Remedial Design / Remedial Action Work Plan

SMART SET CLEANERS
OCEANSIDE, NY
DEC Site No. 130194

March 3, 2016

Prepared For:

Great Lincoln, LLC
488 Madison Avenue, Suite 1100
New York, NY 10022

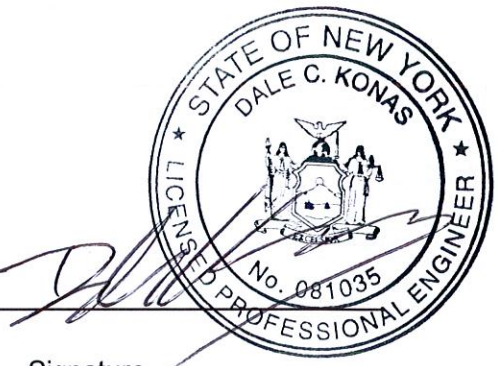
Prepared By:

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

CERTIFICATIONS

I, Dale Konas, certify that I am currently a NYS-registered Professional Engineer and that this Remedial Design/Remedial Action 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).

This Work Plan was developed pursuant to the Order on Consent (Index No. CO 1-20150629-73) between Great Lincoln, LLC and the New York State Department of Environmental Conservation (NYSDEC).



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NYS Professional Engineer #	Date	Signature

EnviroTrac
Environmental Services

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ACO	Order on Consent and Administrative Settlement
AS	Air Sparge
Bgs	Below Ground Surface
Bls	Below Land Surface
CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
CHASP	Community Health and Safety Plan
COC	Contaminant of Concern
CVOC	Chlorinated Volatile Organic Compound
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EPA	United States Environmental Protection Agency
FER	Final Engineering Report
HASP	Health and Safety Plan
HDR	Henningson, Durham & Richardson Architecture and Engineering, PC.
HSA	Hollow Stem Auger
ISCO	In-situ Chemical Oxidation
ID	Inside Diameter
IW	Injection Well
MW	Monitoring Well
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NCDOH	Nassau County Department of Health
OFR	Open File Report
PCE	Tetrachloroethene
PDB	Passive Diffusion Bag
PPB	Parts per Billion
PRAP	Proposed Remedial Action Plan
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
RAP	Remedial Action Plan
RAWP	Remedial Action Work Plan
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SCO	Soil Cleanup Objective
SG	Soil Gas
SMP	Site Management Plan
SSDS	Sub-slab Depressurization System
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

LIST OF ACRONYMS (continued)

VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compound
WRIR	Water-Resources Investigations Report
µg/l	Micrograms per liter
$\mu g/m^3$	Micrograms per meter cubed

1.0 INTRODUCTION

This Remedial Design/Remedial Action Work Plan ("RD/RAWP"), prepared by EnviroTrac Engineering PE PC ("EnviroTrac") on behalf of Great Lincoln, LLC (Great Lincoln), presents the framework for implementation of the RD/RAWP associated with Smart Set Cleaners, Site No. 130194 located at 16 Atlantic Avenue, Oceanside, Nassau County, New York ("Site"). A Site location map is provided in Figure 1.

This RD/RA Work Plan has been prepared pursuant to the Administrative Consent Order ("ACO") Index No. CO 1-20150629-73, entered into by Great Lincoln and the New York State Department of Environmental Conservation ("NYSDEC") dated August 18, 2015 to address the remedy, as outlined in the NYSDEC's Record of Decision ("ROD") dated March 2015 (ROD; NYSDEC 2015). In addition, it has been developed in general accordance with NYSDEC's *Final DER-10 Technical Guidance for Site Investigation and Remediation* ("DER-10"*),* dated May 2010.

1.1 Remedial Action Objectives

The following Remedial Action Objectives ("RAOs") have been established for the Site and are presented in the ROD:

<u>Groundwater</u>

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

<u>Soil</u>

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

<u>Surface Water</u>

RAOs for Environmental Protection

- Restore surface water to ambient water quality criteria for the contaminant of concern.

Soil Vapor

RAOs for Public Health Protection

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

The selected remedy consists of the following:

- In-situ chemical oxidation ("ISCO") will be implemented to treat chlorinated volatile organic compounds ("CVOCs") with total concentrations over 1,000 parts per billion (ppb) in the off-site groundwater plume. This area is known as the Off-Site Hot Zone Groundwater Plume ("Hot Zone").
- The on-site Soil Vapor Extraction ("SVE") system that remediates the source area soil will continue to be operated and maintained and will act as a Sub-slab depressurization system ("SSDS") within the Site unit.
- An on-site cover is present at the Site and surrounding shopping center in the form of pavement and buildings.
- SSDSs will be installed within three adjacent tenant units to address the potential for soil vapor intrusion.

This Work Plan is organized in five sections. Background information is presented in **Section 1**. **Section 2** presents a summary of previously conducted remedial actions. **Section 3** presents the rationale and technical approach and supporting guidance and plans that will be utilized to develop and implement the remedial design and remedial action elements. Reporting and project schedule information is presented in **Section 4**. References pertinent to the remedial program are provided in **Section 5**.

1.1 Site Background

The former Smart Set Cleaners, located at 16 Atlantic Avenue in Oceanside, New York is a one tenant unit (currently a nail salon) with a basement and occupies approximately 0.09 acres within a 3.9 acre shopping center. A Site Plan is provided in Figure 2. The shopping center is located in a mixed commercial and residential area bounded by Smith Street to the north, Atlantic Avenue to the south, Lincoln Avenue to the west, and Long Beach Road to the east. Ground surface elevation at the Site is approximately 15 feet above mean sea level and the nearest residence is located 0.1 miles to the east.

The shopping center is zoned commercial and was developed in 1955. The associated property is entirely covered by two buildings and pavement: one building has 15 tenant units including the former Smart Set Cleaners; and the other has two tenant units.

The general direction of groundwater flow in the vicinity of the former Smart Set Cleaners is to the west-southwest, towards Powell Creek located approximately 0.4 miles from the Site. Locally, the geology consists of thick unconsolidated sandy deposits with groundwater found within the Upper Glacial and Magothy Aquifers. The depth to groundwater at the Site is approximately 10 feet below land surface (bls). No public or private wells have been identified downgradient of the Site.

1.2 Regulatory Background

The dates of operation of the dry cleaner are approximately 1956 through 2005. A routine inspection of the Smart Set Cleaners facility by the Nassau County Department of Health ("NCDOH") in the mid-1990s revealed the existence of interior floor drains that were considered injection wells by the United States Environmental Protection Agency ("EPA").

In 1998, a groundwater sample was collected from a floor drain that showed the presence of the dry cleaning solvent tetrachloroethylene ("PCE"). The NCDOH in conjunction with the EPA pursued the investigation of the source of groundwater contamination.

In 2001, the NCDOH oversaw removal of contaminated soils from the rear of the facility by the owner. The owner's consultant, with oversight by the NCDOH, removed eight cubic yards of soil from the rear of the building beneath the sidewalk in January, 2001 and proceeded with a subsurface investigation that was completed in May 2001.

Additional investigations and a Remedial Action Plan ("RAP") were completed in 2002. The contaminants of concern ("COCs") reported to exceed applicable standards included PCE, cis-1,2-dichloroethylene ("cis-1,2-DCE"), and trichloroethylene ("TCE"), and were detected in the soil, soil vapor, and groundwater at the Site and adjacent tenant units.

Based on findings of the investigations, a Soil Vapor Extraction/Air Sparge ("SVE/AS") system was installed by the owner and commenced operation in 2002. The SVE portion of the system remains in operation and performance reports are submitted on a quarterly schedule to the NYSDEC.

The Site was added to the NYS Registry of Inactive Hazardous Waste Disposal Sites in November 2008 with EPA maintaining the lead role in regulating the owner. The lead was transferred to the NYSDEC in August 2009 at the request of the EPA.

An interim remedial measure ("IRM") was conducted at a Site in 2010. The IRM consisted of an ISCO injection program in the subsurface below the basement of the Site to treat groundwater contamination on-site. Chemical oxidant was injected through six injection wells located in the basement of the Site. This was highly effective and concentrations of PCE, TCE, and cis-1,2-DCE dropped by an order of magnitude in groundwater from 1,900 ppb of PCE to 200 ppb.

A Final Remedial Investigation ("RI") was completed in December 2014. The COCs identified at the Site and downgradient of the Site included PCE, cis-1,2-DCE, and TCE. CVOCs detected at the Site and downgradient (i.e., to the west) of the Site were reported to exceed applicable standards for groundwater and on-site soil vapor intrusion. A 25,000 square-foot area groundwater plume with total concentrations exceeding 1,000 parts per billion (ppb) of CVOCs was estimated to be located approximately 1,200 feet to the west of the Site, and is known as the Off-Site Hot Zone Groundwater Plume.

Based on the results of the RI, the NYSDEC prepared a Proposed Remedial Action Plan ("PRAP") in February, 2015. Remedies for the Site and their costs were presented in a Feasibility Study ("FS") in February 2015. A remedy was selected and presented in the ROD on March 31, 2015 (Exhibit 1). An Order on Consent and Administrative Settlement were signed by the NYSDEC and Great Lincoln, LLC on July 27, 2015.

2.0 PRIOR REMEDIAL ACTIONS

A remedial design investigation was completed in 2001 for the soil, soil vapor, and groundwater beneath the Site and adjacent tenant units.

Based on the investigation results, a RAWP was completed for the installation of the SVE/AS system at the Site. The resulting SVE/AS system commenced operation in 2002. Initially the system consisted of a cluster of three SVE wells and four AS wells located to the rear of the Site. The SVE wells were constructed of four (4) inch diameter schedule 40 PVC with 15 feet of 0.02-inch slotted screens extended five (5) feet into groundwater for dual use as monitoring wells. The AS wells were constructed of two (2) inch diameter schedule 40 PVC with five (5) feet of 0.01-inch slotted screen extended 15 to 20 feet below the top of the water table. In November 2009, the SVE system was expanded to include 6 sub-slab vapor extraction points in the basement area near the former Smart Set Cleaners unit. To date, the SVE portion of the system remains in operation and monthly O&M is performed and reported to the NYSDEC on a quarterly basis. The SVE is currently in good working condition.

On-site groundwater is monitored on a semi-annual basis for CVOC contaminants and reported to the NYSDEC.

3.0 REMEDIAL DESIGN/REMEDIAL ACTION

This RD/RAWP provides the basis for and an overview of the technical components that will be implemented to address requirements specified in the ROD and to achieve compliance with the established RAOs. Where necessary, additional design elements will be conducted to utilize the results of initial remedial actions.

3.1 Remedial Design

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

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

3.2 ISCO Pre-Design Investigation

Currently there is not sufficient detail provided in historic reporting regarding the extent and volume of the off-site VOC plume exhibiting concentrations above the 1,000 ug/l remedial goal (i.e., the “Hot Zone” requiring remedial action) to carry out the design of the ISCO groundwater remedy determined by the ROD. This feature will be investigated/updated through the installation and sampling of new groundwater injection/monitoring wells within the Hot Zone as defined during testing conducted in 2012-2013 (Figure 3).

3.2.1 Injection/Monitoring Well Installation

Nested Injection/monitoring wells will be installed at 14 locations to evaluate the horizontal and vertical extent of the Hot Zone. A proposed injection/monitoring well plume cross-section drawing is depicted in Figure 4. The well network is intended to extend across the currently defined Hot Zone in consideration of accessible locations due to existing infrastructure and the project RAOs. This will result in the development of four general well transects constructed in upgradient, mid-plume and downgradient locations. Two nested wells will be installed within a single borehole at each of the 14 locations. Specifications for these additional wells to be used for pre-design plume delineation and subsequently for chemical injection/performance

monitoring are provided in Figure 5 and Table 1.

EnviroTrac shall adhere to all federal, state, and local laws and regulations associated with construction of injection/monitoring wells and shall obtain required permits and utility markouts associated with the protection of utilities, traffic controls, safety, and security. Prior to the commencement of the installation of the injection/monitoring wells, New York 811 will be contacted a minimum of three (3) days prior to injection/monitoring well installation. In addition, on-site utility markouts will be performed by EnviroTrac's subcontractor prior to any intrusive drilling work, as necessary. Each of the proposed injection/monitoring well locations shall be pre-cleared utilizing soft dig techniques to a depth of five (5) feet (ft.) below grade surface. At the conclusion of daily activities, boreholes shall not be left unfinished or uncovered.

Twenty eight (28) injection/monitoring wells will be installed by the contracted driller in fourteen (14) cluster wells of two (2) injection/monitoring wells at each cluster via a 6 ¼ inch (in.) inside diameter hollow stem auger drill rig.

The injection/monitoring wells within each individual cluster will have two (2) inch (in.) horizontal spacing between each injection/monitoring well. The locations of each injection/monitoring well may vary slightly from the proposed locations due to unforeseen site conditions such as, underground utility locations. All boring locations will be hand cleared to five (5) ft. Proposed injection/monitoring well locations are depicted in Figure 3. As the wells will be installed in locations of active vehicular activity the work will be conducted under provisions in a traffic control plan provided in Appendix A.

The injection/monitoring wells will be constructed with 2 in. schedule 40 polyvinyl chloride ("PVC") riser and 2 in. 0.020 slotted schedule 40 PVC screens. The shallow injection/monitoring well at each cluster will be installed to 54 ft. below grade surface, with the screen zone located from 39 to 54 ft. below grade surface. The deep injection/monitoring well will be installed to 80 ft. below grade surface, with the screen zone located from 60 ft. to 80 ft. below grade surface.

The sand pack surrounding the well screen area will consist of #2 Morie filter pack sand and will be installed from the completion depth to one (1) ft. above the screen zone. A five (5) ft. thick bentonite seal will then be installed above the filter pack. All wells will be grouted from the top of the upper most bentonite seal to one (1) ft. below grade. The injection/monitoring well details are depicted on Figure 5.

Prior to the well installations, the contracted driller will construct a decontamination pad and decontaminate the drill rig and all associated equipment using a portable decontamination trailer w/ a steam cleaner. In addition, all drilling equipment and reusable materials will be decontaminated between each boring location and prior to leaving the Site.

Drill cuttings obtained from auger flights will be screened visually and with a photoionization detector ("PID"). At each cluster injection/monitoring well location, split spoon samples will be collected from the 40 ft. to 80 ft. below grade surface interval. Upon retrieval of the spilt spoons, the samples will be visually examined and one (1) sample from each formation type will be submitted for laboratory analysis to determine the natural oxidation capacity of the formation(s).

Following the installation of the wells, each well will be developed via air lift utilizing a pull behind compressor. The wells will be developed until turbidity is less than 50 NTUs or until turbidity stabilizes with no evidence that turbidity will decrease to desired requirements. If the screen zone is within a silt or clay layer, gentler methods of well development, such as low flow

pumping, will be conducted.

All cuttings and fluids generated from injection/monitoring well drilling, well development, or equipment decontamination procedures will be collected in properly labeled Department of Transportation ("DOT") approved 55 gallon drums. Any wastes generated off-site, will be transported to the Site (located at 16 Atlantic Avenue, Oceanside, New York) and staged until being transported for proper disposal. See Section 3.4.3 Investigation Derived Waste (IDW) below for additional information.

Each of the 28 newly installed injection/monitoring wells will be surveyed to provide horizontal and vertical (elevation) coordinates in accordance with requirements provided in DER-10. Latitude and Longitude coordinates will be based on World Geodetic System 1984 (WGS84) datum. Longitude and latitude well location coordinates will be provided in decimal degrees to a minimum of 6 significant digits (i.e., dd.xxxxxx).

Drilling and well installations will be performed by Associated Environmental Services, Ltd., Hauppauge, New York (Associated) with field oversight by EnviroTrac. Surveying services will be provided by Angle of Attack Land Surveying, Setauket, New York.

3.2.2 ISCO Treatability Testing

Subsurface soil samples will be collected during the proposed well installations and submitted to Carus Corporation ("Carus"), a Carus Group Inc. company, for bench-scale treatability testing. Natural organic matter ("NOM") and reduced metal species in the subsurface can exert a significant oxidant demand that compete with the COCs for available permanganate, directly affecting permanganate persistence and transport in the subsurface, and possibly resulting in incomplete oxidation of the target compounds. In most cases, the natural oxidant demand is the most important factor in determining permanganate dosage for ISCO.

A permanganate soil oxidant demand ("PSOD") study will be performed by Carus to determine the amount of permanganate required to satisfy the site-specific PSOD in consideration of the RAOs. In addition to the amount of NOM, the initial dose of permanganate and the reaction time available also have a significant impact on the PSOD. Therefore, different dosage rates are typically applied during the PSOD test.

Soil samples to be used in the bench-scale study will be collected from the saturated zone and within the vertical interval associated with the currently defined Hot Zone (i.e., approximately 40 to 80 ft. bls) using split-spoon sampling techniques during the pre-design installation of selected injection/monitoring wells. It is envisioned that samples from at least one well from each of the four well transects (i.e., upgradient, mid-plume and downgradient locations shown on Figure 4) will be utilized for this purpose. The goal of this task will be to collect samples representing differing soil types that would demonstrate potential variation in oxidant demand across the anticipated extent of the Hot Zone.

Treatability testing results will be used to finalize the ISCO design that will be provided to the NYSDEC for review and approval prior to conducting any injections.

3.2.3 Groundwater Sampling, Analysis and Data Validation

Groundwater samples will be collected during the pre-design investigation from each of the 28

proposed off-site injection/monitoring wells that will be installed at the 14 locations shown on Figure 3 using passive diffusion bags ("PDBs"). The PDB sampling approach is a non-purge sampling technique that eliminates the generation of purge water.

In order to increase the understanding of vertical concentration trending several PDBs will be deployed within each well at pre-established vertical intervals shown on Table 2. Once deployed, the PDBs will be left undisturbed for approximately 3 weeks to allow for chemical equilibrium to establish between the aquifer and the laboratory supplied water within the bags. At the end of this period the PDBs will be retrieved and samples collected and sent to the laboratory for analysis of VOCs by Method 8260C plus 10 tentatively identified compounds ("TICs"). The rational for analysis of TIC is to more accurately estimate the VOC chemical mass requiring ISCO treatment.

Green/Sustainable Technology: the PDB groundwater sampling approach provides significant benefits in comparison to conventional purge and sample methods:

- Conserves natural resources by eliminating contaminated purge water that would be transported by truck for significant distance to an approved treatment/disposal facility;
- Eliminates energy needed to treat/destroy contaminated waste;
- Reduces equipment (e.g., pumps, meters, decontamination equipment) needed to perform the testing. Transportation of equipment and crews to the Site can be accomplished using smaller, more fuel efficient vehicles;
- On-site time required to perform the sampling and associated field crew trips to the site is significantly reduced;
- Reduces potential local community exposure to volatilized contaminants through elimination of purge water; and
- Reduces potential disruption/inconvenience to the local community through reduction in project required vehicle use and through reduction of required on-site time by field personnel.

Groundwater samples will be analyzed by Phoenix Environmental Laboratories, Inc., Manchester, CT ("Phoenix"). Reporting of results will include Category B ("CAT B") deliverables as defined in the ASP and DER-10 Appendix 2B, and electronic data deliverables ("EDD") that complies with the DEC's Electronic Data Warehouse Standards ("EDWS") or as otherwise directed by DER.

Third party data validation of the CAT B reporting and preparation of Data Usability Summary Reports ("DUSRs") will be conducted by Environmental Data Services, Inc., Williamsburg, VA ("EDS").

