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
20
22
24
26
28
30
32
34
36
38
40
Estimated Radius Of Influence (ft.)



Air Flow vs. Estimated Radius of Influence: SSD-1
Air Flow (cfm)
25.0
20.0
15.0
10.0
5.0
0.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
36.0
38.0
40.0
Estimated ROI (ft)

Soil Vapor Extraction (SVE) & Sub-Slab Depressurization (SSD) Pilot Test Data

Site Name: **1199-1221 Sutter Avenue BROOKLYN, NY**

Test Date: 6/1/2016

Personnel: DW

Weather: Sun 80 F

Extraction Well: **SVE/SSDS-2**

						Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	
						V1-5'	V1-10'	V1-15'	V1-25'	V1-32'	V1-39'	
						Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	
						5	10	15	20	32	39	
	Well Head Vac "H20		Flow (scfm)			Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	
	5.0		17			-1.040	-0.800	-0.400	-0.160	-0.060	-0.030	
	10.0		20			-0.600	-0.450	-0.200	-0.080	-0.030	-0.020	
	15.0		19.5			-0.470	-0.320	-0.150	-0.080	-0.030	-0.010	
	25.0		29.5			-0.200	-0.140	-0.070	-0.020	0.000	0.000	

Comment / Notes:

SVE/SSD-2 Temporary test point installed in basement of Dry Cleaner

Summary of SVE/SSDS Pilot Test
1199-1221 Sutter Avenue
BROOKLYN, NY

SVE Analysis: SVE-2

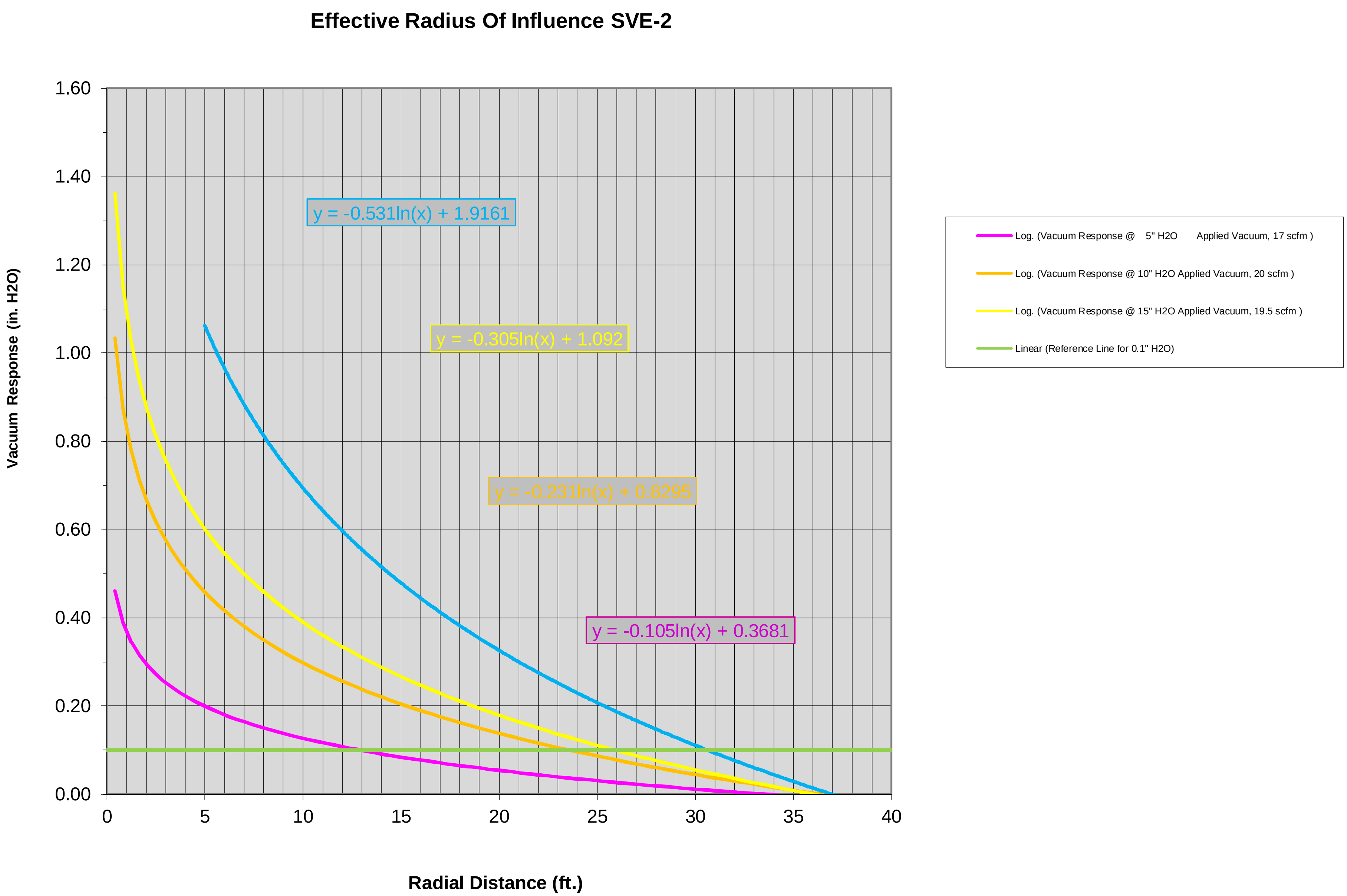
Test Date:	6/1/2016
Performed By:	EnviroTrac - DW
Extraction Point:	**SVE/SSDS-2**
Test Duration (min.):	2 hr
Wellhead Vacuum ("H2O):	5 to 25
Wellhead Flow (scfm):	17 to 29.5

SVE/SSDS-2

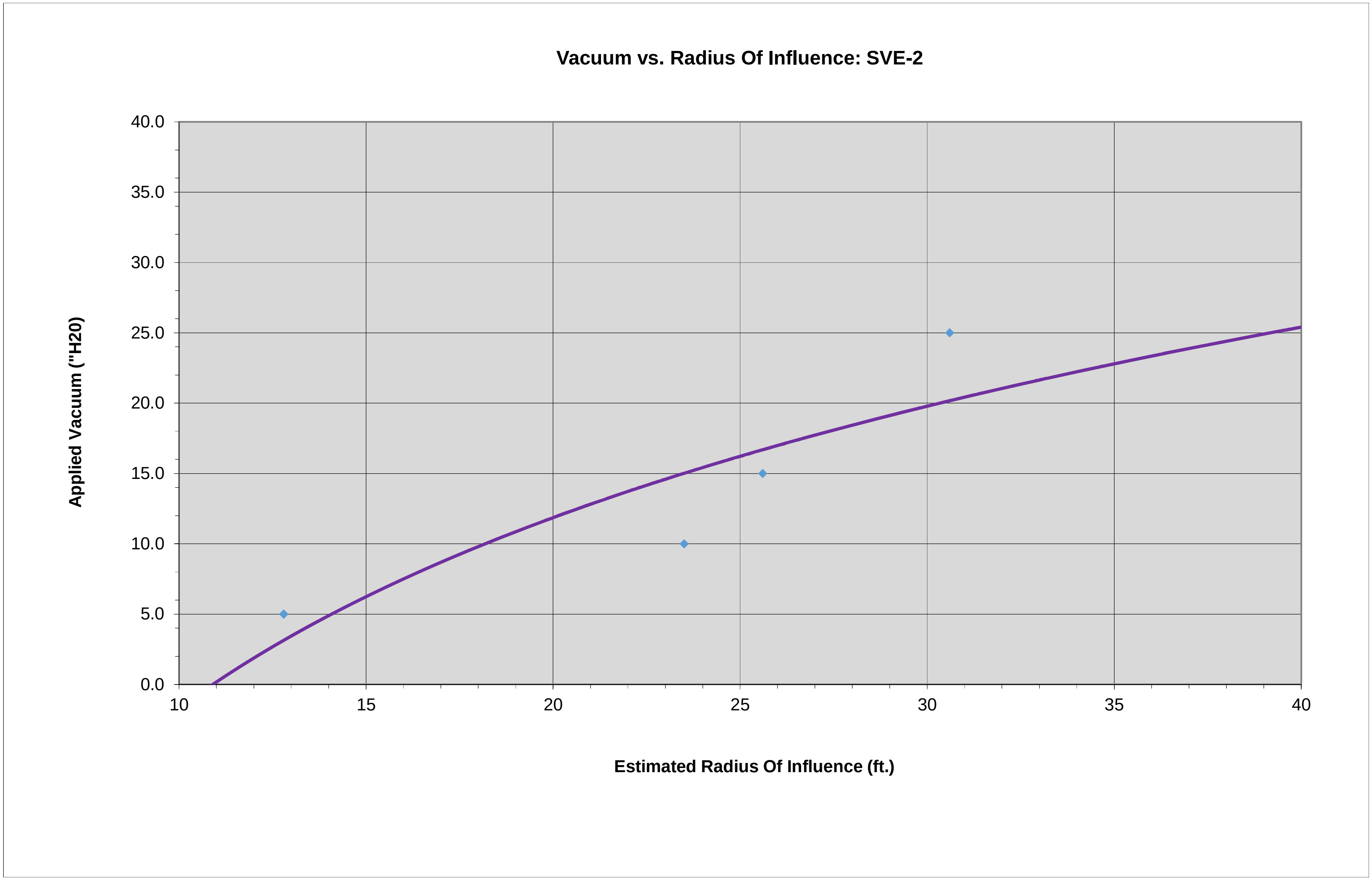
Radial Distance (ft.)	Vacuum Response @ 5" H2O Applied Vacuum, 17 scfm	Vacuum Response @ 10" H2O Applied Vacuum, 20 scfm	Vacuum Response @ 15" H2O Applied Vacuum, 19.5 scfm	Vacuum Response @ 25" H2O Applied Vacuum, 29.5 scfm	Reference Line for 0.1" H2O	TEST POINT ID
5	0.200	0.470	0.600	1.040	0.1	V1-5'
10	0.140	0.320	0.450	0.800	0.1	V1-10'
15	0.070	0.150	0.200	0.400	0.1	V1-15'
25	0.020	0.080	0.080	0.160	0.1	V1-25'
32	0.000	0.030	0.030	0.060	0.1	V1-32'
39	0.000	0.010	0.020	0.030	0.1	V1-39'

Est. ROI (ft.)	Vacuum ("H2O)	Flow (scfm)
12.8	5.0	17.0
23.5	10.0	20.0
25.6	15.0	19.5
30.6	25.0	29.5

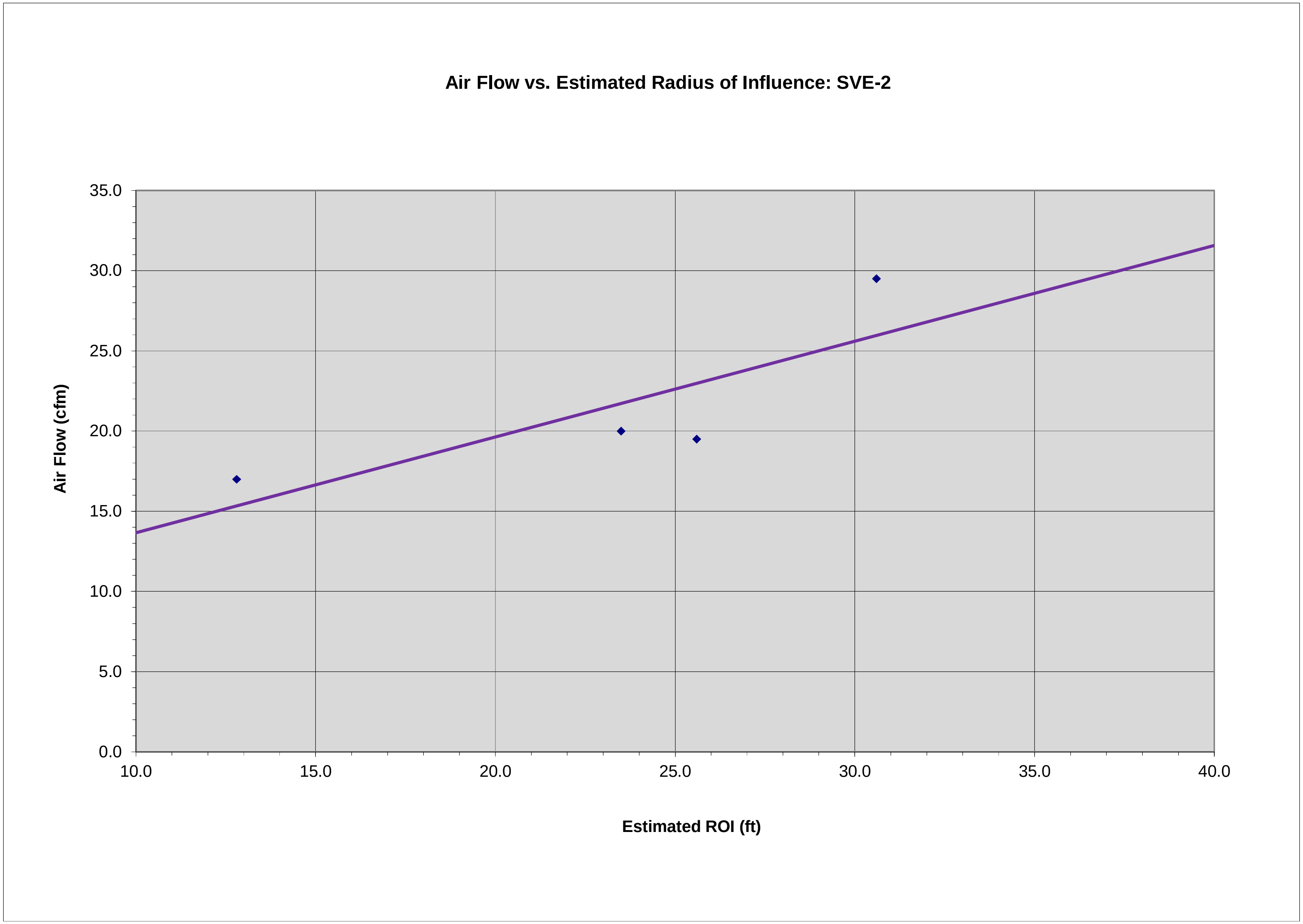
Design Parameters (Per Extraction Well) (ROI = 30 ft)	
Flow (cfm):	26
Vacuum ("H2O):	20



Effective Radius Of Influence SVE-2
y = -0.531ln(x) + 1.9161
y = -0.305ln(x) + 1.092
y = -0.231ln(x) + 0.8295
y = -0.105ln(x) + 0.3681
Vacuum Response (in. H2O)
Radial Distance (ft.)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0
5
10
15
20
25
30
35
40
Log. (Vacuum Response @ 5" H2O Applied Vacuum, 17 scfm)
Log. (Vacuum Response @ 10" H2O Applied Vacuum, 20 scfm)
Log. (Vacuum Response @ 15" H2O Applied Vacuum, 19.5 scfm)
Linear (Reference Line for 0.1" H2O)



Vacuum vs. Radius Of Influence: SVE-2
Applied Vacuum ("H20)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
10
15
20
25
30
35
40
Estimated Radius Of Influence (ft.)


Air Flow vs. Estimated Radius of Influence: SVE-2
Air Flow (cfm)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Estimated ROI (ft)

Summary of SVE/SSDS Pilot Test
1199-1221 Sutter Avenue
BROOKLYN, NY

SSD Analysis: SSD-2

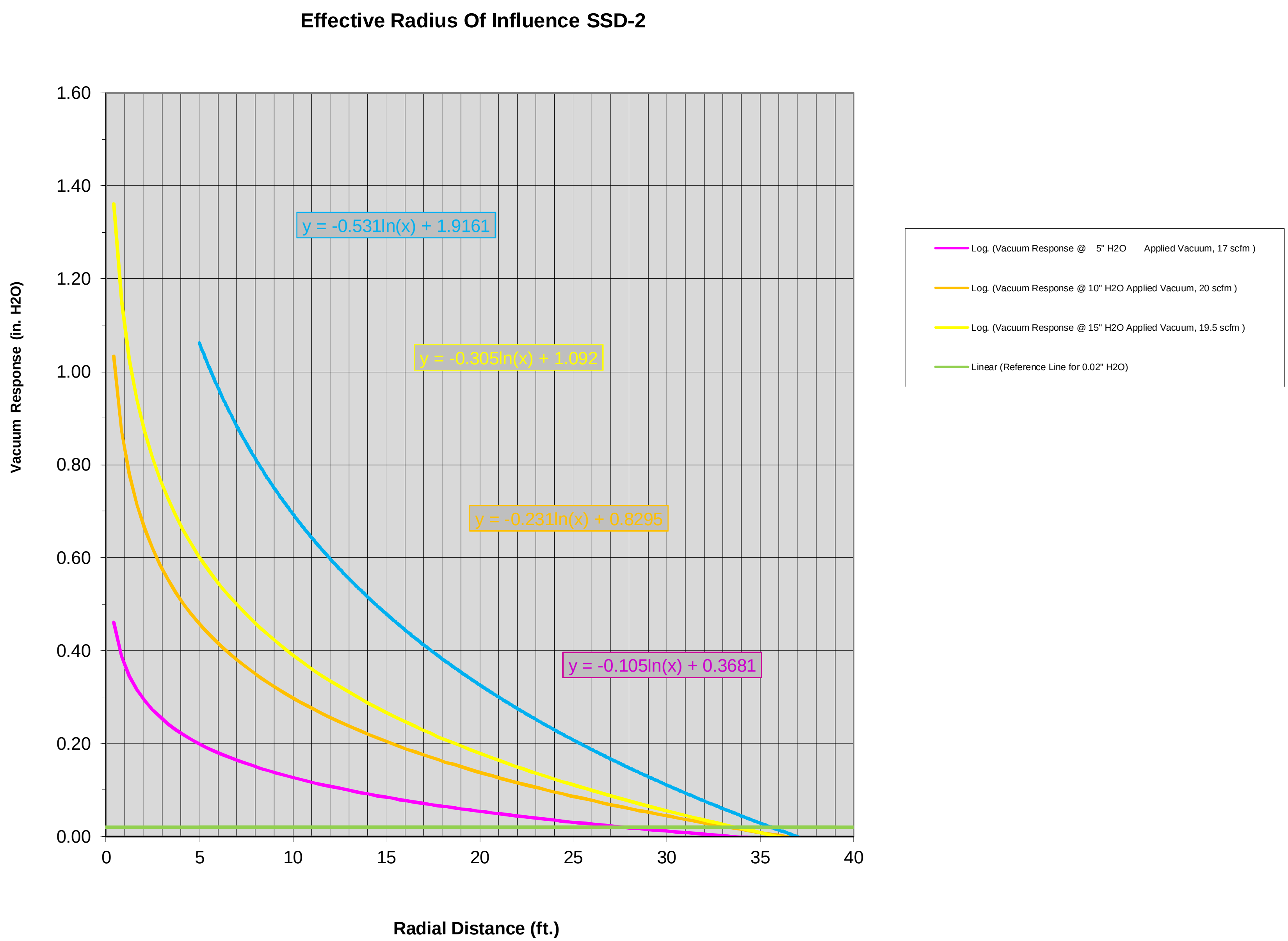
Test Date:	6/1/2016
Performed By:	EnviroTrac - DW
Extraction Point:	**SVE/SSDS-2**
Test Duration (min.):	2 hr
Wellhead Vacuum ("H2O):	5 to 25
Wellhead Flow (scfm):	17 to 29.5

SVE/SSDS-2

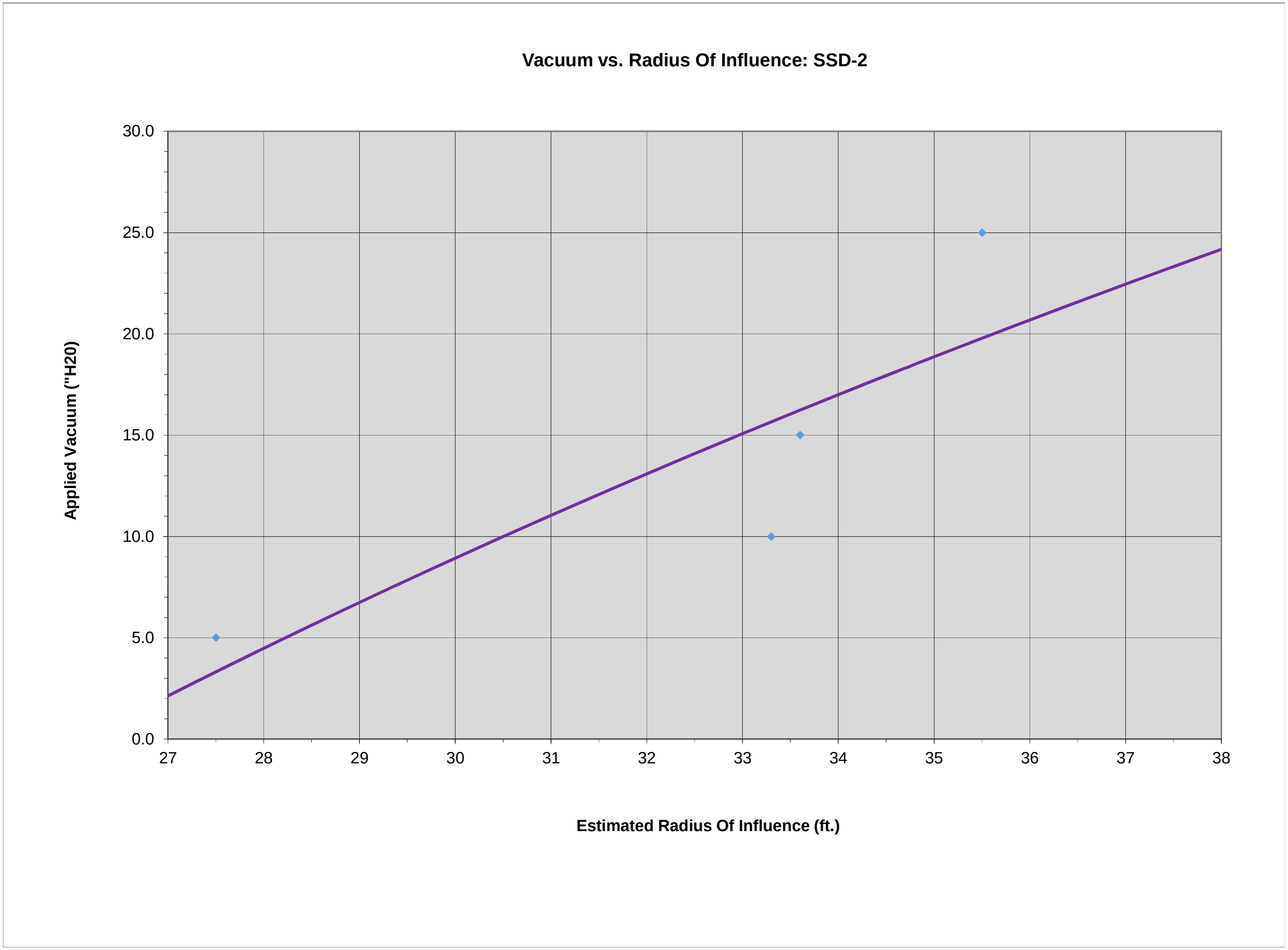
Radial Distance (ft.)	Vacuum Response @ 5" H2O Applied Vacuum, 17 scfm	Vacuum Response @ 10" H2O Applied Vacuum, 20 scfm	Vacuum Response @ 15" H2O Applied Vacuum, 19.5 scfm	Vacuum Response @ 25" H2O Applied Vacuum, 29.5 scfm	Reference Line for 0.02" H2O	TEST POINT ID
5	0.200	0.470	0.600	1.040	0.02	V1-5'
10	0.140	0.320	0.450	0.800	0.02	V1-10'
15	0.070	0.150	0.200	0.400	0.02	V1-15'
25	0.020	0.080	0.080	0.160	0.02	V1-25'
32	0.000	0.030	0.030	0.060	0.02	V1-32'
39	0.000	0.010	0.020	0.030	0.02	V1-39'

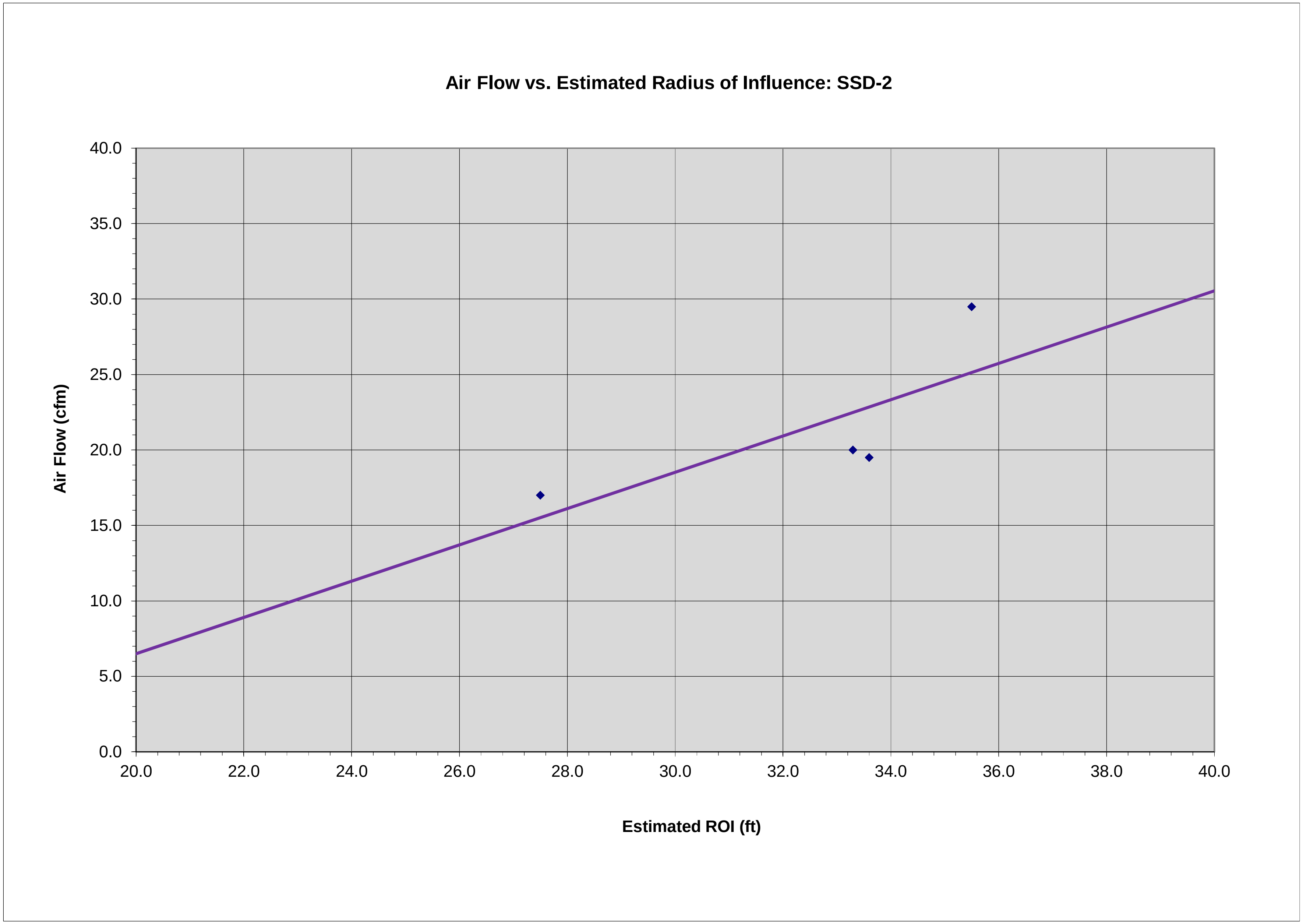
Est. ROI (ft.)	Vacuum ("H2O)	Flow (scfm)
27.5	5.0	17.0
33.3	10.0	20.0
33.6	15.0	19.5
35.5	25.0	29.5

Design Parameters (Per Extraction Well) (ROI = 30 ft)	
Flow (cfm):	18
Vacuum ("H2O):	7.5



Effective Radius Of Influence SSD-2
Vacuum Response (in. H2O)
Radial Distance (ft.)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0
5
10
15
20
25
30
35
40
y = -0.531ln(x) + 1.9161
y = -0.305ln(x) + 1.092
y = -0.231ln(x) + 0.8295
y = -0.105ln(x) + 0.3681
Log. (Vacuum Response @ 5" H2O Applied Vacuum, 17 scfm)
Log. (Vacuum Response @ 10" H2O Applied Vacuum, 20 scfm)
Log. (Vacuum Response @ 15" H2O Applied Vacuum, 19.5 scfm)
Linear (Reference Line for 0.02" H2O)


Vacuum vs. Radius Of Influence: SSD-2
Applied Vacuum ("H20)
Estimated Radius Of Influence (ft.)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
27
28
29
30
31
32
33
34
35
36
37
38


Air Flow vs. Estimated Radius of Influence: SSD-2
Air Flow (cfm)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
36.0
38.0
40.0
Estimated ROI (ft)

ATTACHMENT B

DRAFT

STANDARD OPERATING PROCEDURE – AIR SPARGE PILOT TEST

Required Equipment: AS test compressor, generator, air flow meter, wellhead pressure gauge, digital handheld manometer, Photoionization Detector (PID), water level probe, dissolved oxygen (DO) meter, tapped gripper plugs, and flexible hoses with camlock fittings.

Testing Procedures:

1. Gauge depth to GW and measure DO in all wells to be used during the test. Probe the bottom of each well checking that the total depth of the well matches the well logs. If the test air sparge well seems silted, bail the well to remove the silt. Collect baseline head space VOC readings and pressure measurements from each monitoring well with the PID and digital handheld manometer. Close each of the monitoring wells with a gripper plug tapped with a ball valve or locking quick disconnect tube fitting ensuring a tight seal to prevent short-circuiting. Measure distance between all monitoring points and air sparge test well.

2. Set up test compressor on test air sparge well. Use female adapter (cemented to top of well) to attach steel pipe containing a pressure gauge and a camlock fitting to the well. Connect sparge compressor to the test well with flexible hose (rated to handle maximum compressor pressure) and camlock fittings.

3. Open bleed valve and turn compressor on. Slowly close bleed valve until completely shut.

4. Note the breakthrough pressure (maximum pressure reached) and the running pressure measured at the wellhead.

5. Allow system to operate for a minimum of one hour while recording the following measurements every 10 minutes: air sparge pressure, air sparge flow rate, head space PID and pressure influence at surrounding monitoring wells. There should be a minimum of three different monitoring wells surrounding the test AS well for the purpose of collecting influence readings. Ideally the surrounding wells should be located 10-feet, 15-feet, and 20-feet from the test sparge well.

6. If after one hour the pressure influence and wellhead PID readings have stabilized continue to step 7, if not continue taking measurements every 10 minutes until influence readings are consistent for three consecutive rounds.

7. Gauge depth to GW and measure DO in all surrounding monitoring wells.

8. Set up SVE blower on nearby previously tested SVE well. Operate blower at the same conditions air sample was collected for laboratory analysis during SVE test. Measure extracted air stream with PID and collect air sample for laboratory analysis.

9. Decrease the sparging flow rate 25% and repeat steps 5 through 8.

10. Repeat step 9.

11. Repeat entire process on other predetermined air sparge test wells.

ATTACHMENT C

DRAFT

AIRTECH® VACUUM

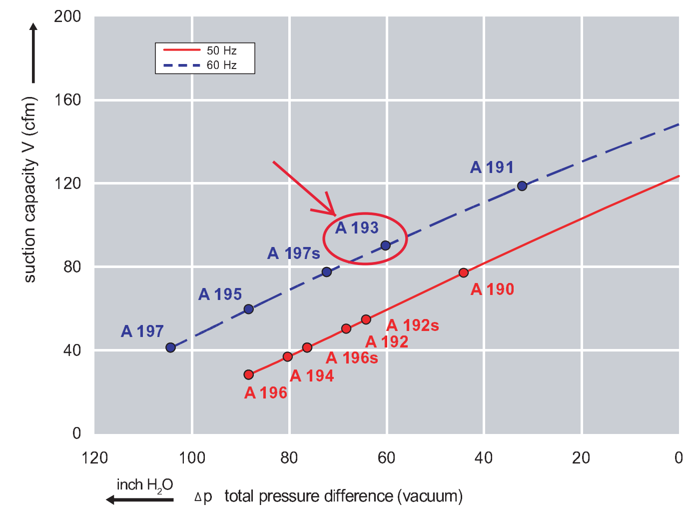
3BA1500

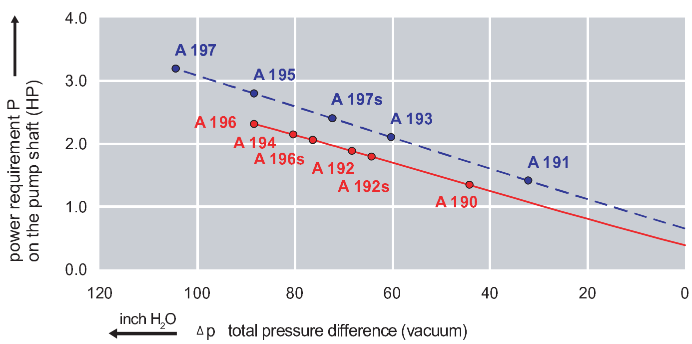
Vacuum/Pressure Regenerative Blower

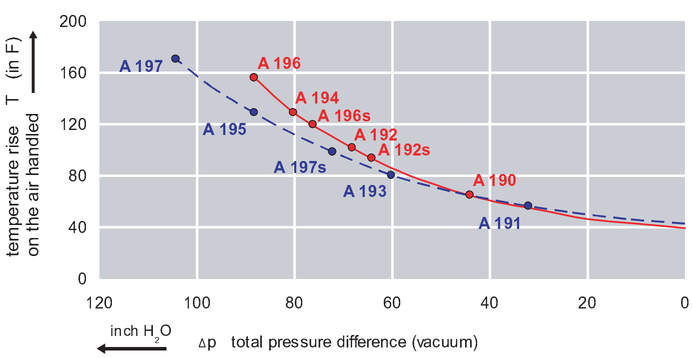
Features:

- Cooler running, outboard bearing provides maintenance-free operation
- Environmentally friendly oil-free technology
- Extremely quiet operation
- All motors are standard TEFC with Class F insulation, UL recognized, CE Compliant
  Explosion-Proof motors available
- Custom construction blowers are available
- Rugged die cast aluminum construction

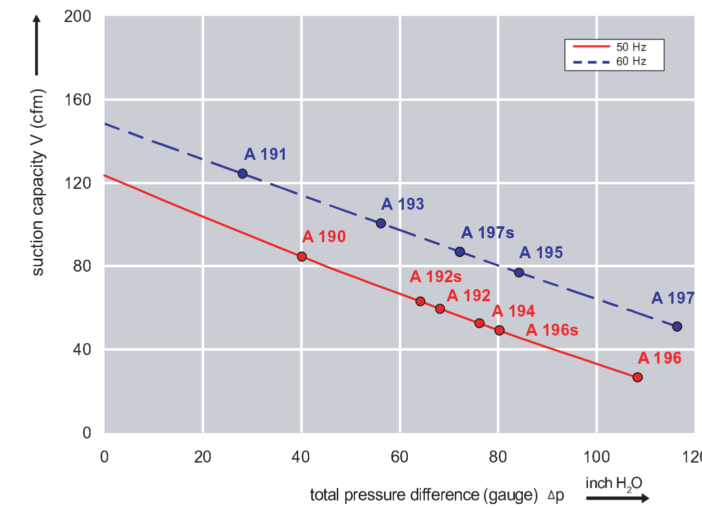
Performance curve for Vacuum pump

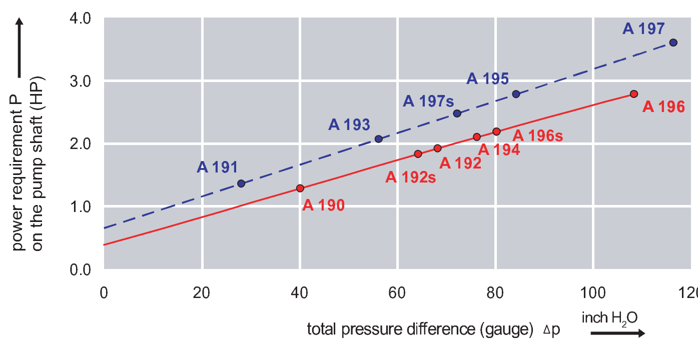


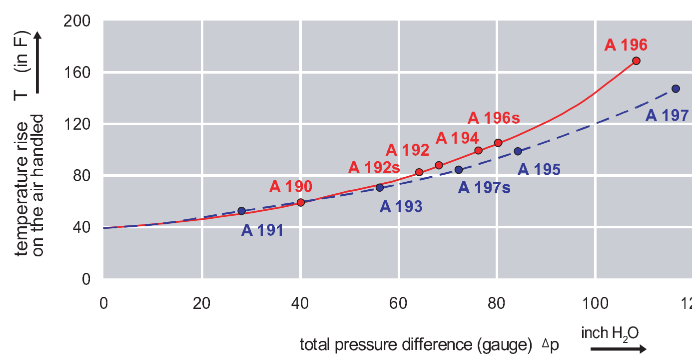




Performance curve for Compressor







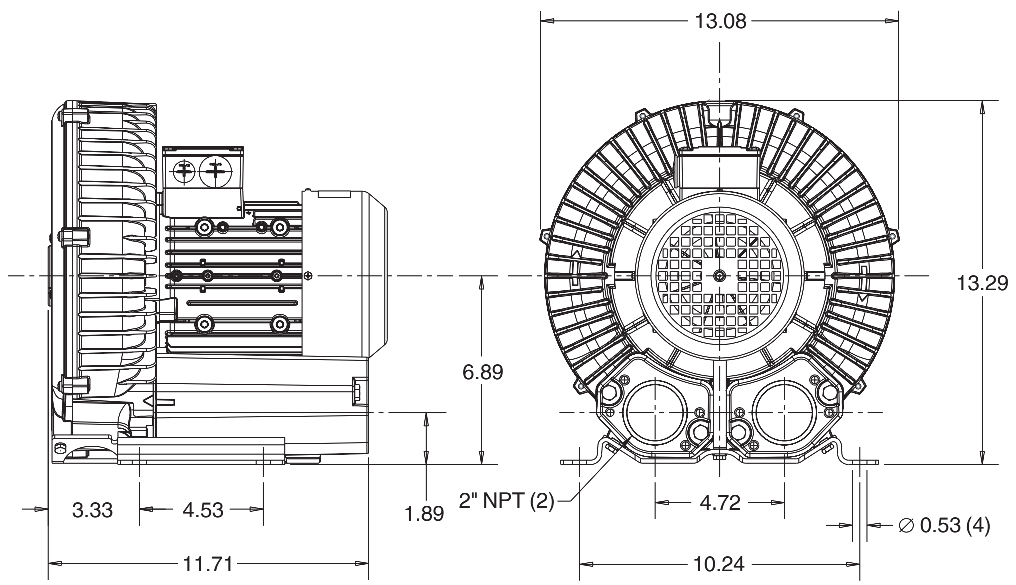
AIRTECH® VACUUM RUTHERFORD, NJ 07070 WWW.AIRTECHUSA.COM TEL: (888) 222-9940 FAX: (201) 569-1696

AIRTECH VACUUM

3BA1500

Vacuum/Pressure Regenerative Blower

Dimensions: (inches)



Recommended Accessories:

Relief valve:

VC61Z (Vacuum)

PC61Z (Pressure)

Filter:

ATF-200-15124/1 (Vacuum)

AFS-30-200-10 (Pressure)

Specifications subject to change without notice. Please contact factory for specification updates.

Selection & Ordering Data - Type 3BA1500

Curve No.	Order No.	Frequency Hz	Rated power HP	Input voltage V		Input current A		Permissible total differential pressure Vacuum inch H2O	Compressor inch H2O	Sound pressure level dB(A)	Weight lbs
3~ 50/60 Hz IP55 insulation material class F											
A 190	3BA1500-7AT06	50	1.14	200D ... 240D	345Y ... 415Y	4.2D	2.4Y	-44	40	64	40
A 191	3BA1500-7AT06	60	1.27	220D ... 250D	415Y ... 460Y	4.35D	2.5Y	-32	28	70	40
A 192	3BA1500-7AT16	50	1.74	200D ... 240D	345Y ... 415Y	5.7D	3.3Y	-68	68	64	44
A 193	3BA1500-7AT16	60	2.0	220D ... 250D	415Y ... 460Y	5.5D	3.2Y	-60	56	70	44
A 194	3BA1500-7AT26	50	2.14	200D ... 240D	345Y ... 415Y	7.5D	4.3Y	-80	76	64	46
A 195	3BA1500-7AT26	60	2.75	220D ... 250D	415Y ... 460Y	7.5D	4.4Y	-88	84	70	46
A 196	3BA1500-7AT36	50	2.95	200D ... 240D	345Y ... 415Y	9.7D	5.6Y	-88	108	64	55
A 197	3BA1500-7AT36	60	3.42	220D ... 250D	415Y ... 460Y	9.0D	5.3Y	-104	116	70	55
1~ 50/60 Hz IP55 with attached capacitor for continuous operation											
A 196s	3BA1500-7AS35	50	2.0	115	230	22.0	11.0	-76	80	64	48
A 197s	3BA1500-7AS35	60	2.35	115	230	24.0	12.0	-72	72	70	48

Suitable for 208 Volt Operation

All curves are rated at 14.7 psia and 68° F ambient conditions and are reported in SCFM referenced to 68° F and 14.696 psia sea level conditions. Curve values are nominal, actual performance may vary by up to 10% of the values indicated. For inlet temperatures above approximately 80 ℉ or for handling gases other than air, please contact your Airtech sales representative for assistance.

ATTACHMENT D

DRAFT

Moisture Separator #AWS80-3

ESD Waste2Water, Inc.

Partnership for a Cleaner Tomorrow

Air / Water Separators

ESD Waste2Water, Inc. ESD custom fabricates Air / Water Separators for Soil Vapor Extraction and Dual Phase Extraction applications. Made of structurally sound, light-weight marine grade 5052 aluminum, our separators can withstand full vacuum applications and are completely corrosion resistant. Unlike carbon steel based separators, ESD Separators resist both internal chemical corrosion and the harshest external environmental conditions. The aesthetic qualities of ESD Separators are never compromised by oxidation. ESD Separators never experience corrosive pitting leaks, because our designs render expensive internal/external epoxy mastic coatings entirely unnecessary.

ESD Separators are available in many standard sizes and can be custom designed with a wide variety of options, including pump out systems, level gauging, additional particulate filtration, and baffling for high entrained

Certified to UL-508A Standards

Thank you for allowing ESD to provide a solution to your equipment needs.

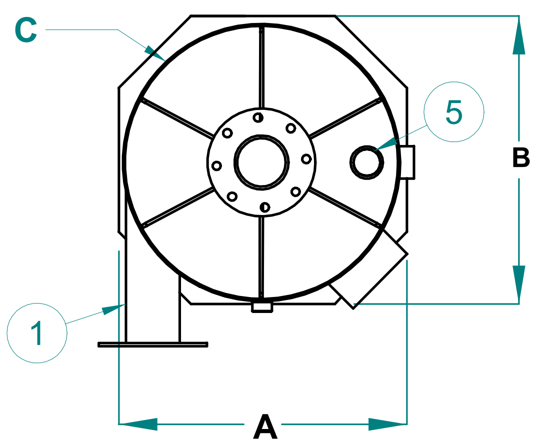
ESD Waste2Water, Inc.
495 Oak Road
Ocala, FL 34472
Tel: 800.277.3279 Fax: 352.680.9278
www.waste2water.com

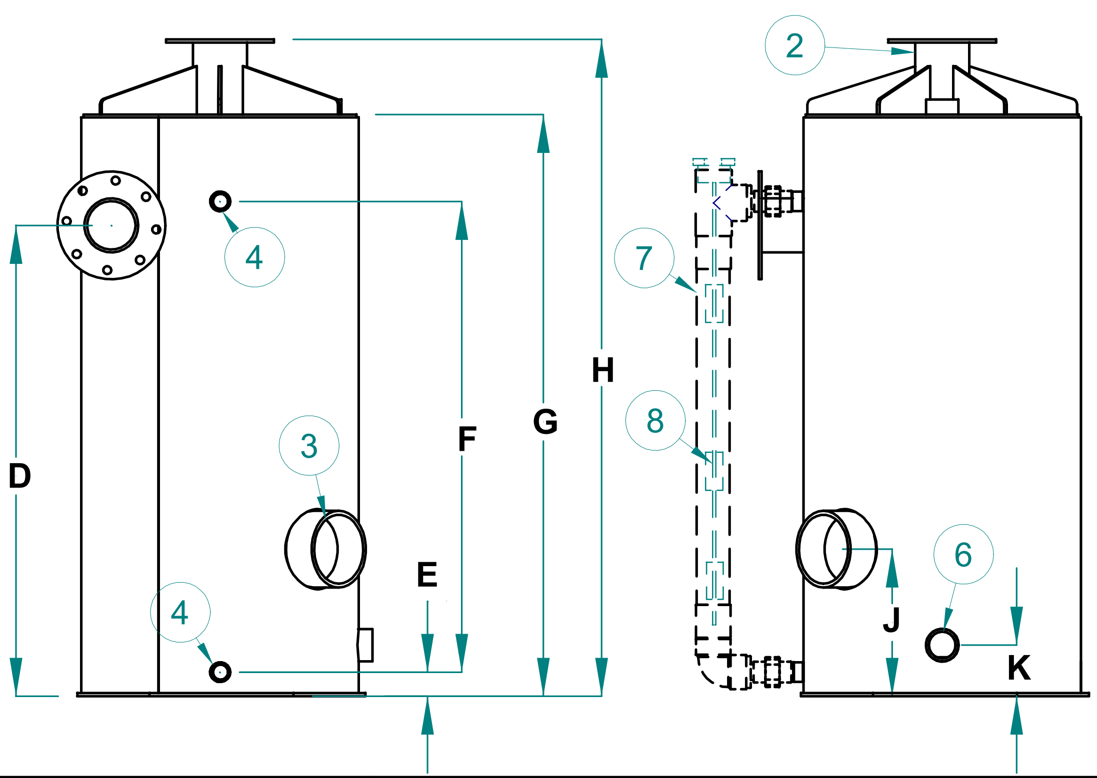
STANDARD AWS SPECIFCATION																											
TYPE	WORKING VOLUME @(LSH)	AVAILABLE CONNECTION TYPE																CLEAN OUT PIPE	A	B	C (DIA.)	D	E	F	G	H	J
		FLANGE						MNPT					FNPT														
		2"	3"	4"	6"	8"	10"	2"	3"	4"	6"	8"	2"	3"	4"	6"	8"										
AWS30	12 GAL	X	X	X	-	-	-	X	X	X	-	-	X	X	X	-	-	6"	-	-	16 1/4"	25"	2"	19"	30"	33 1/2"	6"
AWS60	24 GAL	X	X	X	X	-	-	X	X	X	X	-	X	X	X	-	-	6"	24"	24"	23"	25"	2"	23"	30"	36 1/2"	6"
AWS80	47 GAL	X	X	X	X	-	-	X	X	X	X	-	X	X	X	-	-	8"	24"	24"	23"	39"	2"	39"	48"	54 3/4"	12"
AWS120	50 GAL	X	X	X	X	X	-	X	X	X	X	-	X	X	X	-	-	8"	24"	24"	23"	49"	2"	49"	60"	66 3/4"	12"
AWS220	107 GAL	-	X	X	X	X	X	X	X	X	X	-	X	X	X	-	-	8"	34"	34"	33 1/2"	49"	2"	49"	60"	66 3/4"	12"

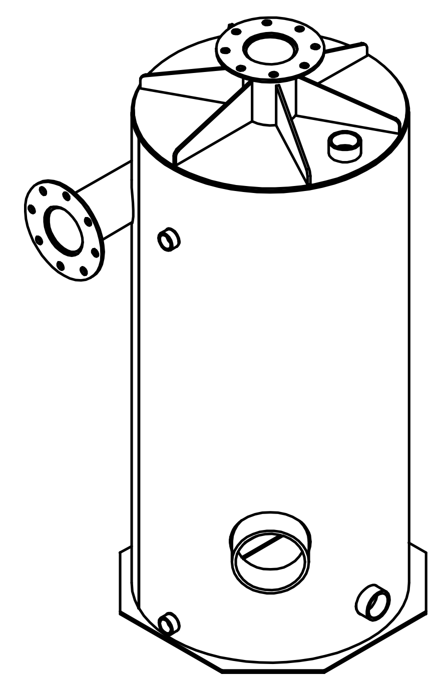
ITEM #	DESCRIPTION
1	INLET PIPE (SEE TABLE FOR AVAILABLE SIZE AND CONNECTION TYPE)
2	OUTLET PIPE (SEE TABLE FOR AVAILABLE SIZE AND CONNECTION TYPE)
3	CLEAN OUT
4	1" FNPT (MULTI LEVEL PROBE)
5	2" FNPT
6	2" FNPT
7	SIGHT TUBE 2" CLEAR PVC
8	MULTI LEVEL PROBE

RECOMMENED AIR FLOW (ACFM)						
	2"	3"	4"	6"	8"	10" *
ACFM	120	280	320	500	750	1000

NOTES:
1. MATERIAL : 1/8" & 3/16" ALUMINUM SHT 5052
2. PROBE (SIGHT TUBE) : 2" CLEAR PVC
3. CUSTOM SIZES AVAILABLE







ALL IDEAS,DESIGNS AND PLANS INDICATED OR REPRESENTED BY THIS DRAWING ARE OWNED BY AND THE PROPERTY OF ESD INC. AND WERE CREATED, EVOLVED AND DEVELOPED FOR USE ON AND IN CONJUCTION WITH THE SPECIFIED PROJECT. NONE OF THE IDEAS,DESIGNS OR PLANS SHALL BE USED OR DISCLOSED TO ANY PERSONS ,FIRM OR CORPORATION FOR ANY PURPOSE WHATSOEVER WITHOUT WRITTEN PERMISSION OF ESD WASTE2WATER, INC.

ESD Waste2Water, Inc.
495 Oak Road
Ocala, FL 34472
Phone (800) 277-3279
Fax (352) 680-0059

SCALE VERIFCATION
THIS BAR REPRESENTS ONE INCH ON ORIGINAL DRAWING
1"
USE TO VERIFY DRAWING

SIZE: B
SHEET #: 1 OF 1
SCALE: NTS
UPDATED BY:

DRAWN BY: J.ANDREWS
APPROVED BY: N/A
COMPLETED: 06/15/10
UPDATED:

AWS SPECIFICATIONS
GENERAL LAYOUT

JOB NUMBER:
PRODUCT NUMBER: **AWS**
FILE NAME: "AWS SPEC.dft"

ATTACHMENT E

DRAFT

COMPACT "L" STYLE INLET VACUUM AIR FILTERS
"CSL" Series 3/8" - 3" FPT

APPLICATIONS

Blowers-Side Channel
Factory Automation
Leak Detection
Medical
Printing Industry
Soil Venting/Remediation
Vacuum Lifters
Vacuum Packaging
Vacuum Pumps & Systems
Woodworking

FEATURES & SPECIFICATIONS

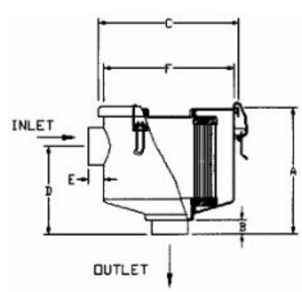
;99%+ removal efficiency std: Paper=2 micron, Polyester=5 micron
Brazed fittings for high vacuum duty
Filter change out differential: 10"-15" in. H_2O above initial delta P
Low pressure drop
Positive sealing O-ring seal system
Pressure drop graphs available upon request
Rugged all steel construction with baked enamel finish
Seamless drawn housings
Stainless steel torsion clips for durability
Temp (continuous): min -15° F (-26° C) max 220° F (104° C)
Vacuum level: Typically $1x10^{-3}$ mmHg ($1.3x10^{-3}$ mbar)

OPTIONS

Activated carbon prefilter to reduce odor
Alternate Top-to-canister fastening system for low pressure or pulsating systems
Available in *Stainless Steel*
Epoxy coated housings
Extra tap fittings for vacuum gauge
Larger sizes available
Special connections
Support brackets
Vacuum gauge available
Various elements available

Line Drawing

Click to see larger image.