Sampling location, sampling analytical and validation results and other pertinent site information will be provided in an EDD using the database software application EQuIS™ ("EQuIS") from EarthSoft® Inc. ("EarthSoft") that is utilized by the NYSDEC's Environmental Information Management System ("EIMS").

3.2.4 Hot Zone Delineation

Results of the well sampling will be used to estimate the chemical mass of the current Hot Zone through interpolation of horizontal and vertical COC concentrations. The location of this newly defined Hot Zone and associated chemical mass will be used to refine the conceptual chemical injection strategy provided in Section 3.3.1 and finalize an appropriate remedial design.

3.3 Remedial Action Implementation

The remedial actions prescribed in the ROD will be implemented in phases (as required) to achieve the RAOs for the on-site soil vapor and off-site downgradient groundwater plume Hot Zone. Work plan addenda will be submitted to the NYSDEC for each subsequent phase of work as required. Phase I of the work to be performed will include the following:

- Conducting an ISCO injection pilot test into the newly defined off-site groundwater Hot Zone and followup performance monitoring to determined full scale implementation parameters;
- On-site SSDS installation and performance testing; and
- Maintenance of the current site cover.

3.3.1 Off-Site Groundwater Hot Zone Remediation

An *Off-Site Groundwater Hot Zone In-Situ Chemical Oxidation Work Plan* ("Hot Zone ISCO Work Plan") will be prepared and provided to the NYSDEC that will present the ISCO technical approach and methods that will be used to address the current Hot Zone, the location and volume of which will be determined using results from the pre-design investigation. In addition to presenting the recommended technical approach, the Hot Zone ISCO Work Plan will provide updates to the Quality Assurance Project Plan ("QAPP"), Health and Safety Plan ("HASP") and Community Air Monitoring Plan ("CAMP") if required, and as warranted, based on the proposed work scope.

<u>ISCO Overview</u>

Conceptually it is envisioned that the technical approach that will be utilized to address Hot Zone COCs exceeding RAOs will utilize a select number of the proposed off-site wells to deliver sodium permanganate as the oxidant to initiate the dechlorination reaction. EnviroTrac possesses extensive experience utilizing ISCO technology to remediate groundwater and has successfully implemented injection programs at similar sites.

ISCO with permanganate is a proven and widely used technology for the remediation of subsurface media impacted with CVOCs. Permanganate facilitates the rapid and complete destruction of many chlorinated and recalcitrant compounds, including PCE, TCE, DCE, and vinyl chloride, the four contaminants of concern most commonly associated with dry-cleaner sites. At many sites, chemical oxidation can be a viable alternative to long-term, traditional remedial technologies such as "pump-and-treat" and SVE/AS systems. Permanganate ISCO is most favorable at sites with relatively permeable subsurface conditions where it can be effectively distributed within the subsurface.

Permanganate offers advantages over other oxidants used for CVOC destruction. It is relatively persistent in the subsurface compared to other oxidants, such as Fenton's reagent, and does

not generate the excessive heat and fugitive vapors associated with other Fenton's-type oxidant technologies. In addition, permanganate is effective in either naturally oxidizing or reducing environments. In most cases, the subsurface environment returns to its natural state (oxidative or reductive) following the completion of oxidation reactions. This is important for sites that have been selected for a cascading remediation approach that may include the implementation of enhanced or augmented anaerobic biodegradation following ISCO.

Pilot Testing

Results of the pre-design including the updated Hot Zone delineation and ISCO treatability testing will be used to prepare a pilot test plan that will entail limited field application of the technology using the developed parameters.

It is envisioned that the pilot testing will entail the injection of a volume of reagent slurry into the Hot Zone using one or more of the proposed nested wells. Following the injections, and after a pre-determined reaction time period, selected monitoring wells will be sampled to evaluate the performance of the injections and to assess viability of full scale implementation of the ISCO technology in achieving compliance with the RAOs. Details pertaining to the pilot testing technical approach will be provided in the Hot Zone ISCO Work Plan. Results of the testing will be provided to the NYSDEC in an *Off-Site Groundwater Hot Zone ISCO Pilot Test Report* ("ISCO Pilot Test Report").

It is anticipated that the pilot testing will provide acceptable results and a full scale injection program will be designed and provided to the NYSDEC in the ISCO Pilot Test Report. If the pilot testing does not achieve the required results to proceed than appropriate measures will be taken to re-evaluate the remedial options and procedures and develop an alternate approach that will be presented to the NYSDEC.

Green/Sustainable Technology: the ISCO approach provides significant benefits when compared to active groundwater remediation methods such as pump and treat and air sparge/soil vapor extraction:

- Eliminates energy/fuel required to operate remedial machinery such as pumps, filters, blowers, lighting, sparge points and air strippers;
- Eliminates surface area in the community needed to house remedial equipment;
- Eliminates noise associated with the operation and maintenance of remedial equipment associated with active systems;
- Eliminates energy/fuel requirements associated with field personnel/contractor visits required for remedial system life cycle activities (installation, operation and maintenance, removal/demolition of facilities);
- Eliminates the need for remedial media (e.g., activated carbon) and fuel needed for transportation associated with installation and periodic change outs of such during the remedial action;
- Eliminates trucking pertaining to off-site disposal or cleaning/regeneration of spent remedial media;
- Greatly reduces potential inconvenience to the local community through reduction of on-site time by field personnel and contractors; and

- Greatly reduces potential exposure to COCs by the local community since the contaminated material is present and remains, and the remedial actions occur, entirely below land surface using the ISCO approach.

3.3.2 On-Site Soil Vapor Intrusion Mitigation

The existing SVE system is currently operating at the Site and is providing a negative pressure beneath the Site. The SVE system will continue to operate; however, EnviroTrac proposes to install SSDSs within the Site unit in the future since the SVE system has approached asymptotic levels. At the appropriate time, a proposal to the NYSDEC will be made for the area influenced by the SVE system extraction points to transition to management strategy employing SSDS mitigation. To assess areas within the Site that are not currently influenced by the SVE system the following measures are proposed:

- SSDSs will be installed in the basements of the adjacent units to the east and west of the Site. The SSDSs will be connected to the existing interior SVE system located in the basement of the Site unit;
- Based on the Pilot Test Results for the SSDSs at the adjacent units, the approximate radius of influence at each of the extraction points is 30 ft. The Pilot Test Results Report is provided in Appendix A. Figure 6 provides area of influence and SSDS piping information; and
- Once the SSDS is activated and sufficient vacuum is established, the system will be monitored on an annual basis and Site Certification reports will be provided to the NYSDEC. Ongoing sampling and monitoring for the SSDSs will be provided in the Site Management Plan ("SMP").

Following approval of this approach, final design details pertaining to the on-site SSDS construction and initiation will be provided to the NYSDEC in an *On-Site Soil Vapor Intrusion Mitigation Work Plan* ("SVI Mitigation Work Plan").

3.4 Project Guidance and Support Plans

3.4.1 Work Zone Traffic Control Plan

Various tasks that will be conducted in order to achieve the project goals will include conducting work activities within and in close proximity to active vehicular public roadways. The purpose of the work zone traffic control plan is to specify measures that will be taken during the implementation of the remedial actions prescribed in the ROD to provide a safe work area for workers within the roadway, while facilitating the safe and orderly flow of all road users (motorists, bicyclists and pedestrians including persons with disabilities in accordance with the Americans with Disabilities Act of 1990) through the work zone. A work zone traffic control plan ("TCP") will be developed in accordance with the NYSDOT Work Zone Traffic Control manual and any additional requirements from Town of Hempstead/hamlet of Oceanside. A draft Work Zone TCP will be provided to the NYSDEC for review. Field work taking place on Atlantic Avenue will not be conducted until approval has been granted by NYSDEC.

3.4.2 Community Air Monitoring Plan (CAMP)

The CAMP provided in Appendix B 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.

3.4.3 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.

3.4.4 Quality Assurance Project Plan (QAPP)

A QAPP provided in Appendix C was developed in accordance with provisions in DER-10 *Chapter 2: Sampling, Analysis and Quality Assurance* and presents in specific terms the policies, organization, objectives, functional activities and specific quality assurance/quality control activities designed to achieve the data quality goals or objectives of the project.

3.4.5 Health and Safety Plan (HASP)

A HASP prepared to address site hazards in accordance the current applicable general industry standards, 29CFR1910, 29CFR1926, and EPA Standard Operating Safety Guides, Publication 9285.1-03 is provided in Appendix D.

3.5 Regulatory and Permitting Requirements

Potentially applicable regulatory programs and permitting (e.g., 6 NYCRR Parts 608,661,663), including documenting substantive requirements, will be summarized in the Hot Zone ISCO Work Plan and SVI Mitigation Work Plan, as necessary. The implementation of the remedy will require that the substantive requirements of state and local permits be complied with as required by 6 NYCRR § 375-1.12 (Permits). Substantive permit requirements for completion of the

remedial action and the steps necessary to comply with them will be identified in the work plans and, if needed, addenda prepared for each phase of work.

3.6 Institutional and Engineering Controls

The selected remedy includes the adoption of Institutional Controls ("ICs") and Engineering Controls ("ECs").

3.6.1 Institutional Controls

An IC in the form of an environmental easement for the controlled property will be imposed that:

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

3.6.2 Engineering Controls

ECs for the Site include or will include:

- The groundwater hot zone ISCO program;
- The existing soil vapor extraction system;
- The existing soil cover at the Site; and
- The proposed sub-slab depressurization system.

3.7 Site Management Plan

The IC/ECs will be managed using an SMP to be developed that will include an Environmental Easement, an Institutional and Engineering Control Plan, a Monitoring Plan and an Operation and Maintenance ("O&M") Plan. The SMP will be prepared using the NYSDEC SMP Template, dated August 2015, or more recent version if available.

3.7.1 Institutional and Engineering Control Plan

The Institutional and Engineering Control Plan will identify all use restrictions and engineering controls for the Site and details the steps and media-specific requirements necessary to ensure that the institutional and engineering controls presented above remain in place and effective.

A site cover currently exists and will be maintained to allow for commercial use of the Site. Any site redevelopment will maintain a site cover, which may consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable Soil Cleanup Objectives

("SCOs"). Where a soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the Site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). Details pertaining to maintenance and ongoing monitoring of the existing site cover will be provided in the SMP.

The SMP will include, but may not necessarily be limited to:

- An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- Descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- A provision for investigation beneath the existing on-site building and off-site buildings if the buildings are demolished to determine if further remedial action is warranted;
- A provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the affected off-site areas, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- Provisions for the management and inspection of the identified engineering controls;
- Maintaining site access controls and Department notification; and
- The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

** Soil vapor intrusion sampling (sub-slab vapor and indoor air) was offered to property owners of off-site buildings in 2013/14 by the NYSDOH. The owners did not grant access. Should the owners request to have their property sampled in the future, the NYSDEC, in consultation with the NYSDOH, shall determine whether soil vapor intrusion sampling is still appropriate. If appropriate, soil vapor intrusion sampling will be completed and actions recommended to address exposures related to soil vapor intrusion will be implemented.

3.7.2 Monitoring Plan

A monitoring plan will be developed to assess the performance and effectiveness of the remedy.

The plan will include, but may not be limited to:

- Monitoring of groundwater and soil vapor intrusion to assess the performance and effectiveness of the remedy;
- A schedule of monitoring and frequency of submittals to the Department; and
- Monitoring for vapor intrusion for any buildings developed on the affected off-site areas, as may be required by the Institutional and Engineering Control Plan discussed above, as well as the separate building on the property.

3.7.3 Operation and Maintenance (O&M) Plan

An O&M Plan will be developed to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy.

The plan will include, but is not limited to:

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

4.0 REPORTING AND REMEDIAL ACTION SCHEDULE

Implementation progress will be communicated to the NYSDEC/NYSDOH throughout the duration of the project through various means including, but not necessarily limited to telephone conversations and email correspondence. Formal reporting will be provided in accordance with provisions in DER-10.

Detailed project schedules will be developed and included in the Hot Zone ISCO Work Plan and SVI Mitigation Work Plan submittals and each addenda, if required. The schedule will include new and/or updated project deliverable milestones and time frames including, but not necessarily limited, to the following:

- Scoping plan submittal and Department review periods;
- Construction durations;
- Interim reporting;
- Construction Completion and Final Engineering Reports; and
- Site Management Plan.

A preliminary project schedule providing anticipated project elements is shown in Figure 7**.**

5.0 REFERENCES

Miller Environmental Group (May 2001), *Summary of Subsurface Investigation*.

EnviroTrac (May 2002), *Additional Investigation and Remedial Action Plan*.

NYSDOH (2006), *Guidance for Evaluating Soil Vapor Intrusion in the State of New York.*

NYSDEC (2010), *Technical Guidance for Site Investigation and Remediation (DER-10) dated May 3, 2010.*

HDR (December 2014), *Final Remedial Investigation Report*.

EnviroTrac (December 2014), *Update Report, July 2014 through September 2014*.

HDR (February 2015), *Final Feasibility Study*.

NYSDEC (February 2015), *Proposed Remedial Action Plan, DEC Site No.: 130194, Index No.: CO 1-20150629-73.*

NYSDEC (March 2015), *Record of Decision. Smart Set Cleaners, DEC Site No.: 130194, Index No.: CO 1-20150629-73.*

EnviroTrac (March 24, 2015), *Letter from Jeffrey Bohlen on behalf of the Potentially Responsible Party*.

NYSDEC (August 2015), *Order on Consent and Administrative Settlement. Smart Set Cleaners, DEC Site No.: 130194, Index No.: CO 1-20150629-73.*

NYSDEC (August 2015), *Site Management Plan Template*.

FIGURES

TOPOGRAPHIC MAP

Figure 1
Topographic Map

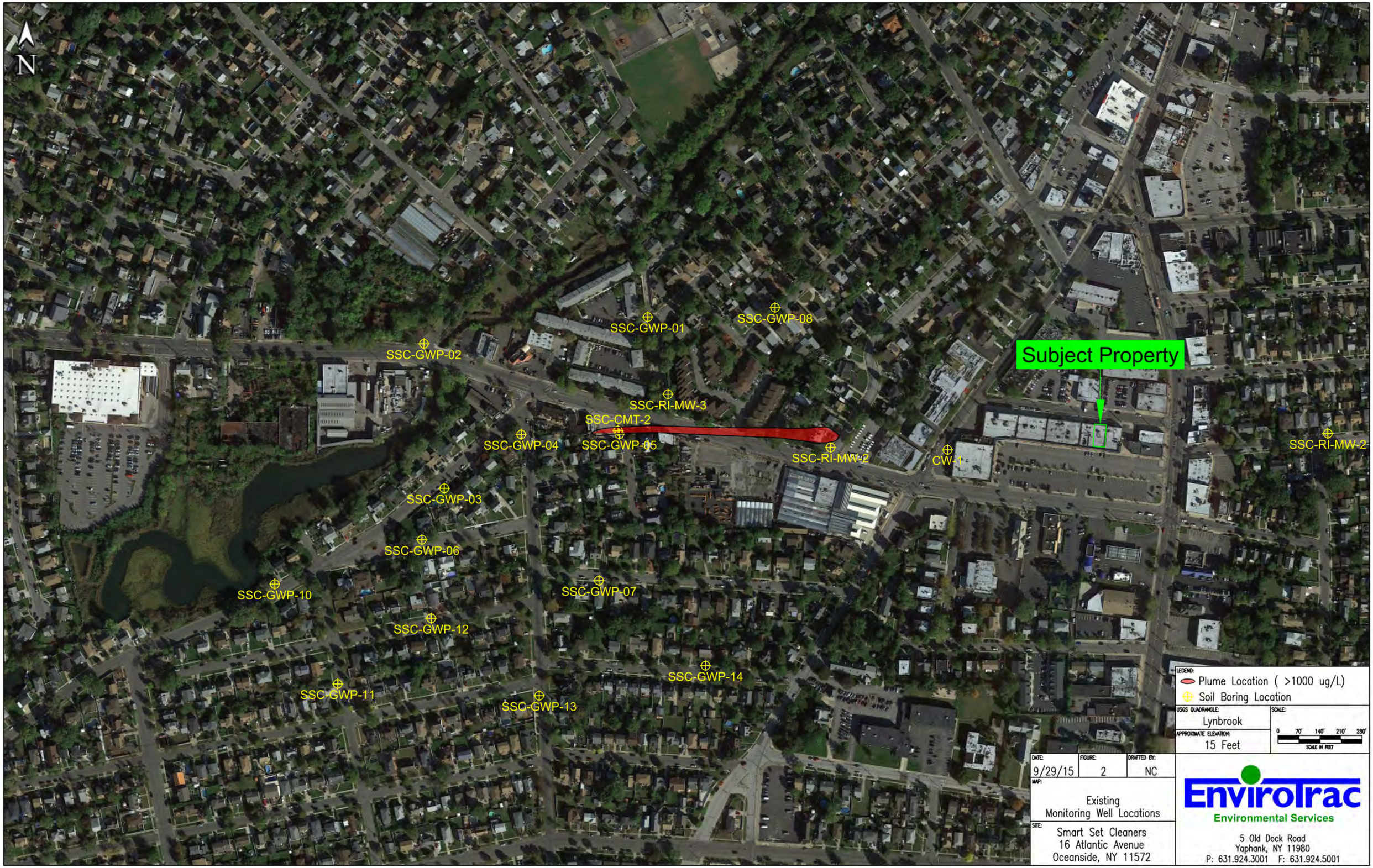
16 Atlantic Avenue
Oceanside, New York

USGS Quadrangle:
Lynbrook

Approx. Elevation:
14 feet

N
W E
S

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


N
SSC-GWP-01
SSC-GWP-08
SSC-GWP-02
Subject Property
SSC-RI-MW-3
SSC-CMT-2
SSC-GWP-04
SSC-GWP-05
SSC-RI-MW-2
CW-1
SSC-RI-MW-2
SSC-GWP-03
SSC-GWP-06
SSC-GWP-10
SSC-GWP-07
SSC-GWP-12
SSC-GWP-14
SSC-GWP-11
SSC-GWP-13
LEGEND:
Plume Location (>1000 ug/L)
Soil Boring Location
USGS QUADRANGLE:
Lynbrook
APPROXIMATE ELEVATION:
15 Feet
SCALE:
0 70' 140' 210' 280'
SCALE IN FEET
DATE:
9/29/15
FIGURE:
2
DRAFTED BY:
NC
MAP:
Existing
Monitoring Well Locations
SITE:
Smart Set Cleaners
16 Atlantic Avenue
Oceanside, NY 11572
EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631.924.3001 F: 631.924.5001

LEGEND:
- "Hot Zone" Location (>1000 ug/L)
- Existing Monitoring Well Location
- Proposed Monitoring/Injection Well Location (14 Total)