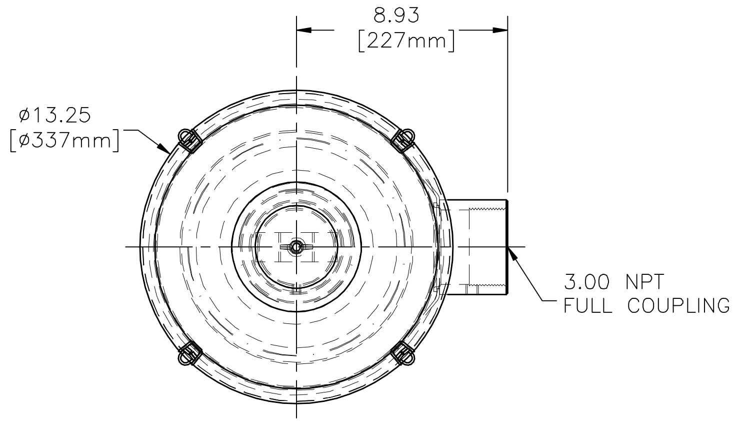
***All measurements are shown in standards.**

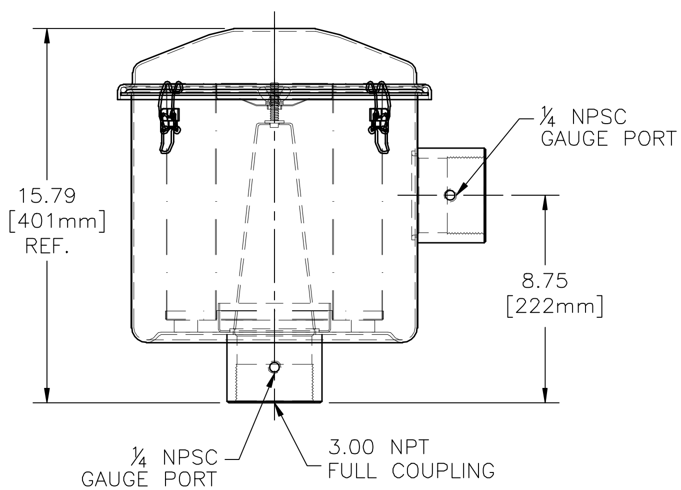
Typical Lead Times:
Normally in stock
1 - 2 weeks
5 - 7 weeks
3 - 4 weeks
8 + weeks

Add To Order	Model Number	Element Type	Inlet in. NPT or FLG	Outlet in. NPT or FLG	Connection Style	Dim A in.	Dim B in.	Dim C in.	Dim D in.	Dim E in.	Dim F in.	Dim G in.	Parent Flow SCFM	Element Parent Flow SCFM	Approx. Weight lbs.	CAD
	CSL-239-300C	Polyester	3	3	FPT	15.75	2.88	13.25	8.75	2.88	12	11	300	750	33	CAD

Solberg Mfg.
1151 W. Ardmore Ave.·Itasca, IL 60143·(630)773-1363· Fax: (630)773-0727

REVISIONS						
ZONE	REV	DESCRIPTION	ECN #	CHG BY	DATE	APP'D





REPLACEMENT ELEMENT# 239	
MATERIAL	POLYESTER
CFM FLOW	750
SURFACE AREA	13 SQ. FT.
I.D.	4.88
O.D.	9.25
HEIGHT	10.00

MODEL#	HOUSING MATERIAL	FINISH
CSL-239-300C	CARBON STEEL	BAKED ENAMEL GREY

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UNLESS OTHERWISE SPECIFIED:
-DIMENSIONS ARE IN INCHES
-REF: APPROXIMATE DIMENSIONS, NO TOLERANCES APPLY
-TOLERANCES ARE:

DECIMALS:	.XX ±.25 .XXX ±.125
ANGLES	±2°

CUSTOMER APPROVAL:

SOLBERG MANUFACTURING INC.
1151 W. ARDMORE AVE.
ITASCA, IL 60143
630/773-1363

DESCRIPTION:
CSL-239-300C

SALES REP.: M.CARROLL	
APPROVALS	DATE
DRAWN: CRW	01/13/06
APPROVED:	

SHEET: 1 of 1 | SHEET SIZE: C | SCALE: NTS

DRAWING NUMBER: SD10098 | REV: —

ATTACHMENT F

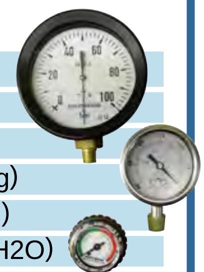
DRAFT

AIRTECH® ACCESSORIES

RELIEF VALVES PRESSURE / VACUUM

CATALOG PART NUMBER	NPT SIZE
VC 51-Z/PC 51-Z	1 1/4"
VC 61-Z/PC 61-Z	1 1/2"
VC 81-Z/PC 81-Z	2"
VC 88-Z/PC 88-Z	2 1/2"
VC 91-Z/PC 91-Z	3"
VC 100-Z/PC 100-Z	4"
VC 110-Z/PC 110-Z	5"

VACUUM GAUGES



CATALOG PART NUMBER	
VCG-40	Capsule Gauge (0-40 Torr)
VCG-100	Capsule Gauge (0-100 Torr)
VCG-760	Capsule Gauge (0-760 Torr)
VCG-2-30HG	Bourdon Tube Gauge 2" (0-30" Hg)
VCG-4-30HG	Bourdon Tube Gauge 4"(0-30" Hg)
VCG-2-200H2O	Bourdon Tube Gauge 2" (0-200" H2O)
VCG-4-200H2O	Bourdon Tube Gauge 4" (0-200" H2O)

PRESSURE GAUGES

CATALOG PART NUMBER	
PG-A1	Ex. Filter Box P. Gauge (1 Bar)
PG-A10	Capsule GaugeP. Gauge (10 Bar)

INLET FILTER ASSEMBLIES

CATALOG PART NUMBER	PORT SIZE	REPLACEMENT CARTRIDGE
AF-20-125-10	1 1/4"	ATC-20
AF-20-150-10	1 1/2"	ATC-20
AF-30-200-10	2"	ATC-30
AF-30-250-10	2 1/2"	ATC-30
AF-230-250-10	2 1/2"	ATC-230
AF-230-300-10	3"	ATC-230
AF-234-400-10	4"	ATC-234
AF-244-500-10	5"	ATC-244

INLET FILTER ASSEMBLIES WITH SILENCERS

CATALOG PART NUMBER	PORT SIZE	REPLACEMENT CARTRIDGE
AFS-20-125-10	1 1/4"	ATC-20
AFS-20-150-10	1 1/2"	ATC-20
AFS-30-200-10	2"	ATC-30
AFS-30-250-10	2 1/2"	ATC-30
AFS-230-250-10	2 1/2"	ATC-230
AFS-230-300-10	3"	ATC-230
AFS-234-400-10	4"	ATC-234
AFS-244-500-10	5"	ATC-244

ATTACHMENT G

DRAFT

SVE/SSD Pilot Test Vapor Sampling Results - BCP Site No. C224141
1199 Sutter Ave Site
Brooklyn, NY

Sample Date June 1, 2015

Air Emission VOCs- Pounds Per Hour

Emission rates in terms of pounds per hour (lbs/hr) for VOCs are calculated using the pollutant emission rate in parts per million (ppm/dry), flow rate in dscfm (Qs), molecular weight of the pollutant (MW), 60 minutes /hour, divided by 385.3x 10E^6 dscf/lb-mole @ 68 F.

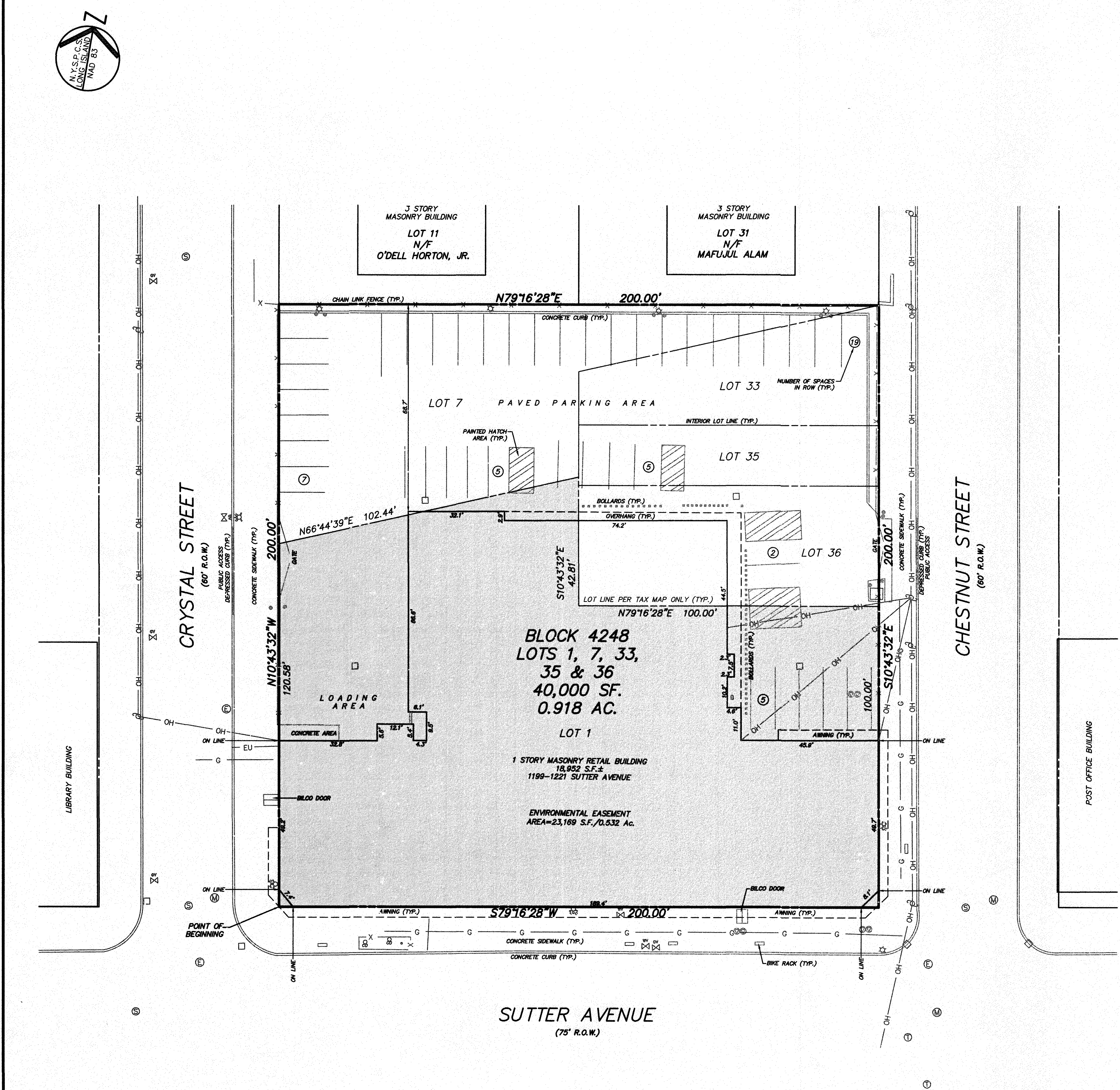
$$\text{Lbs/hr} = \frac{\text{PPM x Qs x MW x 60}}{385.3\text{x } 10E^6}$$

Compound	MW	PPBv	PPM	Q CFM	Lbs/Hr	Lbs/Hr	Tons/Yr
Acetone	58.08	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Benzene	78.11	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Carbon Disulfide	76.14	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Carbon_tetrachloride	153.82	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Chloroform	119.38	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Cumene (isopropylbenzene)	120.2	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Cyclohexane	84.16	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
1,4-Dichlorobenzene	147	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Dichlorodifluoromethane	120.91	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
1,1-Dichloroethane	98.96	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
cis-1,2-Dichloroethylene	96.94	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
trans-1,2-Dichloroethylene	96.94	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Ethanol	46.07	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Ethylbenzene	106.17	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
4-Ethyltoluene	120.19	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Heptane	100.2	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Hexane	86.18	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Isopropyl alcohol	60.1	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Methyl ethyl ketone	72.11	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Methyl isobutyl ketone (MIBK)	100.16	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Methylene_chloride	84.93	5800	5.8	200	1.534E-02	0.01534	6.72E-02
Styrene	104.15	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Tetrachloroethylene	165.83	270	0.27	200	1.394E-03	0.00139	6.11E-03
Tetrahydrofuran	72.11	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Toluene	92.14	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
1,2,4- trichlorobenzene	181.45	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
1,1,1-Trichloroethane	133.4	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Trichloroethylene	131.39	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Trichlorofluoromethane	137.37	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
1,3,5-Trimethylbenzene	120.19	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
Vinyl_chloride	62.5	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
m/p-Xylene	106.17	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
o-Xylene	106.17	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
n-Butylbenzene	134.22	0.0	0.0	200	0.000E+00	0.00000	0.00E+00
					Total Lbs/Hr:	**0.01674**	

APPENDIX C

Metes and Bounds

EnviroTrac
Environmental Services



REV./ ISSUE	DATE	DESCRIPTION
1	10/8/2018	REVISED ENVIRONMENTAL EASEMENT PER D.E.C.

ENVIRONMENTAL EASEMENT AREA DESCRIPTION D.E.C. SITE NUMBER C224141

BLOCK 4248, PORTIONS OF LOT 1
BOROUGH OF BROOKLYN
KINGS COUNTY, NEW YORK

BEGINNING AT A POINT, SAID POINT BEING THE INTERSECTION OF THE NORTHERLY RIGHT–OF–WAY LINE OF SUTTER AVENUE (75 FOOT WIDE RIGHT–OF–WAY) WITH THE EASTERLY RIGHT–OF–WAY OF CRYSTAL STREET (60 FOOT WIDE RIGHT–OF–WAY), AND RUNNING, THENCE;

1. ALONG SAID EASTERLY RIGHT–OF–WAY LINE, NORTH 10°43'32" WEST A DISTANCE OF 120.58 FEET TO A POINT, THENCE;
2. LEAVING SAID RIGHT–OF–WAY LINE, ALONG THE NORTHERLY LINE OF LOT 1 NORTH 66°44'39" EAST, A DISTANCE OF 102.44 FEET TO A POINT, THENCE;
3. ALONG THE WESTERLY LINE OF LOT 36, SOUTH 10°43'32" EAST, A DISTANCE OF 42.81 FEET TO A POINT, THENCE;
4. ALONG THE NORTHERLY LINE OF LOT 1, NORTH 79°16'28" EAST, A DISTANCE OF 100.00 FEET TO A POINT ON THE WESTERLY RIGHT–OF–WAY LINE OF CHESTNUT STREET (60 FOOT WIDE RIGHT–OF–WAY), THENCE;
5. ALONG SAID WESTERLY RIGHT–OF–WAY LINE OF CHESTNUT STREET, SOUTH 10°43'32" EAST, A DISTANCE OF 100.00 FEET TO A POINT OF INTERSECTION OF THE WESTERLY RIGHT–OF–WAY LINE OF CHESTNUT STREET WITH THE NORTHERLY RIGHT–OF–WAY LINE OF SUTTER AVENUE (75 FOOT WIDE RIGHT–OF–WAY), THENCE;
6. ALONG THE NORTHERLY RIGHT–OF–WAY LINE OF SUTTER AVENUE, SOUTH 79°16'28" WEST, A DISTANCE OF 200.00 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 23,169 SQUARE FEET OR 0.532 ACRES.

LEGAL DESCRIPTION OF THE ENTIRE PARCEL

BLOCK 4248, LOTS 1, 7, 33, 35 & 36
BOROUGH OF BROOKLYN
KINGS COUNTY, NEW YORK

BEGINNING AT A POINT, SAID POINT BEING THE INTERSECTION OF THE NORTHERLY RIGHT–OF–WAY OF SUTTER AVENUE (75 FOOT WIDE RIGHT–OF–WAY) WITH THE EASTERLY RIGHT–OF–WAY OF CRYSTAL STREET (60 FOOT WIDE RIGHT–OF–WAY), AND RUNNING, THENCE;

1. ALONG SAID EASTERLY RIGHT OF WAY, NORTH 10°43'32 WEST A DISTANCE OF 200.00 FEET TO A POINT, THENCE;
2. ALONG LOTS 11 & 31, BLOCK 4248, NORTH 79°16'28" EAST A DISTANCE OF 200.00 FEET TO A POINT IN THE WESTERLY RIGHT–OF–WAY OF CHESTNUT STREET, THENCE;
3. ALONG SAID WESTERLY RIGHT–OF–WAY, SOUTH 10°43'32" EAST A DISTANCE OF 200.00 FEET TO THE INTERSECTION OF SAID WESTERLY RIGHT–OF–WAY WITH THE NORTHERLY RIGHT–OF–WAY OF SUTTER AVENUE, THENCE;
4. ALONG SAID NORTHERLY RIGHT–OF–WAY, SOUTH 79°16'28" WEST A DISTANCE OF 200.00 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 40,000 SQUARE FEET OR 0.918 ACRES.

SCHEDULE A LEGAL DESCRIPTION

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND, WITH THE BUILDINGS AND IMPROVEMENTS THEREON ERECTED, SITUATE, LYING AND BEING IN THE BOROUGH OF BROOKLYN, COUNTY OF KINGS, CITY AND STATE OF NEW YORK, BEING KNOWN AS LOTS1, 7, 33, 35 AND 36 ON THE CURRENT TAX MAP OF THE CITY OF NEW YORK, AND WHEN TAKEN TOGETHER ARE BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT THE CORNER FORMED BY THE INTERSECTION OF THE NORTHERLY SIDE OF SUTTER AVENUE WITH THE EASTERLY SIDE OF CRYSTAL STREET;

RUNNING THENCE NORTHERLY ALONG THE EASTERLY SIDE OF CRYSTAL STREET, 200 FEET TO A POINT ON THE WESTERLY SIDE OF CHESTNUT STREET;

THENCE SOUTHERLY AT RIGHT ANGLES TO THE EASTERLY SIDE OF CRYSTAL STREET, 200 FEET TO A POINT ON THE WESTERLY SIDE OF CHESTNUT STREET;

THENCE SOUTHERLY ALONG THE WESTERLY SIDE OF CHESTNUT STREET, 200 FEET TO THE CORNER FORMED BY THE INTERSECTION OF THE WESTERLY SIDE OF CHESTNUT STREET WITH THE NORTHERLY SIDE OF SUTTER AVENUE;

THENCE WESTERLY ALONG THE NORTHERLY SIDE OF SUTTER AVENUE, 200 FEET TO THE POINT OR PLACE OF BEGINNING.

SURVEY REFERENCES

1. CITY OF NEW YORK TAX MAP.
2. MAP PREPARED BY THEO E. SCHATT DATED AUGUST 31, 1974.
3. DEED RECORDED IN THE KINGS COUNTY CLERK'S OFFICE ON JULY 1, 2009 IN CRFN 2009000199791.
4. DOCUMENTS CONTAINED WITHIN TITLE INSURANCE POLICY ISSUED BY STEWART TITLE INSURANCE COMPANY, TITLE NUMBER: APS156646K, DATED MARCH 28, 2015..

GENERAL NOTES

1. BOUNDARY & PLANIMETRIC INFORMATION SHOWN HEREON WAS PREPARED BY PAULUS, SOKOLOWSKI & SARTOR, LLC DURING JUNE, 2015.
2. HORIZONTAL POSITIONS ARE BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM (LONG ISLAND ZONE) NAD 83.
3. PROPERTY IS LOCATED IN ZONE "X" AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP COMMUNITY/PANEL NUMBER 3604970236F DATED SEPTEMBER 5, 2007.
4. THIS SURVEY IS VALID ONLY WHEN SURVEYOR'S EMBOSSED SEAL IS AFFIXED.
5. THERE ARE 43 STRIPED PARKING SPACES OBSERVED ON THE PROPERTY
6. INTERNAL LOT LINES SHOWN HEREON ARE SHOWN PER TAX MAP. FOR INFORMATION PURPOSES ONLY (NO TITLE INFORMATION PROVIDED).

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

GRAPHIC SCALE
20 0 10 20 40 80
0 6.10 3.05 6.10 12.20 24.40
(IN FEET)
1 inch = 20 ft.
(IN METERS)
1 inch = 6.10 meters

LEGEND

- G — GAS LINE
- OH — OVERHEAD WIRES
- EU — UNDERGROUND ELECTRIC
- X — FENCE LINE
- STORM INLET
- UTILITY POLE
- HYDRANT
- HYDRANT
- LIGHT
- CLEANOUT
- BOLLARD
- WATER VALVE
- GAS VALVE
- Ⓢ SANITARY MANHOLE
- Ⓔ ELECTRIC MANHOLE
- Ⓣ TELEPHONE MANHOLE
- Ⓜ MONITORING WELL
- Ⓜ MANHOLE

PAULUS, SOKOLOWSKI AND SARTOR, LLC
67B MOUNTAIN BLVD EXT.
P.O. BOX 4039
WARREN, NEW JERSEY 07059
PHONE: (732) 560-9700
CERTIFICATE OF AUTHORIZATION NO. 24GA28032700

ALL DIMENSIONS MUST BE VERIFIED BY THE CONTRACTOR. NOTIFY PAULUS, SOKOLOWSKI AND SARTOR, LLC. OF ANY CONFLICTS, ERRORS, AMBIGUITIES OR DISCREPANCIES IN THE CONTRACT DRAWINGS OR SPECIFICATIONS BEFORE PROCEEDING WITH CONSTRUCTION.

ALL DIMENSIONS SHALL BE AS NOTED IN WORDS OR NUMBERS ON THE CONTRACT DRAWINGS. DO NOT SCALE THE DRAWINGS TO DETERMINE DIMENSIONS.

THESE CONTRACT DRAWINGS CONTAIN DATA INTENDED SPECIFICALLY FOR THE NOTED PROJECT AND CLIENT. THEY ARE NOT INTENDED FOR USE ON EXTENSIONS OF THIS PROJECT OR FOR REUSE ON ANY OTHER PROJECT.

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JAROSLAVA VONDER
N.Y. LIC. NO. 050533
10-8-2018
SIGNATURE DATE
PROFESSIONAL LAND SURVEYOR

PROJECT

1199-1221 SUTTER AVENUE
BLOCK 4248
LOTS 1, 7, 33, 35 & 36

BOROUGH OF BROOKLYN
KINGS COUNTY, NEW YORK

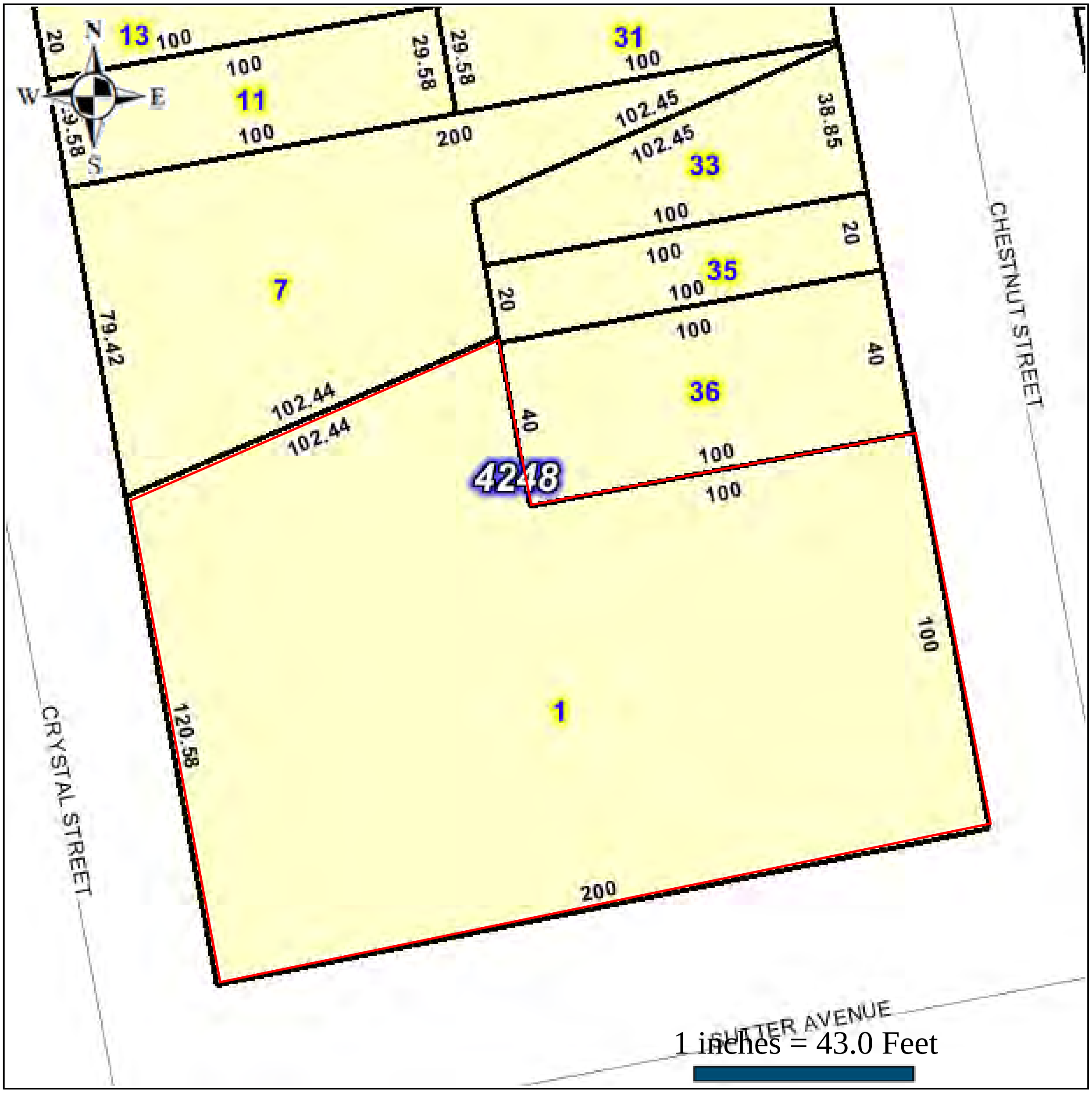
SHEET TITLE

SITE ENVIRONMENTAL EASEMENT

D.E.C. SITE NUMBER C224141

JOB NO.: 05465–0001
DATE: 06/15/2015
DRAWN: B.J.F.
CHECK: J.V.
SCALE: 1"=20'

BINDING ORDER:
SHEET 1 OF 1
SHEET NO.
S-1



1199-1221 Sutter Avenue

site boundary

8/9/2012

APPENDIX D

Sanborn Fire Insurance Maps

1199 Sutter Avenue
1199 Sutter Avenue
Brooklyn, NY 11208

Inquiry Number: 3338020.3
June 06, 2012

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

6/06/12

Site Name:	**Client Name:**
1199 Sutter Avenue	Associated Env. Services
1199 Sutter Avenue	25 Central Ave
Brooklyn, NY 11208	Hauppauge, NY 11788
EDR Inquiry # 3338020.3	Contact: Gregory Ernst

EDR® Environmental Data Resources Inc

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by Associated Env. Services were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

Certified Sanborn Results:

Site Name: 1199 Sutter Avenue
Address: 1199 Sutter Avenue
City, State, Zip: Brooklyn, NY 11208
Cross Street:
P.O. # NA
Project: NA
Certification # D224-4CB5-9444

Sanborn® Library search results
Certification # D224-4CB5-9444

Maps Provided:

2007	2001	1988	1968
2006	1995	1987	1965
2005	1994	1982	1951
2004	1993	1980	1928
2003	1991	1979	1908
2002	1989	1977	1887

The Sanborn Library includes more than 1.2 million Sanborn fire insurance maps, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✔ Library of Congress
- ✔ University Publications of America
- ✔ EDR Private Collection

The Sanborn Library LLC Since 1866™

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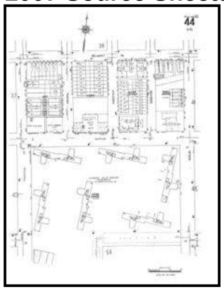
Sanborn Sheet Thumbnails

This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

2007 Source Sheets



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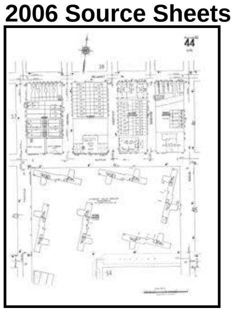

Volume 8, Sheet 44

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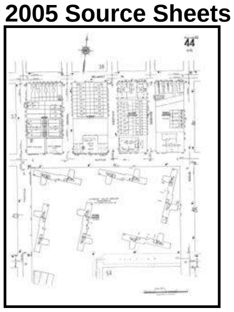

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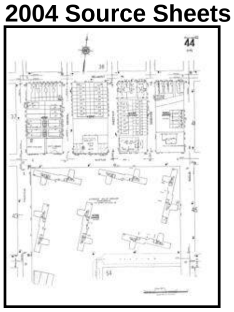

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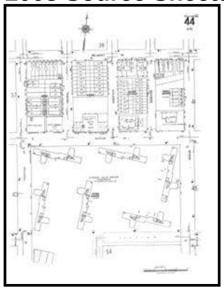

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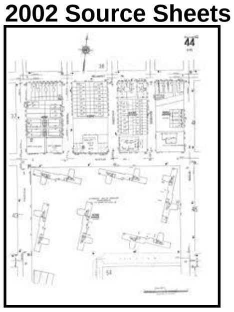

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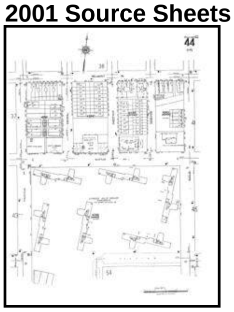

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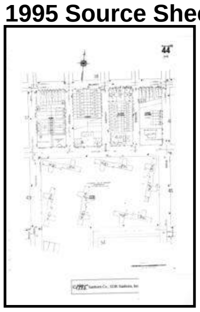

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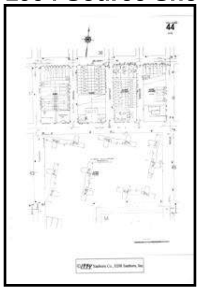

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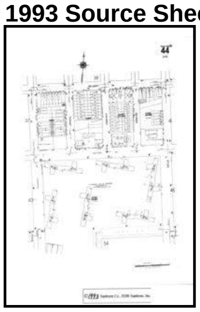

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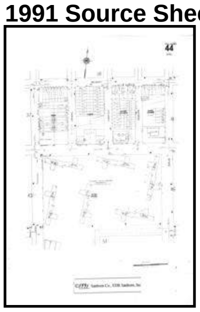

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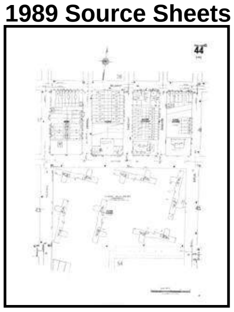

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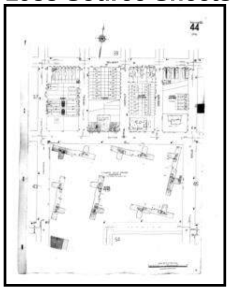
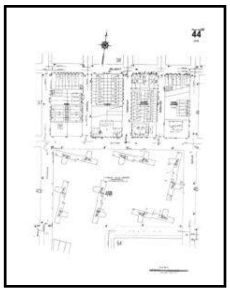


Volume 8, Sheet 44

1987 Source Sheets

Volume 8, Sheet 38



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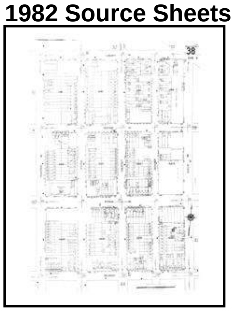

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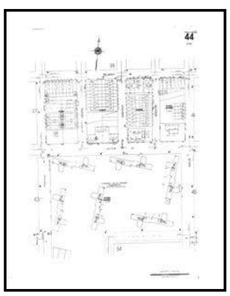

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1980 Source Sheets

Volume 8, Sheet 44

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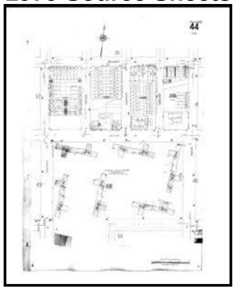

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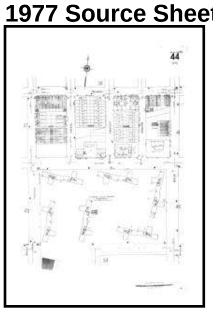
1977 Source Sheets



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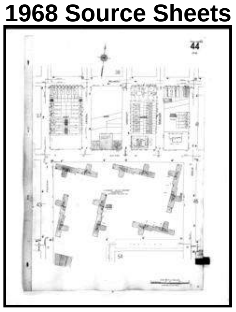
1968 Source Sheets



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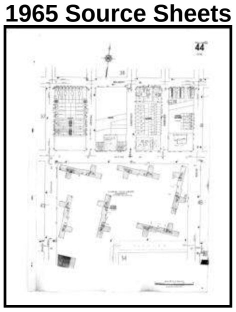

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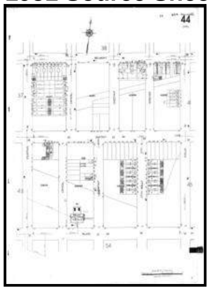
1951 Source Sheets



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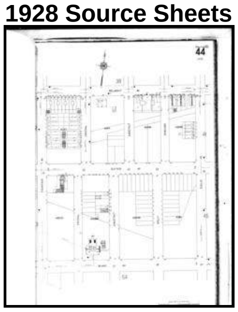
1928 Source Sheets



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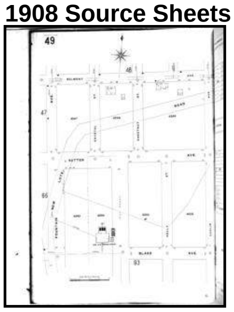
1908 Source Sheets



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1887 Source Sheets

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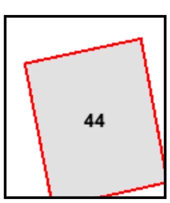

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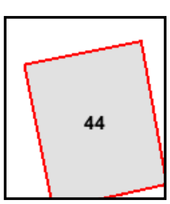

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City, ST, ZIP:	Brooklyn NY 11208
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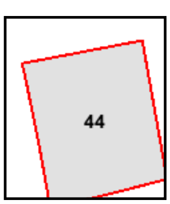

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City, ST, ZIP:	Brooklyn NY 11208
Client:	Associated Env. Services
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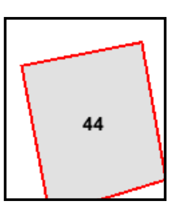

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City, ST, ZIP:	Brooklyn NY 11208
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Order Date:	6/6/2012 10:29:04 AM
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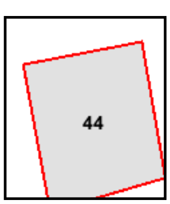

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Certification #	D224-4CB5-9444

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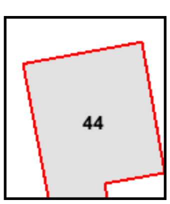

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City, ST, ZIP:	Brooklyn NY 11208
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Copyright:	2001

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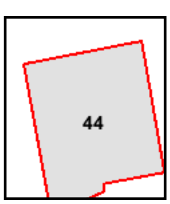

Volume 8, Sheet 44

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1995 Certified Sanborn Map

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Certification # D224-4CB5-9444

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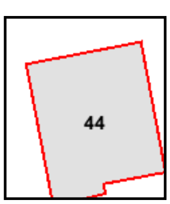

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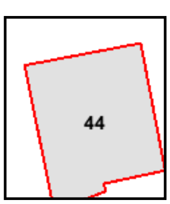

Volume 8, Sheet 44

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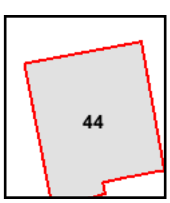

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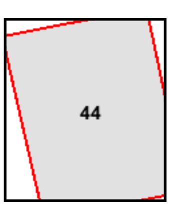

Volume 8, Sheet 44

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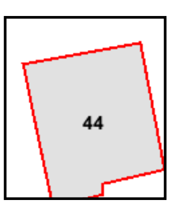

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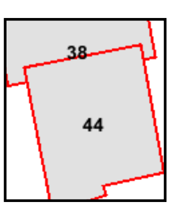

Volume 8, Sheet 38
Volume 8, Sheet 44

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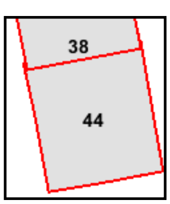

Volume 8, Sheet 38
Volume 8, Sheet 44

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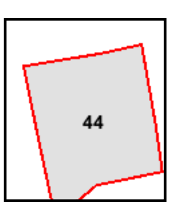

Volume 8, Sheet 44

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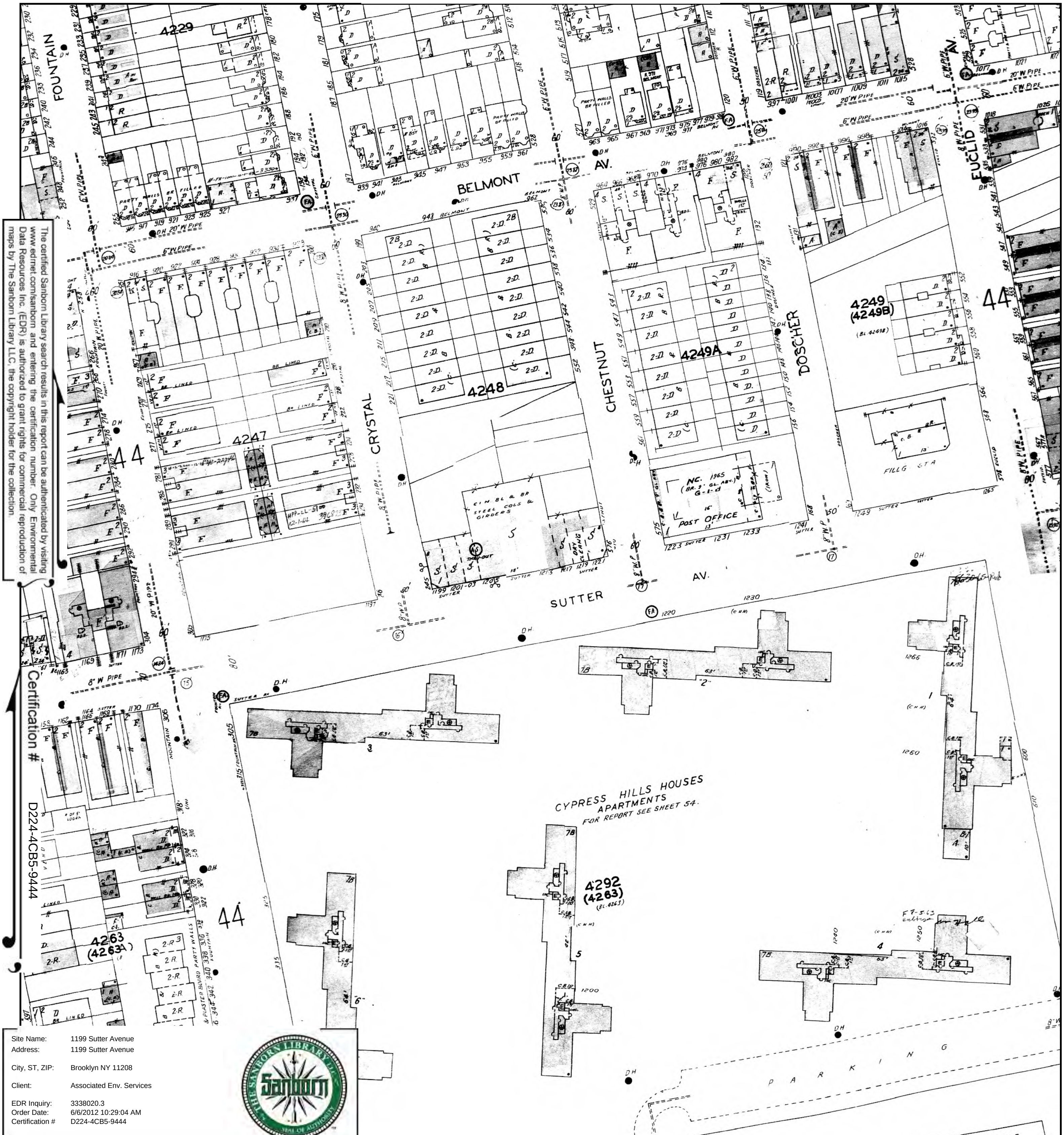

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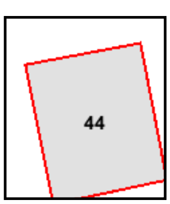

Volume 8, Sheet 44

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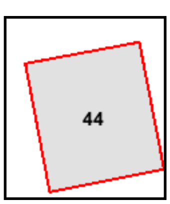

Volume 8, Sheet 44

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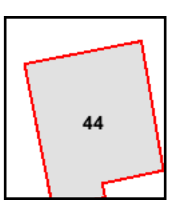

Volume 8, Sheet 44

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Volume 8, Sheet 44

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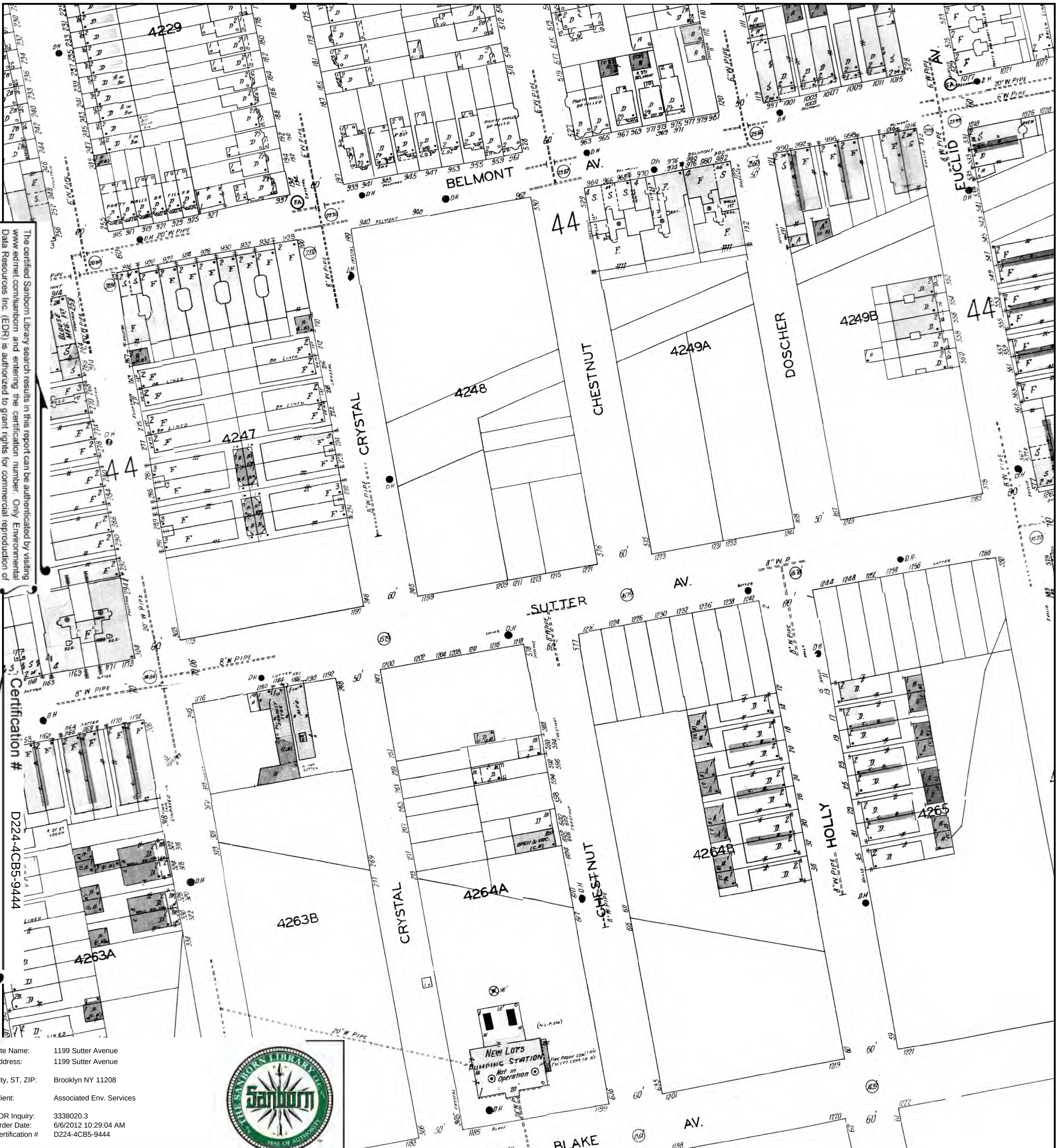

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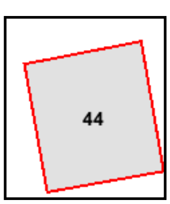

Volume 8, Sheet 44

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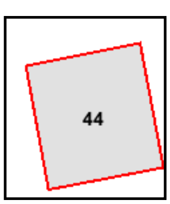

Volume 8, Sheet 44

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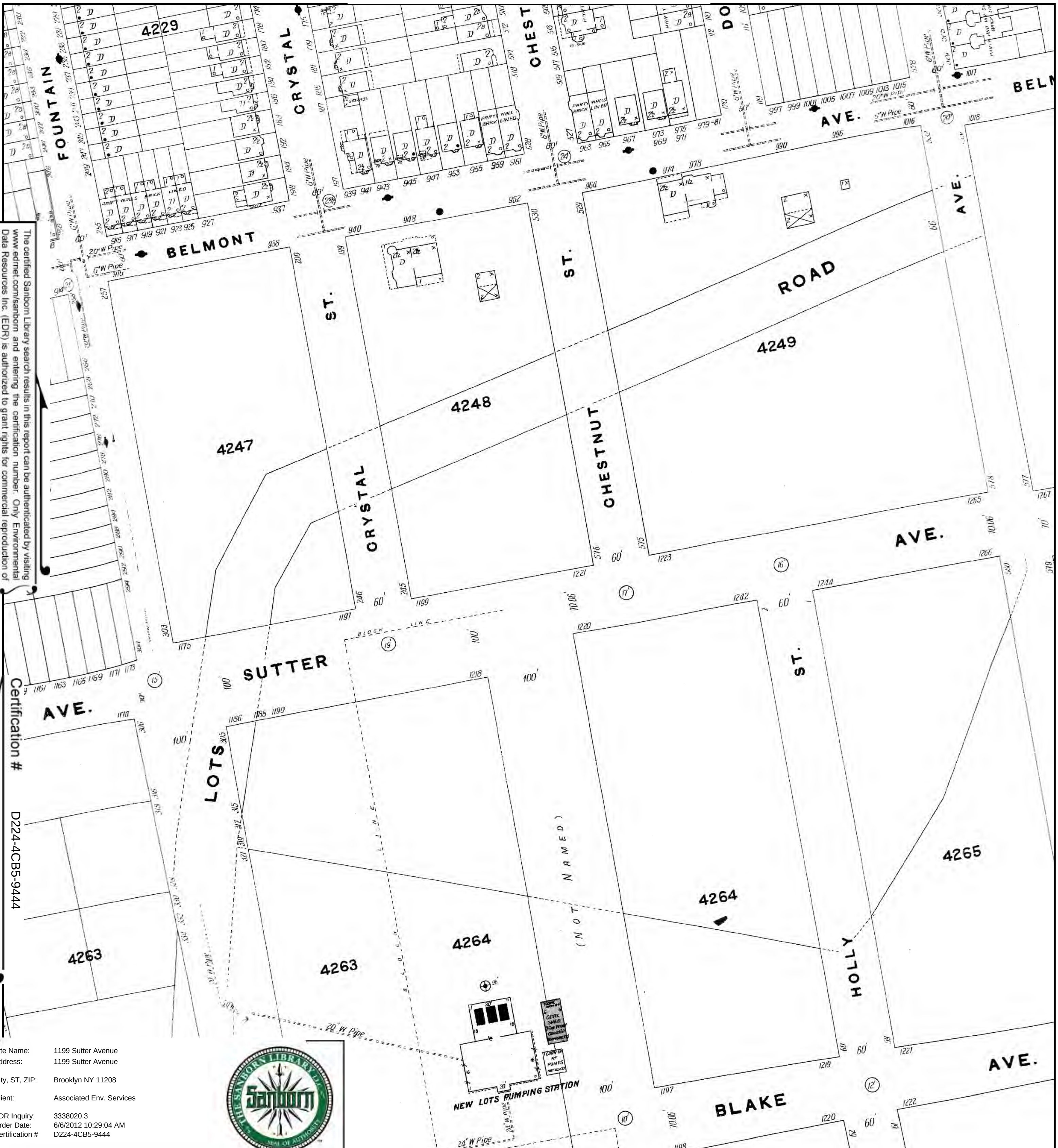

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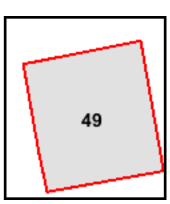

Volume 8, Sheet 49

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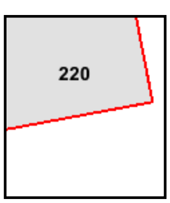


Volume 8, Sheet 220

APPENDIX E

Citizens Participation Plan

EnviroTrac
Environmental Services

New York State Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
AAA Sutter Realty LLC

1199-1221 Sutter Avenue
Brooklyn, Kings County, New York 11208
Block 4248, Lot 1

July 2016

Contents

* * * * *

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

Applicant: **AAA Sutter Realty LLC**
Site Name: **1199 Sutter Avenue**
Site Address: **1199-1221 Sutter Avenue, Brooklyn, New York 11208**
Site County: **Kings County**
Site Number: **BCP Number C224141**

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

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

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

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

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

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

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

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

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

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

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

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

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

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

Project Contacts

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

Locations of Reports and Information

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

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project.

These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.

The site contact list includes, at a minimum:

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

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

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix E shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

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

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

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

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

Technical Assistance Grant

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

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

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

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

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program is provided below:

Citizen Participation Requirements (Activities)	Timing of CP Activity(ies)
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about proposed RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that summarizes the Final Engineering Report • Distribute fact sheet to site contact list announcing issuance of Certificate of Completion (COC)	At the time NYSDEC approves Final Engineering Report. These two fact sheets are combined if possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

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

Issues of public concern at the site include potential health and safety hazards during site remediation; and the potential for contaminants from the site to affect persons or properties neighboring the site. To address these concerns, several actions are being performed by the Applicant. During site remedial activities, the site specific Health and Safety Plan will be followed. The site specific Health and Safety Plan outlines safety procedures to protect workers and the surrounding community and includes continuous air monitoring to ensure than safe levels are maintained. Detailed health and safety information, including the Community Air Monitoring Plan, can found as part of the Remedial Action Work Plan.

Appropriate Interim Remedial Measures (IRM) have been undertaken on-site to mitigate worsening environmental conditions at the subject property. IRMs are discrete actions conducted at a site relatively shortly after contamination is discovered, to reduce risks to people's health and to the environment. IRMs utilized at the subject site have been conducted in August of 2009 and have included the injection of potassium permanganate into the subsurface to mitigate concentrations of tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (c-1,2-DCE) detected in the groundwater.

4. Site Information

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

Site Description

The 1199 Sutter Avenue site is located at 1199-1221 Sutter Avenue, Brooklyn, Kings County, New York, and is further identified as tax map Block 4248, Lot 1. The subject site is located on the north side of Sutter Avenue, between the intersections of Chestnut Street and Crystal Street. The commercial site is 0.52 acres in size and is presently occupied by a single-story commercial building and associated parking lot. The building is divided into five separate retail/office units, which are underlain by a segmented basement for each retail/office unit with utilities, storage, and service rooms.

History of Site Use, Investigation, and Cleanup

The eastern-most retail/office unit was historically occupied by a dry cleaner establishment, which is currently occupied by a self-service laundromat. Sanitary waste and waste water from the laundromat are discharged to the municipal sewerage system located beneath Sutter Avenue.

Environmental History

In January 2009, an initial investigation comprised of a Phase II Environmental Site Assessment (ESA) and conducted by Atlantic Environmental Solutions, Inc. (AES) at the Site to evaluate a recognized environmental condition (REC) associated with the former dry cleaner operations. As part of this investigation, two soil borings were drilled adjacent to the former dry cleaner unit to collect soil and groundwater samples for laboratory analysis. Groundwater is present at approximately 13 feet below grade. The results of the analysis showed that tetrachloroethene (PCE) was detected at a concentration above the 6 NYCRR Part 375 Subpart 375-6.8 Unrestricted Use Soil Cleanup Objective (UUSCO) in one (1) soil sample, S3 [37,500 micrograms per kilogram(ug/kg)], and detected at a concentration above the NYSDEC Ambient Water Quality Standards and Guidance Values, Technical and Operational Guidance Series 1.1.1 (NYSDEC Groundwater Standards) in both groundwater samples, S2 and S3. Additionally, trichloroethene (TCE) were also detected in the groundwater samples above the NYSDEC Groundwater Standards.

Based on the results of the initial investigation, AES conducted a supplemental Phase II subsurface investigation in April, 2009. The supplemental investigation was conducted to determine the severity of the PCE and TCE contamination and delineate the extent of the impacts to the soil and groundwater underlying the former dry cleaner. A total of eight (8) soil borings were installed and included six (6) borings, B-1 through B-6, located within the parking lot and sidewalk adjacent to the building and two (2) borings, B-7 and B-8, located within the basement area of the former dry cleaner. PCE was detected at a concentration above the NYSDEC UUSCO in the soil sample from boring B-7, however, no other contaminant concentrations of VOCs were detected in the soil samples from the Site. PCE was detected at concentrations above the NYSDEC Groundwater Standard in groundwater samples from borings B-4 through B-8. TCE was detected at concentrations above the NYSDEC Groundwater Standards in boring samples B-6 through B-8. Cis-1,2-Dichloroethene (c-1,2-DCE), a common byproduct of PCE and TCE degradation, was also detected above the NYSDEC Groundwater Standard in the groundwater sample from borings B-5 and B-7.

Based on the results of the supplemental investigation, AES recommended the injection of potassium permanganate into the subsurface to mitigate the concentrations of PCE, TCE, and c-1,2-DCE in the groundwater. Coupled with the aforementioned proposed injections, the installation of shallow and deep groundwater monitoring wells was recommended to evaluate and monitor the effectiveness of the proposed remedial approach. Prior to initiating the proposed remedial approach, the NYSDEC was notified of the Site conditions and Spill No. 0902686 was assigned for the pending remedial action.
Between August 5, 2009 and August 24, 2009, an Interim Remedial Measure (IRM) was performed

at the Site and included the injection of a four percent solution of potassium permanganate. The injections were installed at 12 points within a grid pattern at intervals of 10, 15, 20, 35, and 40 feet below grade within and adjacent to the former dry cleaner unit. Groundwater samples were collected at the time of the injections (August, 2009) and then subsequently two (2) months (November, 2009) following the injections to monitor the performance of the injections.

The results of the August, 2009 initial groundwater sampling event showed that PCE was detected at concentrations above the NYSDEC Groundwater Standard in one (1) deep well, MW-4D, and in three (3) shallow wells, MW-1S, MW-2S, and MW-4S. Acetone and chloroform were also detected at concentrations above the NYSDEC Groundwater Standards in well MW-4S.

The results of the November, 2009 performance sampling event showed that PCE concentrations had decreased in well MW-1S and was no longer detected in well MW-2S. When compared to the August, 2009 initial groundwater sampling event, PCE concentrations detected in wells MW-3S and MW-4S were higher, but showed significant improvement from the Phase II Subsurface Investigation results. TCE and c-1,2-DCE, were also detected in MW-4S. Acetone and chloroform were no longer detected in any of the wells in the November, 2009 sampling event. Based on the performance sampling event, AES concluded that the potassium permanganate injections were effective, but that additional sampling was warranted to further evaluate the success of the injection program and determine if additional injections were necessary.

On February 25, 2010, groundwater samples were collected from the four shallow monitoring wells (MW-1S through MW-4S). Groundwater data indicated the concentrations of VOCs were generally consistent with the November, 2009 concentrations, however, the concentrations of VOCs in well MW-1S had increased since the November, 2009 sampling, but remained at roughly half of the levels detected during the Phase II Subsurface Investigation from April, 2009. Thus the increase of VOC concentrations in MW-1S since the November, 2009 was likely due to a rebound from the initial injection of potassium permanganate at the Site. Based on the February, 2010 results, AES recommended a second round of potassium permanganate injections be conducted at greater density than the previous injections in order to further address the residual VOC contamination in the groundwater.

On July 19, 2011 a Site Characterization Investigation was conducted by Associated Environmental Services, Ltd. (Associated) under the oversight of the NYSDEC to further characterize the soil and groundwater quality as well as the soil vapor and ambient air quality. Three (3) soil borings, designated B-10 through B-12, were drilled to approximately 15 feet below grade in the rear parking lot behind the former dry cleaner. One (1) monitoring well, MW-5, was installed off-Site, along at the south side of Sutter Avenue, and downgradient of the Site, to evaluate plume migration. One (1) sub-slab soil vapor sample, SSV-1, was collected on-Site beneath the poured concrete slab within the basement of the former dry cleaner. Concurrently, indoor air quality and outdoor air quality samples were collected over the same duration as the sub-slab soil vapor sample.

PCE was detected in the soil sample collected from B-11 at a concentration slightly above the NYSDEC UUSCO. Acetone was detected in the soil sample collected from B-10 and B-12 at concentrations above the NYSDEC UUSCO.

PCE was detected in the groundwater samples collected from MW-1S, MW-1D, MW-2S, MW-2D, MW-3D, MW-4S, and MW-5S above the NYSDEC Groundwater Standard. Chloroform was detected in the groundwater samples collected from MW-1S, MW-2S, MW-3S, MW-4S, and MW-5S above the NYSDEC Groundwater Standard. TCE and c-1,2-DCE were detected in the groundwater samples collected from MW-4S and MW-5S above the NYSDEC Groundwater Standards.

The vapor analytical data indicated that 13 VOCs were detected in the sub-slab soil vapor sample SS-1 beneath the former dry cleaner unit. Several solvents, such as PCE, TCE, c-1,2-DCE, 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethane (1,1-DCA), and vinyl chloride (VC) were detected at elevated concentrations in sample SS-1. The indoor air sample, IA-1, was collected from the basement of the former dry cleaner and a total of 27 VOCs were detected which included solvents such as PCE and TCE. The indoor air results were compared to the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October, 2006, Indoor Air Guidance Values which showed that the indoor air concentration for PCE [68.5 micrograms per cubic meter of air (ug/m3)] was detected above the Indoor Air Guidance Value of 30 ug/m3. No dry cleaning solvents were detected in the outdoor air sample, OA-1. The sub-slab soil vapor and indoor air results were also compared to NYSDOH Matrices 1 and 2, which indicated that mitigation was required due to the elevated results of PCE, TCE, 1,1,1-TCA, cis-1,2-DCE, and VC.

A Remedial Investigation (RI) was performed by Associated in 2014 and 2015 which focused on soil vapor intrusion (SVI) at the Site and near adjoining properties, and off-Site groundwater migration. Existing wells and newly constructed monitoring wells were sampled during the RI in March, 2015. The results of the RI groundwater sampling event showed on-Site groundwater contaminant concentrations ranged from slight increases to slight decreases, and off-Site groundwater contaminant concentrations showed limited downgradient migration of Site-related contaminants. The RI included additional on-Site sub-slab soil vapor and indoor air sampling as part of a SVI investigation within the other units of the building. The results showed that the sub-slab soil vapor beneath the adjoining supermarket unit to the west also required mitigation due to the detected concentrations for PCE and TCE when compared to the NYSDOH Matrices. The results for the remaining units to the west indicated that no further action was required when compared to the NYSDOH Matrices. Two (2) off-Site soil gas samples and one (1) off-Site outdoor air sample were collected near the northeastern border of the Site and along the south side of Sutter Avenue. The results of the soil gas sample collected near the northeastern Site border showed an elevated concentration of PCE which indicated that further investigation of the adjoining property to the north was required. No Site-related impacts were observed in the downgradient soil gas sample collected to the south, across Sutter Avenue.

Based on previous soil and soil vapor results, a source area that was had not been previously delineated appeared to be present at the Site. Therefore, a Supplemental Subsurface Investigation was performed by Associated in April, 2016 to further delineate on-Site soil, off-Site groundwater, and off-Site SVI concerns. An additional soil boring, S-4 (2016), was installed to the north of the former dry cleaner in the parking lot. The results of the soil sampling event showed an elevated detection of PCE (15,000 ug/kg) at a concentration above its NYSDEC UUSCO. Additional on- and off-Site groundwater samples were collected from the on-Site well MW-4S, off-Site well MW-8S (New York City Housing Authority property), and newly installed off-Site well MW-9S, located across Chestnut Street to the east of the Site. Additional soil gas samples and an outdoor air sample were collected from SSV-8, located at the northeastern border of the Site in order to evaluate SVI impacts at the adjoining property to the north, and SSV-9, located in the sidewalk along the east side of Chestnut Street to evaluate SVI impacts at the adjoining property to the east. The results of the soil gas samples when compared to the NYSDOH Matrices showed that no further action was required, and therefore, the adjoining properties to the north and east had not been impacted. The results of the on-Site groundwater sampling at MW-4S showed a slight decrease of PCE and a steady state for TCE. The results of the off-Site groundwater sampling showed a slight increase of PCE in the downgradient well located along the south side of Sutter Avenue (MW-5S), a detection of PCE was slightly above its NYSDEC Groundwater Standard in the downgradient well located on the NYCHA property (MW-8S), and no impact was shown by on-Site contaminants to the crossgradient well located along Chestnut Street (MW-9S).

5. Investigation and Cleanup Process

Application

The Applicant has applied for and has been accepted into New York's Brownfield Cleanup Program as a Participant. This means that the Applicant was the owner of the site at the time of the disposal or discharge of contaminants or was otherwise liable for the disposal or discharge of the contaminants. The Participant must fully characterize the nature and extent of contamination onsite, as well as the nature and extent of contamination that has migrated from the site. The Participant also must conduct a qualitative exposure assessment, a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

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

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

Investigation

The Applicant has conducted an investigation of the site officially called a "remedial investigation" (RI). This investigation was performed by Associated Environmental Services, LTD in 2014 and 2015.

When the investigation was completed, the Applicant prepared and submitted a report summarizing the results of the investigation. The findings of the investigation are summarized in Section 4, Environmental History, above.

Direct contact with contaminants that may be present in the soil is unlikely because the site is covered with building foundations and concrete pavement. Contaminated groundwater at the site is not used from drinking or other purposes and the site is served by a public water supply that obtains water from a source not affected by this contamination. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn my move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Soil vapor intrusion sampling has indicated that mitigation is warranted for the on-site Laundromat. However, indoor air levels of contaminants of concern in the Laundromat are not above guidance values. There is also a potential for vapor intrusion into commercial spaces adjacent to the drycleaner. Additional investigation is warranted to evaluate the potential for off-site vapor intrusion and subsequent exposures in nearby structures.

Remedy Selection

Following the completion of the Remediation Investigation report, EnviroTrac PC performed a Remedial Alternatives Analysis (RAA) as part of the Remedial Action Work Plan (RAWP). The RAA explores various remedial options and techniques, including no action. To address the on-site soil and soil vapor, the RAA section of the RAWP recommended the installation of a soil vapor extraction (SVE) system to reduce soil concentrations at the site and prevent soil vapors from beneath the site from entering the site building. The current Site cap which consists of the existing building and pavement would also be maintained. The recommended groundwater remedy was natural attenuation monitoring and quarterly sampling to assess groundwater quality.

EnviroTrac has been contracted by the Participant to prepare and submit the RAWP, which includes the RAA.

Cleanup Action

NYSDEC will consider public comments before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy.

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

Certificate of Completion

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

Site Management

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management may be conducted by the Applicant under the NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

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

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

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

Appendix A - Project Contacts and Locations of Reports and Information

Project Contacts

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

New York State Department of Environmental Conservation (NYSDEC):

Michael MacCabe
Project Manager
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7016
Phone: (518) 402-9687
mdmacacb@gw.dec.state.ny.us

New York State Department of Health (NYSDOH):

Krista Anders
New York State Department of Health
Bureau of Environmental Exposure
Investigation
Empire State Plaza, Corning Tower
Room 1787
Albany, New York 12237
Phone: 1-800-458-1158
Kma06@health.state.ny.us

Locations of Reports and Information

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

Cypress Hills Branch
Brooklyn Public Library
236 Crystal Street
Brooklyn, New York 11208
Contact: Rowshon Perveen, Director
Phone: (718) 227-6004
Monday, Wednesday – Friday: 10 am - 6 pm
Tuesday: 1 p.m. – 8 p.m.
Saturday & Sunday: Closed

Community District 5
127 Pennsylvania Avenue, 2nd Floor
Brooklyn, New York 11207
Contact: Nathan Bradley, Chairperson
Phone: (718) 498-5711
Monday - Friday 8:30 am - 4:45 pm

Appendix B – Site Contact List

FEDERAL

U.S. Senate
Hon. Charles Schumer
757 Third Avenue Suite 17-02 New
York New York 10017
(212) 486-4430

U.S. Senate
Hon. Kirsten Gillibrand
780 Third Avenue Suite 2601 New
York New York 10017
(212) 688-6262

Congressman Jerrold Nadler
Brooklyn Office
6605 Fort Hamilton Parkway
Brooklyn, New York 11219
(718) 373-3198

STATE OF NEW YORK

New York State Senator
Hon. Martin Malavé Dilan
573 Metropolitan Avenue
Brooklyn, New York 11211
(718) 573-1726

New York State Assembly – Assembly District 50
Hon. Joseph Lentol
619 Lorimer Street
Brooklyn, New York 11211
(718) 383-7474

LOCAL OFFICIALS AND COMMUNITY ORGANIZATIONS

Mayor Michael Bloomberg
City Hall
New York, NY 10007

Chair of NYC Planning Commission
Amanda Burden
22 Reade Street
New York, NY 10007

NYC Council
Erik Martin Dilan
387 Arlington Avenue
Brooklyn, NY 11208

NYC Department of Environmental Protection
Emily Lloyd, Commissioner
59-17 Junction Boulevard
Flushing, New York 11373
(718) 595-6600

NYC Office of Environmental Sustainability
Nilda Mesa, Director
100 Gold Street, 2nd Floor
New York, New York 10038
(212) 676-3080

NYC Department of Environmental Protection
Office of Environmental Assessment & Planning
Julie Stein
96-05 Horace Harding Expressway
Flushing, New York 11373
311 or (212) 639-9675 outside of NYC

NYC Department of Health and Mental Hygiene
Dr. Mary Bassett, Commissioner
125 Worth Street
New York, New York 10013
311 or (212) 639-9675 outside of NYC

Brooklyn Borough President

Marty Markowitz
Brooklyn Borough Hall
209 Joralemon Street
Brooklyn, NY 11201

Community District 5
Nathan Bradley, Chairperson
127 Pennsylvania Avenue
Brooklyn, NY 11207

Consolidated Edison Public Affairs
Eric Soto, Director
511 Theodore Fremd Avenue
Rye, New York 10580
(877) 602-6633

MEDIA

New York Post
1211 Avenue of the Americas
New York, New York 10036
(212) 930-8500

New York Daily News
4 New York Plaza
New York, New York 10004
(212) 210-2100

Brooklyn Daily Eagle
30 Henry Street
Brooklyn, NY 11201

Brooklyn Downtown Star
69-60 Grand Avenue
Maspeth, NY 11378

The Brooklyn Paper
One Metrotech Center
Brooklyn, NY 11201

News 12 Brooklyn

164 20th Street, 4th Floor
Brooklyn, NY 11232

El Diario La Prensa
1 Metro Tech Center, 18th Floor
Brooklyn, New York 11201
(212) 807-4600

Hoy Nueva York
1 Metro Tech Center, 18th Floor
Brooklyn, New York 11201
(212) 807-4600

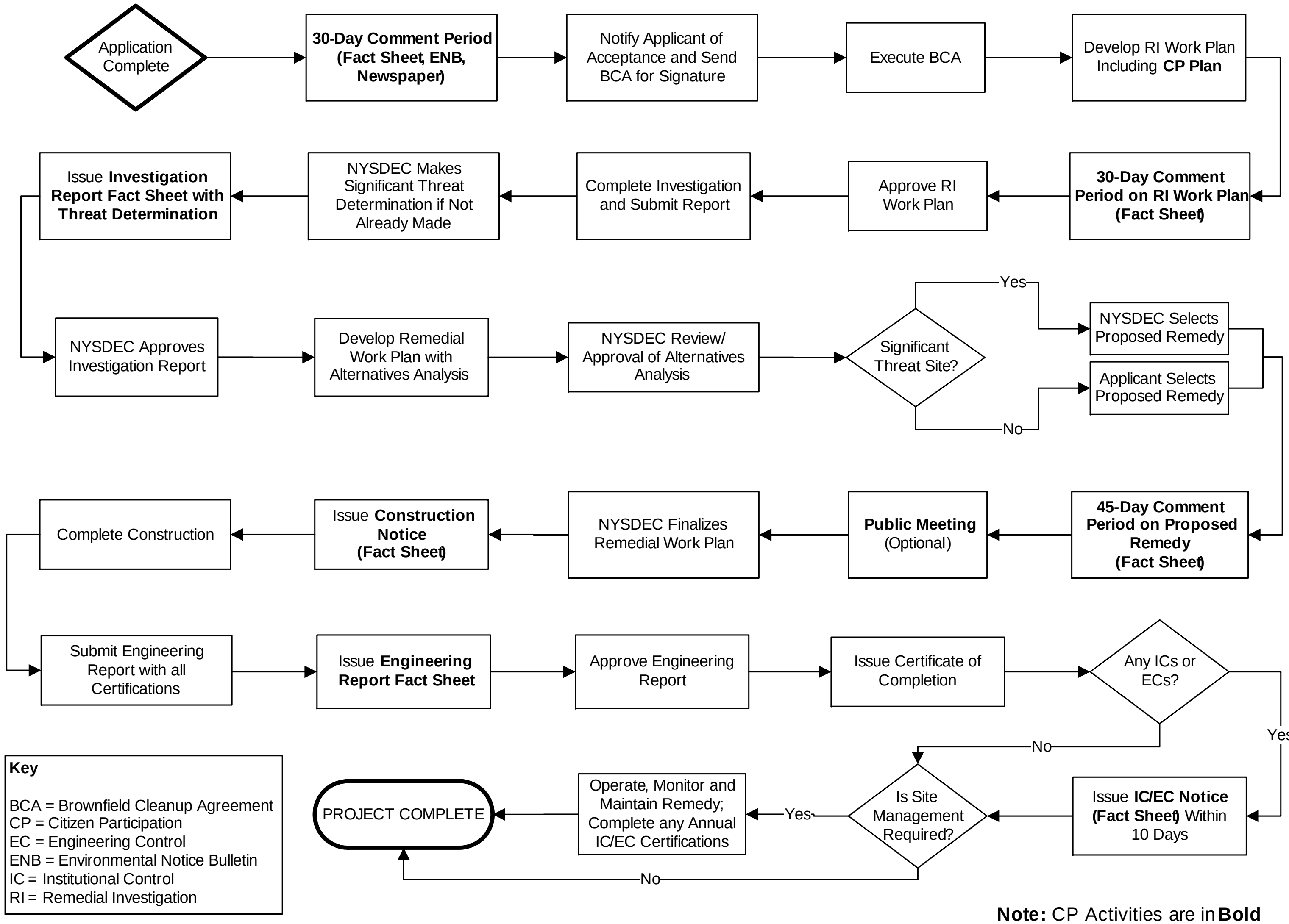
NY 1 News
75 Ninth Avenue
New York, New York 10011
(212) 379-3311

RESIDENTS, OWNERS, AND OCCUPANTS ADJACENT AND IN THE VICINITY OF THE SITE

Property Address	**Unit Number**	**Addressee**
552 Chestnut Street		Resident/Business Owner
221 Crystal Street		Resident/Business Owner
224 Crystal Street		Resident/Business Owner
228 Crystal Street		Resident/Business Owner
232 Crystal Street		Resident/Business Owner
234 Crystal Street		Resident/Business Owner
1197 Sutter Avenue		Cypress Hills Branch Library
475 Fountain Avenue		Resident/Business Owner
575 Chestnut Street		US Post Office
561 Chestnut Street		Resident/Business Owner
559 Chestnut Street		Resident/Business Owner
557 Chestnut Street		Resident/Business Owner
553 Chestnut Street		Resident/Business Owner
551 Chestnut Street		Resident/Business Owner

Appendix C – Site Location Map

Appendix D – Brownfield Cleanup Program Process



APPENDIX F

Health and Safety Plan

EnviroTrac
Environmental Services

1199 SUTTER AVENUE
BROOKLYN, NEW YORK

Health And Safety Plan

NYSDEC BCP Number: C224141

Prepared for:
AAA Sutter Realty, LLC
153-157 Seventh Street
Garden City, New York 11530

Prepared by:
EnviroTrac Engineering PE PC
5 Old Dock Road
Yaphank, New York 11980
631-924-3001

JUNE 2018

TABLE OF CONTENTS

FIGURES

APPENDICES

I. INTRODUCTION

This Health and Safety Plan (HASP) has been prepared to identify and address potential health and safety concerns that may be encountered as a result of the construction activities that will be conducted as part of the installation of a soil vapor extraction (SVE) and air sparge (AS) system at the Sutter Realty Site located at 1199 Sutter Avenue, Brooklyn, New York (Site). Specifically this plan applies to the activities detailed in:

1199 Sutter Avenue, Brooklyn, New York BCP Site Number C224141 Remedial Action Work Plan (RAWP).

The procedures were developed in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard 29 CFR 1910.120.

II. OBJECTIVES

The objective of this HASP is to protect on-Site worker health and safety during field activities at the Site. General guidelines in the HASP are provided to assure that safe working conditions exist at the Site. The health and safety procedures set forth in this plan have been established based on analysis of potential hazards and protection measures have been selected in response to these potential risks. The HASP will be modified if unforeseen changes occur while work is in progress. This plan includes health and safety procedures required for field activities performed at the Site. It has been designed to meet the following objectives:

- Evaluate the risk associated with each operation;
- Provide for identification, recognition, evaluation, and control of health, safety, and environmental hazards (if any);
- Provide the requirements for an optimum, safe, and healthful work environment, in which personnel are not exposed to avoidable risks, accidents, or injuries in the performance of their duties;
- Identify the roles and responsibilities of on-Site personnel; and
- Establish personnel protection standards and mandatory safety practices and procedures for all on-Site personnel.

This document will be periodically reviewed to ensure that it is current and appropriate.

1.0 HEALTH AND SAFETY ORGANIZATION

A. Health and Safety Coordinator: Mr. Michael Clark, CHMM, will serve as the Health and Safety Coordinator. Mr. Clark is Director of Safety and Health for EnviroTrac and has twenty seven years of experience in the environmental, health, and safety field including managing hazardous waste site remediation. He has a working knowledge of federal and state occupational health and safety regulations and is familiar with air monitoring techniques and the development of health and safety programs for personnel working in potentially toxic atmosphere. In addition to developing this Site specific Health and Safety Plan (HASP) Mr. Clark's responsibilities will include the following:

- **a.** Implementation of the HASP.
- **b.** Modification of the HASP as necessary to address new tasks and changing Site conditions.
- **c.** Initial training of on-Site workers with respect to the contents of the HASP.
- **d.** Be available during normal business hours for consultation by the Safety Officer.
- **e.** Be available to assist the Safety Officer (SO) in follow-up training if either new tasks are to be performed or changes in Site conditions occur.

B. Safety Officer: The designated SO will have experience in the remediation of hazardous waste sites or related field experience. The designated SO will have formal training in health and safety and will be conversant with federal and state regulations governing occupational health and safety. The designated SO will be certified in CPR and first aid and will have experience and training in the implementation of personal protection and air monitoring programs. The designated SO will have "hands-on" experience with the operation and maintenance of real-time air monitoring equipment and is thoroughly knowledgeable of the operation and maintenance of air-purifying respirators (APR) and supplied-air respirators (SAR) including SCBA and airline respirators.

In addition to meeting the above qualifications, the designated SO will be responsible for the following minimum requirements:

- a. Implementation, enforcement, and monitoring of the HASP.
- b. Pre-construction indoctrination and periodic training of all on-Site personnel with regard to this safety plan and other safety requirements to be observed during construction, including:
  - i. Potential hazards.
  - ii. Personal hygiene principles.
  - iii. PPE.
  - iv. Respiratory protection equipment usage and fit testing.
  - v. Emergency procedures dealing with fire and medical situations.
  - vi. Conduct daily update meetings in regard to health and safety.
- c. Alerting the project manager prior to starting any particular hazardous work.
- d. Informing project personnel of the New York State Labor Law Section 876 (Right-to-Know Law)
- e. The maintenance of separation of Exclusion Zone (Dirty) from the Support Zone (Clean) areas as described hereafter.

C. Health and Safety Technicians: The designated Health and Safety Technician(s) will have hazardous waste site or related experience and will be knowledgeable of applicable occupational health and safety regulations. The designated Health and Safety Technician(s) will be certified in CPR and first aid, and will be under direct supervision of the SO during on-Site work. The designated Health and Safety Technician(s) will be familiar with the operations, maintenance, and calibration of monitoring equipment that will be used in this remediation.

D. Medical Consultant: A Medical Consultant (MC) Dr. Sarah Mendehlson an occupational medical physician, certified in occupational medicine will be retained for the project. The physician will have experience in the occupational health area and will be familiar with potential site hazards of remedial action projects. The MC will also be available to provide annual physicals and to provide additional medical evaluations of personnel when necessary.

Qualifications of the HSC are presented in Appendix A.

2.0 SITE DESCRIPTION AND HAZARD ASSESSMENT

1199-1221 Sutter Avenue, Brooklyn, NY (herein referred to as the Site) is located in a mixed residential / commercial area of Brooklyn. The Site is bounded by Sutter Ave. to the south, Chestnut St. to the east, residences to the north, and Crystal St. to the west.

Site Features: The Site occupies about half of a city block on the north side of Sutter Avenue. An asphalt parking lot covers the northern portion of the Site and a single-story building is located along the southern portion of the Site. The building is underlain with a basement segmented for each retail/office unit with utilities, storage and service rooms.

Current Zoning and Land Use: The Site is within an R5 (residential) zoned area. The Site is zoned C1-2 (commercial) as are the properties along the north side of a seven-block stretch of Sutter Avenue.

Past use of the Site: The structures on the Site were constructed in 1957 and were the original development on the property. Spanish American Dry Cleaners occupied the eastern-most unit from September 1988 to May 1995. The former location of the dry cleaner is presently occupied by a self-service laundromat.

Site Geology and Hydrogeology: The property is located within the Pavement and Buildings-Flatbush-Riverhead Series Soil Map Unit, which is described as anthropogenic urban fill overlying glacial outwash deposits and characterized as a sandy loam. The groundwater table is approximately 13 feet below grade and generally flows south. Groundwater is not utilized as a source of potable water at the Site or surrounding area.

The scope of work is outlined in the RAWP and consists of the installation of a SVE system and the excavation of soil for eight (8) wells in the basement of the former cleaner unit, the adjacent Supermarket unit to the west, and in the rear parking lot to the north of the former dry cleaner.

CONTAMINANTS OF CONCERN:

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ug/l)	(ug/l)
Volatile Organic Compounds (VOCs)	Tetrachloroethylene (PCE)	ND - 610	5
	Cis-1,2-DCE	ND- 81	5
	Acetone	ND-577	50
	Chloroform	ND-97.7	7
	Trichlorethene	ND - 42	5

Soil	Contaminants of Concern	Concentration Range Detected (ug/kg)	SCG (mg/kg)
Volatile Organic Compounds (VOCs)	Tetrachloroethene (PCE)	443 – 37,500	1,300

ug/l = micrograms per liter
ug/kg = micrograms per kilogram
SCG = standards, criteria, and guidance
ND = not detected
NA = none available

Note: Based on these results, the highest observed contaminate concentrations are below applicable OSHA, ACGIH, and NIOSH Exposure limits.
Tetrachloroethene - OSHA TWA 100 ppm, C200 ppm (5 minutes in any 3-hour period), with a maximum of 300 ppm);
Trichloroethene - OSHA Permissible Exposure Limit (PEL):100 ppm (TWA), 200 ppm (Ceiling), 300 ppm/5min/2hr (Max) -ACGIH Threshold Limit Value (TLV): 50 ppm (TWA) 100 ppm (STEL);

Potential routes by which Site workers could be exposed generally include: inhalation, ingestion, dermal contact, and injection. However, direct contact with contaminants that may be present in the soil is unlikely because the Site is covered with building foundations and concrete pavement. Site workers will be exposed to soil during SVE well installation: Implement HASP, PPE, air monitoring.

Contaminated groundwater at the Site is not used for drinking or other purposes and the Site is served by a public water supply that obtains water from a source not affected by this contamination.

Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion (SVI). SVI sampling has indicated that mitigation is warranted for the on-Site former dry cleaner and adjacent supermarket to the west. The following control measures will be used alleviate exposure by routes of entry:

Control of Potential Exposure by Route of Entry	
Route of Entry	**Control of Potential Exposure**
INHALATION	Tasks associated with this phase of the project have reasonable risk of exposure to inhalation hazards at or near published exposure limits. To control exposure, the following precautions will be followed by all site workers and visitors: • Area air monitoring for the presence of VOCs will be conducted using a direct reading instrument (e.g., MiniRae), if ambient air levels exceed: - 5.0 ppm sustained for 15 minutes, workers will be required to don respiratory protection, the source is to be identified and controlled, if possible, to allow workers to doff respiratory protection. - 25.0 ppm sustained for 15 minutes, work will be stopped and the source is to be identified and controlled prior to commencing work. • Excessive dust generated by drilling operations is to be avoided by distance from the activity, standing upwind, or wetting the material. If exposure cannot be avoided, a filtering facepiece (i.e., dust mask) rated as N95 is to be donned. • For odors detected outside the exclusion zone, as determined noticeable by the project manager, work will be stopped and the source is to be identified and controlled prior to commencing work. If there is a change in the scope of work, the Safety Officer (SO) will stop work and the new conditions will be evaluated for potential inhalation hazards. Work will not proceed until the new conditions are assessed and workers health is addressed.
INGESTION	Tasks associated with this project have a risk of exposure to chemicals or hazardous substances that pose mild to moderate toxicity if ingested. To control exposure, the following precautions will be followed by all site workers and visitors: • Follow good hygiene practices - wash hands, face, and exposed skin with soap and water after work and prior to eating, drinking, smoking, or applying cosmetics or lip balm or immediately after contact with chemicals or hazardous substances. Do not touch mouth, nose, or eyes with unwashed hands or with used gloves. • Chemical-resistant gloves (e.g. nitrile, neoprene, or butyl rubber gloves) are to be worn during hands-on inspections, removing liquid or cleaning, handling chemicals or hazardous substances, or during other tasks that involve direct contact with chemicals or hazardous substances.

DERMAL CONTACT	Tasks associated with this project have a risk of exposure to chemicals or hazardous substances that pose mild to moderate toxicity through dermal contact, including contact with eyes. To control exposure, the following precautions will be followed by all site workers and visitors: • Follow good hygiene practices - wash hands, face, and exposed skin with soap and water after work and prior to eating, drinking, smoking, or applying cosmetics or lip balm or immediately after contact with chemicals or hazardous substances. Do not touch mouth, nose, or eyes with unwashed hands or with used gloves. • Safety glasses with side shields that comply with ANSI Z87.1 requirements are to be worn at all times in the work zone. When working with liquid permanganate, a faceshield attached to the hardhat, in addition to the safety glasses is required. • Chemical-resistant gloves (e.g. nitrile, neoprene, or butyl rubber gloves) are to be worn during hands-on inspections, removing liquid or cleaning, handling chemicals or hazardous substances, or during other tasks that involve direct contact with chemicals or hazardous substances. • Safety shoes/boots that comply with ANSI Z41, ASTM F-2412, or ASTM F-2413 are to be worn while performing tasks in the work zone. Long pants and sleeved shirts are required to be worn at all times in the work zone. When working with liquid permanganate, a splash-resistant chemical suit (i.e., Saranex suit) will be worn by workers.
INJECTION	Tasks associated with this project have a risk of exposure to chemicals, hazardous substances, and biological hazards that pose mild to moderate toxicity through injection. Injection is the puncturing or abrasion of the skin allowing toxins to enter the body. To control exposure, the following precautions will be followed by all site workers and visitors: • Abrasive-resistant or cut-resistant gloves (i.e., leather, Mechanix®, Kevlar-type, etc.) are to be worn while working with tools or manipulating objects that can cause cuts or abrasions to the hands. • Chemical-resistant gloves (e.g. nitrile/neoprene/butyl rubber gloves) are to be worn during hands-on inspections, removing liquid or cleaning, handling chemicals or hazardous substances, or during other tasks that could result in direct contact with chemicals or hazardous substances. • Safety glasses with side shields that comply with ANSI Z87.1 requirements are to be worn at all times in the work zone. • Long pants and sleeved shirts are required to be worn at all times in the work zone. • Safety shoes/boots that comply with ANSI Z41, ASTM F-2412, or ASTM F-2413 are to be worn when there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole. Otherwise, sturdy, enclosed work shoes are to be worn while performing tasks in the work zone. • Be aware of biting/stinging/poisonous insects, poisonous or thorny plants, and any animal in the work zone and take precautions to avoid contact or exposure with these hazards. • Injection of hydraulic fluid can occur from contact with pressurized hydraulic lines on hydraulic powered equipment. Do not come in close proximity to pressurized lines. Depressurize lines prior to inspection, repair, or maintenance of equipment.

General Hazard Evaluation

Ground disturbance projects, such as remediation system installation and well installation will follow the procedures outlined in the EnviroTrac Ground Disturbance Practice are presented in Appendix B.

Risk Characterization

Precautions will be taken to prevent injuries and exposures to the following potential hazards and implement control measure to reduce any potential risks identified on the next table.

Potential Site Hazards and Risk Characterization		
Hazards	**Risk Characterizations**	**Control Measures**
SLIP/TRIP/FALL	Potential wet, or slippery conditions due to weather, on-site spills, on-site water, and drainage/runoff.	**Inspect/be aware of ground conditions and wet or slippery conditions.** **Use PPE to alleviate hazards, good boots, laced and tied; take small steps in slippery conditions, install handrails or use walking devices, like hiking poles.** **Use salt, calcium chloride, sand, or other material to alleviate slippery conditions and/or to melt snow/ice.**
	Potential slips, trips, and falls may result due to the proposed equipment and activities at the site like: drilling / excavation, well installation, system installation, loading/unloading, traffic control, etc.	**Clear trip hazards, when possible.** **Use good housekeeping practices and maintain the work zone free of debris and have equipment, supplies, and tools organized and out of main travel paths.** **Focus on path of travel and keep solid footing. Install handrails, steps, ramps, etc. to alleviate trip or fall hazards.**
INJURY TO BACK	Moving / lifting / carrying supplies, equipment, and materials around the work zone. Performing manual equipment operations such as shoveling, sweeping, raking, pushing (such as a wheel barrow), hand auguring, etc. Removal of well covers, manway covers, or manholes. Lifting and maneuvering cones and barriers to establish Work Zone Protection.	**Use proper lifting techniques: lift with legs, not back; keep load close to the body; do not twist torso, turn by moving your feet.** **Use proper bending techniques: bend at the knees, straighten back, lift and pull using legs, and do not use back or shoulders to lift up or pull.** **Use proper manual equipment techniques for shoveling, raking, sweeping: turn by moving your feet, do not twist torso, use legs not back** **take breaks as needed to alleviate muscle and joint strain.** **Get help or use mechanical lifting equipment when loads exceed 50 lbs or as needed.**

INJURY TO FOOT/FEET	Injury from moving or dropping of equipment, supplies, drums, tanks, and buckets onto foot/feet. Feet being run over by vehicles or being crushed from lowering equipment like a tailgate lift or equipment footing.	**Wear ANSI/ASTM compliant safety boots with steel, composite, or aluminum toes while performing any tasks on site.** **Properly secure equipment and objects. Anticipate and recognize any potential conditions which may cause the dropping of equipment (i.e., ground conditions and wet, icy, or slippery conditions).** **Ensure proper clearance when lowering outriggers on equipment.**
INJURY TO HANDS	Sharps including glass, pieces of metal, wood, plastic, etc. during clean up and debris removal process. Potential pinch points/sharp edges during equipment handling, dropping of equipment on hands. Exposure to hazardous substances from the material stored in the tanks or possible contamination in soil/ground water.	**Debris should not be handled, use shovels, dust pans, etc., to pick up debris. If debris is required to be handled, use cut-resistant gloves (e.g., Kevlar).** **Abrasive-resistant or cut-resistant gloves (e.g., leather, Kevlar, etc.) are to be worn while working with tools, equipment, or manipulating objects that can cause cuts or abrasions to the hands.** **Wear chemical-resistant gloves (e.g. nitrile, neoprene, or butyl rubber gloves) during hands-on inspections, removing liquid or cleaning, handling chemicals or hazardous substances, or during other tasks that involve direct contact with chemicals or hazardous substances.**
INJURY TO HEAD AND EYES	Potential of being struck by overhead equipment such as drill rigs, or other equipment, material, and supplies around work site. Potential projectiles from equipment or surrounding environmental and remediation chemical spills during the proposed monitoring/sampling/injection activities. Potential of being sprayed or splashed in eyes or face while using liquid chemicals under pressure, such as subsurface injection of sodium permanganate. Potential of projectiles impacting face and eyes during preclearing of boreholes.	**Wear a hard hat in compliance with EnviroTrac's Hard Hat Policy while in the Work Zone (certified ANSI Z89.1)** **Safety glasses with side shields that comply with ANSI Z87.1 requirements are to be worn at all times in the work zone.** **Full faceshield attached to the hard hat <u>in addition</u> to safety glasses with side shields that comply with ANSI Z87.1 requirements are to be worn while using airknife for preclearing, working with liquid chemicals, or similar activities that require the protection offered by a full faceshield.**

INJURY TO HEARING	Potential noise due to operating equipment during the proposed activities will not exceed the following levels at the designated durations: Duration Decibel Levels. (dB) (hrs) 8 90 6 92 4 95 3 97 2 100 1.5 102 1 105 0.5 110 <0.25 115	**Wear appropriate ear protection, such as:** **Ear Plugs:** **3M™ E-A-R™ Push-Ins™ corded foam earplugs (NRR 28 dB)** **Ear Muffs:** **MSA Cap Mounted Ear Muff Model: 10087422 (NRR 28)**
WORK IN HOT WEATHER CONDITIONS	Potential heat stress due to the warmer weather conditions (generally) late Spring through the Summer and into late Fall. Indoor and enclosed environments can produce heat stress related to activity, temperature, and lack of ventilation. Working in protective suites including Tyvek, Saranex, FRC, and Level A and Level B PPE. Chemical protective suites will attribute to heat stress in any weather and temperature conditions.	**Review weather forecast prior to going to site and plan accordingly.** **Use appropriate hot weather work apparel.** **Have fluids available on-site and ensure employees are hydrated, take frequent breaks in shade or air conditioned space, accordingly.** **Review OSHA Quick Card for: protecting Workers from Heat Stress.** **Follow requirements or EnviroTrac's Heat/Cold Stress Program.**
WORK IN COLD WEATHER CONDITIONS	Potential cold stress due to the cooler weather conditions (generally) late Fall through the Winter and into Spring. NOTE: Contact with water, being wet, and wet conditions (including rain) will exacerbate cold.	**Review weather forecast prior to going to site and plan accordingly.** **Cold conditions effect reaction time and decision making.** **Use appropriate protection from cold weather conditions including insulated gloves, neck and head coverings, insulated socks, and layering of clothing. Take breaks in warm areas as necessary.** **Protect from water and other wet conditions that can exacerbate cold conditions. Employees are not work in wet clothing.** **Review OSHA Quick Card for: protecting workers from Cold Stress.** **Follow requirements or EnviroTrac's Heat/Cold Stress Program.**

PRIVATE UTILITY MARK OUTS	Potential injury from electrocution while marking out underground utilities. Potential injury from being struck by vehicle while marking out utilities.	**Verify with a tester that there is no stray voltage on facilities connections.** **Provide for Work Zone Protection (cones and barriers) to control traffic, if necessary. Otherwise, observe traffic patterns and conduct work away from traffic.** **All personnel are to wear Class 2 Safety Vests with retro- reflective materials during utility markouts.**
PRE-CLEARING BOREHOLE	Potential to be struck-by debris from air stream Body part can be injured if contacts vacuum from vacuum extractor. Slips, trips from hoses and equipment, fall into bore hole.	**Use face shield attached to hardhat along with safety glasses when preclearing.** **Place a debris catcher, such as a traffic cone, over borehole while pre-clearing to alleviate amount of debris from hole** **Use good housekeeping and keep hoses, equipment, and materials in order, mark location of bore hole and cover when not actively clearing.** **Do not let intake hose of vacuum extractor come in contact with body part. Shut off equipment when not actively clearing hole.**
DRILLING	Potential of injury from rotating augers or being struck-by, or crushed by drill rig; potential of entanglement or struck by drill rig cables; being struck by materials and supplies falling off, or a fall from drill rig.	**Operators of equipment are to be trained and qualified, drillers are required to be licensed with a copy of the license available on site.** **Equipment is to be inspected prior to operation, and must be in satisfactory working order or removed from site.** **A safety zone is to be established around the ground disturbance operation. Equipment is to be shut off and locked out prior to approaching augers to remove cuttings, inspection, maintenance, repair, or for any reason** **Secure equipment and supplies that have the potential of falling or rolling, follow good housekeeping to prevent trip and slip hazards.** **Do not climb on equipment with feet over 6 feet above the ground without implementing fall protection.** **Follow EnviroTrac's Ground Disturbance Practice.**

PORTABLE AIR COMPRESSOR	Potential exposure to Carbon Dioxide gas Potential exposure to hot surfaces (muffler) that can cause burns and/or be a potential hot works issue. Potential fire and/or explosion hazard from fuel. Strike hazard from pressurized air lines disconnecting. Injury from being struck by compressed air. Injury from slips, trips, and falls from equipment associated with air compressor.	**Exhaust contains Carbon Monoxide, do not point exhaust toward: work area, vehicle, and occupied areas (i.e., attendant's kiosk, convenience store, manways where working, etc.)** **Exhaust muffler will get hot, treat as a potential Hot Works issue when working in areas where flammable vapors may accumulate, and maintain at least 3 feet from combustible or flammable materials.** **Shut off when re-fueling, use a funnel to alleviate potential for spills, clean up any spilled fuel immediately.** **Inspect all lines and connections, take defective parts out of service, use whip checks and/or cotter pins at all connections, every time.** **Compressed air is not used to on people. Do not point air steam at anyone, including self. Everyone on site is to wear eye protection whenever compressed air is being used.** **Use good housekeeping and keep hoses, equipment, and materials in order.**
TRAFFIC	Potential vehicle traffic around work area	**Identify traffic patterns and develop a traffic control program using sufficient traffic control devises to control the traffic. Refer to EnviroTrac's Work Zone Protection Practice.** **Establish Work Zone Protection per site Maintenance and Protection of Traffic Plan** **Wear proper PPE for work zones including high visibility apparel (i.e., safety vest), safety boot, safety glasses, hard hat, and long pants.** **Be aware of on-site traffic patterns and any other activities/work being conducted at the site, including the movement of heavy equipment.** **Use buddy system, if more than one person on-site.** **A spotter is required whenever moving heavy equipment around the site or when backing any vehicle.**

EXPOSURE TO HAZARDOUS SUBSTANCES (PCE, TCE, 1,1 Dichloroethene)	Potential exposure to hazardous substances in the soil during the installation of the SVE and AS wells	**Read the SDS sheets in Appendix C for hazardous substances which may be encountered during the proposed activities.** **Wear proper PPE for handling the chemical including faceshield / safety glasses, neoprene/butyl rubber gloves with gauntlets, sleeved shirts, full-length pants, and safety shoes with chemical resistant soles (neoprene).** **Properly decontaminate equipment, materials, and supplies in accordance with EnviroTrac's Decontamination practice.** **Properly dispose of all waste and contaminated materials.**

The Safety Data Sheet for TCE, PCE, cis-1,2-DCE, Acetone, and Chloroform is presented in Appendix C.

3.0 TRAINING

A. OSHA Training

1. All project personnel that will be performing tasks in exclusion zone(s) and/or potentially exposed to hazardous materials will be trained in accordance with OSHA 29CFR1910.120 regulations (HAZWOPER).

2. As part of the initial training and in conformance with OSHA 29CFR 1910.1200 (Hazard Communication Standard), all project employees that will be working at the site and authorized visitors will be informed of the potential hazards of the toxic chemicals that may be encountered and of the risks associated with working at the project site.

3. Personnel that have not successfully completed the required training will not be permitted to enter the project site to perform work.

B. Safety Meetings

1. The SO will conduct daily safety meetings for each working shift that will be mandatory for all project personnel. The meetings will provide refresher courses for existing equipment and protocols, and will examine new site conditions as they are encountered.

2. Additional safety meetings will be held on an as-required basis.

C. Safety Program Triggers, Protocol and Review

If either unforeseen or potentially detrimental site-specific safety-related factor, hazard, or condition become evident during the performance of the work at this site, it will be immediately brought to the attention of the SO who will take appropriate action to stabilize and address the situation. The HSC as well as the project manager's representative will be notified verbally and then in writing as quickly as possible for resolution. In the interim, EnviroTrac and/or its subcontractor(s) will take prudent action to establish and maintain safe working conditions and to safeguard employees, the public, and the environment. Following resolution, the safety protocols will be reviewed for effectiveness and updated/revised as appropriate.

4.0 MEDICAL SURVEILLANCE

As previously stated, maximum contaminate concentrations at the site were observed to be below applicable OSHA, ACGIH, and NIOSH published exposure limits. Consequently, medical surveillance will not be initially required. As a safe guard, air monitoring will occur and if action levels are exceeded, work will be halted, engineering controls will be instituted, and medical surveillance requirements will be re-evaluated. If it is determined that medical evaluation is required, the following will apply:

A. EnviroTrac and its Subcontractor(s) project personnel that either may be exposed to hazardous materials at concentrations above applicable action levels or be required to wear respiratory protection while conducting work related to this project and have not received a baseline medical evaluation one year prior to the start of this project will be provided with medical surveillance prior to the onset of work. Immediately at the conclusion of this project, and at any time there is suspected excessive exposure to substances that would be medically detectable, all project personnel will be medically monitored.

B. EnviroTrac has contracted the services of Dr. Sarah Mendehlson, an Occupational Physician to provide the minimum medical examinations and surveillance specified herein. The evidence of examination of EnviroTrac and Subcontractor on-site personnel will be kept by the SO.

C. Physical examinations will be required for:

1. Any and all personnel either performing work in either the hazardous or transition zones or performing work that requires respiratory protection.

2. All personnel on site who are dedicated for either emergency response or extraction purposes in the Exclusion Zone.

3. Project supervisors entering hazardous or transition zones for more than 16 hours during the length of the contract.

D. Physical examinations will not be required for people making periodic deliveries provided they do not enter hazardous or transition zones.

E. In accordance with good medical practice, the examining Physician or other appropriate representative of the Physician will discuss the results of such medical examination with the individual examined. Such discussion will include an explanation of any medical condition that the Physician believes required further evaluation or treatment and any medical condition which the Physician believes would be adversely affected by such individual's employment at the project site. A written report of such examination will be transmitted to the individual's private physician upon written request by the individual.

F. The examining Physician or Physician group will notify the SO in writing the individual has received a medical examination and will advise the SO as to any specific limitations upon such individual's ability to work at the project site that were identified as a result of the examination. Appropriate action will be taken in light of the advice given pursuant to this subparagraph.

G. The physical examination will also include but not be limited to the following minimum requirements:

1. Complete blood profile;

2. Blood chemistry to include: chloride, CO_2, potassium, sodium, BUN, glucose, globulin, total protein, albumin, calcium, cholesterol, alkaline phosphatase, triglycerides, uric acid, creatinine, total bilirubin, phosphorous, lactic dehydrogenase, SGPT, SGOT;

3. Urine analysis;

4. “Hand on” physical examination to include a complete evaluation of all organ systems including any follow-up appointments deemed necessary in the clinical judgement of the examining physician to monitor any chronic conditions or abnormalities;

5. Electrocardiogram;

6. Chest X-ray(if recommended by examining physician in accordance with good medical practice);

7. Pulmonary function;

8. Audiometry - To be performed by a certified technician, audiologist, or physician. The range of 500 to 8,000 hertz will be assessed;

9. Vision screening - Use a battery (TITMUS) instrument to screen the individual's ability to see test targets well at 13 to 16 inches and at 20 feet. Tests will include an assessment of muscle balance, eye coordination, depth perception, peripheral vision, color discrimination, and tonometry;

10. Tetanus booster shot (if no inoculation has been received within the last five years); and

11. Complete medical history.

5.0 WORK AREAS

A. EnviroTrac will clearly lay-out and identify work areas in the field and will limit equipment, operations and personnel in the areas as defined below:

1. Exclusion Zone (EZ) - The initial exclusion zone will be the SVE system well locations. The level of PPE required in this area will be determined by the HSC and the SO after air monitoring, review of the tasks to be performed and on-Site inspection have been conducted. The area will be clearly delineated from the Transition and Support areas. As work within the Exclusion zone proceeds, the delineating boundary will be relocated as necessary to prevent the accidental exposure of nearby people and equipment to either chemical or physical risk. Additional exclusion ones may include injection well locations. The Exclusion Zones will be delineated by barricading (e.g., chain link, snow fencing, orange plastic fencing, cones caution tape etc.).

2. Contamination Reduction Zone (CRZ) - These zones will include the support and equipment area for installation of the wells, including the stockpile area for cuttings and the decontamination area. These areas occur at the interface of exclusion and support areas and will provide for the transfer of equipment and materials from the Support Zone to the Exclusion Zone, the decontamination of personnel and equipment prior to entering the Support area, and for the physical segregation of the Support and Exclusion areas. These areas will contain all required emergency equipment, and will provide areas for construction equipment storage and

decontamination. These areas will be clearly delineated by fencing (e.g., chain link, snow fencing, orange plastic fencing, cones caution tape etc.). These areas also delineate areas that although not contaminated at a particular time may become so at a later date.

3. Support Zone (SZ) - This area is the remainder of the work Site and project Site. The Support Zone will be clearly delineated and procedures implemented to prevent active or passive contamination from the work Site. The function of the Support Zone includes:

   a. An entry area for personnel, material and equipment to the Exclusion Zone of site operations through the Contamination Reduction Zone;

   b. An exit for decontamination personnel, materials and equipment from the "Decontamination" area of site operations;

   c. The housing of Site special services; and

   d. A storage area for clean, safety, and work equipment.

6.0 SITE SECURITY

Access to the Site will be controlled during operating hours by the on-Site Supervisor. No unauthorized personnel will be allowed on-Site. Only trained and qualified personnel will be authorized to access the Exclusion or Contamination Reduction zones.

7.0 STANDARD OPERATING SAFETY PROCEDURES (SOSP), ENGINEERING CONTROLS

A. General SOP

1. EnviroTrac will ensure that all safety equipment and protective clothing is kept clean and well maintained.

2. All prescription eyeglasses in use on this project will be safety glasses and will be compatible with respirators. No contact lenses will be allowed on Site.

3. All disposable or reusable gloves worn on the Site will be approved by the SO.

4. During periods of prolonged respirator usage in contaminated areas, respirator filters will be changed upon suspected breakthrough. Respirator filters will always be changed either daily or after each work shift whichever occurs first.

5. Footwear used on Site will be covered by rubber boots or booties when entering or working in the Exclusion Zone area or Contamination Reduction Zone. Boots or booties will be washed with water and detergents to remove dirt and contaminated sediment before leaving the Exclusion Zone or Contamination Reduction Zone.

6. All PPE used on Site will be decontaminated or disposed of at the end of the work day. The SO will be responsible for ensuring decontamination of PPE before reuse.

7. All respirators will be individually assigned and not interchanged between workers without cleaning and sanitizing.

8. EnviroTrac, subcontractor, and service personnel unable to pass a fit test as a result of facial hair or facial configuration will not enter or work in an area that requires respiratory protection.

9. EnviroTrac will ensure that all project personnel will have vision or corrected vision to at least 20/40 in one eye.

10. On-Site personnel found to be disregarding any provision of this plan will, at the request of the SO, be barred from the project.

11. Used disposable outerwear such as coveralls, gloves, and boots will not be reused. Used disposable outerwear will be removed upon leaving the hazardous work zone and will be placed inside disposable containers provided for that purpose. These containers will be stored at the Site at the designated staging area and the properly disposed at the completion of the project.

12. Protective coveralls that become torn or badly soiled will be replaced immediately.

13. Eating, drinking, chewing gum or tobacco, smoking, etc., will be prohibited in the exclusion and chemical reduction zones.

14. All personnel will thoroughly cleanse their hands, face, and forearms, and other exposed areas prior to eating, smoking or drinking.

15. Workers who have worked in a hazardous work zone will shower at the completion of the work day.

16. All personnel will wash their hands, face, and forearms before using toilet facilities.

17. No alcohol, firearms, or drugs (without prescriptions) will be allowed on Site at any time.

18. All personnel who are on medication will report it to the SO who will make a determination as to whether or not the individual will be allowed to work and in what capacity. The SO may require a letter from the individual's personal physician stating what limitations (if any) the medication may impose on the individual.

B. Engineering Controls - Air Emissions

When intrusive activities involving impacted soils are conducted, EnviroTrac will monitor and record control air emissions. If recorded levels are above established action levels as set forth in the Air Monitoring Plan (AMP), work will be halted the cause(s) of the exceedance(s) will be determined and appropriate engineering controls will be instituted.

8.0 PERSONAL PROTECTIVE EQUIPMENT

A. Levels of Protection

It is anticipated that Level D protection will be required in this remediation. Although Levels A, B, and C are not planned, Site conditions may be encountered that require their use. The following sections described the requirements of each level of protection.

1. Level A Protection

a. PPE:

i. Supplied-air respirator approved by the Mine Safety and Health Administration (MSHA) and NIOSH. Respirators may be:

- Positive-pressure SCBA; or
- Positive-pressure airline respirator (with escape bottle for Immediately Dangerous to Life and Health [IDLH] or potential for IDLH atmosphere).

ii. Fully encapsulating chemical-resistant suit.

iii. Coveralls.

iv. Cotton long underwear.*

v. Gloves (inner), chemical-resistant.

vi. Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot.)

vii. Hard hat (under suit).*

viii. Disposal gloves and boot covers (worn over fully encapsulating suit).

ix. Cooling unit.*

x. Two-way radio communications (inherently safe).*

* Optional

b. Criteria for Selection:

Meeting any of these criteria warrants use of Level A protection:

a. The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on:

- Measures (or potential for) high concentration of atmospheric vapors, gases, or particulates, or

- Site operations and work functions that involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials highly toxic to the skin.

b. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible.

c. Operations will be conducted in confined, poorly ventilated areas until the absence of substances requiring Level A protection is determined.

d. Direct readings on field Flame Ionization Detectors (FID) or Photoionization Detectors (PID) and similar instruments indicate high levels of unidentified vapors and gases in the air.

2. Level B Protection

a. PPE:

i. Positive-pressure SCBA (MSHA/NIOSH approved); or

ii. Positive-pressure airline respirator (with escape bottle for IDLH or potential for IDLH atmosphere) MSHA/NIOSH approved;

iii. Chemical-resistant clothing (overalls and long-sleeved jacket; coveralls or hooded, one- or two-piece chemical-splash suit; disposable chemical-resistant, one-piece suits);

iv. Cotton long underwear;*

v. Coveralls;

vi. Gloves (outer), chemical-resistant;

vii. Gloves (inner), chemical-resistant;

viii. Boots (inner), leather work shoe with steel toe and shank;

ix. Boots (outer), chemical-resistant, (disposable);

x. Hard hat (face shield*);

xi. 2-way radio communication;* and

xii. Taping between suit and gloves, and suit and boots.

* Optional

b. Criteria for Selection:

Any one of the following conditions warrants the use of Level B Protection:

i. The type and atmospheric concentration of toxic substances have been identified and require a high level of respiratory protection, but less skin protection than Level A. These atmospheres would:

- Have IDLH concentrations; or
- Exceed limits of protection afforded by an air-purifying mask; or
- Contain substances for which air-purifying canisters do not exist or have a low removal efficiency; or
- Contain substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.

ii. The atmosphere contains less than 19.5% oxygen.

iii. Site operations make it highly unlikely that the work being done will generate high concentrations of vapors, gases or particulates, or splashes of material that will affect the skin of personal wearing Level B protection.

iv. Working in confined spaces.

v. Total atmospheric concentrations, sustained in the breathing zone, of unidentified vapors or gases range from 5 ppm above background to 500 ppm above background as measured by direct reading instruments such as the FID or PID or similar instruments, but vapors and gases are not suspected of containing high levels of chemicals toxic to skin.

3. Level C Protection

a. PPE:

i. Full-face, air-purifying, cartridge- or canister-equipped respirator (MSHA/NIOSH approved) with cartridges appropriate for the respiratory hazards;

ii. Chemical--resistant clothing (coveralls, hooded, one-piece or two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls);

iii. Coveralls;

iv. Cotton long underwear;*

v. Gloves (outer), chemical-resistant;

vi. Gloves (inner), chemical-resistant;

vii. Boots (inner), leather work shoes with steel toe and shank;

viii. Boots (outer), chemical-resistant (disposable);*

ix. Hard hat (face shield);*

x. Escape SCBA of at least 5-minute duration;

xi. 2-way radio communications (inherently safe);* and

xii. Taping between suit and boots, and suit and gloves.

*Optional

b. Criteria for Selection:

Meeting all of these criteria permits use of Level C protection:

i. Measured air concentrations of identified substances will be reduced by the respirator to, at or below, the substance's Threshold Limit Value (TLV) or appropriate occupational exposure limit and the concentration is within the service limit of the canister.

ii. Atmospheric contaminant concentrations do not exceed IDLH levels.

iii. Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of the skin left unprotected by chemical-resistant clothing.

iv. Job functions do not require SCBA.

v. Total readings register between background and 5 ppm above background as measured by instruments such as the FID or PID.

vi. Oxygen concentrations are not less than 19.5% by volume.

vii. Air will be monitored continuously.

4. Level D Protection

a. PPE:

i. Coveralls, chemical resistant;

ii. Gloves (outer), chemical resistant;

iii. Gloves (inner), chemical resistant;*

iv. Boots (inner), leather work shoes with steel toe and shank;

v. Boots (outer), chemical resistant (disposable);*

vi. Hard hat;

vii. Face shield;*

viii. Safety glasses with side shields or chemical splash goggles;* and

ix. Taping between suit and boots, and suit and gloves.

*Optional

b. Criteria for Selection:

i. No atmospheric contaminant is present.

ii. Direct reading instruments do not indicate any readings above background.

iii. Job functions have been determined not to require respirator protection.

5. Anticipated Levels of Protection

It is anticipated that the work will be performed in Level D. A respirator will be immediately available in the event that air monitoring indicates an upgrade to Level C is required. The determination of the proper level of protection for each task will be the responsibility of the HSC and SO. These task specific levels of protection are provided below:

PERSONAL PROTECTIVE EQUIPMENT BY TASK	
Task	**PPE**
All Site Tasks	• **Hard hats** are to be worn, if required by the location or activity per to EnviroTrac's Hardhat Policy. • **Safety glasses with side shields** (ANSI Z-87 + certified) or full-face safety shields are to be worn at all times while on-Site. • **Proper gloves** will be provided and used, as required. Abrasion resistant gloves (i.e., leather or similar) and chemical resistant, gauntlet style gloves (i.e., nitrile/neoprene/butyl rubber) will be used as tasks require. • **Safety boots** (ANSI Z-41, ASTM F-249, or ASTM F-2413 compliant) are to be worn, as required by the activity, laced and tied. • **High-visibility attire**, i.e., Class 2, Safety Vests, are to be worn when employees are exposed to vehicular traffic. • **Long pants and sleeved shirts** will be worn while on Site.
Drilling Operations and pre-clearing boreholes	• **Same as above, and to include:** • **Hearing Protection** NRR to protect against noise levels generated by drilling operations. • **Faceshield attached to hardhat, in addition to safety glasses**
Elevated Air Monitoring Results	• **Respirators equipped with HEPA and Organic Vapor cartridges**

6. Safety Equipment Specifications

Prior to purchasing any equipment or supplies required by this HASP, the project manager will be notified of the type, model and manufacturer/supplier of that particular safety equipment that is proposed to be used or purchased for use on this project. The specifications for PPE that, if deemed necessary due to Site/project conditions, will be supplied to the project manager and which differ from the minimum requirements are shown below.

PERSONAL PROTECTIVE EQUIPMENT SPECIFICATIONS				
Description	**Manufacturer**	**Model Number**	**Size**	**Comments**
Tyvek coveralls	Kappler/Abanda	1427/1428	xl/lg	NA
Saranex coveralls	Kappler/Abanda	77427/77428/77434	xl/lg	NA
Sijal acid suit	Chemtex Bata	91522-G	xl/lg	NA
Surgical gloves	Best	7005	xl/lg	NA
Neoprene gloves	Edmont	8-354	xl/lg	NA
Nitrile gloves	Granet	1711	10	NA
Butyl gloves	North	B-161	10	NA
Viton gloves	North	F-124	10/11	NA
Long gauntlet neoprene	Edmont	19-938	xl	NA
Cotton work gloves	North	Grip-N/K511M	men's	or equal
Latex booties	Rainfair	1250-Y	xl	NA
PAPR pesticide cartridges	Racal	AP-3	NA	NA
PAPR asbestos cartridges	Racal	SP-3	NA	NA
APR organic cartridges	MSA	GMC-H	NA	NA
APR asbestos cartridges	MSA	Type H	NA	NA
APR pesticide cartridges	MSA	GMP	NA	NA

9.0 PERSONAL HYGIENE AND DECONTAMINATION

A. Personnel Decontamination

Full decontamination facilities will be provided at all hazardous zones. The facilities will consist of an entrance from the exclusion zone followed by a series of stations as described below.

1. Gross contamination will be removed in the Exclusion Zone to the extent practical. Care will be taken not to compromise personal protective equipment or encapsulating materials while removing gross contamination.

2. Specific points to enter and exit the Contamination Reduction Zone will be established. Securing the flow through the decontamination area will reduce the likelihood of contamination leaving the area, as well as facilitate the use of decontamination supplies and materials, and the collection of waste and rinsate. An

emergency exit will be established to allow for immediate evacuation of the area, will the need arise.

3. Primary Decontamination: A rinsate of a compatible solution that does not adversely affect what is being decontaminated, especially personnel and personal protective equipment will be used to remove as much of the contamination as possible. The effectiveness of the decontamination will be visually verified and, if required by the nature of the contaminants, samples will be collected and analyzed to ensure sufficient decontamination.

4. Encapsulating material and outer protective clothing will be removed and isolated: For equipment, machinery, tools, supplies, and materials that have been encapsulated (e.g., wrapped in plastic), the encapsulating material will be removed with care to keep contain the contaminated side of the material. The material will be collected in a compatible storage container and disposed of accordingly. For personnel: The outer layer of protective clothing will be removed in the reverse order it was put on; outer gloves, over boots, outer layer of protective clothing, etc. Special care will be taken to reduce the risk of contaminating the worker. Required levels of protection until the worker is decontaminated, such as respiratory protection and safety eye wear will be maintained.