USGS QUADRANGLE: Lynbrook

APPROXIMATE ELEVATION: 15 Feet

SCALE: 0 15' 30' 45' 60' SCALE IN FEET

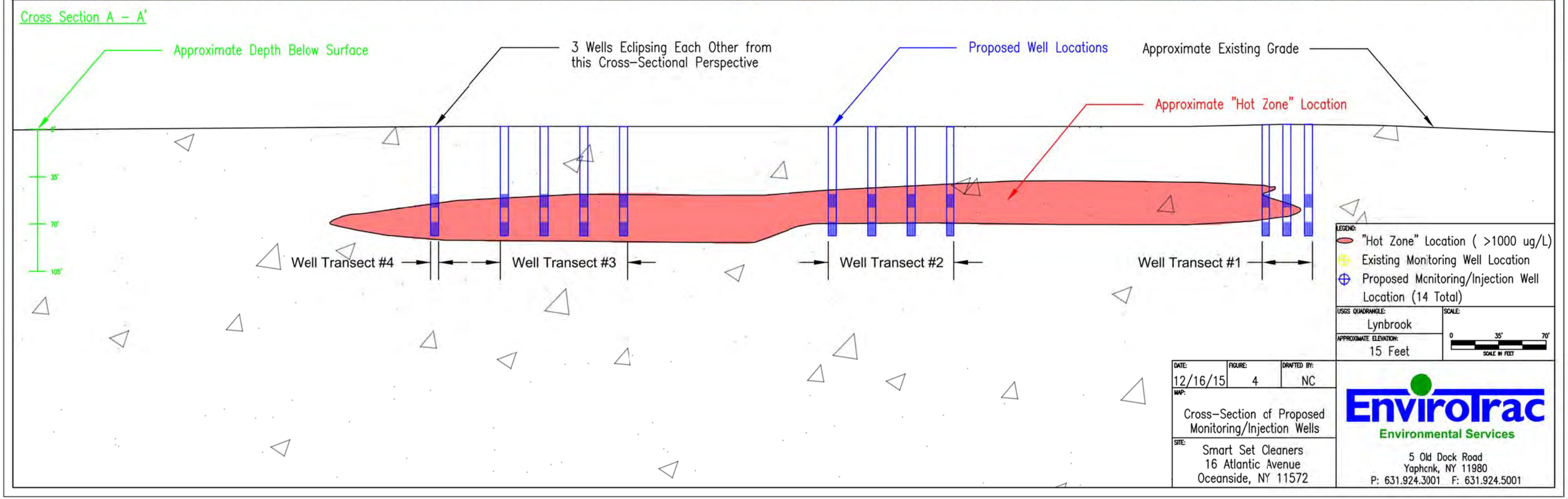
DATE:	FIGURE:	DRAFTED BY:
12/16/15	3	NC

MAP: Proposed Monitoring/Injection Well Locctions

SITE: Smart Set Cleaners
16 Atlantic Avenue
Oceanside, NY 11572

EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631.924.3001 F: 631.924.5001

Cross Section A – A'



LEGEND:
- "Hot Zone" Location (>1000 ug/L)
- Existing Monitoring Well Location
- Proposed Monitoring/Injection Well Location (14 Total)

USGS QUADRANGLE: Lynbrook

APPROXIMATE ELEVATION: 15 Feet

SCALE: 0 35' 70' SCALE IN FEET

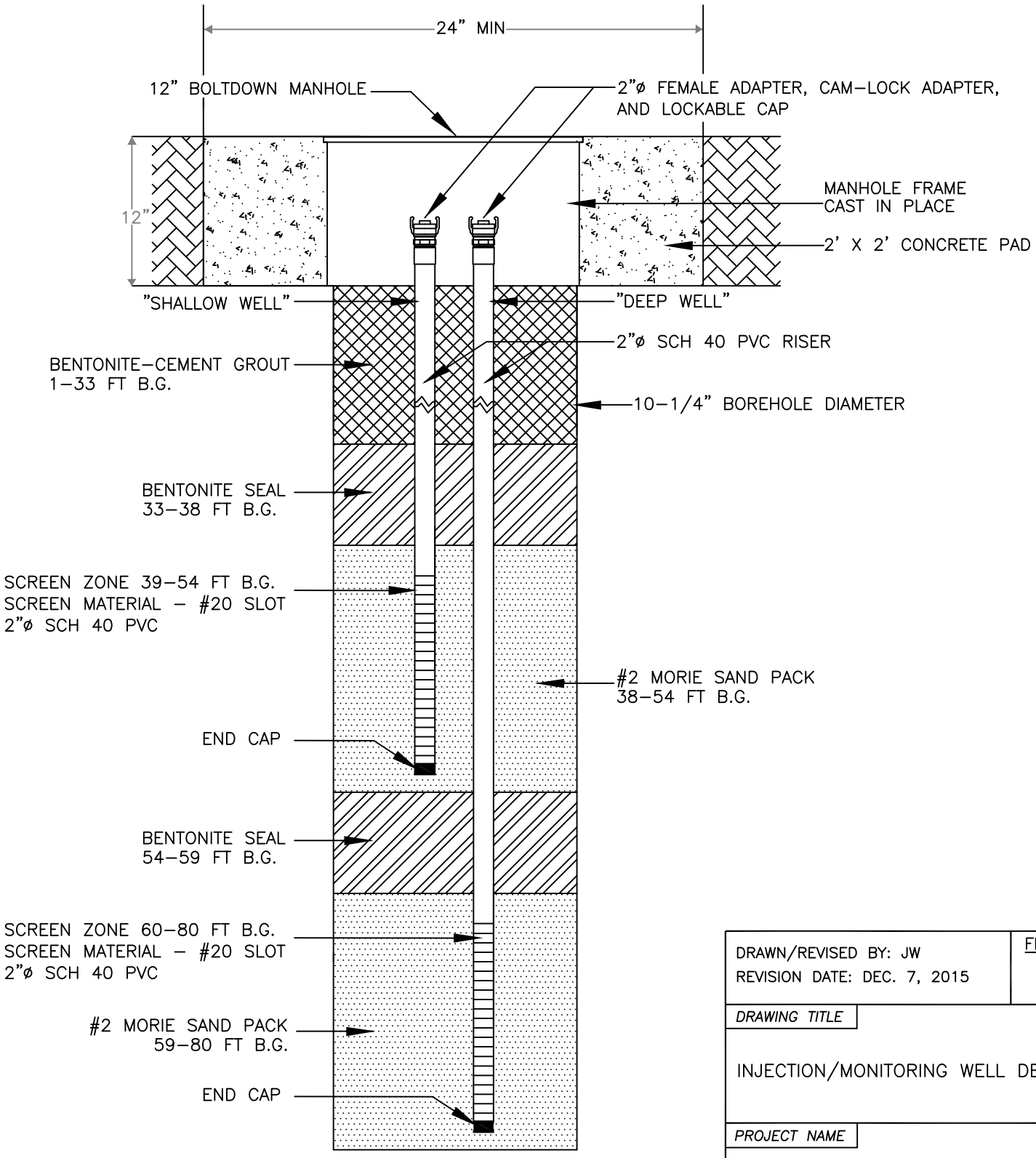
DATE:	FIGURE:	DRAFTED BY:
12/16/15	4	NC

MAP: Cross-Section of Proposed Monitoring/Injection Wells

SITE: Smart Set Cleaners
16 Atlantic Avenue
Oceanside, NY 11572

EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631.924.3001 F: 631.924.5001

TYPICAL WELL CONSTRUCTION



DRAWN/REVISED BY: JW REVISION DATE: DEC. 7, 2015	FIGURE: 5

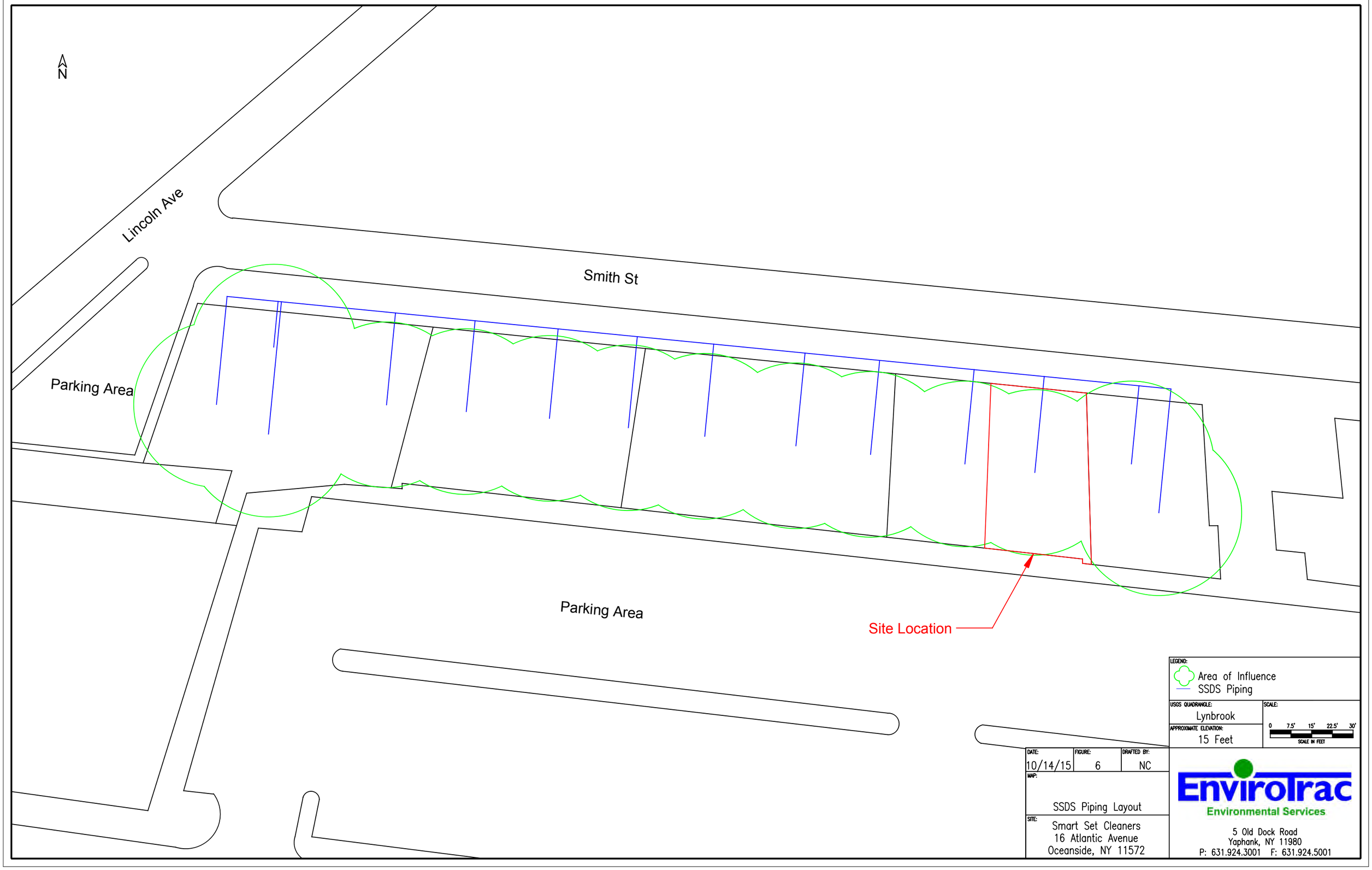
DRAWING TITLE

INJECTION/MONITORING WELL DETAILS

PROJECT NAME

SMART SET CLEANERS
OCEANSIDE, NEW YORK

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


N
Lincoln Ave
Smith St
Parking Area
Parking Area
Site Location
LEGEND:
Area of Influence
SSDS Piping
USGS QUADRANGLE:
Lynbrook
APPROXIMATE ELEVATION:
15 Feet
SCALE:
0 7.5' 15' 22.5' 30'
SCALE IN FEET
DATE:
10/14/15
FIGURE:
6
DRAFTED BY:
NC
MAP:
SSDS Piping Layout
SITE:
Smart Set Cleaners
16 Atlantic Avenue
Oceanside, NY 11572
EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631.924.3001 F: 631.924.5001

Preliminary Project Schedule
Smart Set Cleaners Site
Oceanside, New York

ID	Task Name	Duration	Start	Finish
1	Remedial Design / Remedial Action Work Plan (RD/RAWP) Submittal	0 days	Fri 2/12/16	Fri 2/12/16
2	NYSDEC Review Cycle - RD/RAWP	13 days	Tue 2/16/16	Thu 3/3/16
3	**Hot Zone Groundwater Remediation**	**285 days**	**Fri 3/4/16**	**Thu 4/6/17**
4	**ISCO Predesign Investigation**	**65 days**	**Fri 3/4/16**	**Thu 6/2/16**
5	Installation of Injection / Monitoring Wells	30 days	Fri 3/4/16	Thu 4/14/16
6	Sample Injection / Monitoring Wells	5 days	Fri 4/15/16	Thu 4/21/16
7	Review Sampling Results, Calculate ISCO Requirements, Prepare Hot Zone ISCO Work Plan	30 days	Fri 4/22/16	Thu 6/2/16
8	NYSDEC Review Cycle - Hot Zone ISCO Work Plan	20 days	Fri 6/3/16	Thu 6/30/16
9	ISCO Pilot Test	60 days	Fri 7/1/16	Thu 9/22/16
10	ISCO Pilot Test Report	30 days	Fri 9/23/16	Thu 11/3/16
11	NYSDEC Review Cycle - ISCO Pilot Test Report	20 days	Fri 11/4/16	Thu 12/1/16
12	ISCO Full Scale Treatment	60 days	Fri 12/2/16	Thu 2/23/17
13	Assess ISCO Performance and Prepare Interim Summary Report or CCR	30 days	Fri 2/24/17	Thu 4/6/17
14	**Sub-Slab Depressurization System (SSDS)**	**195 days**	**Fri 3/4/16**	**Thu 12/1/16**
15	Prepare SVI Mitigation Work Plan	30 days	Fri 3/4/16	Thu 4/14/16
16	NYSDEC Review Cycle - SVI Mitigation Work Plan	20 days	Fri 4/15/16	Thu 5/12/16
17	SSDS System Construction, Testing, and Startup	40 days	Fri 5/13/16	Thu 7/7/16
18	SSDS System Performance Monitoring	5 days	Fri 7/8/16	Thu 7/14/16
19	**Assess System Performance**	**100 days**	**Fri 7/15/16**	**Thu 12/1/16**
20	SSDS Interim Summary Report	20 days	Fri 7/15/16	Thu 8/11/16
21	NYSDEC Review Cycle - SSDS Interim Summary Report	20 days	Fri 8/12/16	Thu 9/8/16
22	If Additional System Installation or Modifications is Needed, Prepare SVI Mitigation Work Plan Addendum	40 days	Fri 9/9/16	Thu 11/3/16
23	NYSDEC Review Cycle - SVI Mitigation Work Plan Addendum	20 days	Fri 11/4/16	Thu 12/1/16
24	Implementation of Addendum Modifications	0 days	Thu 12/1/16	Thu 12/1/16
25	If Complete, Prepare Draft SSDS Construction Completion Report	40 days	Fri 9/9/16	Thu 11/3/16

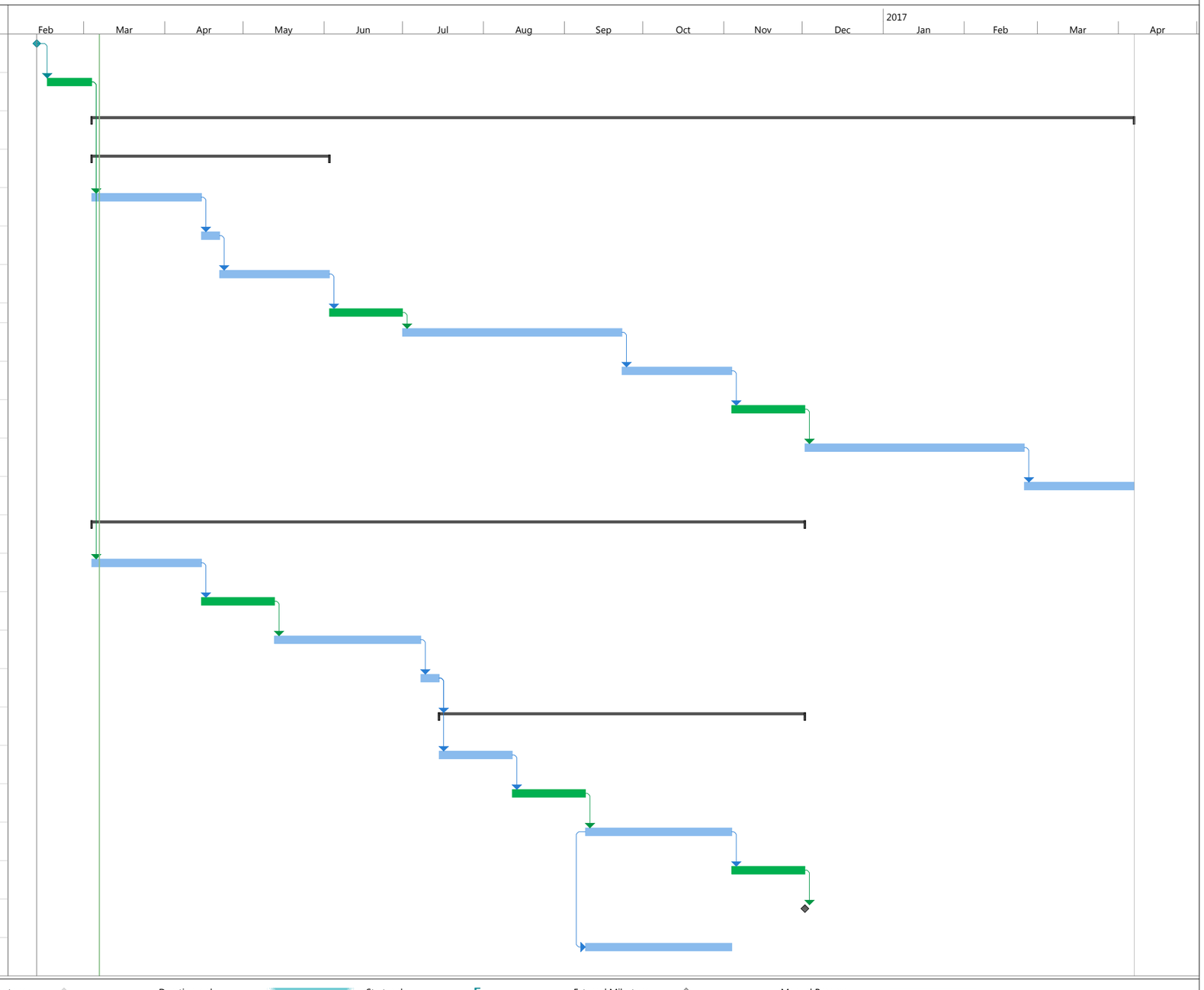


Figure 7

Task | Summary | Inactive Milestone | Duration-only | Start-only | External Milestone | Manual Progress
Split | Project Summary | Inactive Summary | Manual Summary Rollup | Finish-only | Deadline
Milestone | Inactive Task | Manual Task | Manual Summary | External Tasks | Progress

TABLES

Table 1: Proposed Injection/Monitoring Well Details
Smart Set Cleaners - Site 130194
Oceanside, NY

					Shallow Well		Deep Well	
Well Transect (E-W)	Hot Zone Location	Well Pair	DTW	TD	TOS	BOS	TOS	BOS
1	Leading Edge	IW-01, 02	10	80	39	54	60	80
		IW-03, 04	10	80	39	54	60	80
		IW-05, 06	10	80	39	54	60	80
2	Mid-Point	IW-07, 08	10	80	39	54	60	80
		IW-09, 10	10	80	39	54	60	80
		IW-11, 12	10	80	39	54	60	80
		IW-13, 14	10	80	39	54	60	80
3	Trailing Edge	IW-15, 16	10	80	39	54	60	80
		IW-17, 18	10	80	39	54	60	80
		IW-19, 20	10	80	39	54	60	80
		IW-21, 22	10	80	39	54	60	80
		IW-23, 24	10	80	39	54	60	80
		IW-25, 26	10	80	39	54	60	80
		IW-27, 28	10	80	39	54	60	80

Notes:
Odd numbered wells are shallow, even wells are deep.
DTW - approximate depth to water, feet below land surface.
TD - total well depth, feet below land surface.
TOS - depth to top of well screen, feet below land surface.
BOS - depth to bottom of well screen, feet below land surface.