5. Under clothing, if necessary will be removed, and either cleaned or disposed of accordingly.

6. Personnel hygiene: To ensure decontamination, workers will shower/wash with special attention to given to hair, fingernails, and areas such as underarms and groin. Liquid soap will be used for personnel showers to prevent the potential of cross contamination from bar soap. Shower/wash water is to be collected and disposed of accordingly. Depending on the nature of the contaminants and worker exposure, this step may be accomplished by personal hygiene.

B. Disposal of Spent Clothing and Material

1. Contaminated clothing, used respirator cartridges and other disposable items will be put into drums/containers for transport and proper disposal in accordance with TSCA and RCRA requirements.

2. Containers/55-gallon capacity drums will conform to the requirements of 40 CFR Part 178 for Transportation of Hazardous Materials. The containers/drums containing excavated and other hazardous material will be transported to the staging area.

C. Posting Regulations

1. Signs will be posted at the perimeter of the Exclusion Zone that state "Warning, Hazardous Work Area, Do Not Enter Unless Authorized." In addition, a notice directing visitors to sign in will be posted at the project Site. Also, a sign will be posted stating that any questions about the Site will be directed to the New York State Department of Environmental Conservation.

2. Safety regulations and safety reminders will be posted at conspicuous locations

throughout the project area. The following safety regulations and safety reminders are at a minimum to be posted around the job Site:

10.0 SAFETY REGULATIONS

(To be posted for project personnel)

The main safety emphasis is on preventing personal contact with gases, soils, sludge and water. Towards that end, the following rules have been established.

A. Regulations

1. Eating, drinking, and smoking on the Site is PROHIBITED except in specifically designated areas.

2. All project personnel on the Site will wear clean or new gloves daily.

3. If you get wet to the skin, you will wash the affected area with soap and water immediately. If clothes in touch with the skin are wet, these will be changed.

4. You will wash your hands and face before eating, drinking or smoking.

5. Observe regulations on washing and removing boots before entering the dressing room or a clean area and showering before going home.

B. Recommendations

1. Do not smoke on Site with dirty hands; better yet, do not smoke.

2. Check for any personal habit which could get soil or water into your body.

   Examples: food off your fingers, wiping your face or nose with a dirty hand or running a dirty hand through your hair.

3. Check that any regularly worn clothing is clean. Examples include dirty watchbands, neck chains and a dirty liner on your safety helmet. Safety practices with poisonous chemicals can be summed up with a few words:

   Don't breathe in chemical odors and don't touch the water, soil, and sludge. If you do get dirty or wet, clean up as soon as possible.

C. Safety Reminder for toxic chemicals

(Post for Project Personnel)

Chemicals can't cause problems unless you breathe them, eat them, or put them on your skin.

1. Chemical in Gases, Soils, Sludge, and Water

Don't let them go into your mouth, nose, or stay on your skin. Use common personal hygiene.

a. Don’t eat or drink on the Site.

b. No smoking in the area of work.

c. Wear protective clothing.

d. Glove liners will be clean.

e. Wash your hands whenever practical. Wash before eating, drinking, or smoking.

f. Don’t carry chemicals home to your family. (For example, on clothing, mud in the car, dirty hands.)

g. Follow strictly the HASP.

11.0 EQUIPMENT DECONTAMINATION

A. General

1. All equipment and material used in this project will be thoroughly washed down in accordance with established federal and state procedures before it is removed from the project. With the exception of the excavated materials, all other contaminated debris, clothing, etc. that cannot be decontaminated will be disposed by a method permitted by appropriate regulatory agencies. All vehicles and equipment used in the "Dirty Area" will be decontaminated to the satisfaction of the SO in the decontamination area on Site prior to leaving the project. Written certification will be provided that each piece of equipment has been decontaminated prior to removal from the Site.

2. Decontamination will take place within the designated equipment and materials decontamination area. The decontamination will consist of removing materials (e.g. mud etc.) using a brush and an approved water soluble soap. Degreasing, followed by high-pressure, hot-water cleaning, supplemented by detergents will be conducted as appropriate. Wash units will be portable, high-pressure with a self-contained water storage tank and pressurizing system (as required). Each unit will be capable of heating wash waters to 180 degrees Fahrenheit and providing a nozzle pressure of 150 psi.

3. Personnel engaged in vehicle decontamination will wear protective clothing and equipment as determined in the HASP.

12.0 AIR MONITORING PROGRAM (AMP)

This air monitoring program (AMP) has been developed to ensure that the proper level of personnel protective equipment will be used, to document that the level of on-Site worker protection is adequate, and to assess and prevent the potential migration of contaminants to off-Site receptors as a result of Site work. The AMP includes both real-time and documentation air monitoring (personal and area sampling as needed). The purpose of real-time monitoring will be to determine if an upgrade (or downgrade) of PPE is required while performing on-Site invasive work and to implement engineering controls, protocols, or emergency procedures if established action levels are encountered. As part of the AMP, documentation monitoring will be conducted as warranted to ensure that adequate PPE is being used and to determine if engineering controls are mitigating the migration of contamination to off-Site receptors.

A. On-Site Worker Air Monitoring

For the On-Site Worker Air Monitoring for this project, a Photoionization Detector (PID) will be the employed. The instrument can detect and display the relative concentration level of VOCs in the atmosphere and will be used during invasive work including (e.g., drilling and collection of soil samples), to monitor the air in the breathing zone (i.e., from a height of 3 to 5 feet) to assess on-Site worker exposure to VOCs, (i.e., the principal chemicals of concern at the Site based on historic testing results). The equipment will be calibrated at least daily and in accordance with the manufacturer's specifications. On-Site worker action limits and response will be established as follows:

Parameter	Action Level	Action
Total Organic Vapors	0 ppm to < 1 ppm	Normal operations; record breathing zone monitoring measurements every hour.
	> 1 ppm to 5 ppm (sustained for 5 min)	Increase recording frequency to at least every 15 minutes and use benzene colorimetric tube to screen for presence of benzene.
	≥ 5 ppm to ≤ 50 ppm (sustained for 5 min)	Screen for the presence of benzene using colorimetric tube.
	> 50 ppm (sustained for 5 min)	Upgrade to level C PPE, continue screening for benzene. Stop work, evacuate work area, investigate cause of reading, reduce through engineering controls. Do not resume work until hazardous atmosphere has been controlled.
Visible Dust	Determined by on-Site SO	Stop work, institute dust containment/mitigation procedures

The potential implementation of VOC personal documentation sampling will be determined by the SO and project manager based on conditions encountered during initiation of invasive activities or as a result of changing field conditions.

B. Community Air Monitoring

The Community Air Monitoring Plan (CAMP) provided in Appendix B of the RAWP addresses potential project air emissions into the off-Site community that may occur during the implementation of the project and is consistent with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (DER-10 Appendix 1A) guidance for evaluation of potential airborne contaminant releases as a direct result of pre-design investigative and subsequent remedial activities.

13.0 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

A. Communications

1. Telephone communication will be provided at the Site field office. Emergency numbers, such as police, sheriff, fire, ambulance, hospital, poison control, NYSDEC, EPA, NYSDOH, and utilities, applicable to this Site will be prominently posted near the telephone.

2. A signaling system will be established for emergency purposes.

B. Emergency Show and Emergency Eye Wash

1. One portable eyewash/body wash facility will be provided and maintained per active hazardous work zone. The facility will have a minimum water capacity of 10 gallons and will conform to OSHA regulations 29 CFR 1910.151. The portable eyewash/body wash facility will be manufactured/ supplied by Direct Safety Company, Lab Safety Supply Company, or other appropriate suppliers.

C. Fire Extinguishers

1. At least one fire extinguisher will be provided and maintained in the project office and one at each active hazardous work zone. The fire extinguishers will be a 20-pound Class ABC dry fire extinguisher with UL-approval per OSHA Safety and Health Training Standards 29 CFR 1910.157. The fire extinguisher will be manufactured/supplied by Direct Safety Company, Lab Safety Supply Company, or other appropriate suppliers.

D. First Aid Kit

1. One 24-unit (minimum size) "industrial" or "Contractor" first aid kit, will be provided and located in the project office and at each and every hazardous work zone as required by OSHA requirements 29 CFR 1910.151. The first aid kit will be manufactured/supplied by Norton, Scott, or other appropriate suppliers.

E. Emergency Inventory

1. In addition to those items specified elsewhere, the SO will maintain the following inventory of equipment and protective clothing for use at the Site in the event of emergencies:

    a. Washable coveralls;

    b. Gloves (outer);

    c. Gloves (inner);

    d. SCBA;

    e. Face shields;

    f. Safety glasses;

    g. Respirators and appropriate cartridges;

    h. Disposable coveralls;

    i. Chemical-resistant boots and latex boot covers;

    j. Hard hats

14.0 EMERGENCY RESPONSE/CONTINGENCY PLAN AND PROCEDURES

A. Daily Work

1. During the process of work, the quality of the air in and around each active hazardous operation prior to personnel entering these areas will be monitored. Sampling will be conducted on a continuous basis. Based on the air monitoring data, the proper level of protection will be chosen by the SO.

B. Emergency Vehicle Access

1. In the event that emergency services vehicles (police, fire, ambulance) need access to a location which is blocked by the working crew operations, those operations (equipment, materials, etc.) will be immediately moved to allow those vehicles access. Emergency crews will be briefed as to Site conditions and hazards by the

SO. All vehicles and personnel will be decontaminated prior to leaving the Site.

A Site briefing will be scheduled with the local Fire Department at the completion of mobilization to familiarize emergency response personnel with his operations and Site layout.

C. Personal Injury Response Plan

1. In cases of personal injuries, the injured person or the crew personnel in charge will notify the SO. The SO will assess the seriousness of the injury, give first aid treatment if advisable, consult by telephone with a physician if necessary, and arrange for hospitalization if required. The SO will arrange for an ambulance if required.

2. If soiled clothing cannot be removed, the injured person will be wrapped in blankets for transportation to the hospital.

3. Personnel, including unauthorized personnel, having skin contact with chemically contaminated liquids or soils will be flushed with water after any wet or soiled clothing has been removed.

4. These personnel will be observed by the SO to ascertain whether there are any symptoms resulting from the exposure. If there is any visible manifestation of exposure such as skin irritation, the project personnel will refer to a consulting physician to determine whether the symptoms were the result of a delayed or acute exposure, a secondary response to exposure such as skin infection, or occupational dermatitis. All episodes of obvious chemical contamination will be reviewed by the SO in order to determine whether changes are needed in work procedures.

D. Route to the Hospital

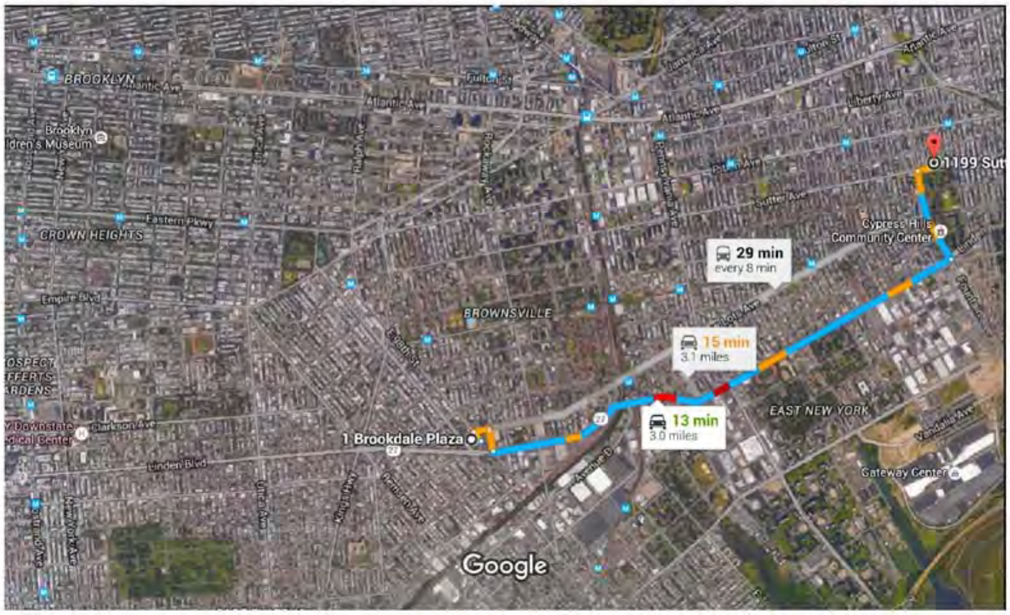
The nearest hospital to the Site is:
Brookdale Hospital
1 Brookdale Plaza
Brooklyn, NY 11212
(718) 240-5000

Directions to Brookdale Hospital from 1199 Sutter Avenue, Brooklyn, NY:

Depart Sutter Ave toward Chestnut St. (525 ft)
Turn Right onto Euclid Ave (0.3 mi)
Turn Right onto RT-27 W / Linden Blvd. (1.8 mi)
Keep straight onto Linden Blvd. (0.3 mi)
Keep left to stay on Linden Blvd (0.4 mi)
Bear right onto Rockaway Pkwy (220 ft)
Arrive at Rockaway Pkwy on the right

6/20/2016 1 Brookdale Plaza, Brooklyn, NY to 1199 Sutter Ave, Brooklyn, NY 11208 - Google Maps

Google Maps 1 Brookdale Plaza, Brooklyn, NY to 1199 Sutter Ave, Brooklyn, NY 11208 Drive 3.0 miles, 13 min



Imagery ©2016 Google, Map data ©2016 Google 2000 ft

	via Linden Blvd 11 min without traffic	13 min 3.0 miles
	via New Lots Ave and Linden Blvd 12 min without traffic	15 min 3.1 miles
	2:50 PM—3:19 PM B15	29 min

https://www.google.com/maps/dir/1+Brookdale+Plaza,+Brooklyn,+NY/1199+Sutter+Ave,+Brooklyn,+NY+11208/@40.6634748,-73.9097241,4329m/data=!3m2!1... 1/1

A map with written directions to the nearest hospital or emergency medical treatment facility will be posted in conspicuous places in the Support Zone.

E. Fire Service

Fire-fighting and fire protection measures will be discussed with the local Fire Chief. If there is a fire, the crewmen or their person in charge will immediately call the SO. The SO will immediately call the fire personnel. The air downwind from any fire or explosion will be monitored immediately in order to protect workers and the nearby community. If personal injuries result from any fire or explosion, the procedures outlined in the Personal Injury Response Plan will be followed.

F. Master Telephone List

The attached master telephone list will be completed and prominently posted at the field office. The list will have telephone numbers of all project personnel, emergency services including hospital, fire, police, and utilities. In addition, two copies with telephone numbers are to be given to the NYSDEC for emergency reference purposes.

Emergency Service	Telephone Number
EnviroTrac Emergency Hot-line	(800) 652-5140
Fire Department	911
Police Department	911
Ambulance	911
Hospital/Emergency Care Facility	(718) 240-5000
Poison Control Center	(800) 336-6997
Chemical Emergency Advice	(800) 424-9300 (CHEMTREC)
New York State Dept. of Environmental Conservation - Central Office Albany	(518) 402-9614
New York State Dept. of Health - Albany	(518) 402-7860

15.0 HEAT STRESS MONITORING

A. Site personnel who wear protective clothing allow body heat to be accumulated with an elevation of the body temperature. Heat cramps, heat exhaustion, and heat stroke can be experienced, which, if not remedied, can threaten life or health. Therefore, an American Red Cross Standard First Aid book or equivalent will be maintained on Site at all times so that the SO and Site personnel will be able to recognize symptoms of heat emergencies and be capable of controlling the problem. The SO will be trained in first aid and CPR from the American Red Cross (or an equivalent training program).

B. When protective clothing is worn, especially Levels A and B, the suggested guidelines for ambient temperature and maximum wearing time per excursion are:

Maximum Wearing Time Per Excursion

Temperature (EF)	(Minutes)
Above 90	15
85 to 90	30
80 to 85	60

70 to 80	90
60 to 70	120
50 to 60	180

C. One method of measuring the effectiveness of employees' rest-recovery regime is by monitoring the heart rate. The "Brouha guideline" is one such method:

1. During a 3-minute period, count the pulse rate for the last 30 seconds of the first minute, the last 30 seconds of the second minute, and the last 30 seconds of the third minute;

2. Double the count;

D. If the recovery pulse rate during the last 30 seconds of the first minute is at 110 beats/minute or less and the deceleration between the first, second, and third minutes is at least 10 beats/minute, the work-recovery regime is acceptable. If the employee's rate is above that specified, a longer rest period is required, accompanied by an increased intake of fluids.

E. In the case of heat cramps or heat exhaustion, "Gatorade" or its equivalent is suggested as part of the treatment regime. The reason for this type of liquid refreshment is that such beverages will return much-needed electrolytes to the system. Without these electrolytes, body systems cannot function properly, thereby increasing the represented health hazard.

F. This liquid refreshment will be stored in a cooler at the edge of the decontamination zone in plastic squeeze bottles. The plastic bottles will be marked with individual's names. Disposable cups with lids and straws may be used in place of the squeeze bottles. Prior to drinking within the decontamination zone, the project personnel will follow the following decontamination procedures:

1. Personnel will wash and rinse their outer gloves and removed them;

2. Personnel will remove their hard hats and respirators and place them on the table;

3. Personnel will remove their inner gloves and place them on the table;

4. Personnel will wash and rinse their face and hands;

5. Personnel will carefully remove their personal bottle or cup from the cooler to ensure that their outer clothes do not touch any bottles, cups, etc.

6. The used bottle or cups will not be returned to the cooler, but will be placed in a receptacle or container to be cleaned or disposed of.

7. Personnel will replace their respirators, hard hats, gloves and tape gloves prior to re-entering the hazardous zone.

G. When personnel are working in situations where the ambient temperatures and humidity are high and especially in situations where protection Levels A, B, and C are required--the SO will:

1. Assure that all employees drink plenty of fluids ("Gatorade" or its equivalent);

2. Assure that frequent breaks are scheduled so overheating does not occur; and

3. Revise work schedules, when necessary, to take advantage of the cooler parts of the day (i.e., 5:00 a.m. to 1:00 p.m., and 6:00 p.m. to nightfall).

16.0 COLD STRESS MONITORING

A. The SO will use the equivalent chill temperature when determining the combined cooling effect of wind and low temperatures on exposed skin or when determining clothing insulation requirements.

B. Site personnel working continuously in the cold are required to warm themselves on a regular basis in the on-Site hygiene facility. Warm, sweet drinks will also be provided to Site personnel to prevent dehydration. The SO will follow the work practices and recommendations for cold stress threshold limit values as stated by the 1991-1992 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices by the American Conference of Governmental Industrial Hygienists or equivalent cold stress prevention methods.

Whole-body protection will be provided to all Site personnel that have prolonged exposure to cold air. The right kind of protective clothing will be provided to Site personnel to prevent cold stress. The following dry clothing will be provided as deemed necessary by the SO:

1. Appropriate underclothing (wool or other);

2. Outer coats that repel wind and moisture;

3. Face, head, and ear coverings;

4. Extra pair of socks;

5. Insulated safety boots; and

6. Glove liners (wool) or wind- and water-repellant gloves.

17.0 LOGS, REPORTS AND RECORD KEEPING

A. Security Log

1. A daily log of security incidents and visitors granted access to the Site will be

maintained, as well as a log of all personnel entering and exiting the Site.

2. All approved visitors to the Site will be briefed by the SO on safety and security, provided with temporary identification and safety equipment, and escorted throughout their visit. Site visitors will not be permitted to enter a hazardous work zone.

3. Project Site will be posted, "Warning: Hazardous Work Area, Do Not Enter Unless Authorized," and access restricted by the use of a snow fence.

B. Safety Log

1. The SO will maintain a bound safety logbook. The log will include all health and safety matters on Site and include, but not be limited to, the following information:

   a. Date and weather conditions on Site;

   b. A description of the proposed work for the day;

   c. Times when Site personnel arrive and depart;

   d. Air monitoring data;

   e. Heat and/or cold stress monitoring;

   f. Decontamination procedures;

   g. Type and calibration of air sampling/monitoring equipment used;

   h. Safety meeting summaries; and

   i. Accidents.

C. Emergency or Accident Report

Any emergency or accident will be reported immediately to the SO and HSC. The project manager will also be notified. A written report will be submitted, but no later than 24 hours of its concurrence. The report will include, but not be limited to, the nature of the problem, time, location, areas affected, manner and methods used to control the emergency, sampling and/or monitoring data, impact, if any, to the surrounding community, and corrective actions the that will be instituted to minimize future occurrences. All spills will be treated as emergencies.

D. Daily Work Report

1. EnviroTrac will maintain a daily work report that summarizes the following:

   a. Work performed;

   b. Level of protection;

c. Air monitoring results;

d. Safety-related problems; and

e. Corrective actions implemented.

18.0 COMMUNITY PROTECTION PLAN

A. General

As part of this HASP, a Community Protection Plan (CPP) was developed that outlines those steps to be implemented to protect the health and safety of surrounding human population and the environment.

B. Air Monitoring

The CAMP provided in Appendix B of the RAWP addresses potential project air emissions into the off-Site community that may occur during the implementation of the project and is consistent with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (DER-10 Appendix 1A) guidance for evaluation of potential airborne contaminant releases as a direct result of pre-design investigative and subsequent remedial activities.

C. Odor

If odor complaints are received from nearby residences during Site activities either odor masking agents or other odor control methods will be used subject to ENGINEER's review. Odor suppression methods will be employed during each day that odor complaints are received.

D. Off-Site Spill Response

As part of the HASP a Spill Response Plan, also coordinated with local officials, in case of an off-Site spill of either liquid or solid wastes has been prepared. The plan includes transportation routes and times, as well as the minimum requirements set forth in the Subpart titled "On-Site Spill Containment Plan." The driver will be supplied with Safety Data Sheets (SDSs), a 24-hour emergency phone number, and instructions for reporting emergencies to local agencies and the project Site.

19.0 CONFINED SPACE WORK

The need to conduct confined space work is not envisioned for this project. However, in the event that a need arises the following procedures will be employed and augmented as warranted.

A. Evaluate the work areas and determine if there are any permit-required confined spaces. If it is determined that personnel will not need to enter a permit-required confined space, appropriate measures to prevent personnel from entering such will be taken. If it is determined that personnel will need to enter a permit-required confined space, a written permit-required confined space program will developed by the SO and HSC and implemented.

B. The written program will comply with 29 CFR 1910.146 and will include the following:

   1. Implement methods to prevent unauthorized entry;

   2. Identify and evaluate the hazards of permit-required confined spaces before personnel entry;

   3. Develop and implement procedures for safe permit-required confined space entry;

   4. Provide the appropriate equipment to evaluate permit-required confined spaces;

   5. Evaluate permit-required confined spaces when entry operations are conducted;

   6. Provide at least one attendant outside the permit-required confined space which will be entered;

   7. Designate the personnel who will have active roles in entry operations;

   8. Develop and implement procedures for obtaining rescue and emergency services;

   9. Develop and implement a system for the preparation, issuance, use, and collection of entry permits;

   10. Develop and implement procedures to coordinate entry operations when personnel from more than one employer are working;

   11. Develop and implement procedures for concluding the entry;

   12. Review and revise entry operations if measures may not protect personnel; and

   13. Review the permit-required confined space program to ensure personnel are protected from the hazards present.

C. Copies of the permit-required confined space program and employee training certificates are presented in Appendix E.

20.0 SPILL CONTAINMENT PLAN

As part of this HASP a site specific Spill Containment Plan (SCP) has been prepared to address potential spills and discharges that may occur as a result of onsite transport, storage and/handling of the permanganate solution and other regulated materials. A copy of the SPC is presented in Appendix E.

Figures

TOPOGRAPHIC MAP

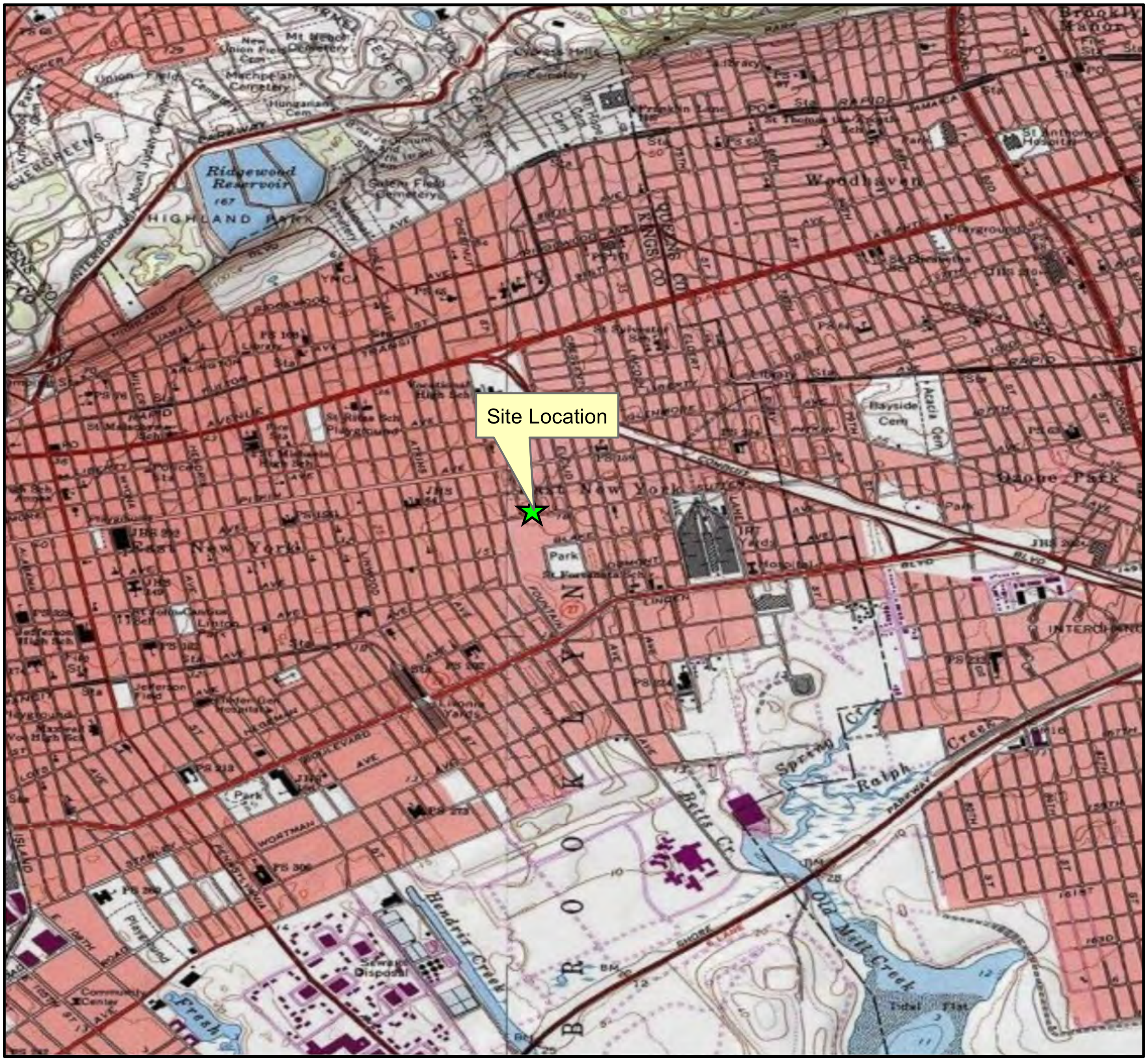


Figure 1
Topographic Map

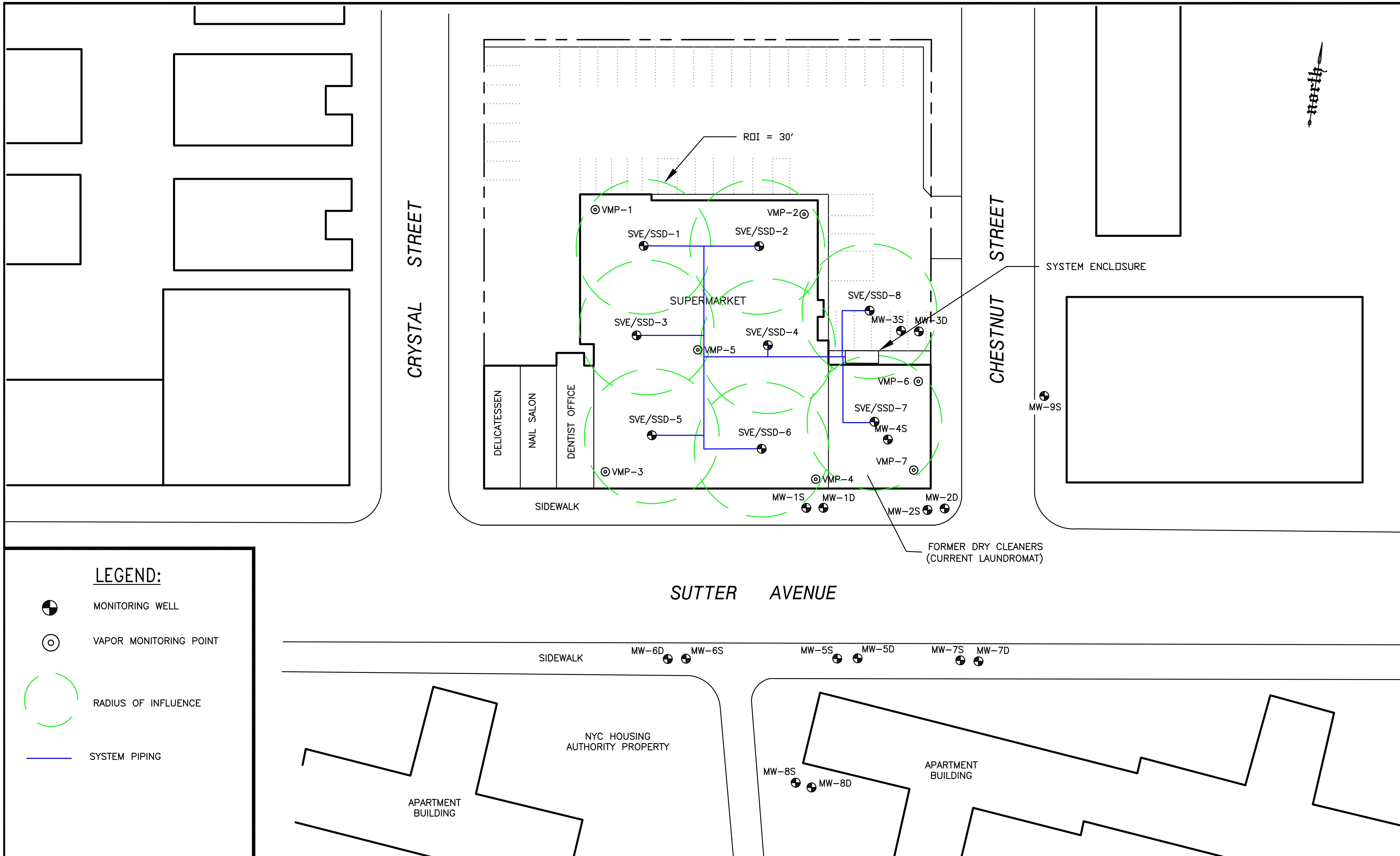
1199 Sutter Avenue
Brooklyn, NY 11208

USGS Quadrangle:
Brooklyn

Approx. Elevation:
19 feet

N
W E
S

EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631-924-3001 F:631-924-5001



EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924-3001 FAX: (631)924-5001

0 20 40
SCALE IN FEET

DATE: 7/6/2016

REVISED BY: EG

1199 SUTTER AVENUE
BROOKLYN, NEW YORK

PROPOSED SVE WELL LOCATIONS

FIGURE #
2

<u>Appendix A</u>
HSC Qualifications

Corporate Resume

EnviroTrac

Solutions in Action

Experience Summary

- Directed Company Safety & Health Operations for Construction, Manufacturing, Transportation, Facility & Emergency Response Operations
- Directed EHS Program for Materials & Metals Recovery/Recycling Operations, Successfully Obtained ISO 14001 Certification
- Managed Hazardous Material & Waste & Petroleum Storage Operations, Including Emergency Response Programs & Remedial Activities for 300+ sites
- Experience Trainer for Safety Programs

Education

- MS Environmental Science, NJ Institute of Technology, 1994
- BS Biology & Chemistry, Rowan University, NJ, 1987

Michael A. Clark

MS, CHMM

Director Health & Safety

Please Contact:

6 Terri LN, STE 350

Burlington, NJ 08016

609-387-5553

Or visit our website:

envirotrac.com

Mr. Clark has over 25 years experience in the environmental, health and safety field managing and directing programs for Fortune 100 corporations, manufacturing and construction companies and consulting firms. He currently is the Corporate Director of EnviroTrac's Health and Safety program.

Safety is a strategic part of EnviroTrac's operations and as Director of Health and Safety, Michael ensures that our safety program focuses on our employees to ensure that they have the training, knowledge and the tools to perform their jobs safely.

Using a behavior-based safety model, EnviroTrac employees are taught to take responsibility and accountability for their own safe work practices. Task-specific hazards are identified and employees are trained, updated and refreshed on how to recognize hazards and mitigate risks.

As Director of Health and Safety Mr. Clark has developed and implemented: accident reporting, investigating, & root cause analysis procedures; ground disturbance procedures for subsurface investigation, drilling, and trenching & excavation; safe driving and behind-the-wheel training; in-house OSHA HazWOPER training; traffic control and work area protection; respiratory protection; confined space entry; personal protection equipment requirements and various other safety programs.

EnviroTrac uses a network of Safety Coordinators to oversee the safety program in each of the EnviroTrac regional offices. Mr. Clark personally manages this network and continuously reviews and updates the Health & Safety program so that the practices, policies and procedures meet or exceed laws, regulations, client-specific requirements and maintain our own standards for the health and safety of our employees.

Think before you act, remember - Safety First!!!

Experience
highlight 2015

Corporate Resume

EnviroTrac

Please Contact:

6 Terri LN, STE 350

Burlington, NJ 08016

609-387-5553

Or visit our website:

envirotrac.com

Michael A. Clark
MS, CHMM

Director Health & Safety

Professional Certifications

Certified Hazardous Materials Manager (CHMM), Institute of Hazardous Materials Management - Master's Level

Advanced Safety Certification, National Safety Council

40-hour HazWOPER certificate and subsequent 8-hr refresher training

Fundamentals of Industrial Hygiene - Harvard School of Public Health

Industrial Ventilation Workshop - AIHA

Advanced IAQ/HVAC Diagnostics Training Course - HL Turner Group

Implementing the ISO 14001:2004 Program workshop

Professional Highlights and Selected Projects

- Mr. Clark has directed the health and safety program for construction projects and facility operations throughout all five boroughs of New York City. He developed and implemented programs that addressed heavy equipment/construction operations, traffic control and work area protection, confined space entry, working at heights, exposure to heat/cold, hazardous materials, hazardous and regulated waste, personal safety and other factors unique an extreme urban environment.

- Mr. Clark has prepared heath and safety worksite from a wide range of hazardous material impacted projects, including PCB exposure monitoring for both airborne and surface contact; industrial processing exposure to mercury vapor and surface contamination; benzene exposure assessments for environmental remediation workers; and asbestos and lead management plans to control worker exposure while managing these materials in place.
-
- In addition to his focus on safe work environments, Mr. Clark implemented a safe driving program for operations in New York City. The program addressed the re-

About EnviroTrac

EnviroTrac is an environmental consulting and remediation firm delivering a wide range of services for a diverse clientele throughout the United States. With a staff of over 130, we exist to provide outstanding quality and value to our clients.

Experience
highlight 2011

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Michael A. Clark
MS, CHMM

Director Health & Safety

quirements of operating vehicles in the most congested urban area of the country and used both classroom training and behind-the-wheel instruction to educate drivers on techniques to safely operate in this unique environment. Following the training, motor vehicle accidents for the company in that market decreased by 30%, resulting in overall cost savings estimated at over $100,000 per year.

- Developed and administered Respiratory Protection Programs for multiple companies encompassing hundreds of employees. These programs have included hazard identification, employee medical monitoring, baseline and periodic biological monitoring, respirator selection and change schedules, and annual review and update of the program as required by OSHA. Mr. Clark is a "Competent Person" as defined by OSHA to administer respirator fit tests and manage a respiratory protection program.

- Conducted over 200 indoor air quality and industrial ventilation investigations and implemented exposure control and remediation actions for worker exposure to: heavy metals, VOC's and other hazardous materials, confined spaces contaminated with hazardous materials, sick building syndrome and mold contamination and industrial ventilation controls during manufacturing processes.

- Developed the in-house EnviroTrac 40-hour OSHA Hazardous Waste Operations and Emergency Response (HazWOPER) certification and 8-hour annual refresher training programs that complies with the requirements of 29CFR 1910.120, Appendix A recommendations. Mr. Clark personally delivers both the 40-hour and 8-hour training to EnviroTrac employees.

- In addition to his work in safety, Mr. Clark also has extensive experience in the environmental field managing petroleum storage operations, air and water environmental discharge permitting and emergency response operations for hazmat spills and releases.

- His experience includes the installation, upgrade and removal of under and above ground storage systems, developing and updating SPCC plans and inspection plans

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Michael A. Clark
MS, CHMM

Director Health & Safety

and monitoring systems. Mr. Clark has managed multiple remediation activities from full site excavation of contaminated soils, to pump and treat systems, underground injection and extraction systems and passive remediation and monitoring.

- Mr. Clark has obtained over 500 air and water discharge permits from environmental state agencies, implemented and audited programs for compliance to permit requirements and prepared discharge reports to the appropriate agencies. Type of permits include: Federal Title V Air Discharge Permit, NPDES water discharge permits, and minor source permits in Washington DC, MA, MD, NH, NJ, PA, and RI.

- During the restoration efforts at *Ground Zero* in NYC after the attacks of 9/11/01, Mr. Clark managed the decontamination of the Verizon telecommunications hub at the World Trade Center Complex that facilitated the restoration of 2M data and 1.5 M voice lines to re-establish communications for lower Manhattan and Wall St.

- While directing the environmental operations for a materials and metals recovery/recycling firm, Mr. Clark developed and implemented the company's environmental program under the strict requirements of ISO 14001:2004. The program applied for and successfully passed the ISO audit with no "non-compliance" issues identified by the Accreditation body and was issued an ISO 14001 certification.

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Experience

highlight 2013

Appendix B
EnviroTrac's Practice for Ground Disturbance

28 GROUND DISTURBANCE PROGRAM

28.1 Purpose

To clearly specify under what conditions the employees of EnviroTrac may conduct operations where any indentation, interruption, intrusion, excavation, construction, or other activity results in the penetration of the ground at any depth.

This document also covers the hazards, procedures, and training associated with the entering of trenches and excavations by employees of EnviroTrac, as defined under 29 CFR 1926 Subpart P. It is intended to provide the guidelines that protect employees from the hazards of entrapment and engulfment when working around trenches and excavations.

28.2 Identification of Underground Installations

It is the policy of EnviroTrac that prior to any operations that disturb more than one foot below surface grade that all underground installations are to be identified. Before any ground disturbance activities, available records will be referenced and operator personnel and/or others that may be familiar with the property will be contacted to determine the existence and location of underground installations such as facilities/tanks/pipelines and utilities in the vicinity of the work area to verify, as far as is reasonable and practicable, the existence of known underground installations.

Areas where hand tools are used for ground disturbance operations, such as shovels, hand augers, etc., will be visually assessed for possible underground installations, utilities, and/or facilities. If underground installations are identified as having hazardous energy, such as electrical power, hydraulic pressure, chemical pipe lines, etc., than procedures to control that hazardous energy will be instituted as required in Section 26 – Control of Hazardous Energy Sources (Lockout / Tagout).

Ground disturbance operations that use mechanical equipment pose a greater threat to underground installations. Prior to ground disturbance operations using mechanical equipment, local requirements for identification of underground utilities will be followed, such as notifying a “One Call Center”, “Call Before Your Dig”, etc. or engaging a third party utility mark out contractor. The Regional Safety Coordinator will maintain current underground utility identification requirements for the regional operations.

Exposing Underground Installations

All underground installations within the dig zone or a drill zone will be hand exposed or vacuum excavated (pothole) to sufficiently verify location, line size, and alignment of underground installations. Care has to be taken during the process of exposing underground installations; damage could occur if cautious work procedures are not followed. The process to expose any installations is to be selected based on site conditions/risks.

The pothole(s) will be made large enough and suitably spaced to accurately determine location, depth, orientation, and facility size. The bottom and sides of the pothole are to be adequately illuminated to determine the presence or absence of underground facilities. Visually confirm the presence or absence of underground facilities continuously during potholing. Use a commercial jacking tool or A-frame and winch to extract a hand auger if the force required to extract the tool exceeds personal lifting limits (50 pounds).

Boreholes will be cleared to a minimum of 5 feet and 110 percent of the mechanical drilling tool diameter, or to the client's/facility's requirements, if different. If a boring is located within 2 feet of an underground facility, a protective casing will be placed in the cleared boring prior to mechanical drilling to guide the drilling tool instead of exposing the underground facility.

28.3 Overhead Utilities and other Overhead Hazards

Overhead utilities pose several hazards including electrical shock or burn, electrical arc or blast, and disruption of services provided by the overhead utilities. All work sites will be assessed for hazards associated with the overhead utilities including all means of access to and egress from the site.

In addition, other overhead and low clearance facilities and structures will be evaluated and assessed for hazards associated with the type of work being performed including all means of access to and egress from the site.

For work areas with overhead utilities, all work performed by EnviroTrac personnel or contractors will not violate the **Minimum Approach Distances** specified in the table below:

Nominal voltage in kilovolts (kV)	Distance: Phase to ground exposure
0.05 to 1.0	Avoid contact
1.1 to 15.0	2'-1" (0.64m)
15.1 to 36.0	2'-4" (0.72m)
36.1 to 46.0	2'-7" (0.77m)
46.1 to 72.5	3'-0" (0.90m)
72.6 to 121	3'-2" (0.95m)
138 to 145	3'-7" (1.09m)
161 to 169	4'-0" (1.22m)
230 to 242	5'-3" (1.59m)
345 to 362	8'-6" (2.59m)
500 to 550	11'-3" (3.42m)
764 to 800	14'-11" (4.53m)

Reference Table R-6 in 29 CFR 1910.269(l)(10)

The specific voltage of a line cannot be visually determined strictly by the placement of the line on the utility pole. Contact the local power company to determine specific voltages of power lines if the scope of work or access to or egress from the site could affect overhead utilities.

If Minimum Approach Distances cannot be maintained during the scope of the work, the lines are to be de-energized by the utility company who will need to certify, in writing, that the lines have been de-energized. To prevent damage, provisions will have to be made so de-energized lines are not contacted.

If the scope of work will bring workers or equipment near the Minimum Approach Distances, these areas will be demarcated and/or cordoned off to prevent crossing into unsafe areas. Spotters will be used if demarcation is not sufficient to prevent encroachment into these areas. The sole responsibility of the spotter will be to warn workers and/or equipment operators that the Minimum Approach Distances may be encroached.

Equipment and vehicles will not be parked overnight or refueled under energized power lines.

In the event of a downed utility line (power or communication), a “circle of safety” will be maintained at a minimum of a 30-foot radius from the downed line. Contact emergency services (911) to report the downed line. Communication lines can become energized when dislodged from the pole or if in contact with power lines.

Other Overhead Hazards

Communication Lines:

Communications lines (generally the lines closest to the ground) usually do not transmit hazardous voltage under normal operating conditions. These lines can cause obstructions that may dislodge loads and/or equipment if contacted. In addition, the company may incur liability for disruption of service if these lines are broken.

Guy Wire:

Guy lines are used to support utility poles and are composed of braded steel cables generally under tension. These lines are not energized under normal operating conditions but may cause damage to equipment or personal injury if contacted.

Demark all Guy Lines in work areas and access to or egress from the site. Spotters will be used if demarcation is not sufficient to prevent contact with Guy Lines.

Building Overhang, Canopies, Bridges, Overpasses, Signs, etc.

In addition to overhead utilities, the project is to be assessed for other overhead hazards that may interfere with the scope of work. These hazards include: canopies, building overhang, signs, bridges, overpass and other hazards. The Project Manager will assess or have the work site assessed for these overhead hazards and include provisions in the work plan to prevent contact, damage, or encroachment of safe Minimum Approach Distances.

28.4 Traffic Control in Construction Sites

Limited space in a construction site increases the potential for worker injury and property damage from vehicle accidents and collisions. To alleviate this, construction sites are to be designed to facilitate vehicle flow and to limit backing.

When vehicles are required to back, a spotter should be used to clear a path of travel. Construction vehicles are to be equipped with a backup beeper. Workers are to wear high visibility apparel (i.e., safety vests), either Class I, II, or III depending on the speed limit of the work site and adjacent traffic areas.

The swing radius of construction equipment is to be demarked so workers are aware of the area and do not enter while equipment is operating. Workers will seek and receive acknowledgement from equipment operators prior to entering the swing radius. Equipment operators will stop operations when workers or equipment enters the swing area.

Operations adjacent to an active traffic area will follow the requirements of EnviroTrac's Work Zone Protection program and the requirements of the USDOT Uniform Traffic Control Manual.

28.5 Environmental Drilling

Work Zone Designation

A Work Zone will be established and controlled around environmental drilling activities that allow only authorized personnel access to the zone. The driller will *Stop Work* when an unauthorized person enters the drilling zone. Follow the procedures listed in the ET Stop Work Practice. The current version of the practice is located on the Safety Portal.

Where open auger operations are used, the driller will establish additional controls such as risk-assessed procedures, signals, an area guard, or other effective means to verify that personnel are clear of the auger any time it is rotating.

Inspection of Drilling Equipment

The driller will inspect the drilling equipment on a daily basis or before each new setup by using an inspection checklist. The inspection will verify that the equipment is in good working order; pressurized hoses are in good condition, and safeguards and kill switches are in place and operational. Any substandard items will be corrected prior to drilling.

Drill Rig Operator

The drill rig operator will remain at the controls unless the rig is shut down. While the drill rig is running, the drill rig operator will not use a mobile phone or radio. The drill rig operator will not wear loose objects or clothing that could inadvertently activate the rig clutch or controls.

Performing Drilling Operations

Prior to conducting drilling operations on site, a Pre-Drilling Site Walkover will be conducted by the drilling operators and a person familiar with the site, preferably the site owner/operator.

During the site walkover, the following will be reviewed, documented, and discussed with the Workforce during the Tailgate Safety Meeting:

- Emergency provisions including the location and operation of emergency shut-offs.
- Ground conditions and topography of locations where drilling rig is to located.
- Overhead utilities and/or obstructions.
- Lay down of materials and supplies including the process to secure of drilling rods and flights, and sampling and waste barrels from falling or rolling.
- Access and egress for the site and muster points in the event of emergency.

If during the site walkover it is determined that the proposed scope of work may impact underground facilities, the project will be re-evaluated for the necessity of data collection versus the risk from impacting underground facilities. If revised or alternative locations are selected, another site walkover will be conducted.

During drilling operations, caution must be taken when drilling between the cleared depth and 20' as underground facilities may still be present. Provisions must be made to communicate during high-noise conditions including the agreement on the meaning of hand signals.

Climbing the Rig

In the event it is necessary to the climb the drilling rig for maintenance or repair, follow procedures listed below:

- If the lowest part of the worker will be higher than 6’, Working At Heights provisions will be required and the provisions of the ET Working At Heights practice will be followed.
- If work on the mast is to proceed, the drill rig will be shut down and locked out before any work on the rig, including the mast can proceed.

28.6 Trenching and Excavation

This section defines the conditions under which employees may enter trenches and excavations. The Excavation Awareness Program described herein is based upon the following government regulations and industry standards:

- CFR Title 29 Part 1926 Subpart P - Excavations
- CFR Title 29 Part 1926.650- Scope, applications, definitions
- CFR Title 29 Part 1926.651- General requirements
- CFR Title 29 Part 1926.652- Requirements for protective systems

The following definitions are included in the above regulations, and are considered pertinent to this program:

- <u>EXCAVATION</u>: Any man-made cut, cavity, trench or depression in the earth surface, made by earth removal.
- <u>TRENCH</u>: A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width cannot exceed 15 feet.
- <u>BENCHING</u>: A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal steps.
- <u>SHIELDING</u>: A structure that is able to withstand the forces imposed by a cave-in and thereby protects employees within the structure.
- <u>SHORING</u>: A structure that supports the sides of an excavation and which are designed to prevent cave-ins.
- <u>SLOPING</u>: A method of protecting employees from cave-ins by excavating to form sides of an excavation that is inclined away from the bottom of the excavation so as to prevent cave-ins.
- <u>STABLE ROCK</u>: Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed.
- <u>COMPETENT PERSON</u>: Defined by OSHA as a person capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees. Authorized to take prompt corrective measures to eliminate existing and predictable hazards and to stop work when required. A competent person should have and be able to demonstrate the following:
  1. Training, experience, and knowledge of:
     a. Soil Analysis
     b. Use of protective systems
  2. Ability to detect:
     a. Conditions that could result in cave-ins
     b. Failures in protective systems
     c. Hazardous atmospheres

d. Other hazards including those associated with confined spaces

Any excavation five feet deep or deeper is not considered safe from cave-ins unless one or more of the following conditions exist:

- It is made entirely of stable rock.
- It has been inspected daily by a competent person and pronounced safe.
- Protective systems are installed which have the capacity to protect workers from cave-ins, which include: sloping, benching, shielding, and shoring that have been inspected daily by a competent person and pronounced safe.

Any excavation four feet deep or deeper that requires human occupancy will require a Competent Person to classify the soil and/or rock deposits of the excavation area as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in 1926 CFR Subpart P Appendix A paragraph (b). Protective systems will be selected based on the flow chart listed in 1926 CFR Subpart P, Appendix F – Selection of Protective Systems. For excavations greater than 20 feet, protective systems will be designed by a Professional Engineer. All protective systems will meet or exceed the minimum standards as specified in 1926 CFR Subpart P:

- Appendix B – Sloping and Benching,
- Appendix C – Timer Shoring for Trenches,
- Appendix D – Aluminum Hydraulic Shoring for Trenches, or
- Appendix E – Alternatives to Timber Shoring.

Atmospheric Testing of Excavation and Trenches

Any excavation, including trenches, four feet deep or deeper that requires human occupancy located in an area where hazardous atmospheres could reasonably be expected to exist, such as landfills, hazardous materials storage facilities, hazardous waste sites, and other environmental remediation areas may only be entered after the atmospheres in those excavations are tested to ascertain that the oxygen content in the excavation is greater than 19.5% and the combustible gas concentration is less than 10% of the LEL of the gas present.

Additional air monitoring is to be conducted for the presence of airborne toxins suspected based on the contamination present at the area of ground disturbance. Engineering controls will be instituted to alleviate employee exposure or, if not feasible, sufficient personal protective equipment will be worn to control worker exposure.

Access, Egress, and Crossings of Excavation or Trench

Any excavation four feet deep or deeper that requires human occupancy must have a ladder, ramp, or other safe means of egress located so that each employee need travel no more than 25 feet in any direction to reach a means of escape.

Crossings over the excavation or walkways within six (6) feet of the excavation are to be designed with handrails that meet OSHA requirements for fall protection.

Water Accumulation in Excavation or Trench

In the event water accumulates in the excavation, the following requirements for controlling this accumulation must be provided if personnel are to enter or work in the excavation:

- Personnel must not work in excavations where standing water has accumulated,
- Water removal or de-watering equipment, such as pumps, are installed and monitored by a competent person,
- Personnel must exit from excavations during rainstorms,
- Trenches must be carefully inspected by a competent person after each rain and before personnel are permitted to re-enter.

Suspended Loads

Workers in the excavation and other areas of the worksite are to be protected against falling loads and are not allowed to be under or in the swing radius of any equipment working with a load.

Authority and Administration

Within EnviroTrac, the Director of Health and Safety, and the designated Regional Health and Safety Coordinators will be responsible for the generation and execution of all portions of the program, and will have the necessary authority to assure that all requirements of this program are properly fulfilled, will administer this program.

28.7 Excavation Entering Procedure

It will be the policy of EnviroTrac not to allow any of its employees to enter excavations for any reason unless that excavation meets the conditions for being safe from cave-in, has been tested to assure that the atmosphere is safe, and has a proper means of ingress/egress as outlined above.

When EnviroTrac is employed as the prime/sole contractor at a facility where excavations are or will be present, the EnviroTrac designated Competent Person will have the responsibility to ascertain that all excavations meet the requirements of the above regulations prior to any employee or contractor entering into such excavations. The Competent Person will perform daily inspections of the excavations or immediately after a rain event using the Trench Inspection and Entry Authorization form located at the end of the this practice.

When EnviroTrac is employed as a sub-contractor at a facility where the client has the responsibility for determining the hazards at the site or location associated with excavations, and consequently controls the compliance to the pertinent excavation regulations, EnviroTrac employees will enter such excavations only if the excavations has been inspected and cleared by the Competent Person and the employee is satisfied that the excavations are safe and meet the conditions for being safe from cave-in.

Should contractors, clients or others request an employee to enter an excavation that the employee does not feel is safe and free from cave-in hazards, the employee is to state that he/she does not consider the excavation safe, inform his/her supervisor and/or the Project Manager, and await further instructions.

28.8 Alternatives to Excavation Entry

Sampling in excavations should always be performed utilizing construction equipment such as backhoes or long handled samplers wherever possible. Entering excavations should always be the last alternative, and must never be undertaken without first ensuring that the excavation is safe from cave-in.

28.9 Employee Training

All employees who are required to enter excavations for any reason will successfully complete an Excavation Awareness Training Program, which will include, but not be limited to the following topics,:

- The contents of 29 CER 1926 Subpart P
- The contents of this EXCAVATION AWARENESS PROGRAM.
- The dangers of excavation entry.
- Alternatives to entering excavations for sampling.

EnviroTrac employees must be made aware of the danger of sidewall collapse for persons standing near the excavation during training. The awareness training will include Control of Hazardous Energy (Lockout/Tagout) for operations that require ground disturbance and include local and pertinent requirements for underground utility identification and mark out.

Documentation of training will be maintained by the EnviroTrac's Safety Department and will include the employee's name; date(s) of training; subject, curriculum, handouts, and pertinent training materials; and trainer's name and title.

The Regional Health and Safety Coordinator will conduct periodic inspection of random work sites to ascertain that this Excavation Awareness Program is conscientiously being followed.

28.10 Program Evaluation

The Corporate Health and Safety staff will review all aspects of this Excavation Awareness Program at least annually to assure its effectiveness. Whenever modifications in work scope, equipment changes or modification, revision of federal regulations or standards, or any action that would necessitate a change in any of the contents of this Excavation Awareness Program occur, such changes will be made, and everyone affected by those changes notified and retrained, if necessary. All such modifications will be made in writing, and the nature of the modification noted and dated.

28.11 Enforcement

The following disciplinary actions will be administered to employees found to be willfully negligent or not complying with the provisions of this policy:

- First Offense: If the violation is correctable, the employee will receive a written warning detailing the nature of the offense, which will be documented in the employee's personnel file. In addition, if the violation is not correctable, the employee will be dismissed from the site and sent home for the day without pay.
- Second Offense: The employee will receive a written warning detailing the nature of the offense, documented to their personnel file, and one day off without pay, regardless of whether the violation is correctable.
- Third Offense: The employee will receive a written warning detailing the nature of the offense, documented to their personnel file, and one week off without pay, regardless of whether the violation is correctable.

- Fourth Offense: The employee will be terminated with cause.

Should willful noncompliance or negligence to the provisions of this policy result in injury or increased risk to another individual then disciplinary action will be more severe than the normal sequence of the above procedures may be administered. All of the above disciplinary steps will be administered within the scope and intent of written company personnel policies.