Table 2: Proposed PDB Deployment Depth Settings
Smart Set Cleaners - Site 130194
Oceanside, NY

	Screen Zones (ft)			
PDB Number	Shallow Wells	Deep Wells	PDB Top (ft)	PBD Bottom (ft)
1	39-54	-	39	41
2			50	52
3	-	60-80	60	62
4			68	70
5			76	78

Notes:
Depths relative to land surface.
PDB - Pre-filled Passive Diffusion Bag (24"L X 1.25"W).

APPENDIX A

SUB-SLAB DEPRESSURIZATION SYSTEM PILOT TEST RESULTS

EnviroTrac
Environmental Services

Sub-Slab Depressurization System (SSDS) Pilot Test Report

Smart Set Cleaners Site
40 Atlantic Avenue
Oceanside, New York

Prepared for:

Great Lincoln LLC
488 Madison Avenue, Suite 1100
New York, NY 10022

Prepared by:

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

October 2015

Sub-Slab Depressurization System (SSDS) Pilot Study Report
Smart Set Cleaners, Oceanside, New York.

PURPOSE

This report is intended to summarize the results of the SSDS pilot study that was conducted by EnviroTrac on October 2, 2015. The purpose of the test was to determine the feasibility of implementing an SSD system as a viable means of mitigation throughout the existing building structure, as well as determining the required operating parameters and layout of such a system.

TECHNICAL SCOPE OF WORK PERFORMED

1. Pilot Test Equipment

For the purpose of the pilot test, the existing onsite Soil Vapor Extraction (SVE)/SSDS system equipment was utilized to conduct the test at a representative location. The existing system consists of six (6) SSD extraction points located on the interior of the building, which provides SSD coverage for the eastern most portion of the building. Prior to starting the test, the interior piping leading to the ssds points was temporarily modified to allow for the operation of one single SSD point. Major system components of the existing SVE/SSD system are described below.

Soil Vapor Extraction Equipment:

- Extraction Blower – 7.5 HP Siemens Model #2BH18001AK12, Regenerative Blower.
  - Max Flow – 370 SCFM
  - Max Vac – 140 “H2O
- Moisture Separator – ESD/W2W Model: AWS80-4

Additional Test Equipment

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

SSDS TESTING METHODOLOGY

The existing SVE/SSD system currently consist six (6) SSDS extraction points that are connected to a common piping header that is routed to a single manifold leg located in the existing system shed that houses the vacuum blower. For the purpose of the pilot study, the first extraction point located along the piping header (the downstream most point) was isolated by temporarily cutting and capping the piping upstream of the point. 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 the test point. Vacuum monitoring points were installed a distance of 5, 10, 15, 20, 25, 35, and 45 feet measured from the test extraction 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 system 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 and 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 the following:

- Step 1 – 5.5 “H_2O Wellhead Vacuum, 10.5 scfm Extraction Flow Rate.

- Step 2 – 12.0 "H_2O Wellhead Vacuum, 21.5 scfm Extraction Flow Rate.
- Step 3 – 19.0 "H_2O Wellhead Vacuum, 32.0 scfm Extraction Flow Rate.
- Step 4 – 28.5 "H_2O Wellhead Vacuum, 45.0 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 SSDS 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 along with a plot of sub-slab vacuum response vs. distance is also provided as an attachment. 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 = 0.04 "H_20 (~1 pascal) vacuum response. The ROI for each of the four steps of the test were estimated to be 33.5, 34.2, 34.3, and 36.1 feet.

CONCLUSIONS

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 ~2 "H2O and an air flow rate of ~10 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: 2.0 "H2O
- Applied Flow Rate: 10 CFM

ATTACHMENTS

1. Pilot Test Data – Field Measurements
2. SVE Test Data Analysis
3. Plot: Vacuum Response vs. Monitoring Point Distance
4. Plot: Radius of Influence vs. Applied Vacuum
5. Plot: 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"

ATTACHMENTS

(SSDS) Pilot Test Data

Site Name: 40 Atlantic Ave. Oceanside, NY

Test Date: 10/2/2015

Personnel: DW/DK/MA

Weather: Rain 58 deg

Extraction Well: SSDS #1

Time	Well Head Vac "H20		Flow (scfm)		Observation Well VP-1 Distance (ft) 5 Vacuum"H_20	Observation Well VP-2 Distance (ft) 10 Vacuum"H_20	Observation Well VP-3 Distance (ft) 15 Vacuum"H_20	Observation Well VP-4 Distance (ft) 20 Vacuum"H_20	Observation Well VP-5 Distance (ft) 25 Vacuum"H_{21}	Observation Well VP-6 Distance (ft) 35 Vacuum"H_{22}	Observation Well VP-7 Distance (ft) 45 Vacuum"H_{23}	Observation Well Distance (ft) Vacuum"H_20	Observation Well Distance (ft) Vacuum"H_20	Observation Well Distance (ft) Vacuum"H_{21}	Observation Well Distance (ft) Vacuum"H_{23}
	5.5		10.5		-1.220	-0.860	-0.353	-0.150	-0.130	-0.057	-0.042				
	12.0		21.5		-2.600	-1.680	-0.711	-0.306	-0.247	-0.128	-0.080				
	19.0		32		-3.910	-2.550	-1.050	-0.450	-0.360	-0.185	-0.100				
	28.5		45		-4.200	-3.300	-1.400	-0.590	-0.480	-0.250	-0.141				

Comment / Notes:

Summary/Analysis of Sub Slab Depressurization Pilot Test Data

40 Atlantic Ave.
Oceanside, NY

Test Date:	10/2/2015
Performed By:	EnviroTrac - DW
Extraction Point:	SSDS#1
Test Duration (min.):	60
Wellhead Vacuum ("H2O):	5.5 to 28.5
Wellhead Flow (scfm):	10.5 to 45

SSDS Pilot Test Data

Radial Distance (ft.)	Vacuum Response 1 5.5" H2O Applied Vacuum, 10.5 scfm	Vacuum Response 2 12" H2O Applied Vacuum, 21.5 scfm	Vacuum Response 3 19" H2O Applied Vacuum, 32 scfm	Vacuum Response 4 28.5" H2O Applied Vacuum, 45 scfm	Reference Line for 0.04" H2O
5	1.220	2.600	3.910	4.200	0.04
10	0.860	1.680	2.550	3.300	0.04
15	0.353	0.711	1.050	1.400	0.04
20	0.150	0.306	0.450	0.590	0.04
25	0.130	0.247	0.360	0.480	0.04
35	0.057	0.128	0.185	0.250	0.04
45	0.042	0.080	0.100	0.141	0.04

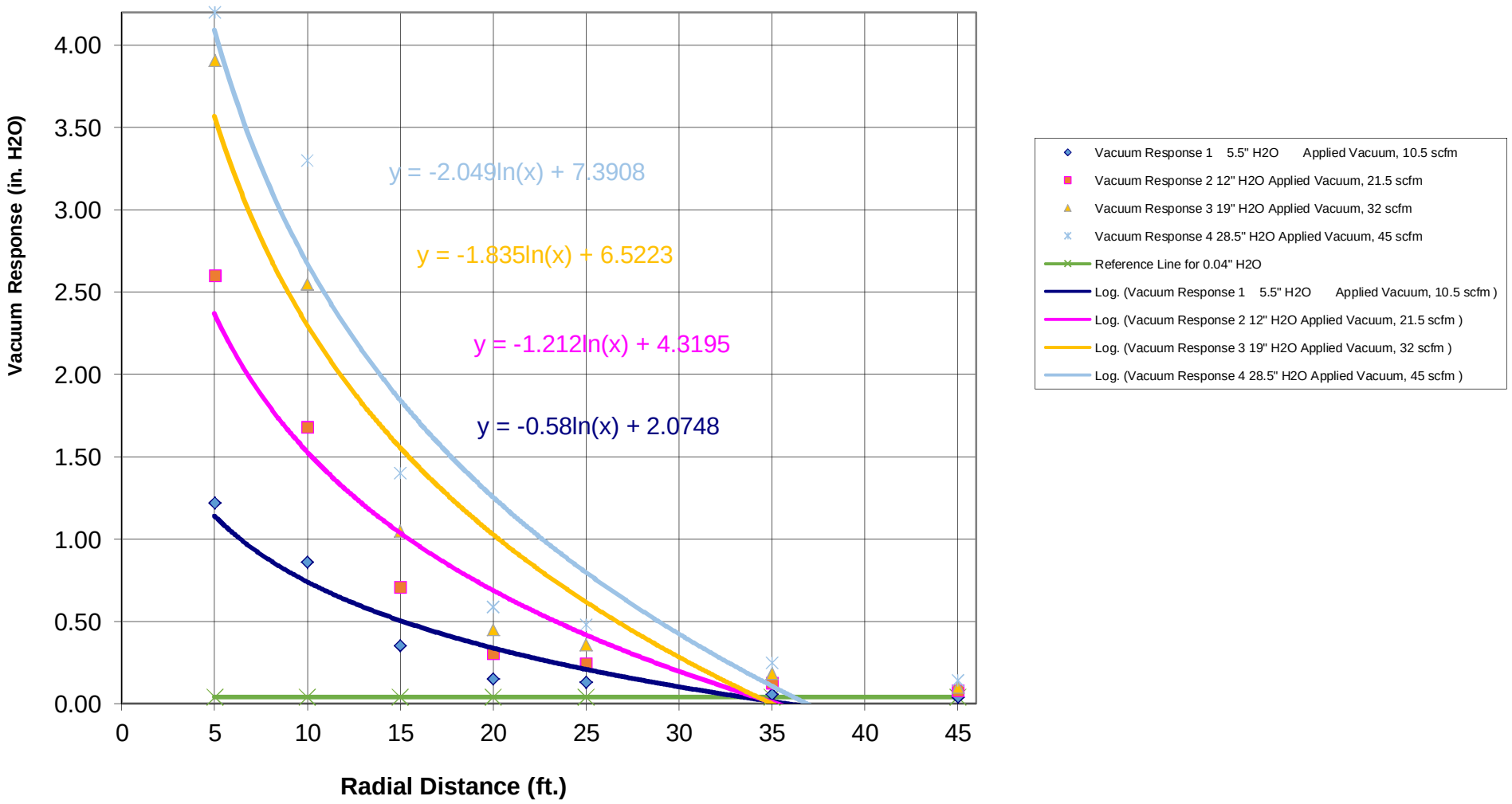
Effective ROI for Each Step

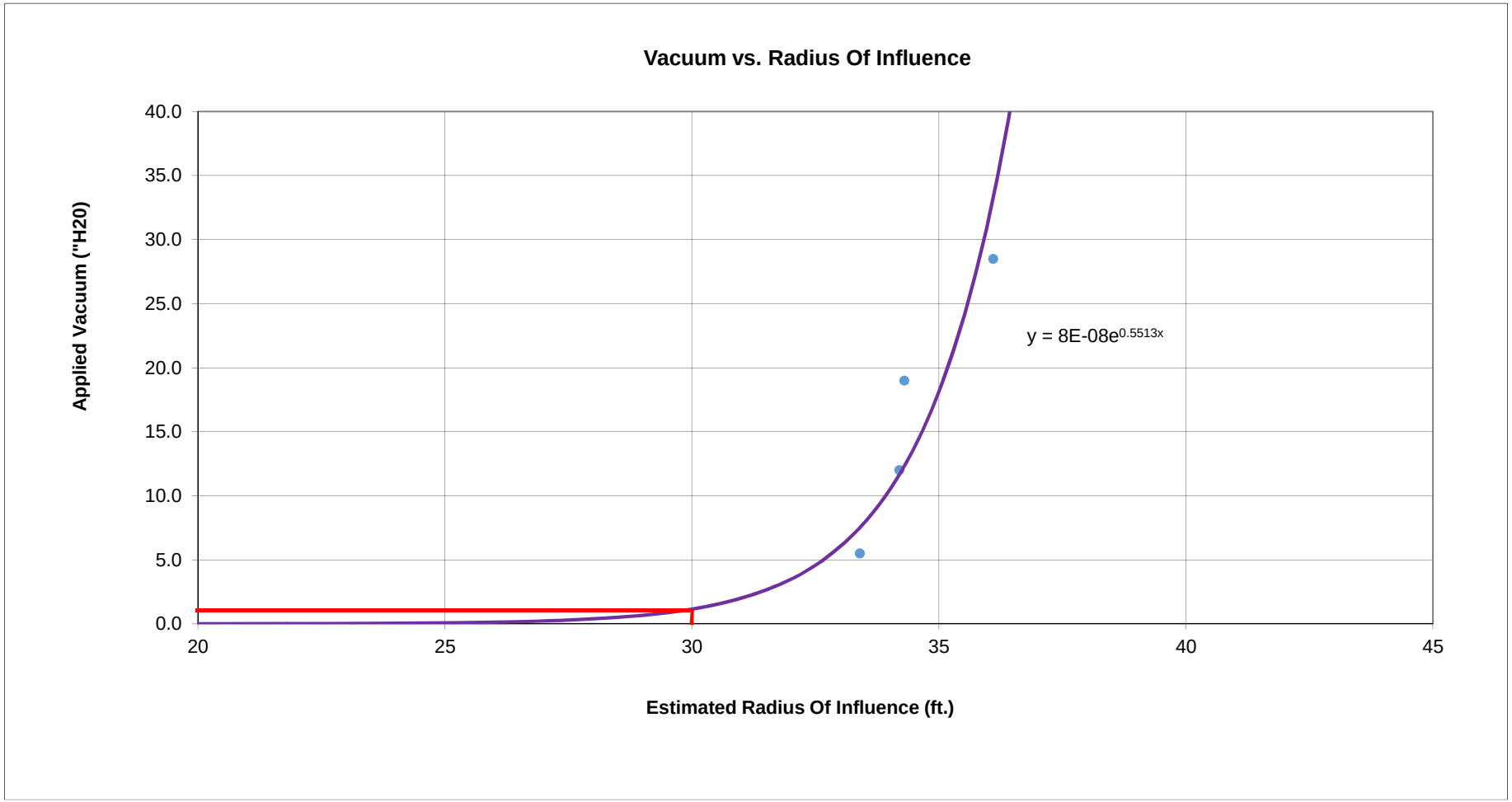
Est. ROI (ft.)	Vacuum ("H2O)	Flow (scfm)
33.4	5.5	10.5
34.2	12.0	21.5
34.3	19.0	32.0
36.1	28.5	45.0

Minimum Design Parameters

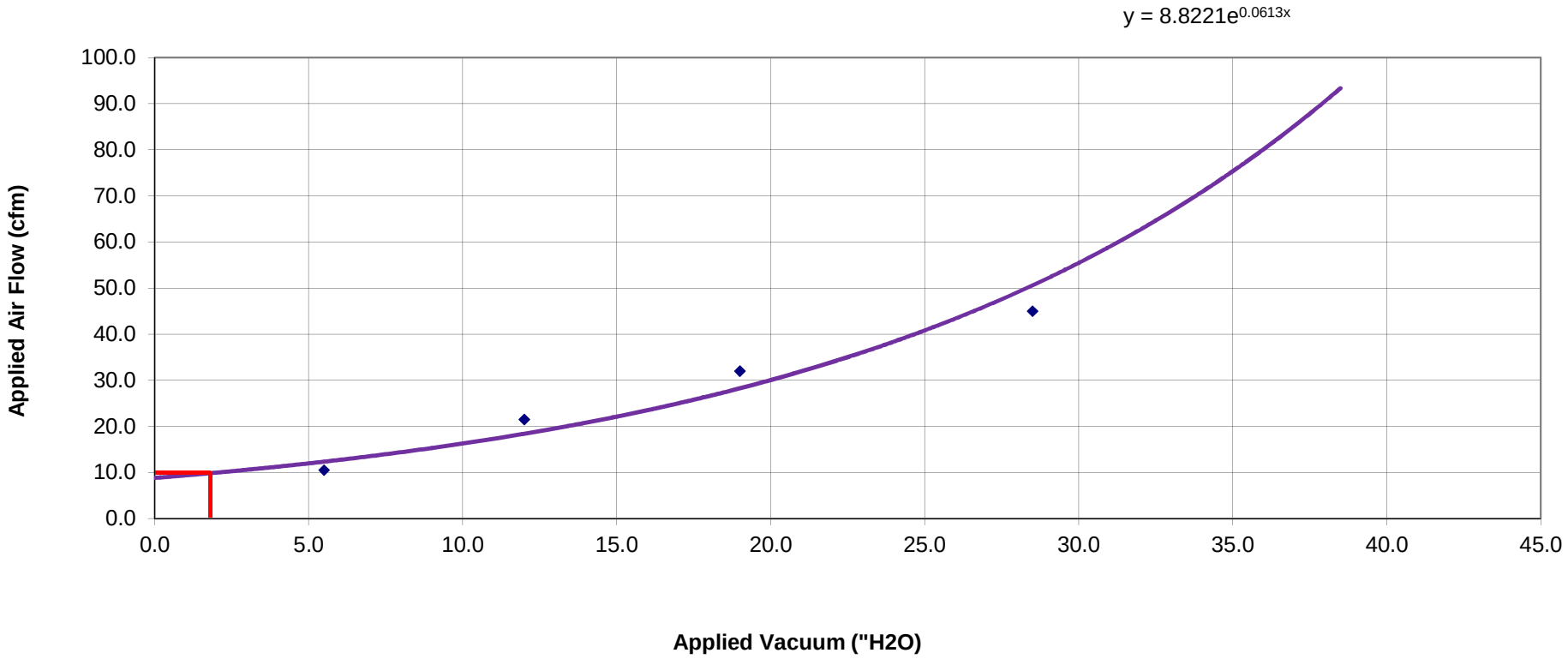
Radius of Influence (ROI):	30
Wellhead Vacuum ("H2O):	2
Wellhead Flow (CFM):	10

Effective Radius Of Influence SSDS #1




Vacuum vs. Radius Of Influence
Applied Vacuum ("H20)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
20
25
30
35
40
45
y = 8E-08e0.5513x
Estimated Radius Of Influence (ft.)

Air Flow vs. Vacuum Graph: SSDS #1



APPENDIX B

COMMUNITY AIR MONITORING PLAN

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

Settings

On-Site Setting

The Smart Set Cleaners Site is located in a mixed commercial and residential area at 16 Atlantic Avenue in Oceanside, New York in Nassau County. It is one tenant unit within a small shopping center and sidewalk behind the tenant unit. The strip mall itself is bounded by Smith Street to the north, Atlantic Avenue to the south, Lincoln Avenue to the west and Long Beach Road to the east.

The Site is one tenant unit with a basement and occupies approximately 0.090 acres. It is located in a small strip mall shopping center. The shopping center property is approximately 3.9 acres and is covered in building or pavement. The property has 2 buildings, one with 15 tenant units including the Site and the other with 2 tenant units. The strip mall was built in 1955.

Land use areas immediately adjacent to the tenant space identified as the Site are:

- To the north: Smith Street, then Lincoln Plaza (a shopping center)
- To the east: an adjoining retail shopping center tenant
- To the south: Atlantic Avenue, then a car wash and gasoline station
- To the west: an adjoining retail shopping center tenant

Off-Site Setting

Proposed off-site injection/monitoring wells are to be installed along Atlantic Avenue between its intersections with Court Street and Bayview Court. Once the injection/monitoring wells have been completed, in-situ chemical oxidation (ISCO) injections will be implemented to treat chlorinated volatile organic compounds (CVOCs). In the aforementioned off-site setting, Atlantic Avenue is bounded to the north by residential properties and to the south by residential properties and commercial businesses.

The designated work area (i.e., the exclusion zone) will include the three adjoining tenants to the west of the Site (for sub-slab depressurization system installation and testing) in the shopping center and the proposed injection/monitoring well locations along Atlantic Avenue.

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 sub-slab depressurization components, soil borings and ISCO injection monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of collection of groundwater samples and the injection of chemical reagents into the subsurface using injection/monitoring wells. 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

Volatile organic compounds (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., injection/monitoring 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 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 State (NYSDEC and NYSDOH) and County Health personnel to review.

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN

EnviroTrac
Environmental Services

Table of Contents

FIGURES

ATTACHMENTS

1.0 TITLE AND APPROVAL PAGE

Title:	Quality Assurance Project Plan (QAPP)
Project Name/Property Name:	Smart Set Cleaners
Property/Site Location:	16 Atlantic Avenue, Oceanside, New York
Revision Number:	
Revision Date:	
NYSDEC Site Number:	130194
Preparer's Name and Organizational Affiliation:	EnviroTrac Ltd. 5 Old Dock Road Yaphank, NY 11980 (631) 924-3100 Jeffb@envirotrac.com
Preparation Date:	December 17, 2015

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

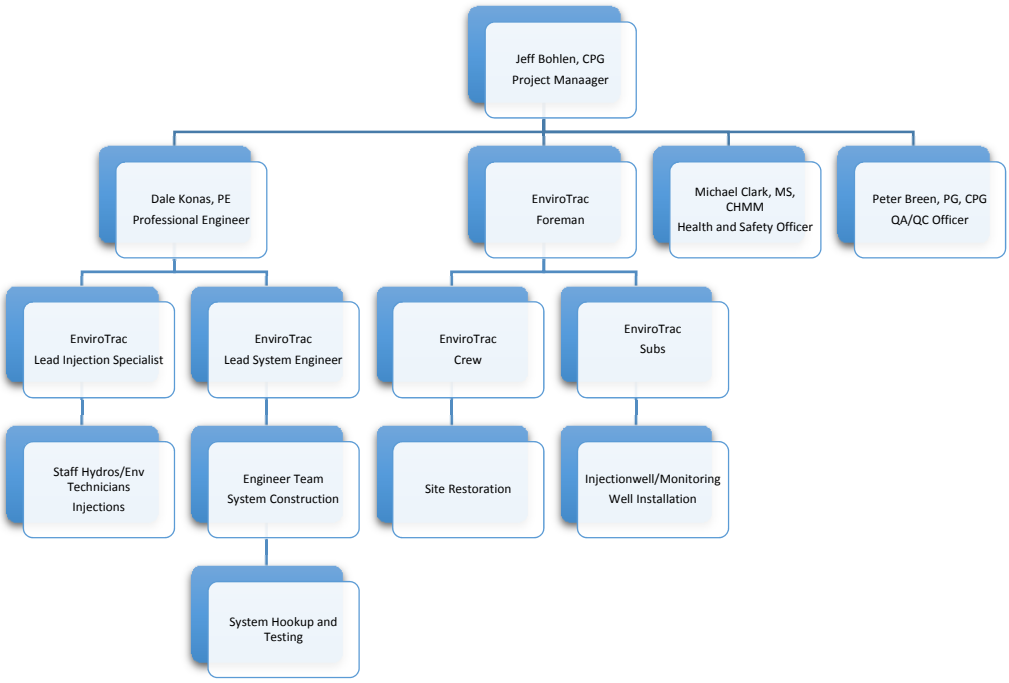
Name	Title	Telephone Number	Organizational Affiliation	Responsibilities
Jeffrey Bohlen, CPG	Environmental Consultant Project Manager	(631) 924-3001	EnviroTrac	Planning and implementation of the Project
Dale Konas, PE	Environmental Consultant Lead Engineer	(631) 924-3001	EnviroTrac	Planning, oversight and engineering certifications
Peter Breen, PG, CPG	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
Melissa Sweet	NYSDEC DER Project Manager	(518) 402-9614	NYS Department of Environmental Conservation	Review, approval, and oversight of project documentation and processes
Scarlett McLaughlin	NYSDOH Project Manager	(518) 402-7860	NYS Department of Health	Assist DER
John Masculin	Environmental Laboratory Contact	(732) 397-1208	Phoenix Environmental Laboratories, Inc.	Laboratory analysis of groundwater samples
Troy Lizer	US Sales Manager Remediation	(800) 435-6856	CARUS Corporation	ISCO Treatability Testing
Douglas Weaver	Third Party Data Validator[2]	(757) 564-0090	Environmental Data Services, Inc.	Data validation of laboratory reports issued by Phoenix. 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) has been conducted. The purpose of the RI 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.

The contaminant(s) of concern identified at the Site are:

- Tetrachloroethylene (PCE)
- Dichloroethene (cis-1,2-)
- Trichloroethene (TCE)
- 1,2-Dichloroethane

The contaminant(s) of concern exceed the applicable standards, criteria and guidance values (SCGs) for:

- Groundwater
- Surface Water
- Soil
- Soil Vapor Intrusion

Groundwater: PCE and its daughter compounds are found in the groundwater on the property and off-site to the west of the Site. The latest sampling of groundwater on the property (analyzed for VOCs) found PCE at approximately 56 micrograms per liter (ug/l) which exceeds the groundwater standard (5 ug/l). PCE and its breakdown products TCE and DCE have been detected up to 800 yards to the west of the Site. PCE has been observed in the off-site groundwater at a maximum concentration of 4,100 ppb, approximately 87 feet below ground surface near the intersection of Lincoln Avenue and Atlantic Avenue. During the Remedial Investigation, the off-site plume was investigated and sampled only for VOCs, compounds related to dry-cleaning activities. This investigation found a maximum of 5,105 ug/l of chlorinated VOCs located approximately 1,550 feet to the west of the Site.

Surface Water: During the RI, surface water was sampled from five locations upstream to downstream of the off-site plume in Powell Creek which is located 2,100 feet to the west of the Site. Samples upstream of the plume intersection with the creek exceeded the standard for PCE (1 ppb) with 4 ug/l. Samples collected in the creek near the plume exhibited the same PCE concentration as upstream, while samples collected downstream of the plume were non-detect.

3.2 Project Description - Site Location, History and Description

Location: The Smart Set Cleaners Site is located in a mixed commercial and residential area at 16 Atlantic Avenue in Oceanside, New York in Nassau County. It is one tenant unit within a small shopping center and sidewalk behind the tenant unit. The strip mall is bounded by Smith Street to the north, Atlantic Avenue to the south, Lincoln Avenue to the west and Long Beach Road to the east.

Site Features: The Site is one tenant unit with a basement and occupies approximately 0.090 acres. It is located in a small strip mall shopping center. The shopping center property is approximately 3.9 acres and is covered in building or pavement. The property has 2 buildings, one with 15 tenant units including the Site and the other with 2 tenant units. The strip mall was built in 1955.

Current Zoning/Use(s): The Site is zoned commercial. It is currently an active nail salon and spa. The surrounding building is commercial space leased for commercial purposes. The nearest residential area is 0.1 mile to the east.

Past Use of the Site: The dates of operation of the dry cleaner are approximately 1956 through 2005. A routine inspection of the Smart Set Cleaners facility by the Nassau County Department of Health (NCDOH) in the mid 1990's revealed the existence of interior floor drains. These drains were considered injection wells by the USEPA. In 1998, a groundwater sample was collected from a floor drain that showed the presence of the dry cleaning solvent tetrachloroethylene (PCE). The NCDOH in conjunction with the USEPA pursued the investigation of the source of groundwater contamination. In 2001, the NCDOH oversaw removal of contaminated soils from the rear of the facility by the owner. The owner's consultant, with oversight by the NCDOH proceeded with a subsurface investigation that was completed in May 2001. Based on the 2001 investigation, a Soil Vapor Extraction/Air Sparge (SVE/AS) system was installed by the owner and started in 2002. That system is still in operation and reports are submitted quarterly on its performance. The Site was added to the NYS Registry of Inactive Hazardous Waste Disposal Sites in November 2008 with USEPA maintaining the lead role in regulating the owner. The lead was transferred to the Department in August 2009 at the request of USEPA.

Site Geology and Hydrogeology: Groundwater flow is to the west-southwest, towards the nearby Powell Creek located approximately 0.4 miles from the Site. No public or private wells have been identified downgradient of the Site. Depth to groundwater is approximately 10 feet below ground surface. There appears to be no clear delineation between the Upper Glacial and Magothy aquifers. The geology of the area consists predominantly of thick unconsolidated sediments.

A topographic map depicting the site location is attached as Figure 1.

3.3 Project Quality Objectives

3.3.1 Off-Site Groundwater Plume

The objective of the project is to remediate groundwater located to the west of the Site to a target maximum total COC “Hot Zone” concentration of 1,000 ug/l (i.e., the remedial goal) utilizing in-situ chemical treatment technology. This will be accomplished by conducting the following sequential tasks:

- Installing and sampling groundwater monitoring wells in the general off-site location where COCs exceeding 1,000 ug/l are believed to exist based on prior testing;
- Defining the current extent of groundwater where COC concentrations exceed the remedial goal (i.e., the targeted treatment zone);
- Calculating the approximate mass of contaminants within the targeted treatment zone and designing a chemical injection treatment approach to achieve the remedial goal; and
- Injecting chemical reagent during one or more events into the targeted zone and conducting performance monitoring in accordance with the RAWP QC procedures to demonstrate achievement of the remedial goal.

The ROD provides the following SCGs[1] for groundwater:

VOC Constituent	SCG (ug/l)
PCE	5
TCE	5
DCE	5
MTBE	10
Acetone	50
1,2-DCA	0.6
Chloroform	7

(1) - *SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values* (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

The first phase of work will consist of a pre-design investigation that is need to address data gaps pertaining to the current definition of the Hot Zone. The pre-design investigation will include the well installations, ground sampling and laboratory analysis, delineation of COCs exceeding remedial goal concentrations and associated volumetric calculations.

3.3.2 On-Site Soil Vapor Intrusion

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil vapor. The site contaminants that are considered to be the primary contaminants of concern based on the concentrations detected, and in comparison with the State's Soil Vapor Intrusion Guidance (NYSDOH 2006), are PCE. The Soil Vapor Intrusion 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 PCE.

4.0 PROJECT TIMELINE

4.1 Project Summary

The project will be conducted in a phased approach in order to address existing data gaps and to increase the efficiency of implementation. Initially a Remedial Design/Remedial Action Workplan will be prepared that provides a summary of remedial requirements specified in the ROD and technical approach that will meet the specified remedial action objectives (RAOs).

4.1.1 Off-Site Groundwater

For the off-site groundwater remedial action a pre-design investigation will first be conducted to develop data to support the prescribed ISCO remedy that is lacking based on the current site characterization. Based on results of the pre-design investigation an *Off-Site Groundwater Hot Zone In-Situ Chemical Oxidation Work Plan* ("Hot Zone ISCO Work Plan") will be prepared for the ensuing chemical injections and ISCO performance monitoring. It is envisioned that a small scale pilot test of the determined ISCO approach will be conducted prior to full scale implementation. The injection process will entail the reagent injection into the Hot Zone followed by a prescribed time period to allow for the chemical reaction process. Upon reaching the reaction time duration groundwater testing will be conducted to assess performance. The full scale ISCO implementation may require multiple injection/monitoring events to achieve the prescribed RAOs. Results of the ISCO program will be provided in an ISCO Pilot Test Report, a Construction Completion Report (CCR) or Final Engineering Report (FER) as appropriate.

4.1.2 On-Site Soil Vapor Intrusion

A sub-slab depressurization system (SSDS) will be installed in the basements of the adjacent units to the east and west of the Site. The SSDSs will be connected to the existing interior SVE system located in the basement of the Site. The existing SVE system will also function in place of the SSDS, as a vapor mitigation system, within the established radius of influence of that system. A pre-design pilot test was conducted in October 2015 to determine the feasibility of implementing an SSD system as a viable means of mitigation throughout the existing building structure, as well as determining the required operating parameters and layout of such a system. Results and conclusions derived from the pilot testing are provided in the RD/RAWP. A final design for the SSDS will be provided in the *On-Site Soil Vapor Intrusion Mitigation Work Plan* ("SVI Mitigation Work Plan"). Upon implementation of the SSDS and verification testing to assess compliance with the established RAOs, results will be provided in a CCR or FER.

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 Site Management Plan (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			Deliverable
		Anticipated Initiation	Anticipated Completion	
RD/RAWP Review	NYSDEC/NYSDOH	Dec, 2015	Jan, 2016	Approved RD/RAWP by NYSDEC/NYSDOH
SSDS Final Design	EnviroTrac	Jan, 2016	Feb, 2016	SVI Mitigation Work Plan
SVI Mitigation Work Plan Review	NYSDEC/NYSDOH	Feb, 2016	Mar, 2016	Approved SVI Mitigation Work Plan by NYSDEC/NYSDOH
SSDS Installation	EnviroTrac	Mar, 2016	May, 2016	SSDS Performance Report
SSDS Performance Report Review	NYSDEC/NYSDOH	May, 2016	Jun, 2016	Approved SSDS Performance Report by NYSDEC/NYSDOH
SSDS Construction Completion Report (CCR)	EnviroTrac	Jun, 2016	Jul, 2016	SSDS CCR
ISCO Pre-Design Investigation	EnviroTrac	Jan, 2016	Apr, 2016	Hot Zone ISCO Work Plan
Hot Zone ISCO Work Plan Review	NYSDEC/NYSDOH	Apr, 2016	May, 2016	Approved Hot Zone ISCO Work Plan by NYSDEC/NYSDOH
ISCO Pilot Test	EnviroTrac	May, 2016	TBD	ISCO Pilot Test Report
ISCO Pilot Test Report Review	NYSDEC/NYSDOH	TBD	TBD	Approved ISCO Pilot Test Report by NYSDEC/NYSDOH
Full Scale ISCO Implementation	EnviroTrac	TBD	TBD	ISCO CCR/Final Engineering Report
Development of Site Management Procedures	EnviroTrac	TBD	TBD	Site Management Plan

5.0 SAMPLING AND ANALYTICAL REQUIREMENTS

5.1 Sampling Methods and Locations

5.1.1 Pre-Design Groundwater Sampling

Twenty eight (28) groundwater monitoring wells, designated IW-1 through IW-28, will be installed and sampled to assess chlorinated VOC concentrations to the west of the Site and define the volume of groundwater where total concentrations exceed the 1,000 ug/l remedial goal. Samples will be collected utilizing passive diffusion bag (PDB) samplers from discreet depths within the well screen zones and analyzed for EPA method 8260C VOCs plus 10 tentatively identified compounds (TICs). The rational for analysis of tentatively identified compounds is to more accurately estimate the VOC chemical mass requiring ISCO treatment. 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 West of the Site	Variable	VOCs + 10 TICs	70	See Below	Determine COC Concentrations within the Suspected Hot Zone
Groundwater	Trip Blank	---	VOCs + 10 TICs	1 per cooler	See Below	Field QC
Groundwater	Blind Duplicate	TBD	VOCs + 10 TICs	4	See Below	Field QC
Groundwater	MS/MSD	TBD	VOCs + 10 TICs	4	See Below	Laboratory QC

Sample Nomenclature:

Samples will be identified using an alphanumeric code. A two-digit number, beginning with 01 and increasing sequentially, will identify each of the twenty eight wells (IW-01 through IW-28) that are installed as vertically nested pairs at 14 locations. Five PDBs will be deployed at each of the 14 locations (2 in the shallow well and 3 in the deeper well). The groundwater sample collection date (i.e. approximately 3 weeks after the deployment of the PDBs to allow for equilibration) will be noted in the sample name using an MS Excel date to number conversion (e.g., January 1, 2016 would be noted as 42370). Therefore the sample name would be IW-[*well number*]-[*PDB interval number*]-[*sampling date*].

Example: Sample designations for drilling location #1 comprised of wells IW-01 and IW-02 would be noted as follows using the example January 1, 2016 sample collection date:

IW-01-1-42370, IW-01-2-42370, IW-02-3-42370, IW-02-4-42370, IW-02-5-42370

5.1.2 ISCO Treatability Soil Sampling

Soil samples will be collected during the proposed injection/monitoring well installations and submitted to Carus Corporation, a Carus Group Inc. company, for bench-scale treatability testing. The proposed injection/monitoring well locations are depicted on Figure 2. Natural organic matter (NOM) and reduced metal species in the subsurface can exert a significant oxidant demand that compete with the COCs for available permanganate, directly affecting permanganate persistence and transport in the subsurface, and possibly resulting in incomplete oxidation of the target compounds. In most cases, the natural oxidant demand is the most important factor in determining permanganate dosage for ISCO.

A permanganate soil oxidant demand (PSOD) study will be performed by Carus to determine the amount of permanganate required to satisfy the site-specific PSOD in consideration of the RAOs. In addition to the amount of NOM, the initial dose of permanganate and the reaction time available also have a significant impact on the PSOD. Therefore, different dosage rates are typically applied during the PSOD test.

Soil samples to be used in the bench-scale study will be collected from the saturated zone and within the vertical interval associated with the currently defined Hot Zone (i.e., approximately 40 to 80 ft bls) using split-spoon sampling techniques during the pre-design installation of selected injection/monitoring wells. Samples from at least one boring location from each of the four well transects (i.e., upgradient, mid-plume and downgradient locations shown on Figure 2) will be collected for this purpose. The goal of this task will be to analyze samples representing differing soil types to assess potential variation in formation-related oxidant demand across the anticipated extent of the Hot Zone.

Treatability testing results will be used to finalize the ISCO design that will be provided in the Hot Zone ISCO Work Plan.

5.2 Analytical Methods and Requirements

5.2.1 Groundwater

The laboratory providing groundwater analytical services is Phoenix Environmental Laboratories, Inc., Manchester, CT (LABID 11301). Phoenix is an Environmental Laboratory Accreditation Program (ELAP) laboratory certified to conduct the following analyses.

- Air and Emissions
- Non Potable Water
- Potable Water
- Solid and Hazardous Waste

The proposed analytical methods for groundwater include:

Matrix	Analytical Group	Bottle	Preservative	Analytical Method	Holding Time
Aqueous	VOCs + 10 TICs	40 ml. Glass w/Teflon®- lined cap	Cool 4°C, HCL to pH<2	8260C	14 days

5.2.2 Soil

Soil samples collected during well installation will be analyzed by Carus using ASTM Method D7262-10, Test Method A, for permanganate natural oxidant demand (PNOD) analysis. For each sample approximately 8 ounces of soil will be sent to the lab in glass jars, no special preservation procedures are needed.