TRENCH INSPECTION AND ENTRY AUTHORIZATION FORM

LOCATION:			**DATE:**
TIME OF INSPECTION(S)			
WEATHER CONDITIONS:		**APPROX. TEMP.:**	
CREW LEADER:		**SUPERVISOR:**	

				Yes	No	
DIMENTIONS:	**DEPTH =**					**HAZARDOUS CONDITIONS**
	TOP =	W	L	❑	❑	.... Saturated soil / standing or seeping water
	BOTTOM =	W	L	❑	❑	.... Cracked or fissured wall(s)
SOIL TYPE:		**TESTED:**		❑	❑	.... Bulging wall(s)
❑ Solid rock (most stable)		❑ Yes		❑	❑	.... Floor heaving
❑ Average soil		❑ No		❑	❑	.... Frozen soil
❑ Fill material				❑	❑	.... Super-imposed loads
❑ Loose sand				❑	❑	.... Vibration
				❑	❑	.... Depth greater than 10'

PROTECTION METHODS:			PLACEMENT OF SPOILS & EQUIPMENT
(Walls MUST be vertical—NO voids)	❑	❑	.... Spoils at least 2 feet from edge of trench
SHORING	❑	❑	.... Equipment at least 2 feet from edge
❑ Timber	❑	❑	.... Backhoe at end of trench
❑ Pneumatic	❑	❑	.... Compressor, etc. at remote location
❑ Hydraulic			**LADDER LOCATION**
❑ Screw Jacks	❑	❑	.... Located in protected area
❑ Trench Shield	❑	❑	.... Within 25 feet of safe travel
UNEVEN, IRREGULAR WALLS	❑	❑	.... Secured
❑ Trench Box	❑	❑	.... Extends 36 inches above the landing
Sloping: ❑ q 1:1 (45°) ❑ q 1 ½:1 (34°)	❑	❑	.... Leads to safe landing

Yes	No	ENVIRONMENTAL CONDITIONS:			OTHER:
❑	❑	Gas detector used?	❑	❑	Shoring equip. & matls inspected prior to use?
❑	❑	Confined space permit issued?	❑	❑	Is trench SAFE to enter?

COMMENTS:

Work Order #

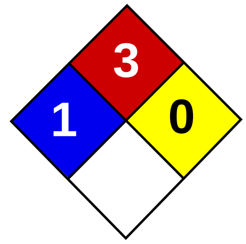
NOTE All unsafe conditions must be corrected prior to trench entry. If any hazardous conditions are observed, the trench must be immediately evacuated and no one is allowed to re-enter until corrective action has been taken.

Certification by Competent Person

Excavation Entry Authorized By: ____________________

Designated Competent Person

Appendix C
Safety Data Sheets



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Acetone MSDS

Section 1: Chemical Product and Company Identification

Product Name: Acetone

Catalog Codes: SLA3502, SLA1645, SLA3151, SLA3808

CAS#: 67-64-1

RTECS: AL3150000

TSCA: TSCA 8(b) inventory: Acetone

CI#: Not applicable.

Synonym: 2-propanone; Dimethyl Ketone; Dimethylformaldehyde; Pyroacetic Acid

Chemical Name: Acetone

Chemical Formula: C3-H6-O

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
Acetone	67-64-1	100

Toxicological Data on Ingredients: Acetone: ORAL (LD50): Acute: 5800 mg/kg [Rat]. 3000 mg/kg [Mouse]. 5340 mg/kg [Rabbit]. VAPOR (LC50): Acute: 50100 mg/m 8 hours [Rat]. 44000 mg/m 4 hours [Mouse].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. The substance is toxic to central nervous system (CNS). The substance may be toxic to kidneys, the reproductive system, liver, skin. 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. 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 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: Flammable.

Auto-Ignition Temperature: 465°C (869°F)

Flash Points: CLOSED CUP: -20°C (-4°F). OPEN CUP: -9°C (15.8°F) (Cleveland).

Flammable Limits: LOWER: 2.6% UPPER: 12.8%

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

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of oxidizing materials, of acids.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Vapor may travel considerable distance to source of ignition and flash back.

Special Remarks on Explosion Hazards:
Forms explosive mixtures with hydrogen peroxide, acetic acid, nitric acid, nitric acid + sulfuric acid, chromic anydride, chromyl chloride, nitrosyl chloride, hexachloromelamine, nitrosyl perchlorate, nitryl perchlorate, permonosulfuric acid, thiodiglycol + hydrogen peroxide, potassium ter-butoxide, sulfur dichloride, 1-methyl-1,3-butadiene, bromoform, carbon, air, chloroform, thitriazylperchlorate.

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.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. 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. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/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. Keep away from incompatibles such as oxidizing agents, reducing agents, acids, alkalis.

Storage:
Store in a segregated and approved area (flammables area) . Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Keep away from direct sunlight and heat and avoid all possible sources of ignition (spark or flame).

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: 500 STEL: 750 (ppm) from ACGIH (TLV) [United States] TWA: 750 STEL: 1000 (ppm) from OSHA (PEL) [United States] TWA: 500 STEL: 1000 [Austalia] TWA: 1185 STEL: 2375 (mg/m3) [Australia] TWA: 750 STEL: 1500 (ppm) [United Kingdom (UK)] TWA: 1810 STEL: 3620 (mg/m3) [United Kingdom (UK)] TWA: 1800 STEL: 2400 from OSHA (PEL) [United States]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Fruity. Mint-like. Fragrant. Ethereal

Taste: Pungent, Sweetish

Molecular Weight: 58.08 g/mole

Color: Colorless. Clear

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

Boiling Point: 56.2°C (133.2°F)

Melting Point: -95.35 (-139.6°F)

Critical Temperature: 235°C (455°F)

Specific Gravity: 0.79 (Water = 1)

Vapor Pressure: 24 kPa (@ 20°C)

Vapor Density: 2 (Air = 1)

Volatility: Not available.

Odor Threshold: 62 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -0.2

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, ignition sources, exposure to moisture, air, or water, incompatible materials.

Incompatibility with various substances: Reactive with oxidizing agents, reducing agents, 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: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 3000 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 44000 mg/m3 4 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. Causes damage to the following organs: central nervous system (CNS). May cause damage to the following organs: kidneys, the reproductive system, liver, skin.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May affect genetic material (mutagenicity) based on studies with yeast (S. cerevisiae), bacteria, and hamster fibroblast cells. May cause reproductive effects (fertility) based upon animal studies. May contain trace amounts of benzene and formaldehyde which may cancer and birth defects. Human: passes the placental barrier.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. May be harmful if absorbed through the skin. Eyes: Causes eye irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. Inhalation: Inhalation at high concentrations affects the sense organs, brain and causes respiratory tract irritation. It also may affect the Central Nervous System (behavior) characterized by dizzness, drowsiness, confusion, headache, muscle weakeness, and possibly motor incoordination, speech abnormalities, narcotic effects and coma. Inhalation may also affect the gastrointestinal tract (nausea, vomiting). Ingestion: May cause irritation of the digestive (gastrointestinal) tract (nausea, vomiting). It may also

affect the Central Nevous System (behavior), characterized by depression, fatigue, excitement, stupor, coma, headache, altered sleep time, ataxia, tremors as well at the blood, liver, and urinary system (kidney, bladder, ureter) and endocrine system. May also have musculoskeletal effects. Chronic Potential Health Effects: Skin: May cause dermatitis. Eyes: Eye irritation.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 5540 mg/l 96 hours [Trout]. 8300 mg/l 96 hours [Bluegill]. 7500 mg/l 96 hours [Fatthead Minnow]. 0.1 ppm any hours [Water flea].

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 3: Flammable liquid.

Identification: : Acetone UNNA: 1090 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 reproductive harm (male) which would require a warning under the statute: Benzene 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: Benzene 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: Benzene, Formaldehyde Connecticut hazardous material survey.: Acetone Illinois toxic substances disclosure to employee act: Acetone Illinois chemical safety act: Acetone New York release reporting list: Acetone Rhode Island RTK hazardous substances: Acetone Pennsylvania RTK: Acetone Florida: Acetone Minnesota: Acetone Massachusetts RTK: Acetone Massachusetts spill list: Acetone New Jersey: Acetone New Jersey spill list: Acetone Louisiana spill reporting: Acetone California List of Hazardous Substances (8 CCR 339): Acetone TSCA 8(b) inventory: Acetone TSCA 4(a) final test rules: Acetone TSCA 8(a) IUR: Acetone

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

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R36- Irritating to eyes. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

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

Section 16: Other Information

References:
-Material safety data sheet issued by: la Commission de la SantÃ© et de la SÃ©curitÃ© du Travail du QuÃ©bec. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. LOLI, RTECS, HSDB databases. Other MSDSs

Other Special Considerations: Not available.

Created: 10/10/2005 08:13 PM

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

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Material Safety Data Sheet
cis-1,2-Dichloroethylene, 97%

ACC# 97773

Section 1 - Chemical Product and Company Identification

MSDS Name: cis-1,2-Dichloroethylene, 97%
Catalog Numbers: AC113380000, AC113380025, AC113380100
Synonyms: cis-Acetylene dichloride.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
156-59-2	cis-1,2-Dichloroethylene	97	205-859-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.
Warning! Flammable liquid and vapor. Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes moderate eye irritation.
Skin: Causes moderate skin irritation. May cause dermatitis.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.
Inhalation: May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at 2200 ppm.
Chronic: Not available. Some German investigators reported fatty degeneration of the liver upon repeated narcotic doses in rats and

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is

difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.
Extinguishing Media: Use water fog, dry chemical, carbon dioxide, or regular foam.
Flash Point: 6 deg C (42.80 deg F)
Autoignition Temperature: 440 deg C (824.00 deg F)
Explosion Limits, Lower:9.70 vol %
Upper: 12.80 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
cis-1,2-Dichloroethylene	200 ppm TWA	none listed	none listed

OSHA Vacated PELs: cis-1,2-Dichloroethylene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are

exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear
Odor: Pleasant odor
pH: Not available.
Vapor Pressure: 201 mm Hg @ 25 deg C
Vapor Density: 3.34 (air=1)
Evaporation Rate:Not available.
Viscosity: Not available.
Boiling Point: 60 deg C @ 760 mm Hg
Freezing/Melting Point:-80 deg C
Decomposition Temperature:Not available.
Solubility: Insoluble.
Specific Gravity/Density:1.2800
Molecular Formula:C2H2Cl2
Molecular Weight:96.94

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.
Conditions to Avoid: Light, ignition sources, exposure to air, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, copper.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 156-59-2: KV9420000
LD50/LC50:
CAS# 156-59-2:
Inhalation, rat: LC50 = 13700 ppm;
.

Carcinogenicity:
CAS# 156-59-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	1,2-DICHLOROETHYLENE
Hazard Class:		3
UN Number:		UN1150
Packing Group:		II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 156-59-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 156-59-2 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F
Risk Phrases:
R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

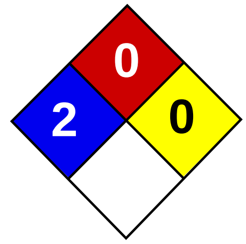
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 7 Keep container tightly closed.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
CAS# 156-59-2: No information available.
Canada - DSL/NDSL
CAS# 156-59-2 is listed on Canada's NDSL List.
Canada - WHMIS
WHMIS: Not available.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 2/09/1998
Revision #5 Date: 3/16/2007

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



Health	2
Fire	0
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Chloroform MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chloroform

Catalog Codes: SLC1888, SLC5044

CAS#: 67-66-3

RTECS: FS9100000

TSCA: TSCA 8(b) inventory: Chloroform

CI#: Not available.

Synonym: Trichloromethane; Methane, trichlor-

Chemical Name: Chloroform

Chemical Formula: CHCl3

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
Chloroform	67-66-3	100

Toxicological Data on Ingredients: Chloroform: ORAL (LD50): Acute: 695 mg/kg [Rat]. 36 mg/kg [Mouse]. 820 mg/kg [Guinea pig]. DERMAL (LD50): Acute: >20000 mg/kg [Rabbit]. VAPOR (LC50): Acute: 47702 mg/m 4 hours [Rat].

Section 3: Hazards Identification

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

Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, heart. 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. Cold water may be used. WARM water MUST 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. 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.

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 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.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: May explode if it comes in contact with aluminum powder, lithium, perchlorate, pentoxide, bis(dimethylamino)dimethylstannane, potassium, potassium-sodium alloy, sodium (or sodium hydroxide or sodium methoxide), and methanol

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. 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. Keep away from incompatibles such as metals, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Sensitive to light. Store in light-resistant containers.

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: 10 (ppm) [Australia] Inhalation TWA: 2 (ppm) from OSHA (PEL) [United States] Inhalation STEL: 9.78 (mg/m3) from NIOSH Inhalation STEL: 2 (ppm) from NIOSH Inhalation TWA: 9.78 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 10 (ppm) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 2 (ppm) [United Kingdom (UK)] Inhalation TWA: 9.9 (mg/m3) [United Kingdom (UK)] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Pleasant. Sweetish. Etheric. Non-irritating

Taste: Burning. Sweet.

Molecular Weight: 119.38 g/mole

Color: Colorless. Clear

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

Boiling Point: 61°C (141.8°F)

Melting Point: -63.5°C (-82.3°F)

Critical Temperature: 263.33°C (506°F)

Specific Gravity: 1.484 (Water = 1)

Vapor Pressure: 21.1 kPa (@ 20°C)

Vapor Density: 4.36 (Air = 1)

Volatility: Not available.

Odor Threshold: 85 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, Light

Incompatibility with various substances: Reactive with metals, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Light Sensitive. Incompatible with triisopropyl phosphine, acetone, disilane, fluorine, strong bases and reactive metals (aluminum, magnesium in powdered form), light.

Special Remarks on Corrosivity: It will attack some forms of plastics, rubber, and coatings.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals: WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 36 mg/kg [Mouse]. Acute dermal toxicity (LD50): >20000 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 47702 mg/m 4 hours [Rat]. 3

Chronic Effects on Humans: CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, heart.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material (possible mutangen) and cause adverse reproductive effects(embryotoxicity and fetotoxicity) Suspected carcinogen (tumorigenic) and teratogen based on animal data. Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans: Acute Potential Health Effects: Skin: Causes skin irritation and may cause chemical burns. Eye: Causes eye irritation, burning pain and reversible injury to corneal epithelium. Inhalation: Causes irritation of the respiratory system (mucous membranes). May affect behavior/Nervous system (CNS depressant, fatigue, dizziness, nervousness, giddiness, euphoria, loss of coordination and judgement, weakness, hallucinations, muscle contraction/spasticity, general anesthetic, spastic paralysis, headache), anorexia (neurological and gastrointestinal symtoms resembling chronic alcoholism), and possibly coma and death. May affect the liver, kidneys and gastrointestinal tract (nausea, vomiting). Ingestion: Causes gastrointestinal tract irritation (nausea, vomiting). May affect the liver, urinary system (kidneys), respiration, behavior/nervous system (symptoms similar to inhalation),and heart. Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect the liver (hepatitis, jaundice, hepatocellular necrosis), metabolism (weight loss), respiration (fibrosis, pneumoconoisis), behavior/central nervous system (symptoms similar to acute inhalation), blood, musculoskeletal system, and kidneys. Ingestion: Prolonged or repeated ingestion may affect the liver, kidneys, metabolism (weight loss), endocrine system (spleen), blood (changes in cell count).

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 43.8 mg/l 96 hours [Trout].

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 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: CLASS 6.1: Poisonous material.

Identification: : Chloroform UNNA: UN1888 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: Chloroform California prop. 65 (no significant risk level): Chloroform: 0.02 mg/day (value) 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: Chloroform New York release reporting list: Chloroform Rhode Island RTK hazardous substances: Chloroform Pennsylvania RTK: Chloroform Massachusetts RTK: Chloroform New Jersey: Chloroform California Director's List of Hazardous Subtances (8 CCR 339): Chloroform Tennessee: Chloroform TSCA 8(b) inventory: Chloroform TSCA 8(d) H and S data reporting: Chloroform: effective: 6/1/87; sunset: 6/1/97 SARA 302/304/311/312 extremely hazardous substances: Chloroform SARA 313 toxic chemical notification and release reporting: Chloroform CERCLA: Hazardous substances.: Chloroform: 10 lbs. (4.536 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-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R20/22- Harmful by inhalation and if swallowed. R38- Irritating to skin. R40- Possible risks of irreversible effects. S36/37- Wear suitable protective clothing and gloves.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: h

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. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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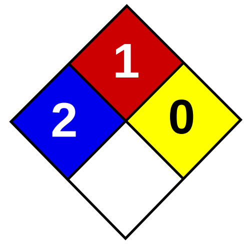

Health	2
Fire	1
Reactivity	0
Personal Protection	H

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, CO_2), 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.

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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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Appendix D
Permit-required confined space program and employee training certificates

29 CONFINED SPACE ENTRY PROGRAM

29.1 Purpose

To clearly specify a confined space and a permit-required confined space and under what conditions the employees of EnviroTrac may enter a permit-required confined space.

29.2 Scope

This document covers the hazards, procedures, and training associated with the entering of confined spaces for any reason by EnviroTrac employees. Confined space entry occurs when any part of a person's body breaks the plane of an opening into a confined space. It is intended to provide the guidelines under which employees can protect themselves from hazardous atmospheres, entrapment, engulfment, external energy sources, and other hazards when working in confined spaces.

29.3 Administration and General Information

It is the policy of EnviroTrac that "confined spaces" are to be eliminated as soon as practically possible from any work site where they are encountered. This program defines and outlines the conditions and methods under which employees may enter confined spaces for sampling and equipment installation and removal. The Confined Space Entry Program described herein is based upon the following government regulations and publication:

- CFR Title 29 Part 1910.146, Permit Required Confined Spaces
- CFR Title 29 Part 1910.147, The Control of Hazardous Energy (Lockout/Tagout)
- A Guide to Safety in Confined Spaces - DHHS (NIOSH) Publication No. 87-113
- OSHA Permit-Required Confined Spaces (OSHA 3138-01R 2004)

Within EnviroTrac, this program will be administered by the Director of Health and Safety and the designated Regional Health and Safety Coordinators, who together will be responsible for the generation and execution of all portions of the program, and who will have the necessary authority to assure that all requirements of this program are properly fulfilled.

The following definitions, taken directly from 29CFR 1910.146, are pertinent to this program:

CONFINED SPACE is a space that:

1. Is large enough and so configured that an employee can bodily enter and perform assigned work
2. Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry)
3. Is not designed for continuous employee occupancy.

PERMIT-REQUIRED CONFINED SPACE has one or more of these characteristics:

1. Contains or has the potential to contain a hazardous atmosphere;
2. Contains a material with the potential to engulf someone who enters the space;
3. Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; and/or

4. Contains job-introduced hazards, such as: welding, cutting, grinding, hot riveting, burning, heating or the introduction of sources of ignition within the confined space, or the use of flammable or toxic cleaning solutions.
5. Contains any other recognized serious safety or health hazards.

Worksites will be inspected for spaces that meet the definition of a permit-required confined space and any EnviroTrac employee that is exposed to these areas will be informed existence, location and the hazards they pose. Areas will be identified with signs stating: “DANGER—PERMIT-REQUIRED CONFINED SPACE—AUTHORIZED ENTRANTS ONLY”

If a confined space is entered for the purpose of eliminating hazards of the space, it is considered a permit required confined space until the hazards have been removed and the entrants have vacated the space. Once all the hazards have been removed, the confined space is subject to reclassification. A permit is not required if the hazards can be eliminated without entering the space.

EnviroTrac employees that are required to enter a permit-require confined space are required to follow all requirements of this practice, unless:

1. The only hazard posed by the space is an actual or potential hazardous atmosphere that continuous forced air ventilation alone is sufficient to maintain that space safe for entry.
   a. The space must be inspected and documented that there are no other potential hazards exist other than the potential atmosphere that be rendered safe by ventilation.
   b. The determination and supporting data is to be made available to each employee who enters the permit space or to that employee's authorized representative.
   c. Entry to the space will not require: testing of the atmosphere prior to entrance or during continuous ventilation, a completed permit for entry, an entry supervisor or attendants, or rescue personnel or equipment.
2. The permit-required confined space is reclassified as a non-permit confined space.

   If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

   The reclassification is to be documented and approved by the Director of Health and Safety that all hazards in a permit space have been eliminated, the documentation will contain the date, the location of the space, and the signature of the person making the determination. The re-classification will be made available to each employee entering the space or to that employee's authorized representative.

29.4 Atmosphere Monitoring

It will be the policy of EnviroTrac not to allow any of its employees to enter permit-required confined spaces for any reason until a confined space permit has been completed.

The permit requires that the atmosphere is sampled at the top, center, and bottom of the space to determine oxygen content and combustible or toxic atmospheres. The following monitoring must be conducted, in this order:

- OXYGEN CONTENT: Check using a direct reading Oxygen Meter, the concentration of oxygen inside of the confined space is to be between 19.5% and 23.5%. If the confined space atmosphere cannot be ventilated to achieve an oxygen concentration of at least 19.5%, entry will only be made using a Supplied Air Respirator with an escape bottle, or an SCBA. If the oxygen concentration cannot be lowered below *23.5%,* the confined space will not be entered.
- COMBUSTIBLE GAS CONCENTRATION: Check using a direct reading Combustible Gas Meter, the concentration of combustible gas in the confined space is not to exceed 10% of the lower explosive limit (LEL) of the gas present in the confined space. Should the combustible gas concentration exceed 10% of the LEL, employees will not enter the confined space unless ventilation can successfully lower the concentration below 10% of the LEL.
- TOXIC VAPOR CONCENTRATION: Using either a Photoionization Detector (PID) or Flame Ionization Detector (FID), the confined space will be sampled for the presence of toxic vapors. If a contaminant in the space is known, and the concentration of that substance is measured at levels above published permissible exposure limits (i.e., OSHA PELs), and the confined space cannot be ventilated to lower the concentration to below published exposure limits, appropriate air purifying or supplied air respirators must be used to enter the space. The specific respiratory protection required must be determined on a site-by-site basis for each confined space and conform to EnviroTrac's Respiratory Protection program (Section 19).

In addition to a hazardous atmosphere, a confined space may contain hazardous materials or physical hazards, such as low ceilings or pipes where a worker may strike his or her head. Personal Protective Equipment to be worn to protect employees from these hazardous conditions.

Heat and cold stress may impact workers in confined spaces. Follow EnviroTrac's Heat and Cold Stress Practice (Section 25).

29.5 Emergency Response Protocol

Emergency response to incidents in a permit-required confined space is to be coordinated prior to entry. Rescue services must be either be: 1) provided by the host facility (stated in contract agreement), or 2) provided by an outside service which is given an opportunity to examine the entry site, practice rescue, and decline as appropriate. EnviroTrac does not perform in-house emergency response services.

Rescue services are to be evaluated for capabilities to respond to particular permit-required confined space rescue scenario and have the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified. Rescue services are required to be on site for all IDLH conditions while work is being performed.

The medical facility to be used in the event of an incident is to be provided with copies of SDSs of hazardous materials that an injured *Entrant* may have been exposed.

The *Entry Supervisor* will coordinate with the Emergency Response Teams prior to allowing employees to enter the confined space. The telephone numbers will be on the Confined Space Entry Permit and in the possession of the *Attendant* during confined space entry, and a telephone or radio will be at the site to provide communications with emergency response teams.

29.6 Confined Space Entry Procedures

Whenever employees of EnviroTrac are required to enter confined spaces for any reason, a permit will be developed prior to site entry, to address the following procedures:

- The Confined Space Entry project has a minimum of three positions:

  The *Entry Supervisor* establishes the terms of the confined space entry and prepares the permit. The *Entry Supervisor* manages the project, determines the space hazards and mitigations, verifies emergency plans and availability of rescue services, and cancels the permit after entry operations are complete.

  The *Entrant* enters the confined space and will be equipped with a body harness and lifeline, and the appropriate Personal Protective Equipment dictated by the atmosphere and other hazards present inside the confined space. The *Entrant* is to Stop Work and exit the space if conditions are felt to be unsafe or provisions of the confined space entry permit are not followed.

  The *Attendant* remains outside the confined space, in control of the lifeline, in constant communication with the entrant, and alert for signs that the entrant is experiencing adverse problems associated with the conditions inside the confined space. The Attendant will not leave the entrance of the confined space while an Entrant is inside unless replaced by another qualified Attendant. One Attendant will be assigned to each confined space entry; Attendants will not be allowed to monitor more than one confined space.

- Provisions for emergency rescue will be established during the project planning by the Entry Supervisor. Rescue services must be either be: 1) provided by the host facility, or 2) provided by an outside service which is given an opportunity to examine the entry site, practice rescue, and decline as appropriate. Rescue services are required to be on site for all IDLH conditions while work is being performed.

- When hazardous energy sources, such as electrical, mechanical, chemical, thermal, pneumatic, hydraulic, or stored are present in a confined space, procedures to control that hazardous energy will be used as required in Section 26 – Control of Hazardous Energy Sources (Lockout / Tagout) or a protective shield, barrier, or other insulating device/material will be used to protect workers from the potential energy source.

- The EnviroTrac Confined Space Entry Permit will be completed by the *Entry Supervisor* and is required to be present at the confined space until the assignment is completed. The Attendant and Entrant will complete the EnviroTrac Confined Space Pre-Entry Checklist. A copy of both documents is located at the end of this practice and on the Safety Portal.

- A Work Zone will be established around the entrance of the Confined Space to allow adequate room for the Attendant; equipment, materials, and supplies; rescue and monitoring equipment; and emergency rescue services. Where required, the Work Zone will use barriers and other traffic control devices to control vehicular and pedestrian traffic.

- Any conditions making it unsafe to remove an entrance cover is to be eliminated before the cover is removed. When entrance covers are removed, the opening is to be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.

- Atmospheric monitoring will have been conducted and provisions to protect *Entrants*. . *Entrants* will have the opportunity to participate in and review monitoring equipment calibration data and testing before entry.
- Continuous positive ventilation will be used to supply air into the space for the duration of the time *Entrants* are in the space. The air will be tested periodically and if the atmosphere changes to something not expected, all *Entrants* will be removed from the space and a new confined space entry permit will be developed.
- The space will be continuously evaluated by the *Entrant(s)* and the *Attendant(s)* for changes that could affect confined space entry. Any changes observed or suspected must be addressed or the permit and entry into the confined space terminated. Any changes in conditions are to be noted on the permit.
- The *Entry Supervisor* will cancel the entry permit when the assignment is completed or when new conditions exist. New conditions must be noted on the canceled permit and used in revising the permit space program. Canceled entry permits will be retained for at least one year.

Should the *Entrant* be overcome by conditions within the confined space, the standby employee will either remove the *Entrant* with the lifeline or will summon assistance from professional emergency response personnel as listed on the Confined Space Entry permit. The stand by employee will not enter the confined space or leave the space unattended unless replaced by another qualified stand by employee.

When EnviroTrac is employed as the prime/sole contractor at a facility where confined spaces are or will be present, the Project Manager, in conjunction with the Corporate Health and Safety Director or Regional Health and Safety Coordinator, will have the responsibility to ascertain that all the requirements of this program are fulfilled prior to any employee entering into such confined spaces.

When EnviroTrac is employed as a sub-contractor or there are multiple employers working in the same confined space, one person will be designated as a *Person-In-Charge* to coordinate all activities for multiple contractors. No contractors will be allowed to perform work unless it is coordinated through the Person-In-Charge.

Should contractors, clients or others request an employee to enter confined spaces which the employee does not feel meet the above entry program requirements, they should inform those requesting them to enter that they do not consider the confined space safe for entry, inform their supervisor and await further instructions. Employees will enter such confined spaces only if they are satisfied that the provisions of this program are fulfilled.

29.7 Confined Space Energy Isolation

Any hazardous energy within the confined space will be controlled as required by 29CFR 1910.147 and by EnviroTrac's Control of Hazardous Energy practice (Section 27). Examples of controlling hazardous energy include:

- Electrical energy devices must be de-energized, and the switching either locked out and/or tagged out.
- Hydraulic energy devices must be de-energized as above, lines capped or blanked, and the stored energy in the systems released of the devices blocked.
- Hydrostatic or pneumatic energy devices must be de-energized, and lines either capped or blanked.
- All other sources of hazardous energy need to be identified and controlled prior to allowing anyone into the confined space.

It will be the policy of EnviroTrac not to permit employees to enter confined spaces that contain the potential for hazardous energy devices without engineering controls. Confined spaces containing well heads with electrically operated pumps may be entered providing the pumps have intrinsically safe or explosion proof motors and the electrical circuits are protected with ground fault circuit interrupters (GFCI).

29.8 Employee Training

All employees who are required to enter confined spaces for any reason will successfully complete a Confined Space Entry Training Program, training be conducted prior to initial assignment, prior to a change in assigned duties, and if a new hazard has been created or special deviations have occurred, and will include, but not be limited to the following topics:

- The contents of this Confined Space Entry Program
- The hazards of confined space entry
- Temperature extremes in confined space
- Duties of the entrant and standby personnel
- Isolation and control of hazardous energy in the confined space
- Rescue methods for confined space entry

Employees will be required to demonstrate competency on confined space entry training through either skills demonstration or a written examination.

Documentation of training will be maintained by the EnviroTrac's Safety Department and will include the employee's name; date(s) of training; subject, curriculum, handouts, and pertinent training materials; and trainer's name and title.

The Regional Health and Safety Coordinator will conduct periodic inspection of random work sites to ascertain that this Confined Space Entry Program is conscientiously being followed.

29.9 Program Evaluation

The Corporate Health and Safety staff will review all aspects of this Confined Space Entry Program at least annually to assure its effectiveness and update the program accordingly. Whenever modifications revisions of federal or applicable state regulations or standards, or any action that would necessitate a change in any of the contents of this practice occur, such changes will be made. , Everyone affected by changes to this program will be notified and retrained, if necessary. All such modifications will be made in writing, and the nature of the modification noted and dated. Examples of program review include: any unauthorized entry of a confined space, a hazard not covered by the permit, the occurrence of an injury or near miss, employee complaints.

Canceled confined space entry permits will be retained for one year and be used in the aforementioned review to ensure that employees are protected. The cancelled permits will be reviewed for any unauthorized entry of a confined space, terminated permits due to hazards not covered by the permit, the occurrence of an injury or near miss, or employee complaints.

29.10 Enforcement

The following disciplinary actions will be administered to employees found to be willfully negligent or not complying with the provisions of this policy:

- First Offense: If the violation is correctable, the employee will receive a written warning detailing the nature of the offense, which will be documented in the employee's personnel file. In addition, if the violation is not correctable, the employee will be dismissed from the site and sent home for the day without pay.
- Second Offense: The employee will receive a written warning detailing the nature of the offense, documented to their personnel file, and one day off without pay, regardless of whether the violation is correctable.
- Third Offense: The employee will receive a written warning detailing the nature of the offense, documented to their personnel file, and one week off without pay, regardless of whether the violation is correctable.
- Fourth Offense: The employee will be terminated with cause.

Should willful noncompliance or negligence to the provisions of this policy result in injury or increased risk to another individual then disciplinary action will be more severe than the normal sequence of the above procedures may be administered. All of the above disciplinary steps will be administered within the scope and intent of written company personnel policies.

EnviroTrac Environmental Services

Health and Safety Program

CONFINED SPACE ENTRY PERMIT

Page 1 of 2

1. Permit Space To Be Entered
2. Purpose of Entry
3. Date of Entry — Authorized Duration of Entry Permit
4. Authorized Entrants
5. Attendants(s)
6. Name of Current Entry Supervisor(s) 1. Time 2. Time

Entry Supervisor who Originally Authorized Entry

Signature or Initials

7. Record hazards of the permit space to be entered.
8. Check or list the measures used to isolate the permit space and to eliminate or control permit space hazards before entry.

Hazard	Yes	No	N/A		Measures
A. Lack of Oxygen	☐	☐	☐	☐	A. Purge-Flush and Vent
B. Combustible Gases	☐	☐	☐		
C. Combustible Vapors	☐	☐	☐	☐	B. Ventilation
D. Combustible Dusts	☐	☐	☐		
E. Toxic Gases	☐	☐	☐	☐	C. Lockout/Tag Out
F. Toxic Vapors	☐	☐	☐		
G. Chemical Contact	☐	☐	☐	☐	D. Inerting
H. Electrical Hazards	☐	☐	☐		
I. Mechanical Exposure	☐	☐	☐	☐	E. Blanking, Blocking, Bleeding
J. Temperature	☐	☐	☐		
K. Engulfment	☐	☐	☐	☐	F. External Barricades
L. Entrapment	☐	☐	☐		
M. Others	☐	☐	☐	☐	G. Confined Space Identification/Signs
	☐	☐	☐		
	☐	☐	☐		
	☐	☐	☐		
	☐	☐	☐		
	☐	☐	☐		

DO NOT DESTROY THIS PERMIT - PERMIT MUST BE RETAINED FOR ONE YEAR AFTER CANCELLED

Rev 11/30/2010

EnviroTrac
Environmental Services
Health and Safety Program

CONFINED SPACE ENTRY PERMIT

Page 2 of 2

9. Acceptable Entry Conditions

10.	Test(s) To Be Taken	Permissible Entry Levels	Test 1	Test 2	Test 3	Test 4
A.	Percent of Oxygen	19.5% to 23.5%				
B.						
C.						
D.						
E.						
F.						
G.						
H.						
I.						
	Name or Initials of Tester					
	Test Times					

11. Rescue and Emergency Services Available:

Name	Name
Telephone	Telephone

12. Communication procedures to be used by authorized entrants and attendants.

13. Equipment supplied to the employee.

Yes	No	N/A	Equipment		Description		
☐	☐	☐	(i)	Gas Test and Monitoring	Name Serial/Unit No.		Model/Type
☐	☐	☐	(ii)	Ventilating			
☐	☐	☐	(iii)	Communications			
☐	☐	☐	(iv)	Personal Protective Equipment	☐ Safety Harness With Life Lines ☐ Respiratory	☐ Hard Hats ☐ Eye ☐ Ear ☐ Face	☐ Hand ☐ Foot ☐ Clothing
☐	☐	☐	(v)	Lighting			
☐	☐	☐	(vi)	Barriers/ Shields	☐ Pedestrian	☐ Vehicle	☐ Other
☐	☐	☐	(vii)	Safe Ingress/Egress	☐ Ladders		
☐	☐	☐	(viii)	Rescue and Emergency	☐ Lifelines	☐ Hoists	☐ Resuscitators-Inhalator
☐	☐	☐	(ix)	Other Safety Equipment			

14. Other information for this particular confined space to ensure employee safety.

15. Additional Permits Required. ☐ Hot Work ☐ Other

THIS CONFINED SPACE ENTRY PERMIT HAS BEEN CANCELLED:

BY ______________________________ (Entry Permit Supervisor) ____________ AM PM (Time) ____________ (Date)

DO NOT DESTROY THIS PERMIT - PERMIT MUST BE RETAINED FOR ONE YEAR AFTER CANCELLED

Rev 11/30/2010

EnviroTrac
Environmental Services
Health and Safety Program

CONFINED SPACE PRE-ENTRY CHECKLIST

LOCATION ______________________________________ DATE_______ TIME________

ENTRY SUPERVISOR____________________________________ PHONE_____________

Mark the appropriate column: X Yes, X No, or X N/A Not Applicable.	Yes	No	N/A
1. Is a "DANGER CONFINED SPACE" sign posted to identify the site as requiring a confined space entry permit to occupy the area?	☐	☐	☐
2. Is a written permit space entry program developed and implemented that complies with Section 1910.146(c)(4)?	☐	☐	☐
3. Is the written program available for inspection by employees and their representatives?	☐	☐	☐
4. Have all ENTRANTS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910.146(h)?	☐	☐	☐
5. Have all ATTENDANTS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910.146(i)?	☐	☐	☐
6. Have all ENTRY SUPERVISORS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910.146(j)?	☐	☐	☐
7. Is the only hazard an actual or potential hazardous atmosphere?	☐	☐	☐
8. Will continuous forced air ventilation alone be sufficient to maintain the permit space safe for entry?	☐	☐	☐
9. Has monitoring and inspection data been developed to eliminate the hazardous atmosphere through forced air ventilation?	☐	☐	☐
10. Has the permit space been isolated?	☐	☐	☐
11. Have steps been taken for purging, inerting, flushing or ventilating the permit space to eliminate or control atmospheric hazards?	☐	☐	☐
12. Is monitoring available to verify that conditions are acceptable for entry throughout the duration of an authorized entry?	☐	☐	☐
13. Are employees trained on how to maintain and properly use testing and monitoring equipment?	☐	☐	☐

REV 11/30/2010 Page 1 of 4

EnviroTrac Environmental Services
Health and Safety Program

Mark the appropriate column: X Yes, X No, or X N/A Not Applicable.	Yes	No	N/A
14. Is ventilating equipment needed to obtain acceptable entry?	☐	☐	☐
15. Is communication equipment necessary and available for use between attendant and entrant?	☐	☐	☐
16. Are the entrants provided with personal protective equipment to be adequately protected insofar as feasible engineering and work practice controls allow?	☐	☐	☐
17. Has adequate lighting equipment been supplied to allow a safe work area and allow a quick exit in an emergency?	☐	☐	☐
18. Has the area been secured with barriers and shields from pedestrian, vehicle or other barriers to protect the entrants from external hazards?	☐	☐	☐
19. Is the confined space provided with equipment, such as ladders, needed for safe ingress and egress by authorized entrants?	☐	☐	☐
20. Is there other training, equipment or services needed to provide safe confined space entry?	☐	☐	☐

SAFETY EQUIPMENT CHECKLIST

- ☐ Safety Harness with Attached Life Lines
- ☐ Respirator and type ______
- ☐ Hard Hat
- ☐ Eye Protection
- ☐ Hand Protection
- ☐ Other (specify)
- ☐ Ear Protection
- ☐ Foot Protection
- ☐ Protective Clothing
- ☐ Ventilator
- ☐ Resuscitator
- ☐ Communications Equipment
- ☐ Gas Tester with Alarms

REV 11/30/2010 Page 2 of 4

EnviroTrac
Environmental Services
Health and Safety Program

GAS TESTS TAKEN

	GAS	PERMISSIBLE ENTRY LEVEL	YES	NO	INSTRUMENT USED	ACTUAL READING	TESTED BY
1.	Oxygen %	19.5% to 23.5%	☐	☐			
2.			☐	☐			
3.			☐	☐			
4.			☐	☐			
5.			☐	☐			
6.			☐	☐			
7.			☐	☐			
8.			☐	☐			
9.			☐	☐			
10.			☐	☐			

Calibrated direct-reading instruments used to test confined space atmosphere:

1. Name _____ Name _____
Make _____ Make _____
Serial No. _____ Serial No. _____
Last Calibration Date _____ Last Calibration Date _____

RESCUE AND EMERGENCY SERVICES

1. Contacts in the event of an emergency include name and telephone number.

A. _____ C._____
_____ _____
_____ _____

B. _____ D._____
_____ _____
_____ _____

2. Rescue services available for this confined space entry.

☐ employee ☐ outside rescue service

3. Rescue Equipment available:

☐ Oxygen ☐ Chest/full body harness
☐ Resuscitator – Inhalator ☐ Retrieval line properly installed
☐ First Aid Equipment ☐ Wristlets when it is the safest and most effective alternative
☐ De-Fibrillator

Additional rescue equipment available

REV 11/30/2010 Page 3 of 4

NOTES

APPENDIX G

Quality Assurance Project Plan

EnviroTrac
Environmental Services

AAA SUTTER REALTY, LLC
1199-1221 SUTTER AVE, BROOKLYN, NEW YORK
KINGS COUNTY, NEW YORK

Quality Assurance Project Plan

NYSDEC BCP Number: C224141

Prepared for:
AAA Sutter Realty, LLC
153-157 Seventh Street
Garden City, New York 11530

Prepared by:
EnviroTrac Engineering PE PC
5 Old Dock Road, Yaphank, New York 11980
631-924-3001

JUNE 2018

Table of Contents

FIGURES

ATTACHMENTS

1.0 TITLE AND APPROVAL PAGE

Title:	Quality Assurance Project Plan (QAPP)
Project Name/Property Name:	1199 Sutter Avenue
Property/Site Location:	1199-1221 Sutter Avenue, Brooklyn, New York
Revision Number:	
Revision Date:	
NYSDEC Site Number:	BCP C224141
Preparer's Name and Organizational Affiliation:	EnviroTrac Engineering PE PC 5 Old Dock Road Yaphank, New York 11980 (631) 924-3100
Preparation Date:	June 27, 2018

2.0 PROJECT ORGANIZATIONAL CHART

Personnel involved in project implementation are below and shown as an organization chart on the following page.

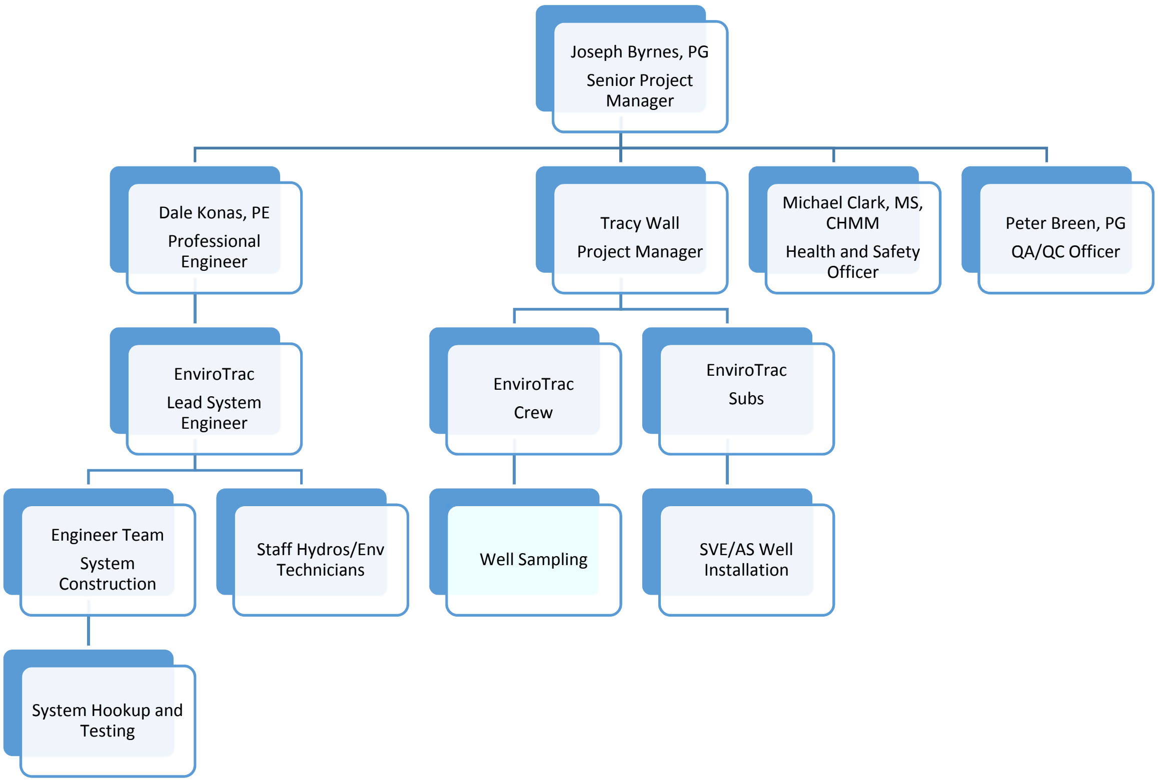
Table 1: Project Implementation Personnel				
Name	Title	Telephone Number	Organizational Affiliation	Responsibilities
Joseph Byrnes, PG	Environmental Consultant Senior Project Manager	(631) 924-3001	EnviroTrac	Planning and implementation of the Project
Tracy Wall	Environmental Consultant Project Manager	(631) 924-3001	EnviroTrac	Planning and implementation of the Project
Dale Konas, PE	Environmental Consultant Lead Engineer	(631) 924-3001	EnviroTrac	Planning, oversight and engineering certifications
Peter Breen, PG	Environmental Consultant QA/QC Officer	(631) 924-3001	EnviroTrac	Review and approval of quality assurance related project components
EnviroTrac Field Staff	Sampling Assistance; Field Oversight	(631) 924-3001	EnviroTrac	Collection of field samples in accordance with the approved RAWP
Michael D. Macabe, PE	NYSDEC DER Project Manager	(518) 402-9687	NYS Department of Environmental Conservation	Review, approval, and oversight of project documentation and processes
Krista Anders	NYSDOH Project Manager	1-800-458-1158	NYS Department of Health	Assist DEC
Nicole Haberkorn	Environmental Laboratory Contact	(732) 397-1208	Pace Analytical Services, Inc.	Laboratory analysis of vapor and groundwater samples
Douglas Weaver	Third Party Data Validator[2]	(757) 564-0090	Environmental Data Services, Inc.	Data validation of laboratory reports issued by Pace. Preparation of DUSRs.

The NYSDEC and NYSDOH Project Managers will be responsible for approving the Quality Assurance Project Plan (QAPP). EnviroTrac will implement the remedial work scope and collect all samples in accordance with NYSDEC/NYSDOH approvals and will be responsible for oversight of remedial tasks.

This QAPP shall govern the operation of the project at all times. Each responsible party listed in above shall adhere to the procedural requirements of the QAPP and ensure that subordinate personnel do likewise. This QAPP shall be reviewed at least annually to ensure that the project will achieve all intended purposes. All the responsible persons listed above shall participate in the review of the QAPP. The consultant Project Manager is responsible for determining that data are of adequate quality to support this project. The project will be modified as directed by the Project Manager. The Project Manager shall be responsible for the implementation of changes to the project and shall document the effective date of all changes made.

It is expected that from time to time ongoing and perhaps unexpected changes will need to be made to the project. The NYSDEC Project Manager shall authorize all changes or deviations in the operation of the project. All verification and validation methods will be noted in the analysis provided in reporting to the NYSDEC.

Project organizational chart:



Resumes of key project personnel are presented in Appendix A.

3.0 PROBLEM DEFINITION/PROJECT DESCRIPTION

3.1 Problem Definition

A Remedial Investigation (RI) was conducted in 2009 to delineate the soil, soil vapor, and groundwater at the Site. A supplemental RI was also conducted in 2016 to further delineate the soil and soil vapor at the Site. The purpose of the RIs was to define the nature and extent of any contamination resulting from previous activities at the Site. The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. Additionally, the RI Report contains a full discussion of the data. Two (2) Interim Remedial Measures (IRM) were performed at the property in an attempt to decrease groundwater concentrations beneath the Site.

The contaminant(s) of concern identified at the Site are:

- Tetrachloroethylene (PCE);
- Trichloroethene (TCE);
- Chloroform;
- Cis-1,2-Dichloroethene (Cis-1,2-DCE); and
- Acetone.

The contaminant(s) of concern exceed the applicable standards, criteria and guidance values (SCGs) for:

- Groundwater;
- Soil; and
- Soil Vapor Intrusion.

Soil
Soil samples were collected from the Site during the Phase II ESA, Supplemental Phase II ESA, Site Characterization, and Supplemental RIR. The soil sampling results showed that tetrachloroethene (PCE) and acetone were detected at concentrations that exceeded the 6 NYCRR Part 375 Subpart 375-6.8 Unrestricted Use Soil Cleanup Objectives (UUSCOs) in several borings located beneath the former dry cleaner and in the rear parking lot to the north of the former dry cleaner unit. Concentrations of PCE also exceeded the Residential Use SCO in one (1) boring and the Restricted Residential Use SCO in one (1) boring.

Groundwater
Groundwater samples were collected from the Site during the Phase II ESA, Supplemental Phase II ESA, two (2) IRM events, Site Characterization, RIR, Supplemental RIR, and other groundwater sampling events. Groundwater samples were also collected from the adjoining properties to the south and east during the Site Characterization, RIR, Supplemental RIR, IRM performed in 2017, and other groundwater sampling events. Groundwater samples were also collected from the adjoining properties to the south and east during the Site Characterization, RIR, and Supplemental RIR.

The groundwater monitoring results from 2009 to 2016 showed that PCE, trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), acetone, and chloroform were detected at concentrations that exceeded the NYSDEC Class GA Ambient Water Quality Standards and Guidance Values (GWQSs) in samples collected beneath the former dry cleaner, in the rear parking lot to the north of the former dry cleaner unit, to the south beneath the sidewalk along the northern and southern portions of Sutter Avenue, and on the adjoining property to the south (New York City Housing Authority apartment complex), across Sutter Avenue. The results of the investigations showed that CVOCs in groundwater exist beneath the Site and have migrated to the south, across Sutter Avenue. The groundwater concentrations detected in the wells across the street on the south side of Sutter Avenue were significantly lower than the concentrations detected in the wells at the Site.

From May 2017 to August 2017 as part of the 2017 IRM, four (4) rounds of groundwater sampling were performed to monitor conditions prior to and after ISCO injections were performed at the Site. Groundwater results indicated concentrations for PCE exceeded its NYSDEC GWQS of 5 ug/L for all sampling events in four (4) wells.

Soil Vapor Intrusion
Sub-slab soil vapor samples, soil gas samples, indoor air samples, and outdoor air samples were collected from the Site and in the vicinity of adjoining properties to the north, south, and east during the Site Characterization, RIR, and On-site Soil Vapor Intrusion Investigation Report. Access to the interior of the adjoining properties to the north (548 Chestnut Street, 552 Chestnut Street) and south (The New York City Housing Authority apartment building located along Euclid Avenue) was not obtained for any of the investigations, however, soil gas samples were collected in the vicinity of these properties with the exception of the recent On-site Soil Vapor Intrusion Investigation performed in March, 2017. The results were compared to the NYSDOH Matrices A, B, and C included in the NYSDOH Guidance For Evaluating Soil Vapor Intrusion in the State of New York, October, 2006. The results of all investigations showed that vapors emanating from soil and groundwater located beneath the Site were infiltrating into the former dry cleaner unit and had the potential to infiltrate into the adjacent supermarket unit. The results showed that no soil vapor intrusion (SVI) impacts were present in the other units within the Site building or in the vicinity of the adjoining properties to the north, south, and east.

Additionally, the 2017 on-Site soil vapor intrusion investigation results show that the indoor air and sub-slab soil vapor concentrations for PCE and TCE were significantly reduced when compared to the 2011 results. Based on the sub-slab soil vapor and indoor air results for TCE, mitigation beneath the former dry cleaner (current laundromat) was warranted..

3.2 Project Description - Site Location, History and Description

Location: The Site is located at 1199-1221 Sutter Avenue in a mixed residential / commercial area of Brooklyn. The Site is bounded by Sutter Avenue to the south, Chestnut Street to the east, residential to the north and Crystal Street to the west.

Site Features: The Site occupies about half of a city block on the north side of Sutter Avenue. An asphalt parking lot covers the northern portion of the Site and a single-story building is located along the southern portion of the Site. The building is underlain with a basement segmented for each retail/office unit with utilities, storage and service rooms.

Current Zoning and Land Use: The Site is within an R5 (residential) zoned area. The Site is zoned C1-2 (commercial) as are the properties along the north side of a seven-block stretch of Sutter Avenue.

Past use of the Site: The structures on the Site were constructed in 1957 and were the original development on the property. Spanish American Dry Cleaners occupied the eastern-most unit from September 1988 to May 1995. The former location of the dry cleaner is presently occupied by a self-service laundromat.

Site Geology and Hydrogeology: The property is located within the Pavement and Buildings-Flatbush-Riverhead Series Soil Map Unit, which is described as anthropogenic urban fill overlying glacial out wash deposits and characterized as a sandy loam. The groundwater table is approximately 13 feet below grade and flows south. Groundwater is not utilized as a source of potable water at Site.

A topographic map depicting the Site location is attached as Figure 1.

3.3 Project Quality Objectives

3.3.1 On-Site Soil

The objective of the project is to address soil and soil vapor located beneath the Site building utilizing soil vapor extraction (SVE). This will be accomplished by conducting the following sequential tasks:

- Performing a Pilot Test for the SVE system (completed June, 2016);
- Determining the radius of influence for each SVE well (included in Remedial Design Work Plan);
- Installing the SVE portion of the system at the Site; and
- Performing monthly operations, maintenance, and monitoring (OMM) of the SVE system.

The Decision Document provides the following SCGs[1] for soil:

VOC Constituent	SCG (ug/kg)
PCE	150,000
Acetone	500,000

(1) - *SCG: Standard Criteria or Guidance – 6 NYCRR Part 375 Subpart 375-6.8(b) Restricted Commercial Use Soil Cleanup Objectives*.

A Pilot Test was performed for the SVE portion of the system in June, 2016. The SVE system was not installed during such time, but a sub-slab depressurization system (SSDS) was installed in 2017 in the basement of the former dry cleaner and adjoining supermarket unit to address soil vapor intrusion issues that may occur within these units. ISCO injections were also performed in the basement of the former dry cleaner in an attempt to decrease groundwater concentrations beneath the Site.

The first phase of work will consist of maintaining the SVE system through an operations, maintenance, and monitoring plan (OMMP) that will be provided in the Site Management Plan (SMP). The OMMP will include weekly site visits for the first month followed by monthly site visits in which effluent volatile organic vapors will be screened with a photoionization detector (PID) and a system operations inspection will be performed.

A cap, which consists of the building and pavement, is present at the Site. The Site cap will be maintained and inspected annually to eliminate exposure to the contaminants in the soil.

3.3.2 On-Site Soil Vapor Intrusion

Based on the findings of the RI, the disposal of hazardous waste has resulted in the contamination of sub-slab soil vapor beneath the building. The Site contaminants that are considered to be the primary contaminants of concern based on the concentrations detected, and in comparison with the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October, 2006 (SVI Guidance), are PCE, TCE, Cis-1,2-DCE, and VC . The SVI Guidance provides a technical approach for the evaluation of SVI potential and actions to address various testing result scenarios pertaining to volatile chemicals in soil vapor including the above-listed contaminants.

In 2011, 2014, and 2016, on and off-Site SVI investigations and soil gas sampling events were performed to determine if soil vapor intrusion was an issue. The results for the indoor and sub-slab soil vapor samples collected from each unit within the Site building were compared to the Matrices provided in the SVI Guidance. The comparison results when utilizing the NYSDOH Matrices showed that mitigation was required in the laundromat unit for PCE, TCE, DCE, and VC and in the supermarket unit for PCE and TCE.

The results for the off-Site soil gas samples collected along the northern border of the Site in the parking lot and in the sidewalk, across Chestnut Street, and when compared to the NYSDOH Matrices showed that no further action was required for off-Site properties.

The Decision Document provides the following SCGs[2] for indoor air:

VOC Constituent	SCG (ug/m^3)
PCE	30

(2) SCG: Standard Criteria or Guidance – NYSDOH Final Evaluation of Soil Vapor Intrusion in the State of New York, October, 2006, Indoor Air Guidance Values.

Operating a SVE system at the Site will address the elevated sub-slab soil vapor gas concentrations located beneath the slab of the former dry cleaner and supermarket units. A SSDS is currently operating at the Site to also address on-site soil vapor intrusion.

3.3.3 On and Off-Site Groundwater

Based on the findings of the RIs, the disposal of hazardous waste has resulted in the contamination of on-Site groundwater and off-Site groundwater, located downgradient and to the south of the Site. The Site contaminants that are considered to be the primary contaminants of concern based on the concentrations detected, and in comparison with the NYSDEC Class GA Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1 include PCE, TCE, DCE, and chloroform.

The Decision Document provides the following SCGs[3] for groundwater:

VOC Constituent	SCG (ug/l)
PCE	5
TCE	5
Acetone	50
Chloroform	7
Cis-1,2-DCE	5

(2) *SCG: Standard Criteria or Guidance – Division of Water Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.*

The objective of the project is to address groundwater located beneath the Site building utilizing air sparge (AS). This will be accomplished by conducting the following sequential tasks:

- Performing a Pilot Test for the AS system;
- Determining the radius of influence for each AS well (included in Remedial Design Work Plan);
- Installing the AS portion of the system at the Site; and
- Performing quarterly groundwater monitoring.

The first phase of work will consist of performing a Pilot Test for the AS portion of the system to determine the radius of influence. One (1) AS well will be installed. Prior to installing the proposed two (2) additional AS wells, a Pilot Test will be performed in the rear parking lot to determine the radius of influence and size of the compressor for the remediation system.