5.3 Reference Limits and Evaluation

Matrix		Aqueous			
Analytical Group		VOCs + 10 TICs			
Analytical Method		SW 846-8260C			
Analyte	CAS Number	Name of State/Territ ory/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	1	3	20 / 70-130
1,1-Dichloroethane	75-34-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130
Chloroform	67-66-3	NYSDEC Division of Water TOGS 1.1.1: 7 ug/L	0.25	5	20 / 70-130
Carbon tetrachloride	56-23-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
1,2-Dichloropropane	78-87-5	NYSDEC Division of Water TOGS 1.1.1: 1 ug/L	0.25	1	20 / 70-130
Dibromochloromethane	124-48-1	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.25	1	20 / 70-130
1,1,2-Trichloroethane	79-00-5	NYSDEC Division of Water TOGS 1.1.1: 1 ug/L	0.25	1	20 / 70-130
Tetrachloroethene	127-18-4	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
Chlorobenzene	108-90-7	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130
Trichlorofluoromethane	75-69-4	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
1,2-Dichloroethane	107-06-2	NYSDEC Division of Water TOGS 1.1.1: 0.6 ug/L	0.25	0.6	20 / 70-130
1,1,1-Trichloroethane	71-55-6	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130
Bromodichloromethane	75-27-4	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.25	1	20 / 70-130
trans-1,3-Dichloropropene	10061-02-6	NYSDEC Division of Water TOGS 1.1.1: 0.4 ug/L	0.25	0.4	20 / 70-130
cis-1,3-Dichloropropene	10061-01-5	NYSDEC Division of Water TOGS 1.1.1: 0.4 ug/L	0.25	0.4	20 / 70-130
Bromoform	75-25-2	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.25	5	20 / 70-130
1,1,2,2-Tetrachloroethane	79-34-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
Benzene	71-43-2	NYSDEC Division of Water TOGS 1.1.1: 1 ug/L	0.25	0.7	20 / 70-130
Toluene	108-88-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130
Ethylbenzene	100-41-4	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130
Chloromethane	74-87-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130
Bromomethane	74-83-9	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130
Vinyl chloride	75-01-4	NYSDEC Division of Water TOGS 1.1.1: 2 ug/L	0.25	1	20 / 70-130
Chloroethane	75-00-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130
1,1-Dichloroethene	75-35-4	NYSDEC Division of Water TOGS 1.1.1: 0.7 ug/L	0.25	1	20 / 70-130
trans-1,2-Dichloroethene	156-60-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	5	20 / 70-130

Matrix		Aqueous			
Analytical Group		VOCs + 10 TICs			
Analytical Method		SW 846-8260C			
Analyte	CAS Number	Name of State/Territ ory/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	0.25	1	20 / 70-130
1,2-Dichlorobenzene	95-50-1	NYSDEC Division of Water TOGS 1.1.1: 3 ug/L	0.25	1	20 / 70-130
1,3-Dichlorobenzene	541-73-1	NYSDEC Division of Water TOGS 1.1.1: 3 ug/L	0.25	1	20 / 70-130
1,4-Dichlorobenzene	106-46-7	NYSDEC Division of Water TOGS 1.1.1: 3 ug/L	0.25	1	20 / 70-130
Methyl tert butyl ether	1634-04-4	NYSDEC Division of Water TOGS 1.1.1: N/A	0.25	1	20 / 70-130
p/m-Xylene	106-42-3/108-38-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
o-Xylene	95-47-6	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
cis-1,2-Dichloroethene	156-59-2	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
Styrene	100-42-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
Dichlorodifluoromethane	75-71-8	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
Acetone	67-64-1	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	2.5	2.5	20 / 70-130
Carbon disulfide	75-15-0	NYSDEC Division of Water TOGS 1.1.1: N/A	0.25	1	20 / 70-130
2-Butanone	78-93-3	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	0.25	1	20 / 70-130
4-Methyl-2-pentanone	108-10-1	NYSDEC Division of Water TOGS 1.1.1: N/A	2.5	2.5	20 / 70-130
2-Hexanone	591-78-6	NYSDEC Division of Water TOGS 1.1.1: 50 ug/L	2.5	2.5	20 / 70-130
Bromochloromethane	74-97-5	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
1,2-Dibromoethane	106-93-4	NYSDEC Division of Water TOGS 1.1.1: 0.0006 ug/L	0.25	1	20 / 70-130
1,2-Dibromo-3-chloropropane	96-12-8	NYSDEC Division of Water TOGS 1.1.1: 0.04 ug/L	0.5	1	20 / 70-130
Isopropylbenzene	98-82-8	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
1,2,3-Trichlorobenzene	87-61-6	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
1,2,4-Trichlorobenzene	120-82-1	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
Cyclohexane	110-82-7	NYSDEC Division of Water TOGS 1.1.1: N/A	0.5	5	20 / 70-130
Methylacetate	79-20-9	NYSDEC Division of Water TOGS 1.1.1: N/A	2.5	5	20 / 70-130
Methylcyclohexane	108-87-2	NYSDEC Division of Water TOGS 1.1.1: N/A	0.5	5	20 / 70-130
Total Xylenes	95-47-6 106-42-3 108-38-3	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130
Trichlorotrifluoroethane	76-13-1	NYSDEC Division of Water TOGS 1.1.1: 5 ug/L	0.25	1	20 / 70-130

Notes:
RPD – Relative Percent Difference
R - Recovery

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 procedures will be utilized for the collection of groundwater samples using passive diffusion bags, permeable water filled plastic bags that allow for movement of VOCs through the bag via chemical diffusion. The use of these devises has been well documented through deployments at a multitude of sites over many years. They represent a "green" technology as their use drastically reduces/eliminates purge waste that must be managed and transported through the use of vehicles utilizing fossil fuels. Their use also significantly reduces on-site time by field personnel and elimination of powered equipment, thereby reducing carbon footprint and reducing injury risk.

PDB Specifications

Pre-filled passive diffusion bags (PDBs) will be procured from ALS Environmental (ALS). ALS Environmental has been granted a license to manufacture, use and provide the bags by the US Geological Survey (USGS) and The General Electric Company (GE), both co-patent holders on the product (US #5,804,743).

PDBs are medical grade, high strength low density polyethylene tubes or bags filled with analyte-free certified ASTM Type II deionized water. This water is identical to that used in the ALS organics laboratory and certificates of quality (to 0.01 ppb) are provided with each shipment.

Hung in monitoring wells for periods of 14 days or more, or until equilibrium is complete between the contaminants in the bag and the surrounding groundwater, the PDB operates by diffusion of contaminates across the polyethylene membrane. No purging is necessary.

Further information pertaining to the use of PDBs is provided by the USGS (2001), *User's Guide for Polyethylene-Based Passive Diffusion Bag Samplers to Obtain Volatile Organic Compound Concentrations in Wells*.

PDB Deployment

Deploy the PDB in the target well as soon as possible upon removal from the shipping/storage pouch.

1. Open the well by removing the protective manhole or opening the top of the protective stickup and measure and record the depth to groundwater and the total depth of the well in the field book.
2. The PDB should be attached to the hanging line at a depth ensuring they hang at the pre-determined location in the well screen.
3. A weight should be fastened below the PDB to ensure that the unit is placed at the proper interval in the well.
4. Secure the line to the well cap before lowering the PDB and assembly into the well.

5. Lower the weight into the well first, followed by the line and PDB until the assembly is at the target depth.
6. Secure the cap onto the top of the well riser.
7. Secure the well by reinstalling the manhole cover or by closing and locking the protective stickup.
8. The PDB is then left undisturbed for a pre-determined period to allow for equilibration of groundwater and the interior liquid within the PDB.

PDB Retrieval and Groundwater Sample Collection

After the PDB has reached its targeted equilibration period, it is removed from the well and the contents are transferred to laboratory supplied glassware.

1. Open the well by removing the protective manhole or opening the top of the protective stickup and measure and record the depth to groundwater in the field book.
2. Field experience has shown that using a plastic winder or a spool winder to retrieve the PDB allows the sampler to keep the line from tangling.
3. If a single individual is retrieving the PDB, it is helpful to have a 2-4 foot long PVC pipe that has been cut in half length-wise. The field sampler can lay the PDB in the pipe after retrieval prior to sample replacement into the VOA vials. A PVC pipe may be procured from any building or hardware supplier.
4. The contents of the PDB should be poured into the VOA vials at the well head. Studies have shown that there is loss of volatile organics from the PDB within 30 minutes after retrieval. Using decontaminated scissors, cut off the angled end of the PDB, then pour the contents of the PDB carefully into the VOA vials, taking care to avoid splashing or unnecessary mixing of air into the sample.
5. Fill each vial just to overflowing and maintain a reverse meniscus. Cap the vial, making sure there are no bubbles or headspace.
6. Secure the cap onto the top of the well riser.
7. Secure the well by reinstalling the manhole cover or by closing and locking the protective stickup.
8. Dispose of the remnants of the PDB and any unused sample appropriately.

6.2 Permanganate Natural Oxidant Demand (PNOD) Determination

Selected soil samples collected during the injection/monitoring well installations via split spoon samplers will be submitted to Carus Corporation for testing to assess the natural oxidant demand inherent to specific soil types encountered. A minimum of one sample for each soil type (e.g., medium sand versus silty clay) will be submitted for analysis. Carus utilizes ASTM Method D7262-10, Test Method A for this analysis. See Attachment B for more information pertaining to the sample submittal procedure.

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 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;
- 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);
- 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 Phoenix Environmental Laboratories, Incorporated 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 Phoenix Environmental 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 Phoenix Environmental Laboratories, Incorporated Quality Manual (Document Control Number 15-1028-1, Date Issued October 28, 2015) provides specific detailed information pertaining to the following:

- Quality Manual Identification Form
- 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
- 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
- Type of Shipment – overnight carrier, laboratory courier

Sample Receipt and Analysis

- Sample Receipt – lab
- Sample Custody and Storage – lab
- Sample Preparation – lab
- Sample Determinative Analysis – lab

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.
- 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 + 10 TICs
Sampling SOP(s)	See Section 6
Analytical Method/SOP Reference	SW-846 8260C
Sampler's Name	EnviroTrac Field Representative
Field Sampling Organization	EnviroTrac
Analytical Organization	Phoenix Environmental Laboratories, Inc.
No. of Sample Locations	28 (plus MS/MSD and Duplicate)

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
- 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
- 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	Phoenix Environmental Laboratories, 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

[1]Step I – Completeness Check
[2]Internal 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 Phoenix Environmental Laboratories, 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).	Phoenix Environmental Laboratories, 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 + 10 TICs	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.

[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.
- 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
- 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

USGS (2001). User's Guide for Polyethylene-Based Passive Diffusion Bag Samplers to Obtain Volatile Organic Compound Concentrations in Wells.

Phoenix Environmental Laboratories, Incorporated. Quality Manual (Document Control Number 15-1028-1, Date Issued October 28, 2015).

FIGURES

TOPOGRAPHIC MAP

Figure 1
Topographic Map

16 Atlantic Avenue
Oceanside, New York

USGS Quadrangle:
Lynbrook

Approx. Elevation:
14 feet

N
W E
S

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


N
SSC-RI-MW-3
SSC-CMT-2
SSC-CMT-1
SSC-RI-MW-2
LEGEND:
"Hot Zone" Location (>1000 ug/L)
Existing Monitoring Well Location
Proposed Monitoring/Injection Well Location (14 Total)
USGS QUADRANGLE:
Lynbrook
APPROXIMATE ELEVATION:
15 Feet
SCALE:
0 15' 30' 45' 60'
SCALE IN FEET
DATE:
12/16/15
FIGURE:
2
DRAFTED BY:
NC
MAP:
Proposed Monitoring/Injection Well Locctions
SITE:
Smart Set Cleaners
16 Atlantic Avenue
Oceanside, NY 11572
EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631.924.3001 F: 631.924.5001

ATTACHMENT A

RESUMES OF KEY PERSONNEL

CORPORATE RESUME

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

Please Contact:

6 Terri Lane, Suite #350

Burlington, NJ 08016

609.387.5553

Or visit our website:

www.envirotrac.com

About EnviroTrac

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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-

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

Jeffrey A. Bohlen, CPG
Principal Geologist

EnviroTrac

jefffb@envirotrac.com
631.924.3001

Experience Snapshot

Mr. Bohlen has over 20 years experience as a Senior Project Manager and Principal Geologist in the environmental consulting and construction industry. Specific experience includes: Insurance-related desktop reviews, cause/origin reports, subsidence reviews, geophysical investigations, compliance audits, Phase I and II Environmental Site Assessments (ESAs), NYC "e" designated properties, brownfield properties, conducting two– and three-dimensional hydrogeologic modeling for simulating groundwater flow and contaminant transport, health and safety monitoring, environmental remediation, design of soil and groundwater remediation systems and management of the remedial process.
Mr. Bohlen is responsible for managing staff and resources, prepairing technical reports, developing budgets, outlining equipment and labor costs for the management of individual remedial projects.

Licenses/Certifications

Certified Professional Geologist (CPG #11381), American Institute of Professional Geologists
Environmental Assessment Association (EAA), Certified Environmental Inspector
Asbestos Air Monitoring Certification
OSHA Lead Construction Training
Visual MODFLOW Certification
OSHA Certification, 40 hr. Health & Safety Training at Hazardous Waste Sites
OSHA Certification, 8 hr. Refresher Health & Safety Training at Hazardous Waste Sites
OSHA Certification-Confined Space Entry and Supervision
American Petroleum Institute—API Work Safe Training
Smith System Driver Safety Training

Strengths

- Remedial Investigation & Feasibility Studies
- Phase I & II ESAs
- Corporate Compliance Audits
- Geotechnical Surveys & Subsurface Investigations
- Storage Tank Management
- Expert Testimony/Forensics
- Design of Remedial Systems
- Brownfield Projects

Education

- BS Environmental Geology, Minor Business Management, Long Island University
- Completed Hydrogeology Field Course, Western Michigan University, 1995

Experience highlight 2015

Corporate Resume

Jeffrey A. Bohlen, CPG

Principal Geologist

Please Contact:

5 Old Dock Road

Yaphank, NY 11980

631.924.3001

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Professional Affiliations

Member of the National Groundwater Association

Member of the Long Island Association of Professional Geologists (LIAPG)

Professional History

- 1999—Present, EnviroTrac Ltd., Senior Project Manager and Principal Geologist
- 1994—1999, Anson Environmental Ltd., Hydrogeologist/Project Manager

Professional Highlights and Selected Projects

- 2005 - Great Lincoln, LLC v. Smartset Cleaners, Inc. et. al.- Retained and qualified as an Expert, Mr. Bohlen represented the property owner (Plaintiff) of commercial strip stores that included a dry cleaner operation (Defendant) in Nassau County, New York. Mr. Bohlen was involved in the investigation of chlorinated solvents in soil and ground water, developed a remedial action plan (RAP) that was approved by the 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. Bohlen 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.
- As a Senior Project Manager and Principal Geologist for EnviroTrac, Mr. Bohlen is involved in managing numerous remedial projects throughout New York State. Investigation and delineation techniques have included soil borings, groundwater monitoring well networks, direct push sampling, geophysical investigations, soil-gas surveys, aquifer testing, surface water and sediment sampling, waste characterization (soil piles, drums, USTs, ASTs, landfills, etc.), test pits, and computer fate & transport modeling. His extensive experience in the above-referenced techniques allows Mr. Bohlen to design and implement cost-effective and timely investigation programs.
- Mr. Bohlen has extensive experience in the selection, design, installation and maintenance of a wide range of soil and ground water remediation systems. Remedial systems have included both active and passive free phase product recovery, pump and treat, soil vapor extraction, air sparging, bioremediation, excavation, dual-phase extraction, chemical oxidation technologies, oxygen releasing compounds and natural attenuation.
- Mr. Bohlen performed several hundred Phase I and II Environmental Site Assessments for commercial, industrial and public utility clients throughout the New York area. Phase I ESAs have been conducted for both property buyers and sellers. Mr. Bohlen recommends additional investigatory or remedial work, as warranted. These projects are usually conducted on a quick turnaround as real-estate transactions are often dependent upon the outcome of the Phase I and II reports.

Experience highlight 2015

Professional Highlights and Selected Projects

- Mr. Bohlen has managed over 200 UST system closures in New York State. Responsibilities included coordinating with the State and local regulatory agencies, local fire marshals, building departments and contractors to permit and remove petroleum USTs. Following UST removal, responsibilities included report preparation and submittal to regulators. Results of submittals either documented closure levels or recommended further investigation.
- Mr. Bohlen has a strong working relationship with local and State environmental regulators including the U.S. Environmental Protection Agency, New York State Department of Environmental Conservation, Suffolk County Department of Health Services and Nassau County Department of Health. These relationships allow Mr. Bohlen to make accurate recommendations for sites with environmental impact.
- Mr. Bohlen conducted several RCRA Closures at industrial facilities throughout the New York metro area. These closures included the development of an approved Closure Plan and Quality Assurance Project Plan (QAPP) for the removal of hazardous waste and subsequent sampling for site closure.
- Mr. Bohlen managed the closure of over 25 underground injection wells in accordance with Federal Underground Injection Control (UIC) requirements and local regulations. Closure responsibilities included preparation of submittals to notify EPA of injection cessation, development of sampling plans and coordinating subcontractors to excavate and/or remove the injection system. Following excavation/removal, responsibilities included documentation sampling, contaminated water and soil disposal coordination, reporting and follow up soil and/or ground-water investigation.
- As soil vapor intrusion (SVI) investigations have become a more frequent regulatory requirement, Mr. Bohlen has worked with the New York State Department of Environmental Conservation to implement these investigations and develop mitigation systems for indoor air.
- By having a diverse portfolio of clients that include the industrial, telecommunications, petroleum, transportation, financial, and insurance industries, Mr. Bohlen and his team at EnviroTrac are more than capable to solve today's environmental issues.

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5 Old Dock Road

Yaphank, NY 11980

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CORPORATE RESUME

Dale Konas, PE
Principal Engineer

dalek@envirotrac.com
631.924.3001

Experience Snapshot

Mr. Konas has over 19 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 Enviro-Trac. Ltd., Mr. Konas is responsible for management of the engineering team and the oversight of all aspects of engineering company wide.

Licenses/Certifications

New York Professional Engineer, No. 081035
Florida Professional Engineer, No. 64384
South Carolina Professional Engineer, No. 27513
North Carolina Professional Engineer, No. 034561
Maryland Professional Engineer, No. 40096
Pennsylvania Professional Engineer, No. PE080942
Rhode Island Professional Engineer, No. 9795
Virginia 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 2015

Corporate Resume

Dale Konas, PE

Principal Engineer

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Yaphank, NY 11980

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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).

Corporate Resume

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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.

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.

Please Contact:

5 Old Dock Road

Yaphank, NY 11980

631.924.3001

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CORPORATE RESUME

Peter C. Breen, PG, CPG
Senior Project Manager

pbreen@envirotrac.com
631.924.3001

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-724, State of Alaska

Certified Professional Geologist, CPG #11417, American Institute of Professional Geologists

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 2015

Corporate Resume

Peter C. Breen, PG, CPG

Senior Project Manager

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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.

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.

Please Contact:

5 Old Dock Road

Yaphank, NY 11980

631.924.3001

Or visit our website:

www.envirotrac.com

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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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- **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

- **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.

- **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.

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Professional Highlights and Selected Projects

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.