The second phase of work will consist of installing the remaining AS wells at the Site in the basement of the former dry cleaner in the sidewalk to the front/south of the former dry cleaner unit via concrete coring in the basement followed by soil removal and via hollow-stem auger drill rig for the well in the sidewalk. The wells be will installed, sealed with hydrated bentonite, and then connected via PVC piping to a system shed. The shed will contain the AS compressor. All soil cuttings removed from the well locations will be containerized in drums and properly disposed off-Site.

A MNA plan will be implemented for groundwater. The existing groundwater monitoring wells (MW-1S, MW-2S, MW-5S, MW-8S, MW-10S, and MW-11S) at the Site and off-Site, located downgradient to the south will be sampled on a quarterly basis for volatile organic compounds (VOCs) by US EPA Method 8260. Groundwater will be sampled using low-flow methods. Groundwater samples will be analyzed by an ELAP-approved laboratory for CAT B deliverables.

A cap, which consists of the building and pavement, is present at the Site. The Site cap will be maintained and inspected annually to eliminate exposure to the contaminants in the groundwater beneath the Site.

EnviroTrac
Environmental Services

4.0 PROJECT TIMELINE

4.1 Project Summary

The project will be conducted in a phased approach in order to increase the efficiency of implementation. Initially a Remedial Design/Remedial Action Workplan (RAWP) will be prepared that provides a summary of remedial requirements specified in the Decision Document and technical approach that will meet the specified remedial action objectives (RAOs).

4.1.1 On and Off-Site Groundwater

For the on and off-Site groundwater remedial action, an AS system will be installed at the Site. An AS system consisting of three (3) wells to be installed in the rear parking lot, the basement of the former dry cleaner, and to the front/south of the former dry cleaner in the sidewalk. The AS system will be designed in conformance with NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation. This will remediate groundwater beneath the Site. Natural attenuation monitoring will also be performed on a quarterly basis. The existing groundwater monitoring wells (MW-1S, MW-2S, MW-5S, MW-8S, MW-10S, and MW-11S) at the Site and off-Site (located downgradient to the south) will be sampled on an annual basis for VOCs by US EPA Method 8260. Groundwater will be sampled using passive diffusion bags. Groundwater samples will be analyzed by an ELAP-approved laboratory for CAT B deliverables.

4.1.2 On-Site Soil

For the on-Site soil, a SVE system will be installed at the Site. A SVE system consisting of two (2) extraction wells to be installed in the rear parking lot and the sidewalk to the front/south of the former dry cleaner, and the two (2) existing SSDS wells in the basement of the former dry cleaner (SSD-7 and SSD-8). Previous on-Site sub-slab soil vapor data collected from beneath the former dry cleaner indicated that PCE was detected at a concentration of 428,000 ug/m^3 and PCE was also detected at a concentration of 20,100 ug/m^3 in the sub-slab soil vapor beneath the supermarket. More recent data collected in 2017 from beneath the former dry cleaner showed a significant decrease of PCE to 831 ug/m^3 and of TCE to 399 ug/m^3. The SVE system will be designed in conformance with NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation. This will mitigate potential long-term exposure to VOCs found in the sub-slab vapor beneath the building. System operations, maintenance, and monitoring will be performed on a monthly basis.

4.1.3 Institutional and Engineering Controls

The on-Site and off-Site remedies will require the adoption of institutional and engineering controls to achieve the RAOS. These will be specified in a SMP to be developed.

4.2 Implementation Schedule

Ongoing communications and correspondence will be conducted to keep the NYSDEC and NYSDOH informed of project status and in the case of problems that may arise that will potentially impact scope and/or schedule. The project's major tasks and anticipated timeline beginning with the submittal of the RD/RAWP to the NYSDEC/NYSDOH are outlined in the table below:

Activities	Organization	Anticipated Initiation	Anticipated Completion	Deliverable
RD/RAWP Review	NYSDEC/NYSDOH	June, 2018	June, 2018	Approved RD/RAWP by NYSDEC/NYSDOH
SVE/AS Draft Remedial Design Work Plan	EnviroTrac	June, 2018	June, 2018	RAWP
Draft Site Management Plan (SMP)	NYSDEC/NYSDOH	July, 2018	August, 2018	Approved SVE/AS Remedial Design Work Plan
SVE/AS Installation Complete	EnviroTrac	July, 2018	September, 2018	SVE/AS Performance Report
SVE/AS Performance Report Review	NYSDEC/NYSDOH	September, 2018	September, 2018	Approved SVE/AS Performance Report by NYSDEC/NYSDOH
SVE/AS Construction Completion Report (CCR)/Final Engineering Report (FER) SMP Approval	EnviroTrac	September, 2018	October, 2018	SVE/AS CCR/FER SMP
Approval of FER	NYSDEC/NYSDOH	October, 2018	November, 2018	Final FER
Development of Site Management Procedures	EnviroTrac	November, 2018	December, 2018	Implementation of SMP

5.0 SAMPLING AND ANALYTICAL REQUIREMENTS

5.1 Sampling Methods and Locations

5.1.1 Groundwater Sampling

Groundwater will be monitored over time for indications of natural attenuation. The existing groundwater monitoring wells (MW-1S, MW-2S, MW-5S, MW-8S, MW-10S, and MW-11S) at the Site and off-Site, located downgradient to the south will be sampled on a quarterly basis for VOCs by US EPA Method 8260. Groundwater will be sampled using low-flow methods. Groundwater samples will be analyzed by an ELAP-approved laboratory for CAT B deliverables. It is anticipated that samples will be collected as described in the following table:

Matrix	Sampling Location	Depth (feet)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
Groundwater	COC Plume on-Site and off-Site to the south	Variable	VOCs	6	See Below	Monitoring for natural attenuation
Groundwater	Trip Blank	---	VOCs	1 per cooler	See Below	Field QC
Groundwater	Blind Duplicate	TBD	VOCs	1	See Below	Field QC
Groundwater	MS/MSD	TBD	VOCs	1	See Below	Laboratory QC

5.1.2 Air Monitoring Sampling

SVE system startup grab emissions sample will be collected via a 6L Summa Canister. Samples will be submitted for laboratory analysis for EPA Method TO-15 analysis.

SVE air emissions will be monitored through the collection of air samples via a Tedlar® bag and screened via a properly calibrated photoionization detector (PID) on monthly basis. On a quarterly basis, the Tedlar® bags will be laboratory analyzed for VOCs via EPA Method TO-15.

5.2 Analytical Methods and Requirements

5.2.1 Groundwater and Air Samples

The laboratory providing groundwater analytical services is Analytical Services, Inc., (Pace) Melville, NY (Lab ID 10478). Pace is an Environmental Laboratory Accreditation Program (ELAP) laboratory certified to conduct the following analyses.

- Non Potable Water;
- Potable Water; and
- Air and Emissions.

The proposed analytical methods for groundwater include:

Matrix	Analytical Group	Bottle	Preservative	Analytical Method	Holding Time
Aqueous	VOCs	40 ml. Glass w/Teflon®- lined cap	Cool 4°C, HCL to pH<2	8260C	14 days

The proposed analytical methods for soil vapor and emissions:

Matrix	Analytical Group	Bottle	Preservative	Analytical Method	Holding Time
Air	VOCs	Tedlar bag or Summa Canister	None	TO-15	Tedlar bag: 2 days; Summa: 30 days

5.3 Reference Limits and Evaluation

Matrix		Aqueous			
Analytical Group		VOCs			
Analytical Method		SW 846-8260C			
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
Methylene chloride	75-09-2	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.169	10	0 / 47-159
1,1-Dichloroethane	75-34-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.07	10	0 / 52-152
Chloroform	67-66-3	NYSDEC Division of Water TOGS 1.1.1: 7 ug/L	0.111	10	0 / 56-142
Carbon tetrachloride	56-23-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.467	10	0 / 19-134
1,2-Dichloropropane	78-87-5	NYSDEC Division of Water TOGS 1.1.1: 1 ug/L	0.095	10	0 / 40-152
Dibromochloromethane	124-48-1	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.174	10	0 / 50-133
1,1,2-Trichloroethane	79-00-5	NYSDEC Division of Water TOGS 1.1.1: 1 ug/L	0.104	10	0 / 62-138
Tetrachloroethene	127-18-4	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.384	10	0 / 46-124
Chlorobenzene	108-90-7	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.034	10	0 / 65-135
Trichlorofluoromethane	75-69-4	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.141	10	0 / 10-144
1,2-Dichloroethane	107-06-2	NYSDEC Division of Water TOGS 1.1.1: 0.6 ug/L	0.087	10	0 / 48-133
1,1,1-Trichloroethane	71-55-6	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.06	10	0 / 24-129
Bromodichloromethane	75-27-4	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.063	10	0 / 55-138
trans-1,3-Dichloropropene	10061-02-6	NYSDEC Division of Water TOGS 1.1.1: 0.4 ug/L	0.144	10	0 / 61-126
cis-1,3-Dichloropropene	10061-01-5	NYSDEC Division of Water TOGS 1.1.1: 0.4 ug/L	0.105	10	0 / 66-126
Bromoform	75-25-2	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.486	10	0 / 51-126
1,1,2,2-Tetrachloroethane	79-34-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.12	10	0 / 46-164
Benzene	71-43-2	NYSDEC Division of Water TOGS 1.1.1: 1 ug/L	0.074	10	0 / 64-139
Toluene	108-88-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.077	10	0 / 69-124
Ethylbenzene	100-41-4	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.132	10	0 / 67-128
Chloromethane	74-87-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.181	10	0 / 58-142
Bromomethane	74-83-9	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.216	10	0 / 67-126
Vinyl chloride	75-01-4	NYSDEC Division of Water TOGS 1.1.1: 2 ug/L	0.119	10	0 / 61-127
Chloroethane	75-00-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.196	10	0 / 58-142
1,1-Dichloroethene	75-35-4	NYSDEC Division of Water TOGS 1.1.1: 0.7 ug/L	0.155	10	0 / 62-131
trans-1,2-Dichloroethene	156-60-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.075	10	0 / 64-133

Matrix		Aqueous			
Analytical Group		VOCs			
Analytical Method		SW 846-8260C			
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
Trichloroethene	79-01-6	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.08	10	0 / 43-150
1,2-Dichlorobenzene	95-50-1	NYSDEC Division of Water TOGS 1.1.1: 3 ug/L	0.114	10	0 / 60-134
1,3-Dichlorobenzene	541-73-1	NYSDEC Division of Water TOGS 1.1.1: 3 ug/L	0.129	10	0 / 61-133
1,4-Dichlorobenzene	106-46-7	NYSDEC Division of Water TOGS 1.1.1: 3 ug/L	0.113	10	0 / 59-134
Methyl tert butyl ether	1634-04-4	NYSDEC Division of Water TOGS 1.1.1: N/A	0.031	10	0 / 64-117
p/m-Xylene	106-42-3/108-38-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.151	10	0 / 72-133
o-Xylene	95-47-6	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.065	10	0 / 72-137
cis-1,2-Dichloroethene	156-59-2	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.149	10	0 / 72-132
Styrene	100-42-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.118	10	0 / 71-132
Dichlorodifluoromethane	75-71-8	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.102	10	0 / 16-152
Acetone	67-64-1	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.356	10	0 / 33-175
Carbon disulfide	75-15-0	NYSDEC Division of Water TOGS 1.1.1: N/A	0.543	10	0 / 19-165
2-Butanone	78-93-3	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.77	10	0 / 33-175
4-Methyl-2-pentanone	108-10-1	NYSDEC Division of Water TOGS 1.1.1: N/A	0.164	10	0 / 44-162
2-Hexanone	591-78-6	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.439	10	0 / 34-175
Bromochloromethane	74-97-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.074	10	0 / 50-200
1,2-Dibromoethane	106-93-4	NYSDEC Division of Water TOGS 1.1.1: 0.0006 ug/L	0.085	10	0 / 55-129
1,2-Dibromo-3-chloropropane	96-12-8	NYSDEC Division of Water TOGS 1.1.1: 0.04 ug/L	0.178	10	0 / 33-137
Isopropylbenzene	98-82-8	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.108	10	0 / 58-131
1,2,3-Trichlorobenzene	87-61-6	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.252	10	0 / 60-140
1,2,4-Trichlorobenzene	120-82-1	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.296	10	0 / 10-175
Cyclohexane	110-82-7	NYSDEC Division of Water TOGS 1.1.1: N/A	0.087	10	0 / 33-152
Methylacetate	79-20-9	NYSDEC Division of Water TOGS 1.1.1: N/A	0.24	10	0 / 45-175
Methylcyclohexane	108-87-2	NYSDEC Division of Water TOGS 1.1.1: N/A	1.27	10	0 / 22-171
Total Xylenes	95-47-6 106-42-3 108-38-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.065	10	0 / 70-133
Trichlorotrifluoroethane	76-13-1	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.761	10	0 / 53-122

Notes:
RPD – Relative Percent Difference
R - Recovery

Matrix		Air			
Analytical Group		VOCs			
Analytical Method		TO-15/TO-15 plus helium			
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
1,1,1-Trichloroethane	71-55-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.022	0.2	25 / 70-130
1,1,2,2-Tetrachloroethane	79-34-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
1,1,2-Trichloroethane	79-00-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.025	0.2	25 / 70-130
1,1-Dichloroethane	75-34-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
1,1-Dichloroethene	75-35-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
1,2,4-Trichlorobenzene	120-82-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
1,2,4-Trimethylbenzene	95-63-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
1,2-Dibromoethane	106-93-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
1,2-Dichlorobenzene	95-50-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.2	25 / 70-130
1,2-Dichloroethane	107-06-2	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
1,2-Dichloroethene (cis)	156-59-2	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.2	25 / 70-130
1,2-Dichloroethene (trans)	156-60-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
1,2-Dichloropropane	78-87-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.031	0.2	25 / 70-130
1,2-Dichlorotetrafluoroethane	76-14-2	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130

Matrix	Air				
Analytical Group	VOCs				
Analytical Method	TO-15/TO-15 plus helium				
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
1,3,5-Trimethylbenzene	108-67-8	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.2	25 / 70-130
1,3-Dichlorobenzene	541-73-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.2	25 / 70-130
1,3-Dichloropropene (cis)	10061-01-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.018	0.2	25 / 70-130
1,3-Dichloropropene (trans)	10061-02-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.031	0.2	25 / 70-130
1,3-Hexachlorobutadiene	87-68-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
1,4-Dichlorobenzene	106-46-7	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
Acetone	67-64-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
Benzene	71-43-2	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.018	0.2	25 / 70-130
Bromodichloromethane	75-27-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.026	0.2	25 / 70-130
Bromoform	75-25-2	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.024	0.2	25 / 70-130
Bromomethane	74-83-9	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
Carbon disulfide	75-15-0	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
Carbon tetrachloride	56-23-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.022	0.2	25 / 70-130
Chlorobenzene	108-90-7	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130

Matrix		Air			
Analytical Group		VOCs			
Analytical Method		TO-15/TO-15 plus helium			
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
Chloroethane	75-00-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.022	0.2	25 / 70-130
Chloroform	67-66-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.024	0.2	25 / 70-130
Chloromethane	74-87-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.028	0.2	25 / 70-130
Dibromochloromethane	124-48-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.022	0.2	25 / 70-130
Dichlorodifluoromethane	75-71-8	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
Ethylbenzene	100-41-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
Methyl butyl ketone	591-78-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.2	25 / 70-130
Methyl ethyl ketone	78-93-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.2	25 / 70-130
Methyl isobutyl ketone	108-10-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.2	25 / 70-130
Methyl tert-butyl ether	1634-04-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.2	25 / 70-130
Methylene chloride	75-09-2	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance): 60 mcg/m^3	0.03	0.2	25 / 70-130
Styrene	100-42-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.018	0.2	25 / 70-130
Tetrachloroethene	127-18-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance): 30 mcg/m^3	0.017	0.2	25 / 70-130
Toluene	108-88-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.2	25 / 70-130

Matrix		Air			
Analytical Group		VOCs			
Analytical Method		TO-15/TO-15 plus helium			
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
Trichloroethene	79-01-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance): 2 mcg/m^3	0.031	0.2	25 / 70-130
Trichlorofluoromethane	75-69-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.018	0.2	25 / 70-130
Vinyl acetate	108-05-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.018	0.2	25 / 70-130
Vinyl chloride	75-01-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.025	0.2	25 / 70-130
Xylenes (m&p)	106-42-3/108-38-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.031	0.2	25 / 70-130
Xylenes (o)	95-47-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.2	25 / 70-130
1,4-Difluorobenzene	540-36-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
Bromochloromethane	74-97-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
Chlorobenzene-d5	3114-55-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
4-Bromofluorobenzene	460-00-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.995	0.5	25 / 70-130
1,2-Dichloroethene (total)	540-59-0	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.0863	0.5	25 / 70-130
1,3-Butadiene	106-99-0	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
1,4-Dioxane	123-91-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.5	25 / 70-130
1-Methylnaphthalene	90-12-0	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.5	25 / 70-130

Matrix		Air			
Analytical Group		VOCs			
Analytical Method		TO-15/TO-15 plus helium			
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
2,2,4-Trimethylpentane	540-84-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.5	25 / 70-130
2,3-Dimethylpentane	565-59-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.025	0.2	25 / 70-130
2-Chlorotoluene	95-49-8	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
2-Methylnaphthalene	91-57-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.018	0.5	25 / 70-130
2-Methylpentane	107-83-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.2	25 / 70-130
3-Chloropropene	107-05-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
3-Hexanone	589-38-8	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.0391	0.5	25 / 70-130
4-Ethyltoluene	622-96-8	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.5	25 / 70-130
Acrylonitrile	107-13-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.079	0.5	25 / 70-130
Benzyl chloride	100-44-7	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.5	25 / 70-130
Cyclohexane	110-82-7	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.5	25 / 70-130
Ethanol	64-17-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.5	25 / 70-130
Ethyl acetate	141-78-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
Freon-114	76-14-2	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.5	25 / 70-130

Matrix		Air			
Analytical Group		VOCs			
Analytical Method		TO-15/TO-15 plus helium			
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
Indan	496-11-7	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
Indene	95-13-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.5	25 / 70-130
Iodomethane	74-88-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.0396	0.5	25 / 70-130
Isopentane	78-78-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.022	0.2	25 / 70-130
Isopropanol	67-63-0	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.024	0.5	25 / 70-130
Isopropylbenzene	98-82-8	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.5	25 / 70-130
Methyl methacrylate	80-62-6	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.5	25 / 70-130
Methyl vinyl ketone	78-94-4	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.073	0.5	25 / 70-130
n-Heptane	142-82-5	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.5	25 / 70-130
n-Hexane	110-54-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.012	0.5	25 / 70-130
n-Propylbenzene	103-65-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.5	25 / 70-130
Naphthalene	91-20-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.5	25 / 70-130
Propylene	115-07-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.015	0.5	25 / 70-130
tert-Butyl Alcohol	75-65-0	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.018	0.5	25 / 70-130

Matrix		Air			
Analytical Group		VOCs			
Analytical Method		TO-15/TO-15 plus helium			
Analyte	CAS Number	Name of State/Territory/Tribal: Regulatory Standards/Criteria	Analytical Method Detection Limit	Laboratory Method Reporting Limit	Batch QC %RPD / %R
Tetrahydrofuran	109-99-9	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
Thiophene	110-02-1	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.022	0.5	25 / 70-130
Vinyl bromide	593-60-2	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0	0.5	25 / 70-130
Xylene (total)	95-47-6 106-42-3 108-38-3	NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) (SVI Guidance):	0.017	0.5	25 / 70-130

Notes:
RPD – Relative Percent Difference
R – Recovery
Units – parts per billion by volume (ppbv)

6.0 PROJECT SPECIFIC METHODS AND STANDARD OPERATING PROCEDURES

Quality objectives will be conducted in accordance with the NYSDEC's DER- 10/Technical Guidance for Site Investigation and Remediation. All analyses will be conducted by an analytical laboratory that is NYSDOH ELAP certified for ASP/CLP categories. The Project will require full ASP/CLP laboratory reporting. An independent third-party will conduct data validation and preparation of Data Usability Summary Reports (DUSRs).

6.1 Groundwater Sampling Procedures

The following describes the purging and sampling procedures for the Low-Stress (Low Flow)/ Minimal Drawdown method for the collection of ground-water samples. These procedures also describe steps for dedicated and non-dedicated systems.

Pre-Sampling Activities (Non-dedicated and dedicated system)

1. Sampling locations must begin at the monitoring well with the least contamination, generally up-gradient or furthest from the site or suspected source. Then proceed systematically to the monitoring wells with the most contaminated ground water.

2. Check and record the condition of the monitoring well for damage or evidence of tampering. Lay out polyethylene sheeting around the well to minimize the likelihood of contamination of sampling/purging equipment from the soil. Place monitoring, purging and sampling equipment on the sheeting.

3. Unlock well head. Record location, time, date and appropriate information in a field logbook or on the ground-water sampling log (See attached ground-water sampling record and ground-water sampling log as examples).

4. Remove inner casing cap.

5. Monitor the headspace of the monitoring well at the rim of the casing for volatile organic compounds (VOC) with a Photoionization detector (PID) or Flame ionization detector (FID), and record in the logbook. If the existing monitoring well has a history of positive readings of the headspace, then the sampling must be conducted in accordance with the Health and Safety Plan.

6. Measure the depth to water (water level must be measured to nearest 0.01 feet) relative to a reference measuring point on the well casing with an electronic water level indicator or steel tape and record in logbook or ground-water sampling log. If no reference point is found, measure relative to the top of the inner casing, then mark that reference point and note that location in the field logbook. Record information on depth to ground water in the field logbook or ground water sampling log. Measure the depth to water a second time to confirm initial measurement; measurement should agree within 0.01 feet or remeasure.

7. Check the available well information or field information for the total depth of the monitoring well. Use the information from the depth of water in step six and the total depth of the monitoring well to calculate the volume of the water in the monitoring well or the volume of one casing. Record information in field logbook or ground-water sampling log.

Purging and Sampling Activities.

8A. Non-dedicated system - Place the pump and support equipment at the wellhead and slowly lower the pump and tubing down into the monitoring well until the location of the pump intake is set 6 at a pre-determined location within the screen interval. The placement of the pump intake should be positioned with a calibrated sampling pump hose, sounded with a weighted-tape, or using a pre-measured hose. Refer to the available monitoring well information to determine the depth and length of the screen interval. Measure the depth of the pump intake while lowering the pump into location. Record pump location in field logbook or groundwater sampling log.

8B. Dedicated system - Pump has already been installed, refer to the available monitoring well information and record the depth of the pump intake in the field logbook or ground-water sampling log.

9. Non-dedicated system and dedicated system - Measure the water level (water level must be measured to nearest 0.01 feet) and record information on the ground-water sampling log, leave water level indicator probe in the monitoring well.

10. Non-dedicated and dedicated system - Connect the discharge line from the pump to a flow-through cell. A “T” connection is needed prior to the flow cell to allow for the collection of water for the turbidity measurements. The discharge line from the flow-through cell must be directed to a container to contain the purge water during the purging and sampling of the monitoring well.

11. Non-dedicated and dedicated system - Start pumping the well at a low flow rate (0.2 to 0.5 liter per minute) and slowly increase the speed. Check water level. Maintain a steady flow rate while maintaining a drawdown of less than 0.33 feet (Puls and Barcelona, 1996). If drawdown is greater than 0.33 feet lower the flow rate. 0.33 feet is a goal to help guide with the flow rate adjustment. It should be noted that this goal may be difficult to achieve under some circumstances due to geologic heterogeneities within the screened interval, and may require adjustment based on site-specific conditions and personal experience (Puls and Barcelona, 1996).

12. Non-dedicated and dedicated system - Measure the discharge rate of the pump with a graduated cylinder and a stop watch. Also, measure the water level and record both flow rate and water level on the groundwater sampling log. Continue purging, monitor and record water level and pump rate every three to five minutes during purging. Pumping rates should be kept at minimal flow to 7 ensure minimal drawdown in the monitoring well.

13. Non-dedicated and dedicated system - During the purging, a minimum of one tubing volume (including the volume of water in the pump and flow cell) must be purged prior to recording the water-quality indicator parameters. Then monitor and record the water-quality indicator parameters every three to five minutes. The water-quality indicator field parameters are turbidity, dissolved oxygen, specific electrical conductance, pH, redoxpotential and temperature. Oxidation-reduction potential may not always be an appropriate stabilization parameter, and will depend on site-specific conditions. However, readings should be recorded because of its value as a double check for oxidizing conditions. Also, for the final dissolved oxygen measurement, if the readings are less than 1 milligram per liter, it should be collected and analyze with the spectrophotometric method (Wilde et al., 1998 Wilkin et al., 2001), colorimetric or Winkler titration (Wilkin et al., 2001). The stabilization criterion is based on three successive readings of the water quality field parameters; the following are the criteria which must be used: Parameter Stabilization Criteria Reference pH ± 0.1 pH units Puls and Barcelona, 1996; Wilde et al., Specific electrical conductance (SEC) ± 3% FS/cm Puls and Barcelona, 1996 oxidation-reduction potential (ORP) ± 10 millivolts Puls and Barcelona 1996 turbidity ± 10 % NTUs (when turbidity is

greater than 10 NTUs) Puls and Barcelona, 1996 Wilde et al., 1998 dissolved oxygen ± 0.3 milligrams per liter Wilde et al., 1998 Once the criteria have been successfully met indicating that the water quality indicator parameters have stabilized, then sample collection can take place.

14. If a stabilized drawdown in the well can't be maintained at 0.33 feet and the water level is approaching the top of the screened interval, reduce the flow rate or turn the pump off (for 15 minutes) and allow for recovery. It should be noted whether or not the pump has a check valve. A check valve is required if the pump is shut off. Under no circumstances should the well be 8 pumped dry. Begin pumping at a lower flow rate, if the water draws-down to the top of the screened interval again turn pump off and allow for recovery. If two tubing volumes (including the volume of water in the pump and flow cell) have been removed during purging then sampling can proceed next time the pump is turned on. This information should be noted in the field notebook or ground-water sampling log with a recommendation for a different purging and sampling procedure.

15. Non-dedicated and dedicated system - Maintain the same pumping rate or reduce slightly for sampling (0.2 to 0.5 liter per minute) in order to minimize disturbance of the water column. Samples should be collected directly from the discharge port of the pump tubing prior to passing through the flow-through cell. Disconnect the pump's tubing from the flow-through-cell so that the samples are collected from the pump's discharge tubing. For samples collected for dissolved gases or Volatile Organic Compounds (VOCs) analyses, the pump's tubing needs to be completely full of ground water to prevent the ground water from being aerated as the ground water flows through the tubing. The sequence of the samples is immaterial unless filtered (dissolved) samples are collected and they must be collected last (Puls and Barcelona, 1996). All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container. When filling the VOC samples a meniscus must be formed over the mouth of the vial to eliminate the formation of air bubbles and head space prior to capping. In the event that the ground water is turbid,(greater then 10 NTUs), a filtered metal (dissolved) sample also should be collected. If filtered metal sample is to be collected, then an in-line filter is fitted at the end of the discharge tubing and the sample is collected after the filter. The in-line filter must be pre-rinsed following manufacturer's recommendations and if there are no recommendations for rinsing, a minimum of 0.5 to 1 liter of ground water from the monitoring well must pass through the filter prior to sampling.

16A. Non-dedicated system - Remove the pump from the monitoring well. Decontaminate the pump and dispose of the tubing if it is non-dedicated.

16B Dedicated system - Disconnect the tubing that extends from the plate at the wellhead (or cap) and discard after use.

17. Non-dedicated system - Before locking the monitoring well, measure and record the well depth (to 0.1 feet). Measure the total depth a second time to confirm initial measurement; measurement should agree within 0.01 feet or remeasure.

18. Non-dedicated and dedicated system - Close and lock the well.

6.2 SVE Emissions Sampling Procedures

<u>SVE Emissions Samples</u>

Following SVE system startup, a grab emissions sample will be collected prior to treatment utilizing a 6L Summa Canister. When Summa Canister samples are collected, the following actions will be taken:

1. Prior to sample collection, the appropriate information should be completed on the Canister Sampling Field Data Sheet;
2. A canister, which is evacuated to 0.05 mm Hg and fitted with a flow restricting device, is opened to the atmosphere containing the VOCs to be sampled;
3. The pressure differential causes the sample to flow into the canister;
4. This technique may be used to collect grab samples (duration of 10 to 30 seconds) or time-integrated samples (duration of 12 to 24 hours). The sampling duration depends on the degree to which the flow is restricted;
5. A critical orifice flow restrictor will have a decrease in the flow rate as the pressure approaches atmospheric; and
6. Upon sample completion at the location, close the valve and the appropriate information should be recorded on the Canister Sampling Field Data Sheet.

SVE quarterly emissions samples will be collected utilizing a Tedlar® bag from the influent and effluent ports of the SVE system. When Tedlar® bag samples are collected, the following actions will be taken:

1. A representative sample is drawn from a source through a heated sample probe and filter.
2. The sample then passes through a heated 3-way valve and into a condenser where the moisture and condensable components are removed from the gas stream and collected in a trap.
3. The sample is collected in a Tedlar® bag held in a rigid, air-tight opaque container.
4. On a monthly basis, the Tedlar bag is screened for vapors utilizing a calibrated PID.
5. On a quarterly basis, the dry gas sample and the corresponding condensate are then transported together to a GC/MS. A mass spectrometer is most suited for the analysis and quantitation of complex mixtures of volatile organic compounds. The total amount of the analyte in the sample is determined by summing the individual amounts in the bag and condensate. A flow chart of the procedure is given at the end of this method.

The field sampling team will maintain a sample log sheet summarizing the following:

- Sample identification;
- Date and time of sample collection;
- Identity of samplers;
- Sampling methods and devices;
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone; and
- Chain of custody protocols and records used to track samples from sampling point to analysis.

All samples will be delivered to Pace Analytical Services, Inc. (Pace), Melville, New York (Lab ID 10478) for analysis of VOCs by EPA Method TO-15.

6.3 Sample Quality Control

To monitor the integrity of field sampling and laboratory procedures, the following quality assurance/quality control (QA/QC) procedures will be adhered to for this effort.

Field QC Samples

Trip Blank: The trip blank accompanies the aqueous samples to and from the field, never opened, until all samples are readied for analysis. Its purpose is to assess the potential for in-transit contamination of samples. Trip blanks will be used at a frequency of one per sample delivery group.

Blind Duplicate: A duplicate sample taken in the field from the same location as the original sample to ascertain sampling precision but it is given another name so it is not identified with any field duplicate, again to test precision. Trip blanks will be used at a frequency of one per 20 samples.

Lab QC Samples

Method Blank (MB): A method blank is an analyte-free matrix (water, soil, etc.) subjected to the entire analytical process to demonstrate that the analytical system itself does not introduce contamination. The method blank results should be below the Method Reporting Limit (MRL) or, if required for DoD projects, < ½ MRL for the analytes being tested. A method blank is included with the analysis of every sample preparation batch, every 20 samples, or as stated in the method, whichever is more frequent.

Matrix Spike/Matrix Spike Duplicate (MS/MSD): The matrix spike/matrix duplicate is a known amount of a compound similar chemically to the target analyte is added to samples to ascertain any matrix effects on recoveries and to determine the accuracy and precision of the method in this matrix. MS/MSDs will be used at a frequency of one per 20 samples.

Laboratory Control Sample (LCS): A laboratory control sample is a well-characterized sample of known analytes and concentration. A reference material containing certified amounts of target analytes, may be used as an LCS. An LCS is prepared and analyzed at a minimum frequency of one per 20 samples, with every analytical batch or as stated in the method, whichever is more frequent. The LCS sample is prepared and analyzed in exactly the same manner as the field samples. The percent recovery of the target analytes in the LCS is compared to established control limits and assists in determining whether the methodology is in control and whether the laboratory is capable of making accurate and precise measurements at the required reporting limit. Comparison of batch-to-batch LCS analyses enables the laboratory to evaluate batch-to-batch precision and accuracy.

Surrogates: Surrogates are organic compounds that are similar in chemical composition and behavior to the analytes of interest, but are not normally found in environmental samples. Depending on the analytical method, one or more of these compounds is added to method blanks, calibration and check standards, and samples prior to extraction and analysis. Samples include duplicates, matrix spike samples, duplicate matrix spike samples and laboratory control samples. This is done in order to monitor the method performance on each sample. The percent recovery is calculated for each surrogate, and the recovery is a measurement of the overall method performance.

Initial (or independent) calibration verification standards (ICVs): Initial (or independent) calibration verification standards are standards that are analyzed after calibration with newly prepared standards but prior to sample analysis, in order to verify the validity and accuracy of the standards used in the calibration. Once it is determined that there is not a reference material defect or systematic error in preparation of the calibration standards, the newly prepared standards are considered valid and may be used for subsequent calibrations and quantitative determinations (as expiration dates and methods allow). The ICV standards are prepared from materials obtained from a source independent from the one used for preparing the calibration standards (“second-source”). ICVs are also analyzed in accordance with method-specific requirements.

Continuing calibration verification standards (CCVs): Continuing calibration verification standards are midrange standards that are analyzed in order to verify that the calibration of the analytical system is still acceptable. The frequency of CCV analysis is either once every ten samples, or as indicated in the method.

7.0 FIELD EQUIPMENT CALIBRATION/CORRECTIVE ACTION

7.1 Community Air Monitoring

Air monitoring at the work Site will be employed to assess potential exposure to the local community in accordance with the CAMP during the handling of waste or contaminated soil and also during all ground intrusive activities and when RAWP activities may generate airborne volatiles or fugitive dust from exposed waste or contaminated soil.

Volatile organic compounds (VOCs) will be monitored using equipment capable of calculating 15-minute running average concentrations (ex., a PGM 6228 RAE Systems MultiRAE multigas detector or similar).

Particulates will be monitored using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10), (ex., a Thermo Andersen MIE DATARAM 4000 particulate meter or similar) with the following minimum performance standards:

- Objects to be measured: Dust, mists or aerosols;
- Measurement Ranges: 0.001 to 400 mg/m^3 (1 to 400,000 ug/m^3);
- Precision (2-sigma) at constant temperature: +/- 10 :g/m^3 for one second averaging; and +/- 1.5 g/m^3 for sixty second averaging;
- Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
- Resolution: 0.1% of reading or 1g/m^3, whichever is larger;
- Particle Size Range of Maximum Response: 0.1-10 microns;
- Total Number of Data Points in Memory: 10,000;
- Logged Data: Each data point with average concentration, time/date and data point number
- Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
- Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
- Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
- Operating Temperature: -10 to 50°C (14 to 122°F); and
- Particulate levels will be monitored upwind and immediately downwind at the working Site and integrated over a period not to exceed 15 minutes.

Manufacturer's instructions pertaining to the use, maintenance and calibration of the monitoring equipment will be followed to ensure proper data collection during the implementation of the CAMP.

8.0 ANALYTICAL LABORATORY QA/QC PROCEDURES

All laboratory analyses performed by Pace are in full compliance within applicable State, or Federal Quality Control guidelines. The Quality Assurance (QA) program and Quality Control (QC) procedures are defined by the Quality Manual and the Laboratory Standard Operating Procedure (SOP) Manual. The QA program meets or exceeds EPA recommended guidelines with quality control samples accounting for at least 20% of the total number of samples analyzed. Data from the analysis of these samples can be used to update control limits, or in the case of projects with defined control limits, the data serves to demonstrate the overall lab performance. Data which exceed control limits are considered suspicious and shall initiate specific actions as defined in this Manual and the SOP Manual. The Quality Assurance Office ensures that facilities, equipment, personnel, methods, records, and Quality Control procedures are in conformance with Pace's Standard Operating Procedures (SOPs) as well as with applicable EPA Quality Control guidelines.

Each laboratory project is monitored through application of a QA/QC program, which includes the following elements:

- Centralized Project files;
- Written Standard Operating Procedures;
- Rigorous Chain-of-Custody procedures;
- Documentation of nonconformance events and corrective actions taken;
- Quality Control of data is assessed by analysis of reference samples, spiked samples, duplicates and surrogate spikes;
- Periodic inspections of projects in progress;
- Frequent equipment calibration and maintenance inspections; and
- Archiving of project records under controlled access.

The Pace Quality Manual (Document Control Number QAM Rev 18.0, Date Issued November 24, 2015) provides specific detailed information pertaining to the following:

- Quality Manual Identification Form; and
- Quality Assurance Policy Statement.

- Quality Assurance Management;
  - Assignment of Responsibilities
  - Communications
  - Document Control
  - QA Program Assessment

- Personnel Responsibilities and Qualifications;
  - Qualifications
  - Training
  - Data Integrity/Ethics Policy
  - Conflict of Interest Policy

- Facilities Equipment and Services;
  - Laboratory Facilities
  - Instrument Maintenance

  - Laboratory Materials Procurement and Tracking

- Data Generation;
  - Standard Operating Procedures
  - Sample Chain of Custody
  - Sample and Data Management
  - Additional Procedural and Calibration Procedures to Achieve Quality Assurance Objectives
    - ✓ Organic Department
    - ✓ Metals Department
    - ✓ Classical Chemistry Department
    - ✓ Bacteria Department

  - Determination of Detection and Quantitation Limits
  - Determination of Inter-element Correction Factors
  - Table of Methods

- Data Processing;
  - Collection
  - Data Review and Validation
  - Report Information and Storage
  - Transcription
  - Data Reduction

- Data Quality Assessment;
  - Definition of Terms
  - Methods for Attaining Quality Control Requirements
  - Data Quality Objectives and Analytical Data Quality Levels

- Corrective Action;
  - System Audits
  - Performance Audits
  - Audits of Subcontractors
  - Nonconformance Event Corrective Action and Documentation

- Customer Complaint Management;
- Client Confidentiality;
- Implementation Requirement and Schedule; and
- References.

9.0 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

9.1 Sampling Handling Systems

The following list includes a summary of sample handling system:

Sample Collection, Packaging and Shipment

- Sample Collection and Packaging – EnviroTrac;
- Coordination of Shipment – EnviroTrac; and
- Type of Shipment – overnight carrier, laboratory courier.

Sample Receipt and Analysis

- Sample Receipt – laboratory;
- Sample Custody and Storage – laboratory;
- Sample Preparation – laboratory; and
- Sample Determinative Analysis – laboratory.

Sample Archiving

- Field Sample Storage – Samples will be shipped within 24 hours and arrive at the laboratory within 24 hours of sample shipment.

Sample Disposal

- Number of Days from Analysis – 30 days.

9.2 Sample Custody Requirements

Chain-of-custody records for all samples will be maintained. A sample will be considered to be "in custody" of any individual if said sample is either in direct view of or otherwise directly controlled by that individual. Storage of samples during custody will be accomplished according to established preservation techniques, in appropriately sealed and numbered containers. Chain-of-custody will be accomplished when the samples are directly transferred from one individual to the next, with the first individual witnessing the signature of the recipient on the chain-of-custody record.

The chain-of-custody records will contain the following information:

- Respective sample numbers of the laboratory and Qualified Environmental Professional, if available;
- Signature of the collector;
- Date and time of collection;
- Sample type (e.g., groundwater, sediment);
- Identification of well or sampling point;
- Number of containers;
- Parameter requested for analysis;
- Signature of person(s) involved in the chain of possession;
- Description of sample bottles and their condition; and
- Problems associated with sample collection (i.e., breakage, preservatives missing), if any.

10.0 FIELD AND ANALYTICAL QUALITY CONTROL SUMMARY

The purpose of the QA/QC program is to establish and maintain laboratory practices that will ensure the scientific reliability and comparability of the data generated in support of the project.

Quality assurance (QA) is the system for ensuring that all information, data, and resulting decisions compiled under an investigation are technically sound, statistically valid, and properly documented. Quality control (QC) is the mechanism through which quality assurance achieves its goals. Quality control programs define the frequency and methods of checks, audits, and reviews necessary to identify problems and dictate corrective action, thus high quality data.

The laboratory QA/QC program will outline the purpose, policies, organizations and operations established to support the chemical analyses.

Matrix	Aqueous
Analytical Group	VOCs
Sampling SOP(s)	See Section 6.1
Analytical Method/SOP Reference	SW-846 8260C
Sampler's Name	EnviroTrac Field Representative
Field Sampling Organization	EnviroTrac
Analytical Organization	Pace Analytical Services, Inc.
No. of Sample Locations	11 (plus MS/MSD, Trip Blank, and Duplicate)

Matrix	Air
Analytical Group	VOCs
Sampling SOP(s)	See Section 6.2
Analytical Method/SOP Reference	TO-15
Sampler's Name	EnviroTrac Field Representative
Field Sampling Organization	EnviroTrac
Analytical Organization	Pace Analytical Services, Inc.
No. of Sample Locations	1 sample for SVE system emissions collected from a port prior to treatment 2 Tedlar bag samples collected from ports prior to treatment and after treatment

11.0 DATA MANAGEMENT AND DOCUMENTATION/PROJECT REPORTS

11.1 Data Management

The Project Manager shall retain copies of all management reports, memoranda, and all correspondence. Other records and documents that will be produced in conjunction with this project include:

- Inspection checklists and reports;
- Return-to-compliance forms;
- Non-applicability forms;
- Enforcement documentation;
- Amended QAPP;
- Data handling reports;
- Progress reports and correspondence to NYSDEC/NYSDOH; and
- Project reporting (to include discussion of QA issues encountered, and how they were resolved).

The sampler's field records will contain sufficient information such that someone else can reconstruct the sampling situation without reliance on the sampler's memory.

Entries in the field records will include, at a minimum, the following:

- Site name and location;
- Project number;
- Name and affiliation of Project Manager and sampler involved;
- Sampling point name and description;
- Type of sample container(s) used;
- Preservative(s) used;
- Date and time of sample collection;
- Sample identification number(s);
- Laboratory's sample identification number(s);
- References such as maps or photographs of the sampling Site, if available;
- Field observations; and
- Pertinent weather factors such as temperature, wind direction and precipitation.

A copy of all project documents and records will be kept on file at EnviroTrac for a minimum of seven years.

11.2 Project Reports

The format for all data reporting packages will be consistent with the requirements and procedures used for data validation and data assessment described in this QAPP. The NYSDEC has implemented an Environmental Information Management System (EIMS). The EIMS uses the database software application EQuIS™ (EQuIS) from EarthSoft® Inc. (EarthSoft). Data will be submitted to the NYSDEC in accordance with their EIMS.

Three kinds of reports will be prepared: readiness reviews, regular quarterly and annual progress reports, and project final report. Progress reports will note the status of project activities and identify whether any QA problems were encountered (and, if so, how they were handled). Project final report will analyze and interpret data, present observations, draw conclusions, identify data gaps, and describe any limitations in the way the data should be used

12.0 DATA REVIEW

12.1 Project Data Verification Process (Step I[1])

Verification Input	Description	Internal/ External[2]	Responsible for Verification (Name, Organization)
Site/Field Logbooks	Field notes will be prepared daily by the Environmental Consultant Project Manager and will be complete, appropriate, legible and pertinent. Upon completion of field work, logbooks will be placed in the project files.	I	EnviroTrac.
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to shipment. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	EnviroTrac.
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	I	Pace Analytical Services, Inc.
Laboratory analytical data package	Data reports will be reviewed as to content and sample information upon receipt from the laboratory by the Environmental Consultant Project Manager. Data will be transmitted to the DEC project manager and reports submitted to the Third Party Data Validation Personnel for DUSR preparation.	I/E	EnviroTrac Environmental Data Services, Inc[2] NYSDEC
Final Sample Report	The project data results will be compiled in a sample report for the project. Entries will be reviewed/verified against hardcopy information.	I	EnviroTrac

1Step I – Completeness Check
2Internal or External is in relation to the data generator.

12.2 Project Validation Process (Step IIa and Step IIb)

Step IIa/IIb[1]	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	EnviroTrac
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	EnviroTrac
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	EnviroTrac

IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	EnviroTrac Pace Analytical Services, Inc.
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	Pace Analytical Services, Inc. Environmental Data Services, Inc.
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	EnviroTrac Environmental Data Services, Inc.

[1]Step IIa – Compliance with Methods, Procedures, and Contracts
[1]Step IIb – Comparison with Performance Criteria in QAPP

12.3 Project Matrix and Analytical Validation (Step IIA and Step IIB) Summary

Step IIa/IIb[1]	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (Title and Organizational Affiliation)
IIa / IIb	Aqueous	VOCs	Unknown	QAPP and USEPA Guidance on Environmental Data Verification and Data Validation USEPA Region 2 Data Validation SOP No HW-24, Revision 4, October 2014	Environmental Data Services, Inc.
IIa / IIb	Air	VOCs	Unknown	QAPP and USEPA Guidance on Environmental Data Verification and Data Validation USEPA Region 2 Data Validation SOP No HW-31, Revision 6, June 2014	Environmental Data Services, Inc.

[1]Step IIa – Compliance with Methods, Procedures, and Contracts
[1]Step IIb – Comparison with Performance Criteria in QAPP

12.4 Usability Assessment (Step III)

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:

- Evaluate whether detectable amounts of contaminant(s) are present. If no detectable amounts are indicated and data are acceptable for the verification and validation, then the data is usable. Non-detects will be provided with the method reporting limit with a “<” sign, “U” qualifier in the results field; and
- If verification and validation are not acceptable then EnviroTrac is to take corrective action (determine cause, data impact, evaluate the impact and document the rationale for resampling).

Describe the evaluative procedures used to assess overall measurement error associated with the project:

- Evaluate whether the quality control data is within the performance criteria (precision, accuracy, etc.) through validation process IIb (Validation Activities).

Identify the personnel responsible for performing the usability assessment:

- Project Management Team –Consisting of the EnviroTrac Project Manager; Data Validator; and
- Personnel preparing Data Usability Summary Report); Environmental Data Services, Inc.

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

- The Usability Report will describe the rationale for the data and the presentation of data limitations. For example, if the performance criteria are not usable to address the regulatory requirements or support the project-decision for the Client, then the EnviroTrac Project Manager should address how this problem will be resolved and discuss the alternative approach. Data proven to be usable will be tabulated and compared to SCOs within the final project report.

13.0 REFERENCES

Pace Analytical Services, Incorporated. Quality Manual (Document Control Number QAM Rev. 18.0, Date Issued November 24, 2015).

New York State Department of Health. Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).

Bureau of Toxic Substance Assessment New York State Department of Health. Trichloroethene (TCE) in Indoor and Outdoor Air (August 2015 Fact Sheet).

Bureau of Toxic Substance Assessment New York State Department of Health. Tetrachloroethene (PERC) in Indoor and Outdoor Air (September 2013 Fact Sheet).

FIGURES

TOPOGRAPHIC MAP

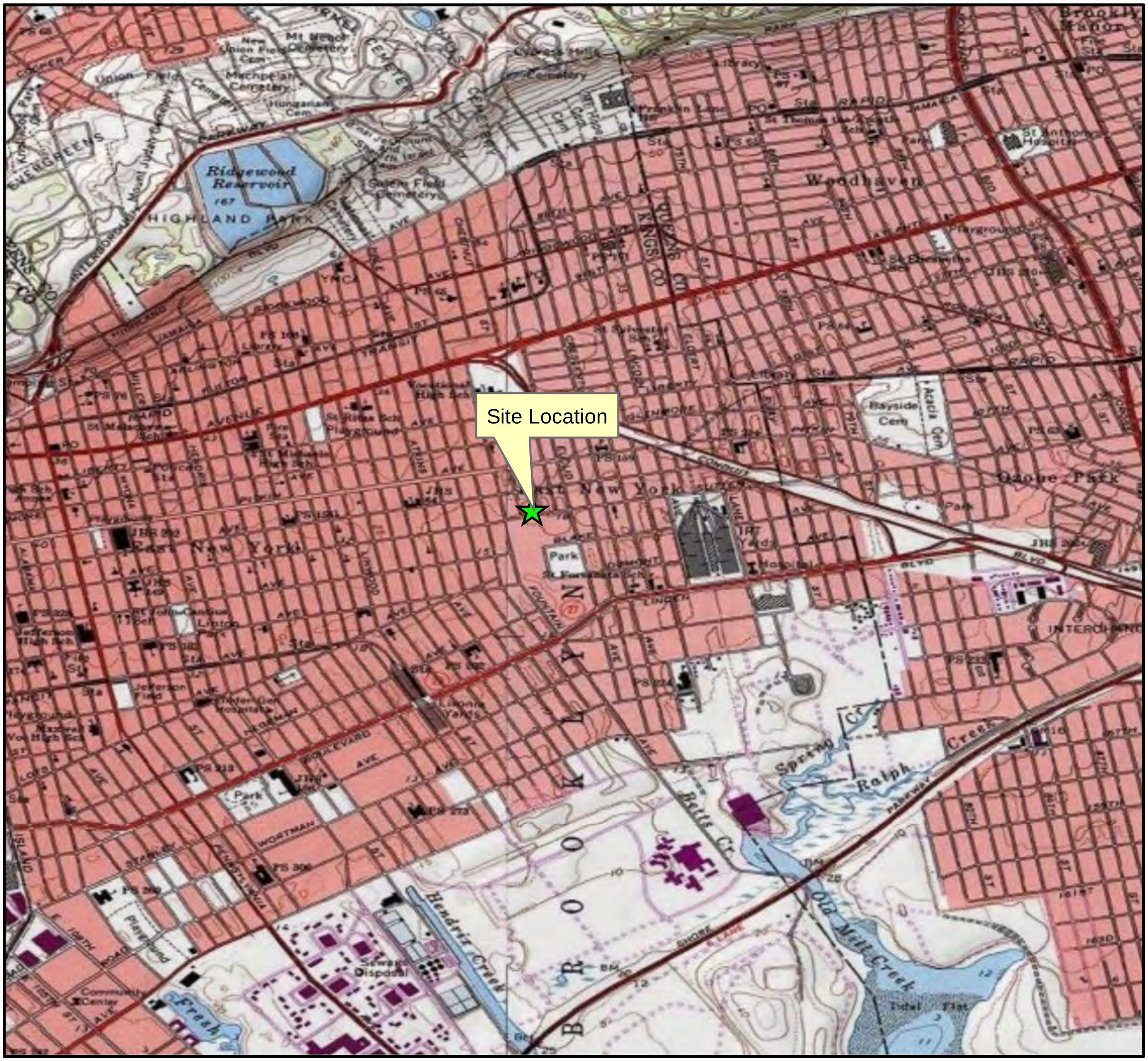
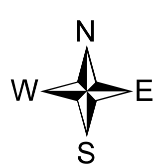


Figure 1
Topographic Map

1199 Sutter Avenue
Brooklyn, NY 11208

USGS Quadrangle:
Brooklyn

Approx. Elevation:
19 feet



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DATE: 6/20/2018

REVISED BY: BS

1199 SUTTER AVENUE
BROOKLYN, NEW YORK

SAMPLE AND INJECTION LOCATIONS 2009 – 2017

FIGURE # 2

ATTACHMENT A

RESUMES OF KEY PERSONNEL

CORPORATE RESUME

Joseph Patrick Byrnes, PG, LEP
President/Principal Consultant

joeb@envirotrac.com
631.924.3001

Experience Snapshot

Mr. Byrnes has worked over 30 years in the environmental consulting field. Although his project experience has been diverse, he has concentrated in subsurface investigations, remedial designs and remedial construction projects. Mr. Byrnes has worked on projects with a wide range of contaminants that have included MTBE, PCBs, chlorinated solvents, petroleum hydrocarbons, jet fuels, nuclear isotopes, metals and coal tar/MGP sites.

Mr. Byrnes acts as Key Contact and Program Manager for several clients, including insurance companies where he provides claim investigations, litigation support and forensic evaluations.

Licenses/Certifications

Professional Geologist, PG-0001951, State of Florida

Professional Geologist, PG-002656-G, Commonwealth of Pennsylvania

Professional Geologist, PG-00699, State of New Hampshire

Professional Geologist, PG-2167, State of North Carolina

Professional Geologist, 2801002005, Commonwealth of Virginia

Certified Professional Geologist, CPG #8868, Amer. Inst. of Prof. Geologists

Licensed Environmental Professional, LEP, Lic. #117, State of Connecticut

Certified Environmental Inspector, #13542, Environmental Assessment Association

DOE Radiological (Rad –Worker 1) Training/ Certification (2005)

OSHA Certification, HAZWOPER, Confined Space, and Supervisor

American Petroleum Institute—API Work Safe Certification

Strengths

- Expert Testimony/Forensics
- Insurance Claims Investigations
- Soil & Groundwater Investigations
- MGP Sites
- Remedial Investigations/ Feasibility (RI/FS) Studies
- Remedial Design & Construction
- Compliance Audits, Due Diligence, Phase I & II ESAs
- Development of Innovative Remedial Technologies

Education

- MS Hydrogeology, SUNY Stony Brook, 1993
- BS Geology, SUNY Binghamton, 1984

Experience
highlight 2016

Corporate Resume

Joseph Patrick Byrnes, PG, LEP

President / Principal Consultant

EnviroTrac

Professional Affiliations

American Institute of Professional Geologists

Environmental Assessment Association

Environmental Professionals Organization of Connecticut

Long Island Association of Professional Geologists

National Ground Water Association

National Society of Environmental Forensics

Professional History

- 1993-Present, EnviroTrac Ltd., President/CEO/Hydrogeologist
- 1991-1993, Handex Corporation, Senior Project Manager / Hydrogeologist
- 1991- Lockwood Kessler & Bartlett Engineers, Hydrogeologist
- 1988-1991, Blasland & Bouck Engineers, Senior Geologist
- 1986-1988, Roux Associates, Geologist

Litigation

- State of New York v. 913 Portion Road Realty, et al.—Mr. Byrnes was retained as an expert for one of the defendants, a major insurance company, in this case in Suffolk County, New York. The case involved a cost recovery action in which the NYSDEC was seeking approximately $2,000,000 in remediation costs associated with the release of hydrocarbon petroleum (gasoline) into soils and ground-water. An offsite contaminant plume, mainly MTBE, was detected offsite and migrating towards a public supply well field approximately 1,800 feet from the subject UST retail facility. Mr. Byrnes was asked to evaluate all the soil and ground-water data collected, perform fate & transport modeling, evaluate the remediation technologies implemented and their effectiveness, conduct forensic analyses to determine age of the plume and if other nearby releases potentially have contributed to the contamination and finally, prepare a cost allocation evaluation. Mr. Byrnes provided an Expert Opinion and was identified as an expert. The case was settled before the trial date.

- *Great Lincoln, LLC v. Smartset Cleaners, Inc. et. al.*- Retained and qualified as an Expert, Mr. Byrnes represented the property owner (Plaintiff) of a commercial strip stores that included a dry cleaners (Defendant) in Nassau County, New York. Mr. Byrnes was involved in the investigation of chlorinated solvents in soil and ground water, developed a remedial action plan (RAP) that was approved by the NYSDOT and USEPA. The RAP consisted of Air Sparge (AS) and Soil Vapor Extraction (SVE) technologies to address the source area located within both soil and ground water. Mr. Byrnes testified in Federal Court for the Plaintiff to demonstrate that the source of the contamination was the result of spills caused by the Defendant. The Plaintiff was successful in the case.

Please Contact:

5 Old Dock Road

Yaphank, NY 11980

631.924.3001

Or visit our website:

www.envirotrac.com

About EnviroTrac

EnviroTrac is an environmental consulting and remediation firm delivering a wide range of services for a diverse clientele throughout the United States. With a staff of over 150, we are consistently ranked among the Top 200 Environmental Consulting Firms by Engineering News-Record (ENR).