Regulatory and Public Agencies

- **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

Professional Highlights and Selected Projects

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.
- **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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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.* Exx-onMobil 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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ATTACHMENT B

CARUS CORPORATION PNOD TECHNICAL BRIEF

CARUS
REMEDIATION



Permanganate Natural Oxidant Demand (PNOD)
Procedure and Non-Regulated Soil
Submittal Procedure

RemOx® ISCO Reagent

TECHNICAL BRIEF

PROCEDURE

Carus Corporation follows ASTM Method D7262-10, Test Method A, for permanganate natural oxidant demand (PNOD) analysis. A brief summary of D7262-10 Test Method A follows:

For each soil sample, 600 g of soil are baked at 105°C. The soils are dosed in triplicate at one initial potassium permanganate ($KMnO_4$) level of 100 ml of 20g/L $KMnO_4$ to 50 g of soil for an initial dose of 40 g $KMnO_4$/kg dry soil. The reactor vials are gently inverted. Following 48 hours of reaction time, the liquid portion of the treated sample is analyzed for permanganate residual following method 4500-$KMnO_4$ Potassium Permanganate in Standard Methods for the Examination of Water and Wastewater.

To order a complete copy of the ASTM method, visit http://www.astm.org.

NON-REGULATED SOIL SUBMITTAL PROCEDURE

Note: This procedure is for soils from areas of the United States for which movement is not restricted under the U.S. Department of Agriculture (USDA).

For each sample location at a remediation site, collect at least 600 grams of soil sample. Two completely filled 250-mL wide mouth glass jars (free of large rocks) with PTFE lined screw caps will provide a sufficient quantity. The ASTM D7262-10 method for PNOD specifies that at least 600 grams soil/aquifer solids be available at the start of testing. Groundwater is not collected for this method.

Fill the containers completely and pack the soil as tightly as possible to eliminate as much entrapped air as possible.

Record the following information on the labels of the sample containers:

- Date and time of sampling
- Location of the sampling
- Initials of the person collecting the sample

Enclose the bottles in bubble wrap or other acceptable packing material to prevent the glass bottles from breaking in transit. Place the samples in a cooler with ice if needed to maintain proper temperature. ASTM D7262-10 specifies the holding time of samples as up to 28 days if held at 4°C.

The Carus laboratory is closed on weekends and holidays. Samples should be shipped between Monday and Thursday to the address below specify overnight delivery. As part of the Responsible Care® 14001 Plant Security requirements, the following information must be on the outside of the shipping container:

Carus Corporation
Attention: Dylan Kemmerer
1500 Eighth Street
Bldg 45- Customer Service Lab
LaSalle, IL 61301

Also include the name and address of the originator, the contact person and a phone number on the shipping container.

Note: The Carus receiving department will not accept samples without the identifications above.

CORPORATE HEADQUARTERS | 315 Fifth Street, Peru IL 61354 | Tel + 1.815.223.1500 / 1-800-435-6856 | Fax + 1.815.224.6697 | Web: www.caruschem.com | E-Mail: salesmkt@caruschem.com
CARUS EUROPE | Parque Empresarial de ASIPO | C/Secundino Roces 3, Planta 1, Oficina 13-14 | 33428 Cayes, Llanera Spain | Tel +34.985.78.55.13 / Fax +34.985.78.55.10

RESPONSIBLE CARE®
OUR COMMITMENT TO SUSTAINABILITY

CARUS®

APPENDIX D

HEALTH AND SAFETY PLAN

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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 at the Smart Set Cleaners Site located at 16 Atlantic Avenue, Oceanside, New York (Site). Specifically this plan applies to the activities detailed in:

Smart Set Cleaners Site Number 130194 Remedial Design/Remedial Action Work Plan (RD/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 remediations. 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 in follow-up training if either new tasks are to be performed or changes in site conditions occur.

B. Safety Officer: The designated Safety Officer will have experience in the remediation of hazardous waste sites or related field experience. The designated Safety Officer will have formal training in health and safety and will be conversant with federal and state regulations governing occupational health and safety. The designated Safety Officer 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 Safety office 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 Safety Officer 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 Safety Officer (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

The Site is an Inactive Hazardous Waste Site located at 16 Atlantic Avenue, Oceanside, New York. The Site is a one tenant unit (currently a nail salon) with a basement that occupies approximately 0.09 acres within a 3.9 acre shopping center. A routine inspection of the Smart Set Cleaners facility by the Nassau County Department of Health (NCDOH) in the mid-1990s revealed the existence of interior floor drains that were considered injection wells by the United States Environmental Protection Agency (EPA). In 1998, a groundwater sample was collected from a floor drain that showed the presence of the dry cleaning solvent tetrachloroethylene (PCE). The NCDOH in conjunction with the EPA pursued the investigation of the source of groundwater contamination. In 2001, the NCDOH oversaw removal of contaminated soils from the rear of the facility by the owner. The owner's consultant, with oversight by the NCDOH, removed eight cubic yards of soil from the rear of the building beneath the sidewalk in January, 2001 and proceeded with a subsurface investigation that was completed in May 2001. Additional investigations and a Remedial Action Plan (RAP) were completed in 2002. The contaminants of concern (COCs) reported to exceed applicable standards included tetrachloroethylene (PCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and trichloroethylene (TCE), also known as chlorinated volatile organic compounds (CVOCs), and were detected in the soil, soil vapor, and groundwater at the Site and adjacent tenant units. A site vicinity map and general site plan are presented as figures 1 and 2 respectively.

The scope of work is outlined in the Remedial Design/Remedial Action Work Plan (RD/RAWP) and consists of the installation of monitoring well for planning and design of a subsurface injection of Sodium Permanganate; and revise the existing Soil Vapor Extraction (SVE) system into a Subsurface Depressurization system.

CONTAMINANTS OF CONCERN:

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ug/l)	SCG
Volatile Organic Compounds (VOCs)	cis-1,2-dichlorethylene (cis-1,2-DCE)	ND-430	5
	Tetrachloroethylene (PCE)	ND-4,100	5
	Trichloroethylene (TCE)	ND-570	5

Soil	Contaminants of Concern	Concentration Range Detected (mg/kg)	SCG (mg/kg)
Volatile Organic Compounds (VOCs)	Tetrachloroethylene (PCE)	0.014	1.3
	Acetone	0.005	0.05
	Methylene chloride	0.002	0.05

SOIL VAPOR (on and off site)	Contaminants of Concern	Concentration Range Detected (ug/m3)	SCG (ppb)
Volatile Organic Compounds (VOCs)	Tetrachloroethylene (PCE)	ND-3,400	NA
	Trichloroethylene (TCE)	ND-220	NA

ug/l = micrograms per liter
ug/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
µg/m3 = micrograms per cubic meter
SCG = standards, criteria, and guidance values ND = not detected
NA = none available
J = estimated concentration detected below quantitation limit

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);
Vinyl Chloride - 1.0 ppm OSHA TWA, 5 ppm OSHA STEL 15 minute(s), 0.5 ppm OSHA action level 8 hour(s), 1 ppm ACGIH TWA; Methylene Chloride - TWA: 50 from ACGIH (TLV) [United States] TWA: 174 from ACGIH (TLV) [United States];
1,2-dichlorethene - OSHA 50 ppm TWA 100 ppm ceiling, ACGIH 10 ppm TWA NIOSH 1 ppm TWA; 4 mg/m^3 TWA; 50 ppm IDHL;
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 workers could be exposed generally include: inhalation, ingestion, dermal contact, and injection. 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	**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.)**
	Potential exposure to hot surfaces (muffler) that can cause burns and/or be a potential hot works issue.	**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.**
	Potential fire and/or explosion hazard from fuel.	**Shut off when re-fueling, use a funnel to alleviate potential for spills, clean up any spilled fuel immediately.**
	Strike hazard from pressurized air lines disconnecting.	**Inspect all lines and connections, take defective parts out of service, use whip checks and/or cotter pins at all connections, every time.**
	Injury from being struck by compressed air.	**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.**
	Injury from slips, trips, and falls from equipment associated with air compressor.	**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 (i.e., SODIUM PERMANGANATE)	Potential exposure to hazardous substances due to chemical remediation solution spills and chemical reactions due to injection of chemical remediation solution into the contaminated groundwater or activation of the chemical (i.e., vapors).	**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 and properly store remediation chemicals when not being utilized.** **Properly store chemicals in sealed container or vessel within a cool, dry storage area to avoid moisture, heat sources, contaminants, and/or incompatible materials (i.e., water, acids, bases, slats of heavy metals, reducing agents, organic materials, flammable or combustible materials) that can initiate a chemical reaction or decomposition. Never discard spilled or otherwise contaminated materials into trash bins or back into the original container.**

The Safety Data Sheet for Sodium Permanganate 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 MendehIson, 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 permanganate injection 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**
Injecting Permanganate	• **Same as All Site Tasks, and to include:** • **Faceshield attached to hardhat, with safety glasses worn underneath** • **Splash-resistant chemical suit** (e.g., Saranex or Tyvek) • **Rubber boots**
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 RD/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. Escape SCBA (authorized visitor use);

    f. Face shields;

    g. Safety glasses;

    h. Respirators and appropriate cartridges;

    i. Disposable coveralls;

    j. Chemical-resistant boots and latex boot covers;

    k. Hard hats;

    l. Bottled Breathing air; and

    m. Rain suits.

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:
South Nassau Communities Hospital
1 Healthy Way
Oceanside, New York
516-632-3000

Directions to South Nassau Communities Hospital from 16 Atlantic Avenue:

Atlantic Avenue east to Long Beach Road
Turn left (north) onto Long Beach Road (0.1 mile)
Turn right (west) onto Davison Avenue (0.3 mile)
Turn left (north) onto Oceanside Road (0.7 mile)
Turn right (east) onto Nassau Parkway (0.1 mile)

Turn left (north) onto hospital emergency entrance drive

Route to Hospital – Total Distance Approximately 1.2 miles

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	(516) 632-3000
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
New York State Dept. of Health - Nassau County	(516) 227-9697

15.0 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 D.

16.0 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).

17.0 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.

18.0 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.

19.0 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 RD/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.

20.0 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.

Figures

TOPOGRAPHIC MAP

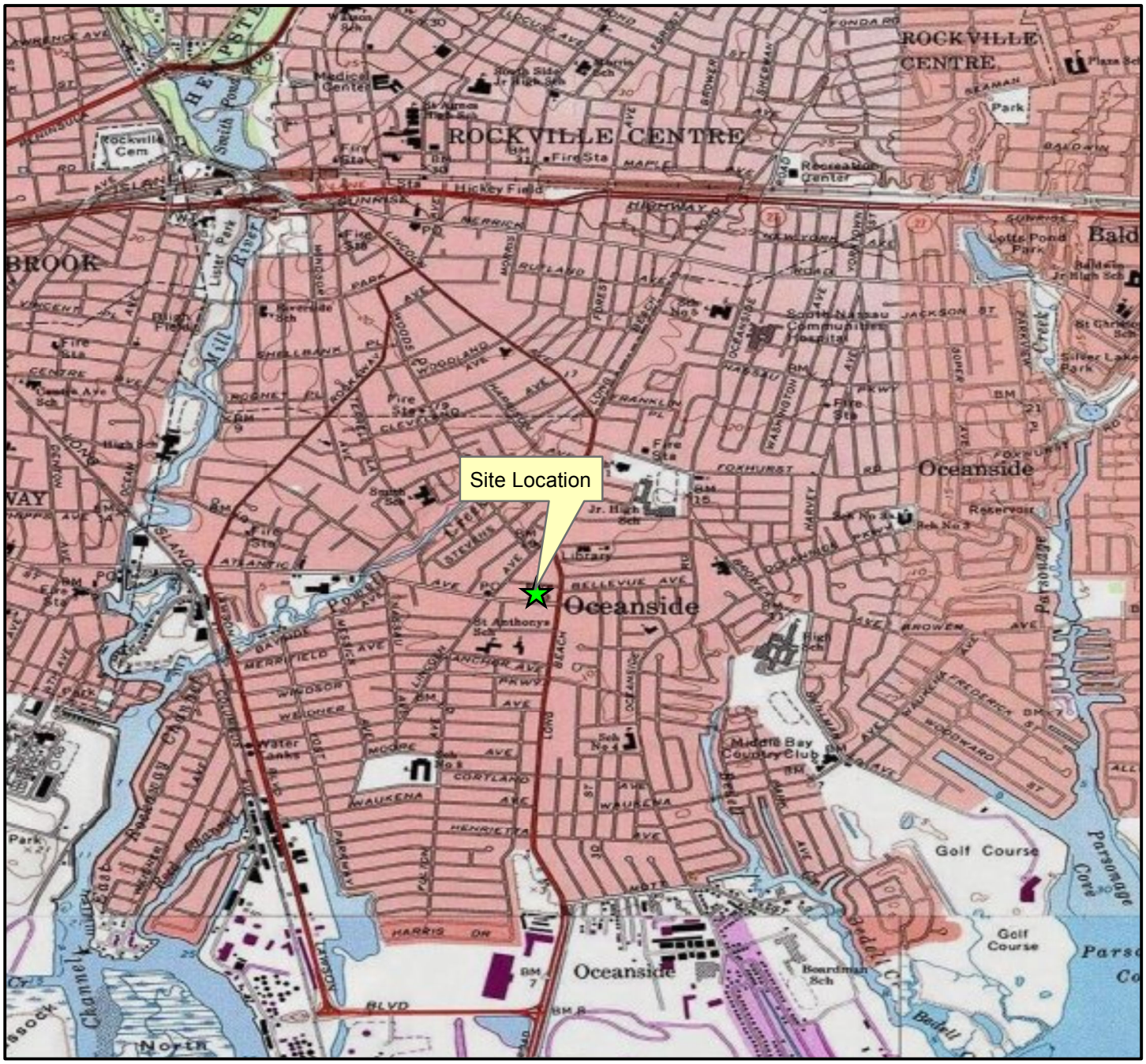


Figure 1
Topographic Map

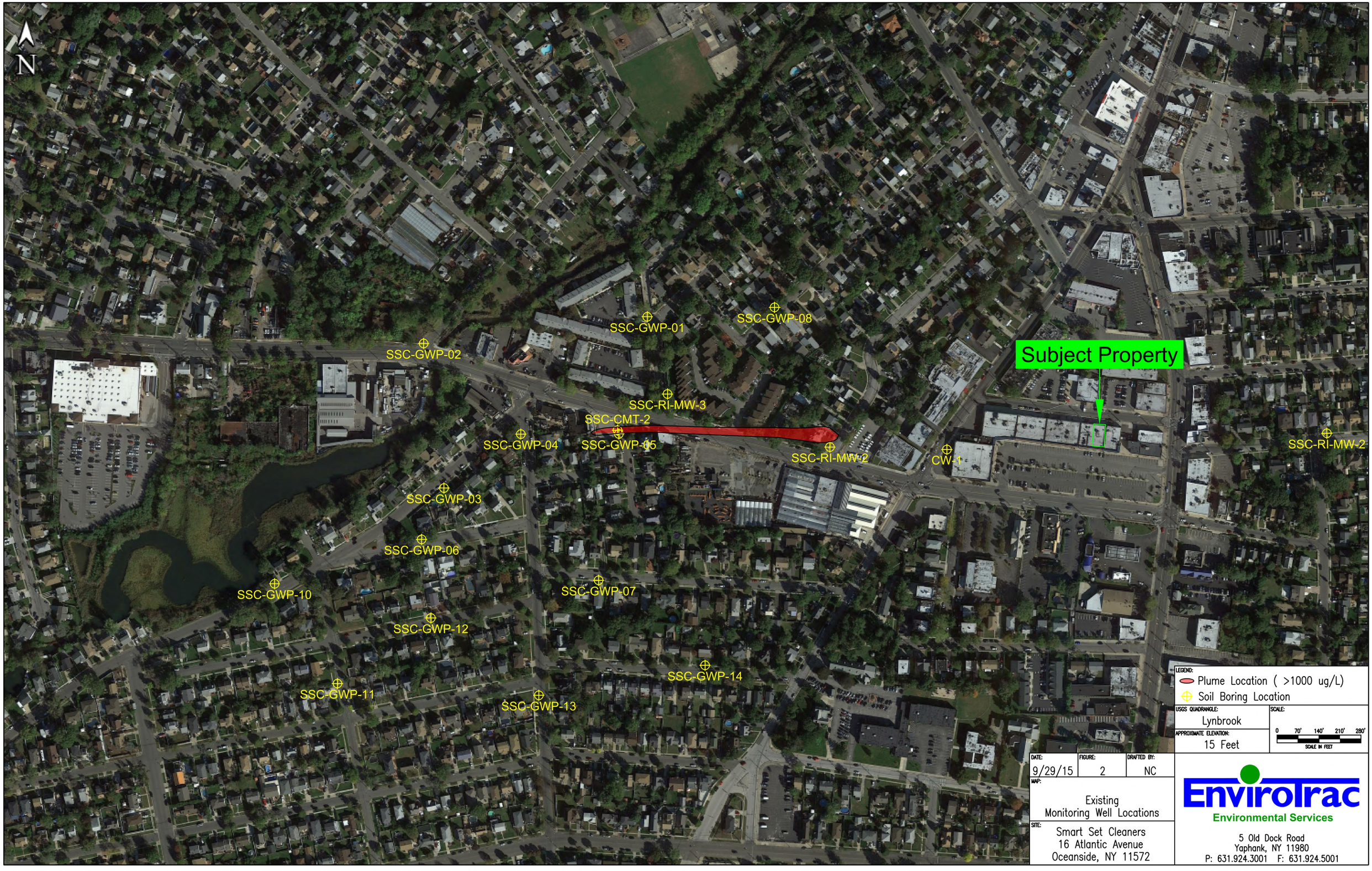
16 Atlantic Avenue
Oceanside, New York

USGS Quadrangle:
Lynbrook

Approx. Elevation:
14 feet

N
W E
S

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


N
SSC-GWP-01
SSC-GWP-08
SSC-GWP-02
Subject Property
SSC-RI-MW-3
SSC-CMT-2
SSC-GWP-04
SSC-GWP-05
SSC-RI-MW-2
CW-1
SSC-RI-MW-2
SSC-GWP-03
SSC-GWP-06
SSC-GWP-10
SSC-GWP-07
SSC-GWP-12
SSC-GWP-14
SSC-GWP-11
SSC-GWP-13
LEGEND:
Plume Location (>1000 ug/L)
Soil Boring Location
USGS QUADRANGLE:
Lynbrook
APPROXIMATE ELEVATION:
15 Feet
SCALE:
0 70' 140' 210' 280'
SCALE IN FEET
DATE:
9/29/15
FIGURE:
2
DRAFTED BY:
NC
MAP:
Existing
Monitoring Well Locations
SITE:
Smart Set Cleaners
16 Atlantic Avenue
Oceanside, NY 11572
EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631.924.3001 F: 631.924.5001

Appendix A
HSC Qualifications

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

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

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

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

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.

Corporate Resume

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

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

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.

Corporate Resume

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

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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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.

<u>Exposing Underground Installations</u>

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:

- EXCAVATION: Any man-made cut, cavity, trench or depression in the earth surface, made by earth removal.
- TRENCH: 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.
- BENCHING: A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal steps.
- SHIELDING: A structure that is able to withstand the forces imposed by a cave-in and thereby protects employees within the structure.
- SHORING: A structure that supports the sides of an excavation and which are designed to prevent cave-ins.
- SLOPING: 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.
- STABLE ROCK: Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed.
- COMPETENT PERSON: 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.

EnviroTrac Environmental Services

TRENCH INSPECTION AND ENTRY AUTHORIZATION FORM

LOCATION:				**DATE:**	
TIME OF INSPECTION(S)					
WEATHER CONDITIONS:				**APPROX. TEMP.:**	
CREW LEADER:				**SUPERVISOR:**	
DIMENTIONS:	**DEPTH =**			Yes No	**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 #	

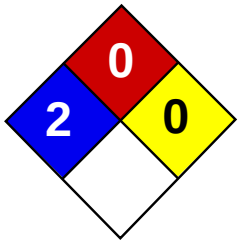
NOTE All unsafe conditions must be corrected prior to trench entry. If any hazardous conditions are observed, the trench must be immediately evacuated and no one is allowed to re-enter until corrective action has been taken.