"We Deliver Value, Quality and Innovation Safely to Our Clients"

Experience highlight 2016

Litigation

- Sunoco, Inc., (R&M) v. 175-33 Horace Harding Realty Corp.- Mr. Byrnes was retained by both parties to conduct an independent forensic investigation and remediation cost allocation analysis for a property in Queens, New York. The subject site was an active retail service station involved in litigation that had a history of petroleum releases. Forensic investigations included several techniques, such as the presence of free phase hydrocarbons and MTBE, hydrocarbon ratios, spikes of MTBE, and plume concentration contour maps over time. Results of the forensic investigation concluded that additional spills or releases of petroleum hydrocarbons occurred. Numerous scientific methods for sharing responsibility for remediation were evaluated and based on site data, plume mass-of-contribution method was determined most appropriate. Based on this analysis, allocation percentages were then used in assigning site-specific remediation costs. Litigation continued that resulted in Mr. Byrnes deposition and subsequent testimony in Federal Court.
- *State of New York v. LVF Realty Co., Inc. et. al.*- Mr. Byrnes was retained to provide expert testimony on behalf of a major oil company (Defendants) in a case where the Plaintiffs was the State of New York. In this case that involved commingled dissolved petroleum plumes, Mr. Byrnes performed forensic investigations, remedial evaluations and cost allocation, review of environmental testing data, hydrogeology, fate and transport of contaminates, UST closures and comparison of data to regulatory guidelines and standards.
- *8-49 Woodhaven Boulevard Holding Corp. v. ExxonMobil Oil Corp.* - A major oil company (Defendants) retained Mr. Byrnes to provide litigation support and expert testimony involving a petroleum impacted site located in Queens, New York. The Plaintiffs argued that soil and ground water contamination prevented them from redeveloping the site property. Mr. Byrnes prepared an expert report and opinion that demonstrated that federal, state and locals laws did not prevent the Plaintiffs from proceeding with redevelopment. To prepare his opinion, Mr. Byrnes reviewed UST removal documents, soil and ground water analytical data, remedial actions taken and effectiveness of such actions, review of regulatory requirements and guidelines, and evaluation of vapor intrusion requirements and engineering controls. Mr. Byrnes was qualified as an expert and testified in court on behalf of the Defendants.
- *Christ the King Roman Catholic Church v. ExxonMobil, et. al.* - Mr. Byrnes was retained by the Defendant to provide professional opinion and expert testimony in this case involving petroleum impacted soil and ground water. Plaintiffs claimed that impacted ground water migration had impacted their property. Mr. Byrnes was retained to assess the effectiveness of soil and ground remediation activities conducted by the Defendants.

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About EnviroTrac

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Litigation

- Jeff Alban, et. Al. v. ExxonMobil Corporation, et.al. —Mr. Byrnes had been retained as an expert for the defendant in this case in Baltimore County, Maryland. The case involved an estimated 26,000 gallon release of gasoline product that included MTBE. As an expert, Mr. Byrnes was responsible for the opinion of the effectiveness of clean-up efforts that included a host of remedial technologies. Data from hundreds of ground water monitoring wells, private drinking water wells and remedial system data was evaluated. Over $38 million in cleanup costs had already been spent since the 2006 release. In all, about 90 families (Plaintiffs) were awarded compensatory damages totaling $150 million; however, the defendant was successful in averting punitive damages that could have been in the billions.
- *County of Suffolk and Suffolk County Water Authority v. Amerada Hess Corp., et. al.* - This case involves one of the actions consolidated in the United States District Court for the Southern District of New York in regards to the *Methyl Tertiary Butyl Ether (MTBE) Products Liability Litigation*. Mr. Byrnes, retained by one of the Defendants and working with experts for all the defendants, is providing litigation support, technical research and opinions relating to hydrogeology of Long Island aquifers, MTBE sources that have potentially contributed and are contributing to the MTBE found in Suffolk County Water Authority drinking water supply wells. In addition, Mr. Byrnes provided engineering and construction cost analyses for treatment of supply wells as well as remediation of MTBE at retail facilities, including life-cycle cost comparison of various remediation technologies. Research also included characterization and lengths of MTBE plumes documented in ground water on Long Island, New York.
- *Plainview Water District v. ExxonMobil Corporation, et. al*.– Mr. Byrnes was retained to provide litigation support on behalf of the Defendants. Plaintiffs argued that petroleum releases pose a future threat to drinking water supply wells, particularly from MTBE. Mr. Byrnes provided research support regarding site-specific hydrogeology, fate and transport of contaminants, evaluation of soil and ground-water remediation and regulatory interpretation.

Insurance Claims

- Honolulu, Hawaii (2014)—Large sanitary landfill owned by the City of Honolulu and operated by the insured. A series of large storms overwhelmed the storm water control system and damaged landfill cells. Local health department and EPA issued a series of violations that claimed that storm water, landfill leachate and solid waste debris breached the facilities storm water collection and diversion structures, resulting in the release in the ocean waters. The insured (landfill operator) filed a claim for remediation and restoration costs. Mr. Byrnes headed a team from EnviroTrac to determine if the restoration work was remedial or prophylactic. It was concluded that all restoration, repairs, construction and enhanced monitoring plans were prophylactic responses to the various violations.

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- Waterbury, Connecticut (2014)—Mr. Byrnes, a Licensed Site Professional (LEP) in CT, was retained by an insurance company to review the investigation and remediation of a former industrial facility owned by its insured who filed a pollution claim. The site soils were contaminated with PCBs, metals, PAHs and VOCs. The remedy for the site include an engineered control or cap to idolate soils. This cap would require a costly 30 year operation and maintenance plan. Mr., Byrnes and his team reviewed all site data and developed an alternative plan that would eliminate the need to this long term monitoring. Statically analysis of the data in accordance with state guidelines was performed and the results of this analysis eliminated the need for an engineered control, which will allow the site to closure in only a few years for a significant cost savings.
- Avenel, New Jersey (2014)—Mr. Byrnes was retained by an insurance company to determine the validity of environmental pollution claim for the insured, a large Chemical manufacturing company. The claim was that facility soils were impacted with PCBs and to a lesser extent other contaminants. It was determine that the PCBs were the results of paint on building materials and large above-ground storage tanks (ASTs). Mr. Byrnes reviewed all files and documents to determine the timeframe when the insured first became aware of this contamination in relation to the policy date. It was determined that the insured had discovered PCBs in soils prior to the policy start.

Professional Highlights and Selected Projects

- Mr. Byrnes has extensive experience in the selection, design, installation and maintenance of a wide range of soil and ground water remediation systems at over 200 sites. Remedial systems have included both active and passive free product recovery, traditional pump and treat, soil-vapor extraction, air sparging, bioventing, bioremediation, excavation, dual phase extraction, steam injection, oxidation technologies, oxygen releasing compounds, natural attenuation and the development of innovative technologies.
- From 1993 to 1998, Mr. Byrnes managed hundreds of environmental investigation and remediation projects for Shell Oil in New York, Connecticut, New Jersey, Massachusetts and Florida. This contract included the management of over 500 retail petroleum facilities. From 1994 to 1998, EnviroTrac was the sole environmental consultant and remediation contractor for Shell Oil in New York and Connecticut (approximately 200 sites).
- Mr. Byrnes worked with ConocoPhillips to develop and manage a Compliance Audit Program for retail service stations in New York State (Suffolk, Nassau, Queens, Kings, Bronx, Richmond, Manhattan, Westchester, Rockland and Orange Counties). Approximately 150 retail stations were included in the program that included state and local file reviews, PBS compliance, UST system and monitoring inspections, onsite waste inspection (drums, soil piles, etc.), potable well survey, remediation system inspection, site sketches, photo-documentation, database management and reporting. Non-compliance issues were documented and follow-up audits were performed.

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- Jet Fuel Remediation Project in Bermuda where Mr. Byrnes acted as Project Manager for a 50,000 gallon jet fuel spill and a Bulk Storage Facility. Project included completion of a Comprehensive Site Assessment (CSA), Risk Assessment (RA) and Remedial Action Plan (RAP) in accordance with Bermuda MoE Guidelines. Scope of work included soil borings, well installations, soil vapor sampling, ground-water sampling, sediment and surface water sampling, tidal studies, tracer testing, ground-water modeling, quantitative risk analysis, feasibility study for remedial alternatives and reporting.
- Mr. Byrnes lead an EnviroTrac project team contracted by the New York State Department of Environmental Conservation (NYSDEC) to initiate an investigation to determine the source of methyl tertiary butyl ether (MTBE) detected in multiple residential wells in Hyde Park, New York. A Preliminary search of the area identified four potentially responsible parties (PRPs) that consisted of gasoline stations that had documented releases associate with their underground storage tan (UST) systems. EnviroTrac began a private well sampling program that included over 250 homes. Based on the results of the monitoring program, 95 activated carbon filtration systems were installed in private homes to remove the MTBE contamination. In conjunction with the elimination of the immediate threat to the public, EnviroTrac began a comprehensive subsurface assessment of the area that identified several pathways of MTBE migration in the fractured bedrock. Field testing included packer testing to isolate fractures for sampling, dye tracer testing and geophysical techniques. A Geographic Information System (GIS) data base was developed to manage the large database and determine site trends. Mr. Byrnes and EnviroTrac's design group developed remediation plans for two of the PRP locations that included the instillation of a High-vacuum Extraction (HVE) and groundwater Pump and Treat (P&T) system. EnviroTrac continues to provide monitoring, O&M, design, and construction needs for the successful completion of this project.
- EnviroTrac was contracted to complete a Soil Vapor Extraction Pilot Study for the Region VII of the USEPA, at the 57th and Broadway Superfund Project located in Wichita, KS. The Superfund site consists of multiple responsible parties that have contributed to the contamination that has impacted several private wells in this mixed use (residential, commercial, and industrial) community. Two of the responsible parties, the Midland Refinery site and the former Wilko Paints site required active remediation. The contaminants of concern include DCE, TCE, PCE, and VC. The scope of work involved the installation of pilot test wells and performing SVE field testing at both locations to collect site specific information. Project objectives were to develop sufficient process design and construction of two separate full-scale SVE systems. Design information included radius of influence, SVE well spacing, system layout, and equipment design specifications. Once the design was completed, EnviroTrac was awarded the contract to install both remediation and groundwater monitoring wells, construct and startup both SVE systems and provide O&M services. Mr. Byrnes acted as Project Manager for this project and both systems were successfully installed and operated by EnviroTrac.

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Corporate Resume

Joseph Patrick Byrnes, PG, LEP

President / Principal Consultant

Professional Highlights and Selected Projects

- At the Department of Energy (DOE) Brookhaven National Laboratory (BNL) facility in Upton, NY ground water within a complex glacial aquifer is contaminated with chlorinated organic solvents at a depth of 150 – 230 ft. below the surface. EPA placed BNL on the National Priorities List (NPL) and EnviroTrac, headed up by Mr. Byrnes, was contracted by BNL to install an In-Well Vapor Stripping (IWVS) system under strict health and safety protocol. IWVS is an in-situ remediation technology that integrates air stripping of VOCs in ground water by converting them to a vapor phase. IWVS creates a ground-water circulation cell in a contaminated zone where contaminants are continually drawn into the well, stripped from the ground water, and the treated ground water is discharged back in to the aquifer. The circulating well concept is also known as groundwater circulating well technology (GCWT). EnviroTrac's construction and engineering group installed over 7,500 feet of 10" diameter PVC underground piping and all equipment, manifolding and controls/sensors/gauges at the wellheads and in the treatment building. Manifold construction included 24" diameter PVC piping and fittings. The system pumps 420 gpm with airflows exceeding 4,800 cubic feet per minute.
- Developed the Well Stripper, a patent-pending innovative ground-water remediation technology. The Well Stripper is an in-situ well stripping and recirculation technology that provides a cost-effective alternative to traditional pump and treat methods. The Well Stripper has been used successfully at several sites in the northeast and can treat common volatile organic compounds (VOCs) such as chlorinated solvents (TCE and PCE) and petroleum hydrocarbons (BTEX and MTBE). As a by-product, the Well Stripper aerates and increases dissolved oxygen concentrations in ground water, which enhances biodegradation.
- Conducted a ground-water analysis study to determine the efficacy and accuracy of no-purge sampling versus the standard well-sampling protocol, which requires the purging of three well-bore volumes of water prior to collecting samples for VOC analysis. This study clearly showed that there were no statistically significant differences in analytical results for ground-water samples collected from the same wells by both sampling methods. Based upon this study, the NYSDEC allows EnviroTrac to collect ground-water samples from the majority of its petroleum-release sites utilizing the no-purge sampling methodology. This NYSDEC-approved procedure allows for a significant cost savings to our clients in time and equipment costs as well as not generating well-purge water, which requires containerization, management and disposal.

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Experience highlight 2016

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Publications

Byrnes, J. P. and M. Goldberg. 1993. Using Field Instrumentation as a Cost-Effective Technique in Estimating Soil-Gas Concentrations. Proceedings of the Focus Conference on Eastern Ground Water Issues, pp.107-118, National Ground Water Association.

Byrnes. J. P. and S. L. Kane. 1996. Regulatory Approval of the Use of a Hand-Held Field GC for Measurement of BTEX in Air Emissions from Remediation Systems. Fourth International Conference On-Site Analysis, Orlando, Florida January 21-24, 1996.

Byrnes, J. P., J. E. Briglia, and L.J. Bealer. 1996. Purge vs. No Purge in Sampling for BTEX and MTBE in Ground Water. Eleventh Annual Conference on Contaminated Soils. October 21-24, 1996, Amherst, Massachusetts.

Byrnes, J. P., J. E. Briglia, and L. J. Bealer. 1996. Evaluation of Well Purging in Ground-Water Sampling for BTEX and MTBE. Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection, and Remediation, November 13-15, 1996, Houston, Texas.

Byrnes, J. P. and S. L. Kane. 1996. Regulatory Approval of the Use of a Hand-Held Field GC for Measurement of BTEX in Air Emissions from Remediation Systems. Contaminated Soils, Volume 2, pp. 79-89, Amherst Scientific Publishers, Amherst, Massachusetts.

Byrnes, J. P., L. J. Bealer and K. Springer. 1998. No Purging Ground Water Sampling proposal for Gasoline Compounds in New Jersey Unconfined Aquifers, pp.474-482. Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection, and Remediation, Nov.11-13, 1998, Houston, Texas.

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CORPORATE RESUME

EnviroTrac

Tracy Wall
Project Manager

tracyw@envirotrac.com
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Experience Snapshot

Ms. Wall has performed numerous hydrogeologic investigations for several sites in New York, New Jersey, Connecticut and Delaware. This experience includes Phase I and II Environmental Site Assessments, soil vapor intrusion investigations, installation, operation, maintenance, and monitoring of remediation and mitigation systems, federal Superfund sites, state petroleum-impacted sites, petroleum and chemical-impacted site evaluations and remediation, underground storage tank evaluations and removals, commercial, residential, and municipal drinking water sampling, monitoring, and reporting for industrial companies, and technical report writing.

Licenses/Certifications

OSHA 40-hour HAZWOPER Training

OSHA 8-hour HAZWOPER Refresher

NYS Asbestos Inspector

API WorkSafe Certification

Strengths

- Phase I & II Environmental Site Assessments
- Soil Vapor Intrusion Investigations
- Installation, Operation, Maintenance, and Monitoring of Remediation and Mitigation Systems
- Tank Removals
- Soil and Groundwater Investigations
- Technical Report Writing for State and County Agencies

Education

- B.S. SUNY Stony Brook, 2001
- A.S. Nassau Community College 1997

Experience
highlight 2017

Corporate Resume

Tracy Wall

Project Manager

Professional Affiliations

- Member of Long Island Professional Geologists

Professional History

- 2015 - Present, EnviroTrac Ltd., Project Manager
- 2006 - 2015 Dermody Consulting, Hydrogeologist
- 2005-2006 Dermody & Menegio Consulting, Hydrogeologist
- 2003-2005 Enviroscience Consultants, Inc., Hydrogeologist
- 2003 Town of East Hampton, Hydrogeologist
- 2001-2003 P.W. Grosser Consulting, Inc. Hydgrogeologist
- 2001 U.S. Geological Survey, Environmental Scientist

Professional Highlights and Selected Projects

Phase I and II Environmental Site Assessments

Performed numerous Phase I environmental site assessments in New York, New Jersey, Connecticut and Delaware for property transfers and refinancing. In cases when Phase I report conclusions recommended additional work be performed to evaluate the potential for contamination at the site, a Phase II investigation was performed which may have included air, soil, soil vapor, groundwater, or drinking water sampling, groundwater flow direction detennination , investigation of upgradient potential sources of contamination, and in some cases, remediation of identified contamination.

Vapor Intrusion Investigations

Performed vapor intrusion investigations in New York to determine if vapor encroachment is an issue at a site. Evaluated investigation results and determined if vapor mitigation is required.

Installation, Operation, Maintenance and Monitoring of Remediation and Mitigation Systems

Performed pilot tests at sites to determine if hydrogeologic conditions are favorable for soil vapor extraction (SVE) and/or air sparge (AS) applications. Active roles in the installation of SVE and AS remediation system components in Bay Shore and Brooklyn and sub-slab depressurization systems (SSDSs) in Bethpage, East Hampton, Farmingdale, Huntington, and Rockville Center. Performed bi-monthly, monthly, and quarterly operation, maintenance, and monitoring tasks and soil, soil vapor, and groundwater sampling for remediation system sites in Bay Shore, Blue Point, and Brooklyn. Performed annual certification evaluations for SSDSs in Bethpage and East Hampton.

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Experience highlight 2017

Corporate Resume

Tracy Wall

Project Manager

Professional Highlights and Selected Projects

Superfund Investigations

Supervised several groundwater and soil investigations for radionuclide and metals contaminated media at Brookhaven National Laboratory.

State Petroleum-Impacted Sites

Performed groundwater sampling for several New York State Department of Environmental Conservation Regions 1 and 2 projects in Farmingdale , Wantagh, Queens, Brooklyn , Bronx, and Manhattan, NY. Also performed monthly and quarterly groundwater sampling at petroleum-impacted residential and municipal properties in New York.

Petroleum and Chemical Subsurface Investigations and Remediation/Underground Storage Tanks

Performed evaluations of UST leakage at numerous sites and oversaw the removal of several USTs. Performed evaluations of wastewater and stormwater systems with petroleum and chemical contamination. The evaluations included soil contamination analysis, groundwater well installation, sampling, and interpretation of results. Work plans were prepared and negotiated with the appropriate regulatory agency to determine the scope of work and objectives at each site. UST removals included the preparation of permits and certifications for the appropriate regulatory agencies. Soil and groundwater remediation was performed at numerous sites including excavation of contaminated soil, removal of free-floating petroleum from the water table surface, and installation of remediation or mitigation systems.

Commercial, Residential and Municipal Drinking Water Sampling

Performed drinking water sampling at several commercial and residential properties located in New York and New Jersey, and also for several Long Island schools for numerous suites of compounds.

Residential Development of Sites

Preparation of Wild, Scenic and Recreational Rivers Act permits and variances, including variances for lot size. Investigations (according to the health department SOP) for development of sites which were historically used for agricultural purposes. Also, managed projects for the identification of threatened and endangered species and historical resources.

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Experience
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Corporate Resume

Tracy Wall

Project Manager

Professional Highlights and Selected Projects

Monitoring and Reporting for Industrial Companies

Performed monthly and semi-annual wastewater investigations for the Long Island Railroad and commercial properties, and completed several Industrial User Self Monitoring Reports.

Water Resources Management Plan

Responsible for the collection of data and assisting in the preparation of the Town of East Hampton Water Resources Management Plan.

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CORPORATE RESUME

EnviroTrac

Peter C. Breen, PG

Senior Project Manager

pbreen@envirotrac.com
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Experience Snapshot

Mr. Breen has provided professional services to clients for over 30 years focusing on environmental site investigation and remediation pertaining to soil, soil vapor and groundwater contamination. Expertise includes the development and implementation of technical scopes, budgets and schedules, regulatory interaction and negotiations, performance of technical "cold eyes" project reviews and cause and effect evaluations. Mr. Breen has assisted insurance companies and law firms with claims and litigation pertaining to soil and groundwater contamination involving mining waste and gasoline release sites.

Licenses/Certifications

Professional Geologist, PG-000193, State of New York

Certified Professional Geologist, CPG #11417, American Institute of Professional Geologists

Certified Professional Geologist, GEOG724, State of Alaska

OSHA HazWOPER Certification, 40-hour Training. 1987

OSHA HazWOPER 8-hour Refresher (completed annually)

Loss Prevention System (LPS) 8-hour Training, 2004

Strengths

- Due Diligence and Remedial Investigations
- Insurance Claims and Litigation Support
- Soil Vapor Intrusion Assessments
- Groundwater Modeling
- Geophysical Evaluations
- Aquifer Testing
- Soil and Groundwater Remediation

Education

- MS Earth Science, Adelphi University
- BS Biology, University of Miami

Experience
highlight 2016

Corporate Resume
Peter C. Breen, PG
Senior Project Manager

EnviroTrac

Professional Affiliations

National Ground Water Association

Professional History

- 1984 – 1990, Roux Associates, Hydrogeologist/Project Manager
- 1990 – 1991, Blasland & Bouck Engineers, Project Manager
- 1991 – 2003, Environmental Resources Management, Senior Project Manager
- 2003 – 2008, Geologic Services Corporation/Kleinfelder, Principal Professional
- 2008 – Present, EnviroTrac Ltd., Senior Project Manager

Representative Projects

Litigation and Claims

- Insurance Firm – Mr. Breen assisted council in 2009 regarding a matter involving methyl tertiary butyl ether (MTBE) Products Liability Litigation related to three cases including:

  West Hempstead Water District v. AGIP Inc., et al, 03 CV 10052

  West Hempstead Water District v. Merit Oil., et al, 08 CV 4290

  Village of Hempstead v. AGIP Inc., et al, 03 CV 10055

  The insured party (defendant) owned, or had previously owned, a portfolio of retail gasoline stations that were identified as potential sources. In excess of 30,000 documents were reviewed during a one-year discovery phase. That information included results of an expedited site assessment, aquifer testing, down-hole geophysical testing and stratigraphic analyses, 3-dimensional numerical groundwater flow and contaminant transport simulations, a two-phase interim remedial measure (IRM) conducted to capture and remove MTBE from groundwater, and other work conducted by the New York State Department of Environmental Conservation (NYSDEC). Other information included numerous reports and other information pertaining to the defendant's properties and information associated with a multitude of other facilities (identified as potential sources by the NYSDEC) owned and operated by other named parties, information regarding activities conducted by two water supply districts (plaintiff's facilities) and hydrogeologic reports and other information developed by others. The cases were settled prior to trial.

- Major Oil Company - Reviewed environmental records pertaining to sixteen (16) MTBE release sites on Long Island, New York on behalf of defendant (oil company). Results of the evaluations were used to develop/update/critique conceptual site models, focusing on assessing spill histories, groundwater plume migration pathways, and plume persistence.

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Litigation and Claims

- Insurance Firm - Assessed environmental records pertaining to a portfolio of fourteen (14) retail petroleum sites located in Florida. The work was conducted to support negotiations between client insurance firm and successor firm. The client had been the provider of insurance for the sites until late 2004 at which time responsibilities for policy management were transferred to the successor firm. During the assessment petroleum contaminated soil and groundwater was discovered at the sites. Responsibility for the funding of the investigative and remedial work to address these issues was apportioned through negotiations conducted by the two insurance firms.
- Major Oil Company - Technical director of a groundwater remediation project located on Long Island, New York. The project was conducted under the oversight of the NYSDEC under a negotiated Order on Consent. Mr. Breen assisted client's (oil company) defense council in a civil action brought forth by local residents. (Madigan et al v. Exxon Mobil Corporation, case number 04-cv—02884 in the U.S. District Court for the Eastern District of New York). The project scope included high definition delineation, monitoring and remediating an extensive off-site plume containing MTBE. This was accomplished through testing and sampling of over 1,000 vertically nested monitoring well points installed throughout a residential neighborhood, wetland assessments, indoor air quality evaluations and through the use of a high capacity (500 gpm) groundwater pump and treat system. Supporting technical evaluations conducted to assess plume migration included gamma logging of boreholes to assess stratigraphic heterogeneities, and slug and constant rate pump testing to support remediation goals. The project included assessment and remediation activities at the sources of the off-site plume; two former retail gasoline stations. Remedial efforts at these on-site locations included groundwater pump and treat, soil vapor extraction and air sparging (SVE/AS), in-situ chemical oxidation (ISCO) using modified Fenton's Reagent and excavation of residual hotspots during station demolition activities.
- Commercial Real Estate Development/Property Management - Managed site investigation and remedial activities at an industrial park located in New York. Site consisted of eight associated properties, activities included evaluation of leaching pools associated with sanitary and storm water systems, and potable water testing. The intent of the work, conducted on the behalf of council in supporting cost recovery efforts, included the identification of responsible parties for historic spills and discharges and preparation of remedial cost estimates. Based on site assessment results it was determined that sediments and liquids present in numerous leaching pools associated with both systems were impacted with chemical contaminants including VOCs, PAHs and inorganic compounds at levels requiring remediation in accordance with Suffolk County Department of Health Action Levels.

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Litigation and Claims

- Mining Facility - Lead hydrogeologist for a regional-scale ground water investigation conducted in the vicinity of a salt mining facility located in south central Kansas. Project was conducted in support of litigation, working for defendant (*Miller v. Cudahy Co., 656 F. Supp. 316 (D. Kan. 1987)*). Aquifer characterization resulted in delineation of saline ground water and assessment of contaminated soil resulting from historic solution mining activities. The plume was found to extend more than seven miles from the Site over an area of approximately 2,500 acres within a highly prolific alluvial aquifer utilized locally for central pivot crop irrigation and potable water supply. In excess of 100 test wells were installed, including three 16-inch diameter groundwater extraction wells. Mr. Breen planned, supervised and analyzed results of three 72-hour high capacity aquifer pumping tests, tested soil and groundwater and conducted other evaluations, including the construction of a numerical groundwater flow model utilizing Modflow to support litigation strategy and assess remedial alternatives.

Professional Highlights and Selected Projects

Petroleum Industry

- Greenwich, Connecticut - Developed documentation for acceptance of the Site into the CT DEEP Property Transfer Program (working on behalf of the current owner) for a former fuel oil terminal. Regulatory submittals included Form III and ECAF and ELUR documents. Site Investigation has been completed and a remedial action plan (RAP) is being implemented with LEP oversight with a goal of redeveloping the property for residential use.
- Groton, Connecticut - Developed documentation for acceptance of the Site into the CT DEEP's Property Transfer Program (working on behalf of the former owner and with LEP oversight) for an operating fuel oil terminal. Regulatory submittals included Form III and ECAF documents. Ongoing work includes the performance of a phased Site Investigation and development of appropriate remedial alternatives.
- New Haven, Connecticut - Currently managing data acquisition and quality assurance tasks for the remediation of a former fuel oil terminal in accordance with CT DEEP requirements and with LEP oversight. Site work has included identification and remediation of soil hot spots and assessment of historic and ongoing site testing results in accordance with RSRs in preparation for redevelopment.
- Oceanside, New York - Project director of a former petroleum terminal site investigation and remediation project conducted under a stipulation agreement with the NYSDEC. The project scope includes delineating, monitoring and remediating ground water containing petroleum compounds including benzene, toluene, ethylbenzene and xylene (BTEX), and MTBE. Initial work conducted to support cost recovery efforts by the client included a forensic evaluation of prior site use and spill history. An interim remedial measure (IRM) implemented to reduce on-site chemical constituent concentrations entailed the use of a constructed on-site groundwater pump and treat system consisting of seven recovery wells and air stripping technology. Supplemental remediation technologies are in the process of being evaluated to achieve site closure goals. This process will be supported through additional site testing and stratigraphic evaluation.

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About EnviroTrac

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Professional Highlights and Selected Projects

- Linden, New Jersey - Managed a Remedial Investigation for a 72-acre research and development site conducted under an Administrative Order of Consent with the New Jersey Department of Environmental Protection (NJDEP). Work included a detailed forensic evaluation of historic site activities which resulted in the identification of 30 Areas of Environmental Concern (AOCs) and led to the assessment of associated soil and ground water in overburden and layered siltstone bedrock aquifers. Due to the varied historic activities conducted at the Site a wide range of chemical constituents including inorganics, organics and semi-volatile compounds were found in soil and groundwater. Petroleum related constituents represented the primary COCs in the overburden groundwater while TCE and associated breakdown products were found in the bedrock Associated work included evaluation of sediment and surface water at on-site wetlands, the development of a baseline ecological evaluation (BEE) and removal of thirteen formerly abandoned in place USTs ranging in capacity from 550 to 10,000 gallons. Bedrock evaluations employed regional and local fracture trace analysis and an innovative testing approach utilizing downhole closed circuit television, acoustic televiewer, heat pulse flow meter and pumping test applications.
- Florham Park, New Jersey - Managed an RI conducted in support of divesting a 270-acre research and development Site. A significant portion of the Site is occupied by wetlands evaluated within the context of a BEE. Impacts found included pesticides and inorganic resulting from historic agricultural land use, and VOCs and SVOCs from activities conducted by the current occupant. Remedial activities included soil mixing and sediment excavation, groundwater pump and treat and soil vapor extraction/air sparging (SVE/AS) technologies, and in-situ treatment options.
- Retail Station Portfolio, Metropolitan New York - Served as the senior technical advisor supporting environmental activities pertaining to a large portfolio of retail petroleum site investigation and remediation projects located throughout the Long Island and NYC metropolitan area, advising clients and assisting project managers with construction of site conceptual models, investigation approach and remedial and public affairs strategy development, and serving in a peer review capacity. Project sites were situated within urban and suburban settings and are located in ice contact or glacial outwash settings.

Manufacturing Facilities

- Bay Shore, New York - Managed site assessment and remediation activities conducted at a large medical products manufacturing facility. The scope of work included soil and groundwater evaluations consisting of soil boring and well installations, soil and groundwater sampling, and developing a historic use model of on-site drains and leaching pools. Chemicals concern included metals and chlorinated VOCs. Approximately 1,300 tons of metals contaminated soil was excavated and water modeling and site assessment findings he was successful in negotiating the elimination of significant quantity of groundwater related site assessment and remediation work that had previously been proposed to the overseeing regulatory agency, and afforded the client considerable cost savings.

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Professional Highlights and Selected Projects

- Yaphank, New York - Conducted Phase II site investigation and remediation activities at an automotive parts manufacturing plant. A detailed evaluation of historic manufacturing process/waste management was conducted and revealed the use of improper practices that resulted in the contaminated of soil at waste staging area and on-site sanitary and storm water management facilities. The remediation of soil and leaching pool structures was required based on the presence of VOCs, SVOCs and inorganic chemical constituents at levels exceeding NYSDEC and SCDOHS criteria. As a result of cleanup activities conducted, 67 tons of soil contaminated with petroleum related compounds and chlorinated VOCs was excavated from the former drum staging area was hauled from the Site for disposal. Remedial activities associated with the onsite leaching pools resulted in 45,000 gallons of liquid and 71 tons of solids requiring disposal containing a mixture of sanitary and chemical waste. Following completion of these activities a notice of no further action (NFA) was obtained from the overseeing regulatory agency.

Brownfields Sites

- Bronx, New York - Assumed management of a former retail gasoline station BCP Volunteer site at the remedial phase of the project. Former consultant had recommended a Track 1 cleanup; remediation to unrestricted media chemical criteria. Based on the site location, testing results and planned site redevelopment a Track 4 cleanup was judged to be more appropriate. Mr. Breen successful negotiated the cleanup plan strategy with the NYSDEC and a remedial action plan is currently being developed. It is anticipated that the client will save more than $1-million as a result.
- Hartsdale, New York - Directed work at a dry cleaner site where the current owner enrolled as a Volunteer in the NYS Brownfield Cleanup Program. Testing including drilling and sampling of wells and conducting soil vapor intrusion studies. Subsurface chlorinated VOC impacts were addressed through a focused IRM consisting of in-situ chemical reduction (ISCR) technology. All submittals have been provided to NYSDEC/NYSDOH and the certificate of completion is expected.

Aerospace Industry

- Eatontown, New Jersey - Managed a Remedial Investigation performed under ECRA, ISRA requirements at a manufacturing facility. Media of investigation included soil, ground water, sediment, surface water and air. The principal contaminants of concern included chlorinated VOCs. As a result of compiling and analyzing the significant repository of environmental documentation and constructing a detailed conceptual site model, Mr. Breen was the first investigator to link the on-site groundwater contaminant plume with a small stream located nearby. Subsequent testing revealed elevated concentrations of vinyl chloride in surface water associated with that stream persisting at detectable concentrations at locations more than a mile off-site.

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Corporate Resume

Peter C. Breen, PG

Senior Project Manager

Professional Highlights and Selected Projects

- Greenfield, Massachusetts - Managed an intensive investigation resulting in characterization and delineation of a TCE plume in ground water emanating from a former tool and die manufacturing facility. Work included establishment of on-site and off-site monitoring well networks, assessment of surface water resulting from seeps located within the core of the plume and investigating potential volatilization to a nearby child daycare facility, residences and commercial structures located within the plume footprint. An additional component of the project related to monitoring and evaluating the performance of an on-site UV peroxidation groundwater treatment facility. and evaluating the performance of an on-site UV peroxidation groundwater treatment facility.
- Bethpage and Calverton, New York - Conducted environmental site assessment evaluations at two large manufacturing facilities as part of site decommissioning activities. Work activities included a comprehensive review of historic manufacturing practices resulting in the identification of numerous areas of environmental concern and required subsequent tracing and testing of interior and exterior locations of drains and leaching structures, former ordinance testing locations, and conducting soil and groundwater characterization activities.

Industrial Sites

- Woburn, Massachusetts - Conducted hydrogeologic and geophysical evaluations to define the extent of animal hide piles and former on-site chemical disposal lagoons, and assess associated impacts of volatile and inorganic chemical constituents to soil, sediment and groundwater at the 245-acre Industri-Plex Superfund Site. Geophysical testing included the use of electromagnetics, resistivity and metal detection techniques. Hydrogeologic assessments included slug testing and constant rate pump testing techniques.
- Mount Pleasant, Tennessee - Characterized the hydrogeology of a karst limestone watershed setting at a large chemical formulation facility. The site consisted of raw material mining areas and an associated chemical manufacturing plant. Key on-site features that were investigated included a bedrock fault zone, a stream that bisects the site and numerous springs. Work elements included the installation of test wells in unconsolidated and bedrock settings and conducting hydraulic parameter assessments, surface water flow monitoring, hydrologic budget estimations and assessment of ground water/surface water hydraulic relationships.

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Peter C. Breen, PG

Senior Project Manager

Professional Highlights and Selected Projects

Regulatory and Public Agencies

- NYSDEC: Nassau County, New York - Managed ongoing off-site surface water and ground water sampling and SVI testing and mitigation system installations pertaining to a chlorinated solvent release at a former dry cleaner. Advocated for, and successfully adopted groundwater sampling using passive diffusion bags (PDB) for a network of 50 monitoring wells. This approach reduced field labor and eliminated purge water waste management and disposal, resulting in significant cost savings.
- NYSDEC: Nassau County, New York - Managed a program of SVI testing conducted to evaluate potential intrusion of chlorinated solvent compounds and monitor the progress of an ongoing remedial action in a neighborhood of 65 residences during the 2009 through 2012 heating seasons. Directed field activities and served as the primary contact for the NYSDEC and coordinated analytical laboratory and data validator subcontractor services. Work was conducted in accordance with the 2006 NYSDOH Guidance on SVI evaluations and included the collection of 24-hour duration sub-slab, indoor and outdoor air TO-15 samples.
- NYSDEC: New York State - Managed a program of surface geophysical surveys conducted at 25 inactive hazardous waste sites located throughout New York State. Developed technical approach, analyzed data, prepared reports and served as primary contact with the NYSDEC. Methods included the use of magnetometer, electrical resistivity, electromagnetic (EM) and metal detection techniques. The work assignment also included conducting four Phase II Site Investigations at facilities evaluations conducted through the installation of soil borings and groundwater quality evaluations conducted through the installation of soil borings and groundwater monitoring wells and performance of slug tests.
- NYSDEC: Suffern, New York - Conducted site testing and other technical evaluations to age-date a spill of heating oil at a residential property. This work was performed in collaboration with a group of experts assembled by, and under the direction of, Mr. Breen. The scope of work also included critiquing a prior dating assessment conducted by another consultant that utilized a less rigorous approach.
- NYSDEC: Blooming Grove, New York - Evaluated impacts to soil and groundwater at a former landfill. Geophysical testing utilizing a variety of techniques was conducted to delineate the lateral and vertical extent of fill material. Monitoring well installations were completed in unconsolidated material and underlying shale bedrock to assess environmental impacts and to support fate and transport assessments; ground water flow pathway identification within the bedrock was assisted through the use of 3D photographic fracture trace analysis. Numerous ephemeral seeps were identified and assessed to determine potential impacts to on-site ponded water and local streams.

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Professional Highlights and Selected Projects

- EPA: Holbrook, New York - Evaluated impacts to soil and groundwater at a former audio recordings manufacturing site through the implementation of a RI/FS conducted for the EPA. Potential impacts to a nearby municipal water supply well field and a down gradient wetland were assessed utilizing site test data and groundwater flow and transport modeling techniques.
- Middlesex County Utility Authority: Middlesex County, New Jersey - Performed a detailed third party peer review and technical critique of a comprehensive hydrogeologic investigation conducted to support the proposed expansion of a major municipal landfill. The study was conducted on behalf of the utility authority to support proposed expansion of the landfill and considered potential effects to nearby wetlands and esuarine environments as the site is located adjacent to a large tidally influenced surface water feature. In addition, the hydraulic effects of an existing containment slurry wall were assessed, under existing conditions and under scenarios representing the expanded landfill.

Environmental Due Diligence

Environmental Professional and Senior Reviewer for numerous Phase I ESAs prepared in accordance with ASTM Standard Practice E 1527-13 for a variety of clients including but not limited to banks, developers and real estate professionals. Currently serves as EnviroTrac's national account representative for final review and certification of all Phase I ESA related work conducted by the firm for a major bank.

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Experience highlight 2016

Peter C. Breen, PG

Senior Project Manager

Publications & Presentations

April 2004 - *Evaluating Plume Capture Through Mass Flux Estimates*. LIG Conference SUNY Stony Brook, New York.

March 2006 - *Evaluating the Performance of a Groundwater Recovery System Through a Detailed Site Characterization and Contaminant Mass Flux Estimate.* ExxonMobil Global Remediation Conference, Orlando, Florida.

Spring 2008 - *Engineering Social Responsibility: Kleinfelder Adopts Company-Wide Sustainability Principles*. EFCG Sustainability Newsletter, Edition 1.

May 2008 - Environmental Services Sector Representative, *Round Table Discussion*. Queens Sustainability Summit at CUNY School of Law, Flushing, New York.

January 2009 - Panelist, *Environmental Law -Turning Brown Fields Green*. Queens Green Business Summit at Queens College, Flushing, New York.

February 2010 - Panelist, *Green Remediation -Turning Brown Fields Green*. Queens Green Business Summit at Queens College, Flushing, New York.

October 2010 - Panelist, *The Green Movement*. The 41st Annual Conference of the Long Island Business Development Council, Montauk, New York.

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CORPORATE RESUME

Dale Konas, PE

Principal Engineer

dalek@envirotrac.com

631.924.3001

Experience Snapshot

Mr. Konas has over 20 years experience as an Engineer in the civil and environmental consulting fields. Specific experience includes the design, construction, and operation & maintenance of soil and groundwater remediation systems, AST and UST compliance, SPCC plans, Emergency Response Plans, construction management, estimating and contract review, engineering technical support, research & development of innovative technologies, and acquisition of permits.

As Principal Engineer for EnviroTrac. Ltd., Mr. Konas is responsible for management of the engineering team and the oversight of all aspects of engineering company wide.

Licenses/Certifications

- NY Professional Engineer, No. 081035
- FL Professional Engineer, No. 64384
- SC Professional Engineer, No. 27513
- NC Professional Engineer, No. 034561
- MD Professional Engineer, No. 40096
- PA Professional Engineer, No. PE080942
- RI Professional Engineer, No. 9795
- VA Professional Engineer, No. 0402053568
- OSHA Certification: 40 hr. HAZWOPER Health & Safety Training at Hazardous Waste Sites
- OSHA Certification: 10 hr. Construction Safety and Health
- OSHA Certification: Confined Space Entry & Supervisor
- American Petroleum Institute: API Work Safe Certification
- American Red Cross: Community First Aid & Safety Certification
- Smith System Driver Safety Training
- NYSDEC Erosion & Sediment Control Certification.

Strengths

- Remedial Design, Construction, and Operation & Maintenance
- Soil & Groundwater Investigations
- Remedial Investigation/Feasibility (RI/FS) Studies
- Regulatory Compliance/ Permitting
- Value Engineering
- Evaluations & Implementation of Innovative Remedial Technologies

Education

- BS Civil Engineering, SUNY Buffalo 1996
- AS Engineering Science, SUNY Farmingdale 1993

Experience highlight 2016

Corporate Resume

Dale Konas, PE

Principal Engineer

Professional Affiliations

- American Society of Civil Engineers
- National Society of Professional Engineers

Professional History

- 2014 – Present, EnviroTrac Ltd, Principal Engineer
- 2001-2014, EnviroTrac Ltd, Senior Project Engineer
- 1997-2001, EnviroTrac Ltd, Project Engineer
- 1996-1997, Soil Mechanics, Inspector

Professional Highlights and Selected Projects

- Provided the engineering design, installation and construction oversight of over 150 Soil-Vapor Extraction (SVE), combination SVE / Air Sparging (AS), and pump and treat type systems at retail petroleum service station and industrial sites in New York, New Jersey, Connecticut, Florida, Maryland, and Massachusetts. Responsible for project scheduling, budget tracking, material/equipment purchasing, design engineering, P&ID and As-Built Drawings.
- Manages a team of technicians and engineers who specialize in the operation and maintenance of a wide range of remediation systems. Responsible for the oversight of the overall monitoring, repair, operation, modification and general upkeep of EnviroTrac's O&M project portfolio. Special emphasis is placed on how the optimization of each system is conducted with respect to its general operation, and the efficiency in which cleanup goals can be potentially achieved.
- Design and field Engineer responsible for the implementation of In-Well Air Stripping systems at retail petroleum sites in New York. Responsibilities included performing pilot tests of the In-Well Stripping system to evaluate the effectiveness of this technology to remediate petroleum hydrocarbon groundwater contamination. Design challenges included adding In-Well Stripping technology to existing SVE systems.
- Field Engineer responsible for construction oversight of a large scale In-Well Air Stripping system at Department of Energy's Brookhaven National Laboratory. Responsible for design changes, installation of subsurface and aboveground system components, equipment and associated controls, equipment and piping testing, as-built drawings, scheduling, planning and direct interaction with BNL engineers. System included the installation of over 7,500 feet of subsurface 10-inch diameter PVC pipe, 24-inch diameter manifolds, connection to seven In-Well Stripping Treatment Wells, and the installation of aboveground equipment, off-gas controls and instrumentation. System is designed to pump 420 gallons per minute (gpm) with air velocities over 4,800 cubic feet per minute (cfm).

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Experience highlight 2016

Corporate Resume

Dale Konas, PE

Principal Engineer

Professional Highlights and Selected Projects

- Lead engineer for the design of an active petroleum hydrocarbon vapor mitigation system for several homes that were part of a newly planned residential development. The housing development was located down gradient of a former retail gasoline station that had a recorded petroleum spill that had migrated to the adjacent properties. The design included the installation of an impermeable geomembrane barrier and an active sub-slab depressurization system. The barrier consisted of several layers of geotextile fabric and sealed at penetrations and contacts with the concrete foundation walls. The depressurization system included a network of subsurface vapor collection piping, vacuum blowers and an integrated control and alarm system. During the design phase of the project, EnviroTrac worked closely with the local regulatory agencies and the Fire Marshal to ensure that the system met all applicable local regulations and fire codes.
- Lead Engineer for several New York State Department of Environmental Conservation (NYSDEC) petroleum spill sites in the Upstate area of New York. Experience includes conducting feasibility and cost analysis for the selection of supplemental water treatment systems for public drinking-water well systems impacted with MTBE that were servicing New York State facilities. Upon selection, Mr. Konas was responsible for the design, installation, operation and maintenance of the systems. Treatment technologies include large-scale granulated-activated carbon (GAC) units, traditional air strippers and low-profile air strippers. He is also responsible for evaluating existing remediation systems at NYSDEC petroleum spill sites and designing and implementing appropriate modifications to increase system efficiencies.
- Field Engineer responsible for construction and oversight of a groundwater Pump & Treat system at DOE's Brookhaven National Laboratory. The system was designed to extract 100 gpm with treatment via three 2,000-lb. GAC vessels in series. Responsible for design changes, installation of subsurface and aboveground system components, equipment and associated controls, equipment and pipe testing, as-built drawings, scheduling, planning and direct interaction with BNL engineers.
- Lead Project Engineer for a $1.1 million dollar contract for the construction and operation of large scale soil vapor extraction (SVE) system at a NYSDEC Hazardous Waste site in Hauppauge, NY. The project included the construction of two SVE systems that were designed to prevent the migration of vapors from the underlying PCE contaminated soil into the two existing single story industrial buildings located at the site. Major system components included six (6) 7.5 HP positive displacement blowers that induced a negative pressure under the concrete floor slab of the two buildings and then conveyed the air through four (4) 3000lb vapor phase activated carbon units. As part of a change order, EnviroTrac was also retained to design and install an additional SVE system in order to address the spill source area. Because of the high PCE concentrations present in the extracted air stream, three 5000lb vapor phase GAC units were incorporated in the final system design. Through out the project many cost saving value engineering ideas were incorporated. An example includes the replacement of the originally designed timber framed equipment sheds with steal shipping containers. This design change enabled the systems to be constructed in house and then later shipped to the site.

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Professional Highlights and Selected Projects

providing a savings in construction costs.

- Senior Design Engineer for the design and construction of a dual phase high vacuum extraction (HVE), pump and treat system for the NYSDEC (Spills Division), for the town of Hyde Park, NY. The treatment system was designed to remediate a methyl tertiary butyl ether (MTBE) impacted overburden aquifer that was contaminated from a UST related petroleum spill at a retail service station. The design included seven high vacuum extraction wells installed in the overburden aquifer. Contaminated water and vapor is extracted from these wells using a 10-HP liquid ring pump that produces an airflow rate of 140cfm at a vacuum of over 28 inches of mercury. The water is separated from the vapor stream and pumped to a polyethylene equalization tank. Submersible pumps installed into three bedrock extraction wells, pump water from bedrock fractures, to the equalization tank. The combined water from the equalization tank is then processed through a series of sediment filters and a lo-profile air stripper, and then discharged up gradient of the HVE and bedrock wells through a series of horizontal injection wells. This design incorporates a recirculation effect throughout the site, in which the same water is treated several times and causes the contaminants to be flushed from the soil formation. Because the MTBE had migrated into the complex bedrock formation and impacted over 140 private resident potable wells, this design was part of what was considered a high profile project in an effort so remediate one of several contaminant source zones.
- Lead Project Engineer for the construction and operation of a vacuum enhanced NAPL recovery (VENR) system for Metro-North Rail Road located at the Croton-on-Hudson Harmon Yard, NY. The system incorporated over 70 remediation wells that were utilized by three separate systems in order to recover free phase LNAPL hydrocarbons containing PCBs and remediate soil and ground water. Major components of the system included several large soil vapor extraction and air injection blowers, active and passive LNAPL skimmers and pumps, and PLC based control systems that provided remote monitoring and control. In order to prevent any migration of the LNAPL offsite, an impervious curtain wall was installed along the down gradient property line. This curtain wall was constructed using specially made pre-coated steal sheet piling to a depth of 20 feet. Also as part of the contract, two large concrete block buildings were constructed to house the major system components and controls. Throughout the construction of the system, through value engineering, several design modifications were implemented that resulted in a combined savings of over $150,000 to Metro-North.

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CORPORATE RESUME

Michael A. Clark, MS, CHMM

Director Health & Safety

EnviroTrac

michaelc@envirotrac.com

909.387.5553

Experience Snapshot

Mr. Clark has over 25 years experience in the environmental, health, and safety field managing and directing programs for Fortune 100 corporations, manufacturing and construction companies, and consulting firms. He currently is the Corporate Director of EnviroTrac's Health and Safety program.

EnviroTrac uses a network of Safety Coordinators to oversee the safety program in each of the EnviroTrac regional offices. Mr. Clark personally manages this network and continuously reviews and updates the Health & Safety program so that the practices, policies and procedures meet or exceed laws, regulations, client-specific requirements and maintain our own standards for the health and safety of our employees.

Licenses/Certifications

Certified Hazardous Materials Manager (CHMM), Institute of Hazardous Materials Management - Master's Level

Advanced Safety Certification, National Safety Council

40-hour HazWOPER certificate and subsequent 8-hr refresher training

Fundamentals of Industrial Hygiene - Harvard School of Public Health

Industrial Ventilation Workshop - AIHA

Advanced IAQ/HVAC Diagnostics Training Course - HL Turner Group

Implementing the ISO 14001:2004 Program workshop

NYSDOL/NJDOL Asbestos Supervisor

Smith System Driving Safety Trainer

Strengths

- Behavior Based Safety and Hazard Communication
- Facility Environmental and Safety Compliance Audits and Loss Prevention
- Root Cause and Accident Investigations
- Safety and awareness trainer for HAZWOPER, HazCom, HazMat awareness, respirators, PPE, fall protection, confined space entry, first aid/CPR, etc.
- Safe Driver Trainer
- Exposure monitoring and control

Education

- MS Environmental Sciences, NJ Institute of Technology, 1994
- BS Biology & Chemistry, Rowan University, NJ 1987

Corporate Resume

Michael A. Clark, MS, CHMM

Director Health & Safety

Professional Highlights and Selected Projects

- Mr. Clark has directed the health and safety program for construction projects and facility operations throughout EnviroTrac's footprint of operation. He developed and implemented programs to address hazardous materials exposure controls, heavy equipment/construction operations, traffic control and work area protection, confined space entry, working at heights, exposure to heat/cold, hazardous and regulated waste, personal safety, and other factors unique an extreme urban environment.

- Mr. Clark has prepared heath and safety plans from a wide range of hazardous material impacted projects, including PCB exposure monitoring for both airborne and surface contact; industrial processing exposure to mercury vapor and surface contamination; benzene exposure assessments for environmental remediation workers; and asbestos and lead management plans to control worker exposure during abatement and while managing these materials in place.

- In addition to his focus on safe work environments, Mr. Clark implemented a safe driving program for field operations at EnviroTrac. The program addressed the requirements of operating vehicles in the most congested urban areas of the country and uses both classroom training and behind-the-wheel instruction to educate drivers on techniques to safely operate in this unique environment. Following the training, motor vehicle accidents for the company in that market decreased by 30%, resulting in overall cost savings estimated at over $100,000 per year.

- Developed and administered Respiratory Protection Programs for multiple companies encompassing hundreds of employees. These programs have included hazard identification, employee medical monitoring, baseline and periodic biological monitoring, respirator selection and change out schedules, and annual review and update of the program as required by OSHA. Mr. Clark is a "Competent Person" as defined by OSHA to administer respirator fit tests and manage a respiratory protection program.

- Conducted over 200 indoor air quality and industrial ventilation investigations and implemented exposure control and remediation actions for worker exposure to: heavy metals, VOCs, and other hazardous materials; confined spaces contaminated with hazardous materials; sick building syndrome and mold contamination; and industrial ventilation controls during manufacturing processes.

- Developed the in-house EnviroTrac 40-hour OSHA Hazardous Waste Operations and Emergency Response (HazWOPER) certification and 8-hour annual refresher training programs that complies with the requirements of 29CFR 1910.120, Appendix A recommendations. Mr. Clark personally delivers both the 40-hour and 8-hour training to EnviroTrac employees.

- In addition to his work in safety, Mr. Clark also has extensive experience in the environmental field managing petroleum storage operations, air and water environmen-

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Professional Highlights and Selected Projects

- His experience includes the installation, upgrade and removal of under and above ground storage systems, developing and updating SPCC plans and inspection plans and monitoring systems. Mr. Clark has managed multiple remediation activities from full site excavation of contaminated soils, to pump and treat and contaminant extraction systems, underground injection, and passive remediation and monitoring.
- Mr. Clark has obtained and managed over 500 air and water discharge permits from environmental state agencies, implemented and audited programs for compliance to permit requirements, and prepared compliance and discharge reports to the appropriate agencies. Type of permits include: Federal Title V Air Discharge Permit, NPDES water discharge permits, and minor source permits in Washington DC, MA, MD, NH, NJ, PA, and RI.
- During the restoration efforts at *Ground Zero* in NYC after the attacks of 9/11/01, Mr. Clark managed the decontamination of the Verizon telecommunications facility adjacent to the World Trade Center Complex that facilitated the restoration of 2M data and 1.5 M voice lines to re-establish communications for lower Manhattan and Wall St.
- While directing the environmental operations for a materials and metals recovery/recycling firm, Mr. Clark developed and implemented the company's environmental program under the strict requirements of ISO 14001:2004. The program applied for and successfully passed the ISO audit with no "non-compliance" issues identified by the Accreditation body and was issued an ISO 14001 certification.

About EnviroTrac

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APPENDIX H

Community Air Monitoring Plan

EnviroTrac
Environmental Services

AAA SUTTER REALTY, LLC

1199 SUTTER AVENUE, BROOKLYN

KINGS COUNTY, NEW YORK

Community Air Monitoring Plan

NYSDEC BCP Number: C224141

Prepared for:
AAA SUTTER REALTY, LLC
153-157 Seventh Street
Garden City, New York 11530

Prepared by:
EnviroTrac Engineering PE PC
5 Old Dock Road, Yaphank, New York 11980
631-924-3001

JUNE 2018

EnviroTrac
Environmental Services

This 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. It 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.

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

Proposed Monitoring

Real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) will be conducted during implementation of the RAWP to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses) from potential airborne contaminant releases as a direct result of the remedial work activities.

Continuous monitoring will be required for all ground intrusive activities including, but not necessarily limited to, the installation of soil vapor extraction (SVE) wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of groundwater samples. In some instances, depending upon the proximity of potentially exposed individuals and/or field observations during implementation of such work, continuous monitoring may be required during these activities.

VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the downwind perimeter of the work area on a continuous basis during intrusive activities (e.g., injection/monitoring well installations). Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below:

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

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities 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.

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations during work activities (e.g., SVE well installations).

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

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work 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.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will 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.

Special Requirements for Work within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with New York State Department of Health (NYSDOH) prior to commencement of the work.

If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m3 or less at the monitoring point.

All readings will be recorded and available for the New York State Department of Environmental Conservation (NYSDEC) and the NYSDOH personnel to review.

APPENDIX I

Resumes

CORPORATE RESUME

Tracy Wall
Project Manager

tracyw@envirotrac.com
631.924.3001

Experience Snapshot

Ms. Wall has performed numerous hydrogeologic investigations for several sites in New York, New Jersey, Connecticut and Delaware. Ms. Wall has significant experience in: Phase I and II Environmental Site Assessments (ESAs); soil vapor intrusion investigations; installation, operation, maintenance, and monitoring of remediation and mitigation systems; project management of New York State Department of Environmental Conservation (NYSDEC) and NYCOER BCP and VCP sites, federal Superfund sites, state and petroleum-impacted sites; petroleum and chemical-impacted site evaluations and remediation; underground storage tank (UST) evaluations and removals; commercial, residential, and municipal drinking water sampling; monitoring, and reporting for industrial companies; and technical report writing.

Licenses/Certifications

OSHA 40 Hour Hazardous Waste Operations and Emergency Response Training

OSHA 8 Hour Refresher Hazardous Waste Operations and Emergency Response Training

New York State Asbestos Inspector

American Petroleum Institute (API) Work Safety Training

Strengths

- Phase I & II Environmental Site Assessments (ESAs)
- Project Management of NYSDEC and NYCOER BCP and VCP Projects
- Soil Vapor Intrusion Investigations
- Installation, Operation, Maintenance, and Monitoring of Remediation and Mitigation Systems
- Tank Removals
- Soil and Groundwater Investigations
- Technical Report Writing for State and County Agencies

Education

- B.S., SUNY Stony Brook, 2001
- A.S., Nassau Community College, 1997

Corporate Resume

Tracy Wall

Project Manager

Professional Affiliations

- Member of Long Island Professional Geologists
- Member of Environmental Professionals Association

Professional History

- 2015—Present, Project Manager, EnviroTrac Ltd.
- 2006—2015, Hydrogeologist, Dermody Consulting
- 2005—2006, Hydrogeologist, Dermody & Menegio Consulting
- 2003—2005, Hydrogeologist, Enviroscience Consultants, Inc.
- 2003, Hydrogeologist, Town of East Hampton
- 2001—2003, Hydrogeologist, P.W. Grosser Consulting, Inc.
- 2001, Environmental Scientist, U.S. Geological Survey

Professional Highlights and Selected Projects

Ms. Wall performed numerous Phase I ESAs in New York, New Jersey, Connecticut and Delaware for property transfers and refinancing. For cases in which Phase I ESA report conclusions recommended additional work be performed to evaluate the potential for contamination at the site, a Phase II ESA investigation was performed, which may have included: air, soil, soil vapor, groundwater, or drinking water sampling; groundwater flow direction detennination; investigation of upgradient potential sources of contamination; and in some cases, remediation of identified contamination.

Ms. Wall performed vapor intrusion investigations in New York to determine whether vapor encroachment would have been an issue at a site. Ms. Wall evaluated the investigation results and successfully determined whether vapor mitigation would have been required.

Ms. Wall performed pilot tests at sites to determine whether hydrogeologic conditions would have been favorable for soil vapor extractions (SVE) and/or air sparge (AS) applications. Ms. Wall played active roles in the installation of SVE and AS remediation system components in Bay Shore and Brooklyn, New York and sub-slab depressurization systems (SSDSs). Ms. Wall performed bi-monthly, monthly, and quarterly operation, maintenance, and monitoring tasks as well as soil, soil vapor, and groundwater sampling for remediation system sites. Ms. Wall performed activities on Long Island, NY and in the five boroughs of New York City.

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Professional Highlights and Selected Projects

Ms. Wall prepared several work plans for interim remedial measures and final remedial activities, managed remedial activities, prepared site management plans, worked with NYS certified engineers to prepare final engineer reports, and implemented community air monitoring plan (CAMP) air monitoring programs.

Ms. Wall supervised several groundwater and soil investigations for radionuclide and metals contaminated media at Brookhaven National Laboratory located on Long Island, New York.

Ms. Wall performed groundwater sampling for several NYSDEC Regions 1 and 2 projects on Long Island, New York and the five boroughs of New York City. Ms. Wall also performed monthly and quarterly groundwater sampling at petroleum-impacted residential and municipal properties in New York.

Ms. Wall performed evaluations of UST leakage at numerous sites and oversaw the removal of several USTs. Ms. Wall performed evaluations of wastewater and stormwater systems with petroleum and chemical contamination. The evaluations included soil contamination analysis, groundwater well installation, sampling, and interpretation of results. Work plans were prepared and negotiated with the appropriate regulatory agency to determine the scope of work and objectives at each site. UST removals included the preparation of permits and certifications for the appropriate regulatory agencies. Soil and groundwater remediation was performed at numerous sites including excavation of contaminated soil, removal of free-floating petroleum from the water table surface, and installation of remediation or mitigation systems.

Ms. Wall performed drinking water sampling at several commercial and residential properties located in New York and New Jersey, and also for several Long Island schools for numerous suites of compounds.

Ms. Wall was involved in the Preparation of Wild, Scenic and Recreational Rivers Act permits and variances, including variances for lot size. Investigations were conducted in accordance with the health department standard operating procedure for development of sites which were historically used for agricultural purposes. In addition, she managed projects for the identification of threatened and endangered species and historical resources.

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Experience
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Corporate Resume

Tracy Wall

Project Manager

Professional Highlights and Selected Projects

Ms. Wall performed monthly and semi-annual wastewater investigations for the Long Island Railroad and commercial properties. In addition, she completed several Industrial User Self Monitoring Reports.

Ms. Wall was responsible for the collection of data and assisting in the preparation of the town of East Hampton, New York Water Resources Management Plan.

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CORPORATE RESUME

EnviroTrac

Dale Konas, PE
Principal Engineer

dalek@envirotrac.com
631.924.3001

Experience Snapshot

Mr. Konas has over 20 years experience as an Engineer in the civil and environmental consulting fields. Specific experience includes the design, construction, and operation & maintenance of soil and groundwater remediation systems, AST and UST compliance, SPCC plans, Emergency Response Plans, construction management, estimating and contract review, engineering technical support, research & development of innovative technologies, and acquisition of permits.

As Principal Engineer for EnviroTrac. Ltd., Mr. Konas is responsible for management of the engineering team and the oversight of all aspects of engineering company wide.

Licenses/Certifications

- NY Professional Engineer, No. 081035
- FL Professional Engineer, No. 64384
- SC Professional Engineer, No. 27513
- NC Professional Engineer, No. 034561
- MD Professional Engineer, No. 40096
- PA Professional Engineer, No. PE080942
- RI Professional Engineer, No. 9795
- VA Professional Engineer, No. 0402053568
- OSHA Certification: 40 hr. HAZWOPER Health & Safety Training at Hazardous Waste Sites
- OSHA Certification: 10 hr. Construction Safety and Health
- OSHA Certification: Confined Space Entry & Supervisor
- American Petroleum Institute: API Work Safe Certification
- American Red Cross: Community First Aid & Safety Certification
- Smith System Driver Safety Training
- NYSDEC Erosion & Sediment Control Certification.

Strengths

- Remedial Design, Construction, and Operation & Maintenance
- Soil & Groundwater Investigations
- Remedial Investigation/Feasibility (RI/FS) Studies
- Regulatory Compliance/ Permitting
- Value Engineering
- Evaluations & Implementation of Innovative Remedial Technologies

Education

- BS Civil Engineering, SUNY Buffalo 1996
- AS Engineering Science, SUNY Farmingdale 1993

Experience
highlight 2016

Corporate Resume

Dale Konas, PE

Principal Engineer

Professional Affiliations

- American Society of Civil Engineers
- National Society of Professional Engineers

Professional History

- 2014 – Present, EnviroTrac Ltd, Principal Engineer
- 2001-2014, EnviroTrac Ltd, Senior Project Engineer
- 1997-2001, EnviroTrac Ltd, Project Engineer
- 1996-1997, Soil Mechanics, Inspector

Professional Highlights and Selected Projects

- Provided the engineering design, installation and construction oversight of over 150 Soil-Vapor Extraction (SVE), combination SVE / Air Sparging (AS), and pump and treat type systems at retail petroleum service station and industrial sites in New York, New Jersey, Connecticut, Florida, Maryland, and Massachusetts. Responsible for project scheduling, budget tracking, material/equipment purchasing, design engineering, P&ID and As-Built Drawings.
- Manages a team of technicians and engineers who specialize in the operation and maintenance of a wide range of remediation systems. Responsible for the oversight of the overall monitoring, repair, operation, modification and general upkeep of EnviroTrac's O&M project portfolio. Special emphasis is placed on how the optimization of each system is conducted with respect to its general operation, and the efficiency in which cleanup goals can be potentially achieved.
- Design and field Engineer responsible for the implementation of In-Well Air Stripping systems at retail petroleum sites in New York. Responsibilities included performing pilot tests of the In-Well Stripping system to evaluate the effectiveness of this technology to remediate petroleum hydrocarbon groundwater contamination. Design challenges included adding In-Well Stripping technology to existing SVE systems.
- Field Engineer responsible for construction oversight of a large scale In-Well Air Stripping system at Department of Energy's Brookhaven National Laboratory. Responsible for design changes, installation of subsurface and aboveground system components, equipment and associated controls, equipment and piping testing, as-built drawings, scheduling, planning and direct interaction with BNL engineers. System included the installation of over 7,500 feet of subsurface 10-inch diameter PVC pipe, 24-inch diameter manifolds, connection to seven In-Well Stripping Treatment Wells, and the installation of aboveground equipment, off-gas controls and instrumentation. System is designed to pump 420 gallons per minute (gpm) with air velocities over 4,800 cubic feet per minute (cfm).

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Experience highlight 2016

Corporate Resume

Dale Konas, PE

Principal Engineer

Professional Highlights and Selected Projects

- Lead engineer for the design of an active petroleum hydrocarbon vapor mitigation system for several homes that were part of a newly planned residential development. The housing development was located down gradient of a former retail gasoline station that had a recorded petroleum spill that had migrated to the adjacent properties. The design included the installation of an impermeable geomembrane barrier and an active sub-slab depressurization system. The barrier consisted of several layers of geotextile fabric and sealed at penetrations and contacts with the concrete foundation walls. The depressurization system included a network of subsurface vapor collection piping, vacuum blowers and an integrated control and alarm system. During the design phase of the project, EnviroTrac worked closely with the local regulatory agencies and the Fire Marshal to ensure that the system met all applicable local regulations and fire codes.
- Lead Engineer for several New York State Department of Environmental Conservation (NYSDEC) petroleum spill sites in the Upstate area of New York. Experience includes conducting feasibility and cost analysis for the selection of supplemental water treatment systems for public drinking-water well systems impacted with MTBE that were servicing New York State facilities. Upon selection, Mr. Konas was responsible for the design, installation, operation and maintenance of the systems. Treatment technologies include large-scale granulated-activated carbon (GAC) units, traditional air strippers and low-profile air strippers. He is also responsible for evaluating existing remediation systems at NYSDEC petroleum spill sites and designing and implementing appropriate modifications to increase system efficiencies.
- Field Engineer responsible for construction and oversight of a groundwater Pump & Treat system at DOE's Brookhaven National Laboratory. The system was designed to extract 100 gpm with treatment via three 2,000-lb. GAC vessels in series. Responsible for design changes, installation of subsurface and aboveground system components, equipment and associated controls, equipment and pipe testing, as-built drawings, scheduling, planning and direct interaction with BNL engineers.
- Lead Project Engineer for a $1.1 million dollar contract for the construction and operation of large scale soil vapor extraction (SVE) system at a NYSDEC Hazardous Waste site in Hauppauge, NY. The project included the construction of two SVE systems that were designed to prevent the migration of vapors from the underlying PCE contaminated soil into the two existing single story industrial buildings located at the site. Major system components included six (6) 7.5 HP positive displacement blowers that induced a negative pressure under the concrete floor slab of the two buildings and then conveyed the air through four (4) 3000lb vapor phase activated carbon units. As part of a change order, EnviroTrac was also retained to design and install an additional SVE system in order to address the spill source area. Because of the high PCE concentrations present in the extracted air stream, three 5000lb vapor phase GAC units were incorporated in the final system design. Through out the project many cost saving value engineering ideas were incorporated. An example includes the replacement of the originally designed timber framed equipment sheds with steal shipping containers. This design change enabled the systems to be constructed in house and then later shipped to the site.

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Experience highlight 2016

Professional Highlights and Selected Projects

providing a savings in construction costs.

- Senior Design Engineer for the design and construction of a dual phase high vacuum extraction (HVE), pump and treat system for the NYSDEC (Spills Division), for the town of Hyde Park, NY. The treatment system was designed to remediate a methyl tertiary butyl ether (MTBE) impacted overburden aquifer that was contaminated from a UST related petroleum spill at a retail service station. The design included seven high vacuum extraction wells installed in the overburden aquifer. Contaminated water and vapor is extracted from these wells using a 10-HP liquid ring pump that produces an airflow rate of 140cfm at a vacuum of over 28 inches of mercury. The water is separated from the vapor stream and pumped to a polyethylene equalization tank. Submersible pumps installed into three bedrock extraction wells, pump water from bedrock fractures, to the equalization tank. The combined water from the equalization tank is then processed through a series of sediment filters and a lo-profile air stripper, and then discharged up gradient of the HVE and bedrock wells through a series of horizontal injection wells. This design incorporates a recirculation effect throughout the site, in which the same water is treated several times and causes the contaminants to be flushed from the soil formation. Because the MTBE had migrated into the complex bedrock formation and impacted over 140 private resident potable wells, this design was part of what was considered a high profile project in an effort so remediate one of several contaminant source zones.
- Lead Project Engineer for the construction and operation of a vacuum enhanced NAPL recovery (VENR) system for Metro-North Rail Road located at the Croton-on-Hudson Harmon Yard, NY. The system incorporated over 70 remediation wells that were utilized by three separate systems in order to recover free phase LNAPL hydrocarbons containing PCBs and remediate soil and ground water. Major components of the system included several large soil vapor extraction and air injection blowers, active and passive LNAPL skimmers and pumps, and PLC based control systems that provided remote monitoring and control. In order to prevent any migration of the LNAPL offsite, an impervious curtain wall was installed along the down gradient property line. This curtain wall was constructed using specially made pre-coated steal sheet piling to a depth of 20 feet. Also as part of the contract, two large concrete block buildings were constructed to house the major system components and controls. Throughout the construction of the system, through value engineering, several design modifications were implemented that resulted in a combined savings of over $150,000 to Metro-North.

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Experience highlight 2016

CORPORATE RESUME

EnviroTrac

Peter C. Breen, PG

Senior Project Manager

pbreen@envirotrac.com
631.924.3001

Experience Snapshot

Mr. Breen has provided professional services to clients for over thirty years, focusing on environmental site investigation and remediation pertaining to soil, soil vapor and groundwater contamination. His expertise includes the development and implementation of technical scopes, budgets and schedules, regulatory interaction and negotiations, performance of technical "cold eyes" project reviews and cause and effect evaluations. He has assisted insurance companies and law firms with claims and litigation pertaining to soil and groundwater contamination involving mining waste and gasoline release sites.

Licenses/Certifications

Professional Geologist, PG-000193, State of New York

Certified Professional Geologist, CPG #11417, American Institute of Professional Geologists

Certified Professional Geologist, GEOG724, State of Alaska

OSHA 40 Hour Hazardous Waste Operations and Emergency Response Training

OSHA 8 Hour Refresher Hazardous Waste Operations and Emergency Response Training

Loss Prevention System (LPS) 8 hour Training, 2004

American Red Cross First Aid/CPR/AED Training

American Red Cross Bloodborne Pathogens Training

Strengths

- Due diligence and remedial investigations
- Insurance claims and litigation support
- Soil vapor intrusion assessments
- Groundwater modeling
- Geophysical evaluations
- Aquifer testing
- Soil and groundwater remediation

Education

- MS Earth Science, Adelphi University
- BS Biology, University of Miami

Experience
highlight 2018

Corporate Resume

Peter C. Breen, PG

Senior Project Manager

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Professional Affiliations

- American Institute of Professional Geologists
- National Ground Water Association

Professional History

- 1984—1990, Hydrogeologist/Project Manager, Roux Associates
- 1990—1991, Project Manager, Blasland & Bouck Engineers
- 1991—2003, Senior Project Manager, Environmental Resources Management
- 2003—2008, Principal Professional, Geologic Services Corporation/Kleinfelder
- 2008—Present, Senior Project Manager, EnviroTrac Ltd.

Professional Highlights and Selected Projects

Mr. Breen has extensive experience pertaining to conceptualizing and implementing technical and quality assurance aspects of site cleanups conducted in accordance with the Remediation Standard Regulations (RSRs), section 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies.

Mr. Breen worked on a former manufacturing facility in Cromwell, Connecticut. The remedy for the site included limited hot spot soil remediation and an environmental land use restriction (ELUR) restricting the property to commercial use was filed. Verification reporting is in progress with licensed environmental professional (LEP) oversight.

Mr. Breen worked on a petroleum lubricants manufacturing facility in East Haven, Connecticut. He managed data compilation and quality assurance including evaluation of site testing results to assure usability and compliance with reasonable confidence protocol (RCP) requirements. He developed a conceptual site model for the overburden/bedrock hydrogeologic setting as well as a path forward to achieve compliance with RSRs with LEP oversight. The site testing is ongoing and RSR compliance may include implementing administrative controls and/or conducting soil and groundwater remedial work.

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Experience highlight 2018

Corporate Resume

Peter C. Breen, PG

Senior Project Manager

Professional Highlights and Selected Projects

Mr. Breen assisted council in 2009 regarding a matter involving MTBE Products Liability Litigation related to three cases including:

West Hempstead Water District v. AGIP Inc., et al, 03 CV 10052

West Hempstead Water District v. Merit Oil., et al, 08 CV 4290

Village of Hempstead v. AGIP Inc., et al, 03 CV 10055

The insured party (Defendant) owned, or had previously owned, a portfolio of retail gasoline stations that were identified as potential sources. An excess of thirty-thousand documents were reviewed during a one-year discovery phase. That information included results of an expedited site assessment, aquifer testing, down-hole geophysical testing and stratigraphic analyses, three-dimensional numerical groundwater flow and contaminant transport simulations, a two-phase interim remedial measure (IRM) conducted to capture and remove MTBE from groundwater, and other work conducted by the New York State Department of Environmental Conservation (NYSDEC). Other information included: numerous reports pertaining to the defendant's properties and information associated with a multitude of other facilities (identified as potential sources by the NYSDEC) owned and operated by other named parties, information regarding activities conducted by two water supply districts (Plaintiff's facilities) and hydrogeologic reports and other information developed by others. The cases were settled prior to trial.

Mr. Breen reviewed environmental records pertaining to sixteen MTBE release sites on Long Island, New York on behalf of Defendant (a major oil company). The results of the evaluations were used to develop/update/critique conceptual site models, focusing on assessing spill histories, groundwater plume migration pathways, and plume persistence.

Mr. Breen assessed environmental records pertaining to a portfolio of fourteen retail petroleum sites located in Florida. The work was conducted to support negotiations between the client's insurance firm and successor firm. The client had been the provider of insurance for the sites until the end of 2004, at which time responsibilities for policy management were transferred to the successor firm. During the assessment, petroleum contaminated soil and groundwater was discovered at the sites. The responsibility for the funding of the investigative and remedial work to address these issues were apportioned through negotiations conducted by the two insurance firms.

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Corporate Resume

Peter C. Breen, PG

Senior Project Manager

Professional Highlights and Selected Projects

Mr. Breen was the Technical Director of a groundwater remediation project located on Long Island, New York. The project was conducted with the oversight of the NY SDEC under a negotiated Order on Consent. He assisted the client's (oil company) defense council in a civil action brought forth by local residents. (Madigan et al v. Exxon Mobil Corporation, case number 04-cv—02884 in the U.S. District Court for the Eastern District of New York). The scope of the project included high definition delineation, monitoring and remediating an extensive off-site plume containing MTBE. This was accomplished through testing and sampling of over one-thousand vertically nested monitoring well points installed throughout a residential neighborhood, wetland assessments, indoor air quality evaluations and through the use of a high capacity (500 gpm) groundwater pump and treat system. Supporting technical evaluations were conducted to assess plume migration included gamma logging of boreholes to assess stratigraphic heterogeneities, as well as slug and constant rate pump testing to support remediation goals. The project included assessment and remediation activities at the sources of the off-site plume—two former retail gasoline stations. Remedial efforts at these on-site locations included groundwater pumping and treatment; soil vapor extraction and air sparging (SVE/AS); in-situ chemical oxidation (ISCO) using modified Fenton's Reagent and excavation of residual hotspots during station demolition activities.

Mr. Breen was the Lead Hydrogeologist for a regional-scale groundwater investigation conducted in the vicinity of a salt mining facility located in south central Kansas. The project was conducted in support of litigation, working for Defendant (*Miller v. Cudahy Co., 656 F. Supp. 316 (D. Kan. 1987)*). Aquifer characterization resulted in delineation of saline groundwater and assessment of soil contaminated as a result of historic solution mining activities. The plume was found to extend more than seven miles from the Site over an area of approximately two-thousand-five-hundred acres within a highly prolific alluvial aquifer utilized locally for central pivot crop irrigation and potable water supply. An excess of on-hundred test wells were installed, including three sixteen-inch diameter groundwater extraction wells. Mr. Breen planned, supervised and analyzed the results of three seventy-two-hour high capacity aquifer pumping tests, tested soil and groundwater and conducted other evaluations such as the construction of a numerical groundwater flow model utilizing Modflow to support the litigation strategy and assess remedial alternatives.

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Experience highlight 2018

Corporate Resume

Peter C. Breen, PG

Senior Project Manager

Professional Highlights and Selected Projects

Mr. Breen was the Project Director of a former petroleum terminal site investigation and remediation project in Oceanside, New York, conducted under a stipulation agreement with the NYSDEC. The scope of the project included delineating, monitoring and remediating ground water containing petroleum compounds including BTEX and MTBE. The initial work conducted to support cost recovery efforts by the client included a forensic evaluation of prior site use and spill history. An interim remedial measure (IRM) implemented to reduce on-site chemical constituent concentrations entailed the use of a constructed on-site groundwater pump and treat system consisting of seven recovery wells as well as air stripping technology. Supplemental remediation technologies are in the process of being evaluated to achieve site closure goals. This process will be supported through additional site testing and stratigraphic evaluation.

Mr. Breen managed a Remedial Investigation for a seventy-two-acre research and development site in Linden, New Jersey, conducted under an Administrative Order of Consent with the New Jersey Department of Environmental Protection (NJDEP). The work included a detailed forensic evaluation of historic site activities which resulted in the identification of thirty Areas of Environmental Concern (AOCs) and led to the assessment of associated soil and ground water in overburden and layered siltstone bedrock aquifers. Due to the varied historic activities conducted at the site, a wide range of chemical constituents including inorganics, organics and semi-volatile compounds were found in soil and groundwater. Petroleum-related constituents represented the primary chain of custodies (COCs) in the overburden groundwater while TCE and associated breakdown products were found in the bedrock. Associated work included evaluation of sediment and surface water at on-site wetlands, the development of a baseline ecological evaluation (BEE) and removal of thirteen formerly abandoned in place USTs ranging in capacity from five-hundred-fifty to ten-thousand gallons. The bedrock evaluations employed regional and local fracture trace analysis and an innovative testing approach utilizing downhole closed circuit television, acoustic televiewer, heat pulse flow meter and pumping test applications.

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Professional Highlights and Selected Projects

Mr. Breen served as the senior technical advisor supporting environmental activities pertaining to a large portfolio of retail petroleum site investigation and remediation projects located throughout the Long Island and the New York City metropolitan area. As such, he advised clients and assisted project managers with the construction of site conceptual models; investigated approach, remedial and public affairs strategy development; and served in a peer review capacity. The project sites were situated within urban and suburban settings and were located in ice contact or glacial outwash settings.

Mr. Breen managed site assessment and remediation activities conducted at a large medical products manufacturing facility in Bay Shore, New York. The scope of work included soil and groundwater evaluations consisting of soil boring and well installations, soil and groundwater sampling, as well as developing a historic use model of on-site drains and leaching pools. The chemicals concerned included metals and chlorinated VOCs. Approximately one-thousand-three-hundred tons of metals contaminated soil was excavated and water modeling and site assessment findings. He was successful in negotiating the elimination of significant quantity of groundwater-related site assessment and remediation work that had previously been proposed to the overseeing regulatory agency, and afforded the client considerable cost savings.

Mr. Breen conducted Phase II ESA site investigation and remediation activities at an automotive parts manufacturing plant in Yaphank, New York. A detailed evaluation of historic manufacturing process/waste management was conducted, which revealed the use of improper practices that resulted in the contaminated of soil at waste staging area and on-site sanitary and storm water management facilities. The remediation of soil and leaching pool structures was required based on the presence of VOCs, semi-volatile organic compounds (SVOCs) and inorganic chemical constituents at levels exceeding NYSDEC and state department of health services (SCDOHS) criteria. As a result of cleanup activities conducted, sixty-seven tons of soil contaminated with petroleum related compounds and chlorinated VOCs was excavated from the former drum staging area was hauled from the site for disposal. The remedial activities associated with the onsite leaching pools resulted in forty-five-thousand gallons of liquid and seventy-one tons of solids requiring disposal containing a mixture of sanitary and chemical waste. Following completion of these activities, a notice of no further action (NFA) was obtained from the overseeing regulatory agency.

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Peter C. Breen, PG

Senior Project Manager

Professional Highlights and Selected Projects

Mr. Breen assumed management of a former retail gasoline station BCP Volunteer site in the Bronx, New York, at the remedial phase of the project. The former consultant had recommended a Track 1 cleanup and remediation to unrestricted media chemical criteria. Based on the site location, testing results and planned site redevelopment, a Track 4 cleanup was judged to be more appropriate. He successful negotiated the cleanup plan strategy with the NYSDEC and a remedial action plan is currently being developed. It is anticipated that the client will save more than $1 million as a result.

Mr. Breen directed work at a dry cleaner site in Hartsdale, New York, where the current owner enrolled as a volunteer in the NYS Brownfield Cleanup Program. The testing included drilling and sampling of wells and conducting soil vapor intrusion studies. Subsurface chlorinated VOC impacts were addressed through a focused IRM consisting of in-situ chemical reduction (ISCR) technology. All submittals have been provided to NYSDEC/NYSDOH and the certificate of completion is expected.

Mr. Breen managed a RI performed under ECRA and ISRA requirements at a manufacturing facility in Eatontown, New Jersey. The media of investigation included soil, ground water, sediment, surface water and air. The principal contaminants of concern included chlorinated VOCs. As a result of compiling and analyzing the significant repository of environmental documentation and constructing a detailed conceptual site model, he was the first investigator to link the on-site groundwater contaminant plume to a small stream located nearby. Subsequent testing revealed elevated concentrations of vinyl chloride in surface water associated with that stream, persisting at detectable concentrations at locations more than a mile off-site.

Mr. Breen managed an intensive investigation resulting in the characterization and delineation of a TCE plume in groundwater emanating from a former tool and die manufacturing facility in Greenfield, Massachusetts. The work included the establishment of on-site and off-site monitoring well networks, the assessment of surface water resulting from seeps located within the core of the plume as well as the investigation of potential volatilization to nearby residences and commercial structures, and a child daycare facility located within the plume footprint. An additional component of the project related to monitoring and evaluating the performance of an on-site UV peroxidation groundwater treatment facility as well as evaluating the performance of an on-site UV peroxidation groundwater treatment facility.

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Professional Highlights and Selected Projects

Mr. Breen conducted hydrogeological and geophysical evaluations to define the extent of animal hide piles and former on-site chemical disposal lagoons, and assess associated impacts of volatile and inorganic chemical constituents to soil, sediment and groundwater at the two-hundred-forty-five-acre Industri-Plex Superfund site in Woburn, Massachusetts. The geophysical testing included the use of electromagnetics, resistivity and metal detection techniques. The hydrogeological assessments included slug testing and constant rate pump testing techniques.

In Mount Pleasant, Tennessee, Mr. Breen characterized the hydrogeology of a karst limestone watershed setting at a large chemical formulation facility. The site consisted of raw material mining areas and an associated chemical manufacturing plant. Key on-site features that were investigated included a bedrock fault zone, a stream that bisects the site and numerous springs. Work elements included the installation of test wells in unconsolidated and bedrock settings and conducting hydraulic parameter assessments, surface water flow monitoring, hydrologic budget estimations and assessment of ground water/surface water hydraulic relationships.

Mr. Breen managed an ongoing off-site surface water and ground water sampling and SVI testing and mitigation system installations pertaining to a chlorinated solvent release at a former dry cleaner in Nassau County, New York. He advocated for, and successfully adopted groundwater sampling using passive diffusion bags (PDB) for a network of fifty monitoring wells. This approach reduced field labor and eliminated purge water waste management and disposal, resulting in significant cost savings.

Mr. Breen managed a program of SVI testing conducted to evaluate potential intrusion of chlorinated solvent compounds and monitor the progress of an ongoing remedial action in a Nassau County, New York, neighborhood of sixty-five residences from the 2009 to 2012 heating seasons. He directed field activities and served as the primary contact for the NYSDEC and coordinated analytical laboratory and data validator subcontractor services. Work was conducted in accordance with the 2006 NYSDOH Guidance on SVI evaluations and included the collection of twenty-four-hour duration sub-slab, indoor and outdoor air TO-15 samples.

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Professional Highlights and Selected Projects

Mr. Breen conducted site testing and other technical evaluations to age-date a spill of heating oil at a residential property in Suffern, New York. This work was performed in collaboration with a group of experts he assembled and directed. The scope of work also included critiquing a prior dating assessment conducted by another consultant that utilized a less rigorous approach.

Mr. Breen evaluated impacts to soil and groundwater at a former landfill in Blooming Grove, New York. Geophysical testing utilizing a variety of techniques was conducted to delineate the lateral and vertical extent of fill material. Monitoring well installations were completed in unconsolidated material and underlying shale bedrock to assess environmental impacts and to support fate and transport assessments; ground water flow pathway identification within the bedrock was assisted through the use of three-dimensional photographic fracture trace analysis. Numerous ephemeral seeps were identified and assessed to determine potential impacts to on-site ponded water and local streams.

In Holbrook, New York, Mr. Breen evaluated impacts to soil and groundwater at a former audio recordings manufacturing site through the implementation of a RI/FS conducted for the EPA. The potential impacts to a nearby municipal water supply well field and a down gradient wetland were assessed utilizing site test data and groundwater flow and transport modeling techniques.

Mr. Breen performed a detailed third party peer review and technical critique of a comprehensive hydrogeological investigation conducted to support the proposed expansion of a major municipal landfill in Middlesex County, New Jersey. The study was conducted on behalf of the utility authority to support the proposed expansion of the landfill. It considered potential effects to nearby wetlands and estuarine environments as the site is located adjacent to a large tidally influenced surface water feature. In addition, the hydraulic effects of an existing containment slurry wall were assessed, under existing conditions and under scenarios representing the expanded landfill.

Mr. Breen was the Environmental Professional and Senior Reviewer for numerous Phase I ESAs prepared in accordance with ASTM Standard Practice E 1527-13 for a variety of clients including but not limited to banks, developers and real estate professionals. He currently serves as EnviroTrac's national account representative for final review and certification of all Phase I ESA related work conducted by the firm for a major bank.

Experience
highlight 2018

Peter C. Breen, PG

Senior Project Manager

Professional Highlights and Selected Projects

Mr. Breen managed a program of surface geophysical surveys conducted at twenty-five inactive hazardous waste sites located throughout New York State. He developed technical approach, analyzed data, prepared reports and served as primary contact with the NYSDEC. The methods used included the use of magnetometer, electrical resistivity, electromagnetic (EM) and metal detection techniques. The work assignment also included conducting four Phase II Site Investigations at facilities evaluations conducted through the installation of soil borings and groundwater quality evaluations conducted through the installation of soil borings and groundwater monitoring wells and performance of slug tests.

Mr. Breen conducted ESA evaluations at two large manufacturing facilities in Bethpage and Calverton, New York, as part of site decommissioning activities. The work activities included a comprehensive review of historic manufacturing practices, which resulted in the identification of numerous areas of environmental concern and required subsequent tracing and testing of interior and exterior locations of drains and leaching structures; former ordinance testing locations; and conducting soil and groundwater characterization activities.

Mr. Breen managed a remedial investigation (RI) conducted in support of divesting a two-hundred-seventy-acre research and development site in Florham Park, New Jersey. A significant portion of the site is occupied by wetlands evaluated within the context of a BEE. The impacts found included pesticides and inorganic compounds resulting from historic agricultural land use, and VOCs and SVOCs from activities conducted by the current occupant. Remedial activities included soil mixing and sediment excavation, groundwater pumping and treatment, soil vapor extraction/air sparging (SVE/AS) technologies, and in-situ treatment options.

Mr. Breen worked on a remedy for a site in Waterbury, Connecticut. The solution included establishment of an ELUR and data evaluations to achieve RSR compliance. Direct exposure criteria compliance was supported utilizing ninety-five percent Upper Confidence Level (UCL) analysis of the arithmetic mean. Developed alternate surface water protection criteria (SWPC) using 7Q10 evaluation.

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Corporate Resume

Peter C. Breen, PG

Senior Project Manager

Professional Highlights and Selected Projects

Mr. Breen managed site investigation and remedial activities at an industrial park located in New York. The site consisted of eight associated properties; activities included evaluation of leaching pools associated with sanitary and storm water systems, and potable water testing. The intent of the work, conducted on behalf of the council in supporting cost recovery efforts, included the identification of responsible parties for historic spills and discharges and preparation of remedial cost estimates. Based on site assessment results, it was determined that sediments and liquids present in numerous leaching pools associated with both systems were impacted with chemical contaminants including volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and inorganic compounds at levels requiring remediation in accordance with Suffolk County Department of Health Action Levels.

Mr. Breen developed documentation for acceptance of the site into the CT DEEP's Property Transfer Program (working on behalf of the former owner and with LEP oversight) for an operating fuel oil terminal in Groton Connecticut. The regulatory submittals included Form III and ECAF documents.

Mr. Breen managed data acquisition and quality assurance tasks for the remediation of a former fuel oil terminal in New Haven, Connecticut, in accordance with CT DEEP requirements and with LEP oversight. Site work included identification and remediation of soil hot spots and assessment of historic and ongoing site testing results in accordance with RSRs in preparation for redevelopment.

Mr. Breen developed documentation for acceptance of the site into the Property Transfer Program (working on behalf of the current owner) for a former fuel oil terminal in Greenwich, Connecticut. The regulatory submittals included Form III, ECAF and ELUR documents. The site investigation and remedial action plan (RAP) was completed with LEP oversight. The property was redeveloped for residential use.

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Senior Project Manager

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Professional Highlights and Selected Projects

April 2004 - Presented *Evaluating Plume Capture Through Mass Flux Estimates*. LIG Conference SUNY Stony Brook, New York.

March 2006 - Presented *Evaluating the Performance of a Groundwater Recovery System Through a Detailed Site Characterization and Contaminant Mass Flux Estimate.* ExxonMobil Global Remediation Conference, Orlando, Florida.

Spring 2008 - Published *Engineering Social Responsibility: Kleinfelder Adopts Company-Wide Sustainability Principles*. EFCG Sustainability Newsletter, Edition 1.

May 2008 - Environmental Services Sector Representative, *Round Table Discussion*. Queens Sustainability Summit at CUNY School of Law, Flushing, New York.

January 2009 - Panelist, *Environmental Law -Turning Brown Fields Green*. Queens Green Business Summit at Queens College, Flushing, New York.

February 2010 - Panelist, *Green Remediation -Turning Brown Fields Green*. Queens Green Business Summit at Queens College, Flushing, New York.

October 2010 - Panelist, *The Green Movement*. The 41st Annual Conference of the Long Island Business Development Council, Montauk, New York.

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CORPORATE RESUME

EnviroTrac

Michael A. Clark, MS, CHMM
Director Health & Safety

michaelc@envirotrac.com
909.387.5553

Experience Snapshot

Mr. Clark has over 25 years experience in the environmental, health, and safety field managing and directing programs for Fortune 100 corporations, manufacturing and construction companies, and consulting firms. He currently is the Corporate Director of EnviroTrac's Health and Safety program.

EnviroTrac uses a network of Safety Coordinators to oversee the safety program in each of the EnviroTrac regional offices. Mr. Clark personally manages this network and continuously reviews and updates the Health & Safety program so that the practices, policies and procedures meet or exceed laws, regulations, client-specific requirements and maintain our own standards for the health and safety of our employees.

Licenses/Certifications

Certified Hazardous Materials Manager (CHMM), Institute of Hazardous Materials Management - Master's Level

Advanced Safety Certification, National Safety Council

40-hour HazWOPER certificate and subsequent 8-hr refresher training

Fundamentals of Industrial Hygiene - Harvard School of Public Health

Industrial Ventilation Workshop - AIHA

Advanced IAQ/HVAC Diagnostics Training Course - HL Turner Group

Implementing the ISO 14001:2004 Program workshop

NYSDOL/NJDOL Asbestos Supervisor

Smith System Driving Safety Trainer

Strengths

- Behavior Based Safety and Hazard Communication
- Facility Environmental and Safety Compliance Audits and Loss Prevention
- Root Cause and Accident Investigations
- Safety and awareness trainer for HAZWOPER, HazCom, HazMat awareness, respirators, PPE, fall protection, confined space entry, first aid/CPR, etc.
- Safe Driver Trainer
- Exposure monitoring and control

Education

- MS Environmental Sciences, NJ Institute of Technology, 1994
- BS Biology & Chemistry, Rowan University, NJ 1987

Michael A. Clark, MS, CHMM

Director Health & Safety

EnviroTrac

Professional Highlights and Selected Projects

- Mr. Clark has directed the health and safety program for construction projects and facility operations throughout EnviroTrac's footprint of operation. He developed and implemented programs to address hazardous materials exposure controls, heavy equipment/construction operations, traffic control and work area protection, confined space entry, working at heights, exposure to heat/cold, hazardous and regulated waste, personal safety, and other factors unique an extreme urban environment.

- Mr. Clark has prepared heath and safety plans from a wide range of hazardous material impacted projects, including PCB exposure monitoring for both airborne and surface contact; industrial processing exposure to mercury vapor and surface contamination; benzene exposure assessments for environmental remediation workers; and asbestos and lead management plans to control worker exposure during abatement and while managing these materials in place.

- In addition to his focus on safe work environments, Mr. Clark implemented a safe driving program for field operations at EnviroTrac. The program addressed the requirements of operating vehicles in the most congested urban areas of the country and uses both classroom training and behind-the-wheel instruction to educate drivers on techniques to safely operate in this unique environment. Following the training, motor vehicle accidents for the company in that market decreased by 30%, resulting in overall cost savings estimated at over $100,000 per year.

- Developed and administered Respiratory Protection Programs for multiple companies encompassing hundreds of employees. These programs have included hazard identification, employee medical monitoring, baseline and periodic biological monitoring, respirator selection and change out schedules, and annual review and update of the program as required by OSHA. Mr. Clark is a "Competent Person" as defined by OSHA to administer respirator fit tests and manage a respiratory protection program.

- Conducted over 200 indoor air quality and industrial ventilation investigations and implemented exposure control and remediation actions for worker exposure to: heavy metals, VOCs, and other hazardous materials; confined spaces contaminated with hazardous materials; sick building syndrome and mold contamination; and industrial ventilation controls during manufacturing processes.

- Developed the in-house EnviroTrac 40-hour OSHA Hazardous Waste Operations and Emergency Response (HazWOPER) certification and 8-hour annual refresher training programs that complies with the requirements of 29CFR 1910.120, Appendix A recommendations. Mr. Clark personally delivers both the 40-hour and 8-hour training to EnviroTrac employees.

- In addition to his work in safety, Mr. Clark also has extensive experience in the environmental field managing petroleum storage operations, air and water environmen-

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Corporate Resume

Michael A. Clark, MS, CHMM

Director Health & Safety

EnviroTrac

Professional Highlights and Selected Projects

- His experience includes the installation, upgrade and removal of under and above ground storage systems, developing and updating SPCC plans and inspection plans and monitoring systems. Mr. Clark has managed multiple remediation activities from full site excavation of contaminated soils, to pump and treat and contaminant extraction systems, underground injection, and passive remediation and monitoring.
- Mr. Clark has obtained and managed over 500 air and water discharge permits from environmental state agencies, implemented and audited programs for compliance to permit requirements, and prepared compliance and discharge reports to the appropriate agencies. Type of permits include: Federal Title V Air Discharge Permit, NPDES water discharge permits, and minor source permits in Washington DC, MA, MD, NH, NJ, PA, and RI.
- During the restoration efforts at *Ground Zero* in NYC after the attacks of 9/11/01, Mr. Clark managed the decontamination of the Verizon telecommunications facility adjacent to the World Trade Center Complex that facilitated the restoration of 2M data and 1.5 M voice lines to re-establish communications for lower Manhattan and Wall St.
- While directing the environmental operations for a materials and metals recovery/recycling firm, Mr. Clark developed and implemented the company's environmental program under the strict requirements of ISO 14001:2004. The program applied for and successfully passed the ISO audit with no "non-compliance" issues identified by the Accreditation body and was issued an ISO 14001 certification.

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CORPORATE RESUME

EnviroTrac

Joseph Patrick Byrnes, PG, LEP
President/Principal Consultant

joeb@envirotrac.com
631.924.3001

Experience Snapshot

Mr. Byrnes has worked 32 years in the environmental consulting field. Although his project experience has been diverse, he has concentrated in subsurface investigations, remedial designs and remedial construction projects. Mr. Byrnes has worked on projects with a wide range of contaminants that have included MTBE, PCBs, chlorinated solvents, petroleum hydrocarbons, jet fuels, nuclear isotopes, metals and coal tar/ MGP sites.

Mr. Byrnes acts as Key Contact and Program Manager for several clients, including insurance companies where he provides claim investigations, litigation support and forensic evaluations.

Licenses/Certifications

Professional Geologist, PG-000286-1, State of New York
Professional Geologist, PG-0001951, State of Florida
Professional Geologist, PG-002656-G, Commonwealth of Pennsylvania

Professional Geologist, PG-00699, State of New Hampshire

Professional Geologist, PG-2167, State of North Carolina

Professional Geologist, 2801002005, Commonwealth of Virginia

Certified Professional Geologist, CPG #8868, Amer. Inst. of Prof. Geologists

Licensed Environmental Professional, LEP, Lic. #117, State of Connecticut

Certified Environmental Inspector, #13542, Environmental Assessment Association

OSHA Certification, HAZWOPER, Confined Space, and Supervisor

American Petroleum Institute—API Work Safe Certification

Strengths

- Expert Testimony/Forensics
- Insurance Claims Investigations
- Soil & Groundwater Investigations
- MGP Sites
- Remedial Investigations/ Feasibility (RI/FS) Studies
- Remedial Design & Construction
- Compliance Audits, Due Diligence, Phase I & II ESAs
- Development of Innovative Remedial Technologies

Education

- MS Hydrogeology, SUNY Stony Brook, 1993
- BS Geology, SUNY Binghamton, 1985

Experience
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Corporate Resume

Joseph Patrick Byrnes, PG, LEP

President / Principal Consultant

EnviroTrac

Professional Affiliations

American Institute of Professional Geologists

Environmental Assessment Association

Environmental Professionals Organization of Connecticut

Long Island Association of Professional Geologists

National Ground Water Association

National Society of Environmental Forensics

Professional History

- 1993-Present, EnviroTrac Ltd., President/CEO/Hydrogeologist
- 1991-1993, Handex Corporation, Senior Project Manager / Hydrogeologist
- 1991- Lockwood Kessler & Bartlett Engineers, Hydrogeologist
- 1988-1991, Blasland & Bouck Engineers, Senior Geologist
- 1986-1988, Roux Associates, Geologist

Litigation

- State of New York v. 913 Portion Road Realty, et al.—Mr. Byrnes was retained as an expert for one of the defendants, a major insurance company, in this case in Suffolk County, New York. The case involved a cost recovery action in which the NYSDEC was seeking approximately $2,000,000 in remediation costs associated with the release of hydrocarbon petroleum (gasoline) into soils and ground-water. An offsite contaminant plume, mainly MTBE, was detected offsite and migrating towards a public supply well field approximately 1,800 feet from the subject UST retail facility. Mr. Byrnes was asked to evaluate all the soil and ground-water data collected, perform fate & transport modeling, evaluate the remediation technologies implemented and their effectiveness, conduct forensic analyses to determine age of the plume and if other nearby releases potentially have contributed to the contamination and finally, prepare a cost allocation evaluation. Mr. Byrnes provided an Expert Opinion and was identified as an expert. The case was settled before the trial date.
- *Great Lincoln, LLC v. Smartset Cleaners, Inc. et. al.*- Retained and qualified as an Expert, Mr. Byrnes represented the property owner (Plaintiff) of a commercial strip stores that included a dry cleaners (Defendant) in Nassau County, New York. Mr. Byrnes was involved in the investigation of chlorinated solvents in soil and ground water, developed a remedial action plan (RAP) that was approved by the NYSDOT and USEPA. The RAP consisted of Air Sparge (AS) and Soil Vapor Extraction (SVE) technologies to address the source area located within both soil and ground water. Mr. Byrnes testified in Federal Court for the Plaintiff to demonstrate that the source of the contamination was the result of spills caused by the Defendant. The Plaintiff was successful in the case.

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Experience highlight 2017

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Litigation

- Sunoco, Inc., (R&M) v. 175-33 Horace Harding Realty Corp.- Mr. Byrnes was retained by both parties to conduct an independent forensic investigation and remediation cost allocation analysis for a property in Queens, New York. The subject site was an active retail service station involved in litigation that had a history of petroleum releases. Forensic investigations included several techniques, such as the presence of free phase hydrocarbons and MTBE, hydrocarbon ratios, spikes of MTBE, and plume concentration contour maps over time. Results of the forensic investigation concluded that additional spills or releases of petroleum hydrocarbons occurred. Numerous scientific methods for sharing responsibility for remediation were evaluated and based on site data, plume mass-of-contribution method was determined most appropriate. Based on this analysis, allocation percentages were then used in assigning site-specific remediation costs. Litigation continued that resulted in Mr. Byrnes deposition and subsequent testimony in Federal Court.
- *State of New York v. LVF Realty Co., Inc. et. al.*- Mr. Byrnes was retained to provide expert testimony on behalf of a major oil company (Defendants) in a case where the Plaintiffs was the State of New York. In this case that involved commingled dissolved petroleum plumes, Mr. Byrnes performed forensic investigations, remedial evaluations and cost allocation, review of environmental testing data, hydrogeology, fate and transport of contaminates, UST closures and comparison of data to regulatory guidelines and standards.
- *8-49 Woodhaven Boulevard Holding Corp. v. ExxonMobil Oil Corp.* - A major oil company (Defendants) retained Mr. Byrnes to provide litigation support and expert testimony involving a petroleum impacted site located in Queens, New York. The Plaintiffs argued that soil and ground water contamination prevented them from redeveloping the site property. Mr. Byrnes prepared an expert report and opinion that demonstrated that federal, state and locals laws did not prevent the Plaintiffs from proceeding with redevelopment. To prepare his opinion, Mr. Byrnes reviewed UST removal documents, soil and ground water analytical data, remedial actions taken and effectiveness of such actions, review of regulatory requirements and guidelines, and evaluation of vapor intrusion requirements and engineering controls. Mr. Byrnes was qualified as an expert and testified in court on behalf of the Defendants.
- *Christ the King Roman Catholic Church v. ExxonMobil, et. al.* - Mr. Byrnes was retained by the Defendant to provide professional opinion and expert testimony in this case involving petroleum impacted soil and ground water. Plaintiffs claimed that impacted ground water migration had impacted their property. Mr. Byrnes was retained to assess the effectiveness of soil and ground remediation activities conducted by the Defendants.

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Litigation

- Jeff Alban, et. Al. v. ExxonMobil Corporation, et.al. —Mr. Byrnes had been retained as an expert for the defendant in this case in Baltimore County, Maryland. The case involved an estimated 26,000 gallon release of gasoline product that included MTBE. As an expert, Mr. Byrnes was responsible for the opinion of the effectiveness of clean-up efforts that included a host of remedial technologies. Data from hundreds of ground water monitoring wells, private drinking water wells and remedial system data was evaluated. Over $38 million in cleanup costs had already been spent since the 2006 release. In all, about 90 families (Plaintiffs) were awarded compensatory damages totaling $150 million; however, the defendant was successful in averting punitive damages that could have been in the billions.
- *County of Suffolk and Suffolk County Water Authority v. Amerada Hess Corp., et. al.* - This case involves one of the actions consolidated in the United States District Court for the Southern District of New York in regards to the *Methyl Tertiary Butyl Ether (MTBE) Products Liability Litigation*. Mr. Byrnes, retained by one of the Defendants and working with experts for all the defendants, is providing litigation support, technical research and opinions relating to hydrogeology of Long Island aquifers, MTBE sources that have potentially contributed and are contributing to the MTBE found in Suffolk County Water Authority drinking water supply wells. In addition, Mr. Byrnes provided engineering and construction cost analyses for treatment of supply wells as well as remediation of MTBE at retail facilities, including life-cycle cost comparison of various remediation technologies. Research also included characterization and lengths of MTBE plumes documented in ground water on Long Island, New York.
- *Plainview Water District v. ExxonMobil Corporation, et. al*.– Mr. Byrnes was retained to provide litigation support on behalf of the Defendants. Plaintiffs argued that petroleum releases pose a future threat to drinking water supply wells, particularly from MTBE. Mr. Byrnes provided research support regarding site-specific hydrogeology, fate and transport of contaminants, evaluation of soil and ground-water remediation and regulatory interpretation.

Insurance Claims

- Honolulu, Hawaii (2014)—Large sanitary landfill owned by the City of Honolulu and operated by the insured. A series of large storms overwhelmed the storm water control system and damaged landfill cells. Local health department and EPA issued a series of violations that claimed that storm water, landfill leachate and solid waste debris breached the facilities storm water collection and diversion structures, resulting in the release in the ocean waters. The insured (landfill operator) filed a claim for remediation and restoration costs. Mr. Byrnes headed a team from EnviroTrac to determine if the restoration work was remedial or prophylactic. It was concluded that all restoration, repairs, construction and enhanced monitoring plans were prophylactic responses to the various violations.

- Waterbury, Connecticut (2014)—Mr. Byrnes, a Licensed Site Professional (LEP) in CT, was retained by an insurance company to review the investigation and remediation of a former industrial facility owned by its insured who filed a pollution claim. The site soils were contaminated with PCBs, metals, PAHs and VOCs. The remedy for the site include an engineered control or cap to idolate soils. This cap would require a costly 30 year operation and maintenance plan. Mr., Byrnes and his team reviewed all site data and developed an alternative plan that would eliminate the need to this long term monitoring. Statically analysis of the data in accordance with state guidelines was performed and the results of this analysis eliminated the need for an engineered control, which will allow the site to closure in only a few years for a significant cost savings.
- Avenel, New Jersey (2014)—Mr. Byrnes was retained by an insurance company to determine the validity of environmental pollution claim for the insured, a large Chemical manufacturing company. The claim was that facility soils were impacted with PCBs and to a lesser extent other contaminants. It was determine that the PCBs were the results of paint on building materials and large above-ground storage tanks (ASTs). Mr. Byrnes reviewed all files and documents to determine the timeframe when the insured first became aware of this contamination in relation to the policy date. It was determined that the insured had discovered PCBs in soils prior to the policy start.

Professional Highlights and Selected Projects

- Mr. Byrnes has extensive experience in the selection, design, installation and maintenance of a wide range of soil and ground water remediation systems at over 200 sites. Remedial systems have included both active and passive free product recovery, traditional pump and treat, soil-vapor extraction, air sparging, bioventing, bioremediation, excavation, dual phase extraction, steam injection, oxidation technologies, oxygen releasing compounds, natural attenuation and the development of innovative technologies.
- From 1993 to 1998, Mr. Byrnes managed hundreds of environmental investigation and remediation projects for Shell Oil in New York, Connecticut, New Jersey, Massachusetts and Florida. This contract included the management of over 500 retail petroleum facilities. From 1994 to 1998, EnviroTrac was the sole environmental consultant and remediation contractor for Shell Oil in New York and Connecticut (approximately 200 sites).
- Mr. Byrnes worked with ConocoPhillips to develop and manage a Compliance Audit Program for retail service stations in New York State (Suffolk, Nassau, Queens, Kings, Bronx, Richmond, Manhattan, Westchester, Rockland and Orange Counties). Approximately 150 retail stations were included in the program that included state and local file reviews, PBS compliance, UST system and monitoring inspections, onsite waste inspection (drums, soil piles, etc.), potable well survey, remediation system inspection, site sketches, photo-documentation, database management and reporting. Non-compliance issues were documented and follow-up audits were performed.

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- Jet Fuel Remediation Project in Bermuda where Mr. Byrnes acted as Project Manager for a 50,000 gallon jet fuel spill and a Bulk Storage Facility. Project included completion of a Comprehensive Site Assessment (CSA), Risk Assessment (RA) and Remedial Action Plan (RAP) in accordance with Bermuda MoE Guidelines. Scope of work included soil borings, well installations, soil vapor sampling, ground-water sampling, sediment and surface water sampling, tidal studies, tracer testing, ground-water modeling, quantitative risk analysis, feasibility study for remedial alternatives and reporting.
- Mr. Byrnes lead an EnviroTrac project team contracted by the New York State Department of Environmental Conservation (NYSDEC) to initiate an investigation to determine the source of methyl tertiary butyl ether (MTBE) detected in multiple residential wells in Hyde Park, New York. A Preliminary search of the area identified four potentially responsible parties (PRPs) that consisted of gasoline stations that had documented releases associate with their underground storage tan (UST) systems. EnviroTrac began a private well sampling program that included over 250 homes. Based on the results of the monitoring program, 95 activated carbon filtration systems were installed in private homes to remove the MTBE contamination. In conjunction with the elimination of the immediate threat to the public, EnviroTrac began a comprehensive subsurface assessment of the area that identified several pathways of MTBE migration in the fractured bedrock. Field testing included packer testing to isolate fractures for sampling, dye tracer testing and geophysical techniques. A Geographic Information System (GIS) data base was developed to manage the large database and determine site trends. Mr. Byrnes and EnviroTrac's design group developed remediation plans for two of the PRP locations that included the instillation of a High-vacuum Extraction (HVE) and groundwater Pump and Treat (P&T) system. EnviroTrac continues to provide monitoring, O&M, design, and construction needs for the successful completion of this project.
- EnviroTrac was contracted to complete a Soil Vapor Extraction Pilot Study for the Region VII of the USEPA, at the 57th and Broadway Superfund Project located in Wichita, KS. The Superfund site consists of multiple responsible parties that have contributed to the contamination that has impacted several private wells in this mixed use (residential, commercial, and industrial) community. Two of the responsible parties, the Midland Refinery site and the former Wilko Paints site required active remediation. The contaminants of concern include DCE, TCE, PCE, and VC. The scope of work involved the installation of pilot test wells and performing SVE field testing at both locations to collect site specific information. Project objectives were to develop sufficient process design and construction of two separate full-scale SVE systems. Design information included radius of influence, SVE well spacing, system layout, and equipment design specifications. Once the design was completed, EnviroTrac was awarded the contract to install both remediation and groundwater monitoring wells, construct and startup both SVE systems and provide O&M services. Mr. Byrnes acted as Project Manager for this project and both systems were successfully installed and operated by EnviroTrac.

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Corporate Resume

Joseph Patrick Byrnes, PG, LEP

President / Principal Consultant

Professional Highlights and Selected Projects

- At the Department of Energy (DOE) Brookhaven National Laboratory (BNL) facility in Upton, NY ground water within a complex glacial aquifer is contaminated with chlorinated organic solvents at a depth of 150 – 230 ft. below the surface. EPA placed BNL on the National Priorities List (NPL) and EnviroTrac, headed up by Mr. Byrnes, was contracted by BNL to install an In-Well Vapor Stripping (IWVS) system under strict health and safety protocol. IWVS is an in-situ remediation technology that integrates air stripping of VOCs in ground water by converting them to a vapor phase. IWVS creates a ground-water circulation cell in a contaminated zone where contaminants are continually drawn into the well, stripped from the ground water, and the treated ground water is discharged back in to the aquifer. The circulating well concept is also known as groundwater circulating well technology (GCWT). EnviroTrac's construction and engineering group installed over 7,500 feet of 10" diameter PVC underground piping and all equipment, manifolding and controls/sensors/gauges at the wellheads and in the treatment building. Manifold construction included 24" diameter PVC piping and fittings. The system pumps 420 gpm with airflows exceeding 4,800 cubic feet per minute.
- Developed the Well Stripper, a patent-pending innovative ground-water remediation technology. The Well Stripper is an in-situ well stripping and recirculation technology that provides a cost-effective alternative to traditional pump and treat methods. The Well Stripper has been used successfully at several sites in the northeast and can treat common volatile organic compounds (VOCs) such as chlorinated solvents (TCE and PCE) and petroleum hydrocarbons (BTEX and MTBE). As a by-product, the Well Stripper aerates and increases dissolved oxygen concentrations in ground water, which enhances biodegradation.
- Conducted a ground-water analysis study to determine the efficacy and accuracy of no-purge sampling versus the standard well-sampling protocol, which requires the purging of three well-bore volumes of water prior to collecting samples for VOC analysis. This study clearly showed that there were no statistically significant differences in analytical results for ground-water samples collected from the same wells by both sampling methods. Based upon this study, the NYSDEC allows EnviroTrac to collect ground-water samples from the majority of its petroleum-release sites utilizing the no-purge sampling methodology. This NYSDEC-approved procedure allows for a significant cost savings to our clients in time and equipment costs as well as not generating well-purge water, which requires containerization, management and disposal.

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