Certification by Competent Person

Excavation Entry Authorized By: _____

Designated Competent Person

Appendix C
Tetrachloroethylene and Sodium Permanganate Safety Data Sheets



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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RemOx® L
ISCO Reagent

EC- SAFETY DATA SHEET according to Regulation (EC) № 1907/2006 of the European Parliament and of the Council, of 18 December 2006 concerning REACH

Material Safety Data Sheet

Section 1 Chemical Product and Company Identification

PRODUCT NAME: RemOx® L ISCO Reagent **TRADE NAME:** RemOx® L ISCO Reagent	**Revision Date: April 2008**

USES OF SUBSTANCE: RemOx® L ISCO Reagent is a liquid oxidant recommended for in-situ and ex-situ remediation of sites that require a strong oxidant.

COMPANY NAME (Europe): CARUS NALON S.L.	**COMPANY ADDRESS:** Carus Nalon S.L. Barrio Nalon, s/n 33100 Trubia-Oviedo Espana, Spain **INFORMATION:** (34) 985-785-513 (34) 985-785-513 www.caruseurope.com (Web) carus@carusnalon.com (Email) **EMERGENCY TELEPHONE:** (34) 985-785-513
COMPANY NAME (US): CARUS CORPORATION	**COMPANY ADDRESS:** 315 Fifth Street Peru, IL 61354, USA **INFORMATION:** (815)-223-1500 www.caruscorporation.com (Web) salesmkt@caruscorporation.com (Email) **EMERGENCY TELEPHONE:** (800) 435 –6856 (USA) (800) 424-9300 (CHEMTREC, USA) (815-223-1500 (Other countries)

Section 2 Hazards Identification

1. Eye Contact
   RemOx® L ISCO Reagent is damaging to eye tissue on contact. It may cause burns that result in damage to the eye.
2. Skin Contact
   Momentary contact of solution at room temperature may be irritating to the skin, leaving brown stains. Prolonged contact is damaging to the skin.
3. Inhalation
   Acute inhalation toxicity data are not available. However, airborne concentrations of RemOx® L ISCO Reagent in the form of mist may cause irritation to the respiratory tract.
4. Ingestion
   RemOx® L ISCO Reagent if swallowed, may cause burns to mucous membranes of the mouth, throat, esophagus, and stomach.

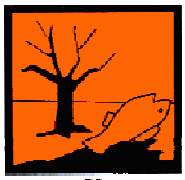
Section 3 Hazardous Ingredients

Material or Component	CAS No.	%	Hazard Data
Sodium Permanganate	10101-50-5	40	**PEL/C** 5 mg Mn per cubic meter of air **TLV-TWA** 0.2 mg Mn per cubic meter of air

HAZARD SYMBOLS:


O


Xn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RISK PHRASES:

8 Contact with combustibles may case fire.
22 Harmful if swallowed.
50/53 Very toxic to aquatic organisms, may cause long-term effects in the aquatic environment.

SAFETY PHRASES:

17 Keep away from combustible materials.
24/25 Avoid contact with skin and eyes.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

Section 4 First Aid Measures

1. Eyes
   Immediately flush eyes with large amounts of water for at least 15 minutes holding lids apart to ensure flushing of the entire surface. Do not attempt to neutralize chemically. Seek medical attention immediately. Note to physician: Decomposition products are alkaline.
2. Skin
   Immediately wash contaminated areas with water. Remove contaminated clothing and footwear. (Caution: Solution may ignite certain textiles). Wash clothing and decontaminate footwear before reuse. Seek medical attention immediately if irritation is severe and persistent.
3. Inhalation
   Remove person from contaminated area to fresh air. If breathing has stopped, resuscitate and administer oxygen if readily available. Seek medical attention immediately.
4. Ingestion
   Never give anything by mouth to an unconscious or convulsing person. If person is conscious, give large quantities of water or milk. Seek medical attention immediately.

Section 5 Fire Fighting Measures

NFPA* HAZARD SIGNS:

Health Hazard 1 = Materials which under fire conditions would give off irritating combustion products. (less than 1 hour exposure) Materials which on the skin could cause irritation.
Flammability Hazard 0 = Materials that will not burn.
Reactivity Hazard 0 = Materials which in themselves are normally stable, even under fire exposure

conditions, and which are not reactive with water.

Special Hazard OX = Oxidizer

***National Fire Protection Association 704**

FIRST RESPONDERS:
Wear protective gloves, boots, goggles, and respirator. In case of fire, wear positive pressure breathing apparatus. Approach incident with caution. Use 2004 Emergency Response Guidebook (U.S. DOT RSPA, TC and STC). Guide No. 140. (http://hazmat.dot.gov/pubs/erg2004/erg2004.pdf).

FLASHPOINT	None
FLAMMABLE OR EXPLOSIVE LIMITS	Lower: Nonflammable Upper: Nonflammable
EXTINGUISHING MEDIA	Use large quantities of water. Water will turn pink to purple if in contact with RemOx® L ISCO Reagent. Dike to contain. Do not use dry chemicals, CO_2Halon® or foams.
SPECIAL FIREFIGHTING PROCEDURES	If material is involved in fire, flood with water. Cool all affected containers with large quantities of water. Apply water from as far as a distance as possible. Wear self-contained breathing apparatus and full protective clothing.
UNUSUAL FIRE AND EXPLOSION	Powerful oxidizing material. May decompose spontaneously if exposed to heat (135°C/275°F). May be explosive in contact with certain other chemicals (Section 10). May react violently with finely divided and readily oxidizable substances. Increases burning rate of combustible material. May ignite wood and cloth.

Section 6 Accidental Release Measures

PERSONAL PRECAUTIONS

Personnel should wear protective clothing suitable for the task. Remove all ignition sources and incompatible materials before attempting clean up.

ENVIRONMENTAL PRECAUTIONS:

Do not flush into sanitary sewer system or surface water. If accidental release into the environment occurs, inform the responsible authorities. Keep the product away from drains, sewers, surface and ground water and soil.

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Contain spill by collecting the liquid in a pit or holding behind a dam (sand or soil). Dilute to approximately 6% with water, and then reduce with sodium thiosulfate, a bisulfite or ferrous salt solution. The bisulfite or ferrous

salt may require some dilute sulfuric acid (10% w/w) to promote reduction. Neutralize with sodium carbonate to neutral pH, if acid was used. Decant or filter and deposit sludge in approved landfill. Where permitted, the sludge may be drained into sewer with large quantities of water. To clean contaminated floors, flush with abundant quantities of water into sewer, if permitted by federal, state, and local regulations. If not, collect water and treat as above.

Section 7 Handling and Storage

WORK/HYGIENIC PRACTICES

Wash hands thoroughly with soap and water after handling RemOx® L ISCO Reagent. Do not eat, drink or smoke when working with RemOx® L ISCO Reagent . Wear proper protective equipment. Remove clothing, if it becomes contaminated.

VENTILATION REQUIREMETNS

Provide sufficient mechanical and/or local exhaust to maintain exposure below the TLV/TWA.

CONDITIONS FOR SAFE STORAGE

Store in accordance with NFPA 430 requirements for Class II oxidizers. Protect containers from physical damage. Store in a cool, dry area in closed containers. Segregate from acids, peroxides, formaldehyde, and all combustible, organic, or easily oxidizable materials including antifreeze and hydraulic fluid.

Section 8 Exposure Controls and Personal Protection

RESPIRATORY PROTECTION

In cases where overexposure to mist may occur, the use of an approved NIOSH-MSHA mist respirator or an air supplied respirator is advised. Engineering or administrative controls should be implemented to control mist.

EYE

Faceshield, goggles, or safety glasses with side shields should be worn. Provide eyewash in working area.

GLOVES

Rubber or plastic gloves should be worn.

OTHER PROTECTIVE EQUIPMENT

Normal work clothing covering arms and legs, and rubber, or plastic apron should be worn. Caution: If clothing becomes contaminated, wash off immediately. Spontaneous ignition may occur with cloth or paper.

Section 9 Physical and Chemical Properties

APPEARANCE AND ODOR	Dark purple solution, odorless
BOILING POINT, 760 mm Hg	105 °C
VAPOR PRESSURE (mm Hg)	760 mm at 105ºC
SOLUBILITY IN WATER % BY SOLUTION	Miscible in all proportions
PERCENT VOLATILE BY VOLUME	61% (as water)
EVAPORATION RATE	Same as water
FREEZING POINT	-15.0 °C
SPECIFIC GRAVITY	1.36-1.39

pH	5-9
OXIDIZING PROPERTIES	Strong oxidizer. May ignite wood and cloth.
EXPLOSIVE PROPERTIES	Explosive in contact with sulfuric acid or peroxides, or readily oxidizable substances.

Section 10 Stability and Reactivity

STABILITY	Under normal conditions, the material is stable.
CONDITIONS TO AVOID could	Contact with incompatible materials or heat (135°C / 275ºF) result in violent exothermic chemical reaction.
INCOMPATIBLE MATERIALS	Acids, peroxides, formaldehyde, antifreeze, hydraulic fluids, and all combustible organic or readily oxidizable materials, including metal powders. With hydrochloric acid, toxic chlorine gas is liberated.
HAZARDOUS DECOMPOSITION PRODUCTS	When involved in a fire, liquid permanganate may form corrosive fumes.
CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION	Material is not known to polymerize.

Section 11 Toxicological Information

SODIUM PERMANGANATE: Acute oral LD_{50} not known.

1. Acute toxicity

Irritating to body tissue with which it comes into contact. No acute toxicity data is available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate. The toxicity data for potassium permanganate is given below:

Ingestion:
LD 50 oral rat: 780 mg/kg male (14 days); 525 mg/kg female (14 days).
Harmful if swallowed. ALD: 10g. Ingestion may cause nausea, vomiting, sore throat, stomach-ache and eventually lead to a perforation of the intestine. Liver and kidney injuries may occur.

Skin contact:
LD 50 dermal no data available.
The product may be absorbed into the body through the skin. Major effects of exposure: severe irritation, brown staining of skin.

Inhalation:
LC 50 inhal. no data available.
The product may be absorbed into the body by inhalation. Major effects of exposure: respiratory disorder, cough.

2. Chronic toxicity

No known cases of chronic poisoning due to permanganates have been reported. Prolonged exposure, usually

over many years, to heavy concentrations of manganese oxides in the form of dust and fumes may lead to chronic manganese poisoning, chiefly involving the central nervous system.

3. Carcinogenicity
Sodium permanganate has not been classified as a carcinogen by ACGIH, NIOSH, OSHA, NTP, or IARC.

4. Medical Conditions Generally Aggravated by Exposure
Sodium permanganate solution will cause further irritation of tissue, open wounds, burns or mucous membranes.

Section 12 Ecological Information

Entry to the Environment
Permanganate has a low estimated lifetime in the environment, being readily converted by oxidizable materials to insoluble MnO_2.

Bioconcentration Potential
In non-reducing and non-acidic environments MnO_2 is insoluble and has a very low bioaccumulative potential.

Aquatic Toxicity
No data.

Section 13 Disposal Considerations

Waste Disposal

RemOx® L ISCO Reagent, once it becomes a waste, is considered a D001 hazardous (ignitable) waste. For disposal of RemOx® L ISCO Reagent solutions, follow procedures in Section 6 and deactivate the permanganate to insoluble manganese dioxide. Dispose of it in a permitted landfill. Contact Carus Chemical Company for additional recommendations.

Section 14 Transport Information

USA (land, D.O.T.)	**Proper Shipping Name:** 49 CFR172.101 Permanganates, inorganic, aqueous solution, n.o.s .(contains sodium permanganate **Hazard Class:** 49 CFR172.101….Oxidizer **ID Number:** 49 CFR172.101….UN 3214 **Packing Group:** 49 CFR172.101….II **Division:** 49 CFR172.101….5.1
European Labeling in accordance Road/Rail Transport (ADR/RID)	**ID Number:** UN 3214 **ADR/RID Class** 5.1 **Description of Goods:** Permanganates, inorganic, aqueous solution, n.o.s (contains sodium permanganate) **Hazard Identification No.** 50
European Labeling in accordance with EC directive (Water, I.M.O.)	**Proper Shipping Name:** Permanganates, inorganic, aqueous solution, n.o.s (contains sodium permanganate) **Hazard Class:** Oxidizer **ID Number:** UN 3214

	Packing Group:	II
	Division:	5.1
	Marine Pollutant:	No
European Labeling in accordance with EC directive (Air, I.C.A.O.)	**Proper Shipping Name:**	Permanganates, inorganic, aqueous solution, n.o.s (contains sodium permanganate)
	Hazard Class:	Oxidizer
	ID Number:	UN 3214
	Packing Group:	II
	Division:	5.1

Section 15 Regulatory Information (Sodium Permanganate)

TSCA	Listed in the Toxic Substances Control Act (TSCA) Chemical Substance Inventory.
CERCLA	Not listed.
RCRA	Oxidizers such as RemOx® L ISCO Reagent solution meet the criteria of ignitable waste. 40 CFR 261.21.
SARA TITLE III Information	
Section 302/303	Extremely hazardous substance: Not listed
Section 311/312	Hazard categories: Fire, acute and chronic toxicity.
Section 313	RemOx® L ISCO Reagent contains 40% manganese compounds as part of the chemical and is subject to the reporting requirements of Section 313 of Title III, Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372.
FOREIGN LIST	Canadian Non-Domestic Substance List , EINECS

Section 16 Other Information

NIOSH	National Institute for Occupational Safety and Health
MSHA	Mine Safety and Health Administration
OSHA	Occupational Safety and Health Administration
NTP	National Toxicology Program
IARC	International Agency for Research on Cancer
PEL	Permissible Exposure Limit
C	Ceiling Exposure Limit
TLV-TWA	Threshold Limit Value-Time Weighted Average
CAS	Chemical Abstract Service
EINECS	Inventory of Existing Chemical Substances (European)

Chithambarathanu Pillai (S.O.F.)
April 2008

Appendix D
Spill Containment Plan

SPILL CONTAINMENT PLAN

CHEMICAL OXIDATION REMEDIATION
AT THE FORMER SMART SET CLEANERS
16 ATLANTIC AVENUE
OCEANSIDE, NEW YORK
SITE NO. 130194

SPILL CONTAINMENT PLAN

EnviroTrac will maintain appropriate containment and/or diversionary structure, materials and equipment to prevent and control the spillage of any specific item during the chemical oxidation pilot study. None of the work areas shall be impacted with any manmade or natural harmful materials. Additional details on prevention of accidents and Site control during construction and injection are provided in the Health and Safety Plan. The RemOx®L ISCO Reagent (sodium permanganate) MSDS and Liquid Permanganate Material Recommendation Data Sheets are attached.

Based on the size of the project and scopes of work, the anticipated occurrence and possible extent of spills are minimal. Permanganate compatible absorbent materials, such as kitty litter with no saw dust, will be maintained on Site at all times during construction and system operation in the event of any possible spillage. A solution of one (1) part water, one (1) part 3% hydrogen peroxide, and one (1) part white vinegar stored in a three gallon garden sprayer will be on-Site to reduce the permanganate should an incident occur. An MSDS for 3% hydrogen peroxide is attached.

Secondary containment will be constructed beneath all injection system equipment and associated piping. The secondary containment unit will be Collapse-a-tainer® Containment Systems #PAK593 or approved equal. The Collapse-a-tainer will be 10 feet long, 10 feet wide and one foot high and have a holding capacity of 748 gallons, which is greater than 110% of maximum storage capacity. To ensure compatibility, the unit will be lined with polypropylene sheeting. Polypropylene sheeting will also be placed beneath injection lines when active. Where applicable, additional polypropylene sheeting will be placed around the Geoprobe injection points, while any injections using these points, are being carried out. A detailed product specification for the Collapse-a-tainer® is attached.

To reduce the risk of over pressurization of the injection piping, wells, or Geoprobe rods, the effluent pipe of the injection pump will be fitted with a pressure relief valve set to 80 psi. The blow-off connection of the relief valve will be routed back into the supply tank via flexible PVC hose. In the event excessive pressure is generated during the injection process, the relief valve will open and safely return the liquid permanganate solution back to the storage tank. Prior to the commencement of injection event, all process equipment will be tested for leaks and proper operation via a wet test using potable water. In the event any leaks are discovered during this test, the leaks will be repaired and the system retested. A pressure gauge will be installed on the effluent pipe of the injection pump to visually monitor the injection pressure. This pressure is not to exceed 80 psi.

To protect against the occurrence of spills and accidents, as well as to minimize the potential for emergency events, all on-Site personnel shall:

1. Attend Spill Prevention Briefings and read this Spill Prevention and Control Plan (SPCP) and Health and Safety (HASP) prior to beginning of all on-Site activities. Spill Prevention Briefings shall highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.

2. Field work will only be conducted during daylight hours.

3. No eating, drinking, or smoking will be permitted within the work zone.

4. All personnel shall be knowledgeable in the use of the first-aid equipment outlined in the HASP.

5. Only authorized personnel will be allowed on Site.

6. Monitor the injection systems on a frequent basis to check integrity of all lines and connections.

7. Monitor all pressure gauges to make sure pressure does not exceed 80 psi.

8. Monitor all pressure gauges to make sure pressure does not exceed 80 psi.

EMERGENCY RESPONSE

In the event of a spill, the client and the New York State Department of Environmental Conservation (NYSDEC) will be notified immediately. Within a 24 hour period, EnviroTrac shall provide a written description of the event, corrective action taken, and plans for preventing a recurrence, as well as a written commitment of manpower, equipment, and materials required to expedite control and removal of any harmful quantity of material released. The written description of the event will include the date and time, a map depicting the impacted area, cause of the release a list of agencies contact and third parties with potential claims and the impact on human health and the environment. If an injury associated with the spill requires medical assistance or if an emergency requires local authority notification a listing of emergency phone numbers is provided as follows:

Emergency Contact Information

Emergency Service	Telephone Number
EnviroTrac Emergency Hot-line	(800) 652-5140
Fire Department	911
Police Department	911
Ambulance	911
Hospital/Emergency Care Facility	(516) 632-3000
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
New York State Dept. of Health - Nassau County	(516) 227-9697

Communications on-Site will be conducted through verbal communications. When out of audible range, verbal communications may be assisted using portable telephones. The portable telephones will be capable of summoning emergency assistance from local police departments, or State or local emergency response teams.

CORRECTIVE ACTION

In the event of a significant release of concentrated permanganate to the surface, EnviroTrac will immediately attempt to contain the solution by applying a compatible absorbent material to the best of our ability to the impacted area. In addition, all incompatible and combustible materials will be removed from the area. Once contained the sodium permanganate solution will be further diluted with water and neutralized with a solution of one (1) part water, one (1) part 3% hydrogen peroxide, and one (1) part white vinegar. This solution will never be used on concentrated permanganate.

Once the solution is neutralized the fluids will be removed from the spill enclosure utilizing an absorbent material which will be stored in a 55-gallon drum for proper off-site disposal. If warranted, a vacuum truck will be dispatched to the site to excavate the neutralized fluids. If the release impacts native soils, the soil will be neutralized, excavated and temporarily stored on-site for proper off-site disposal.

For releases of diluted permanganate, EnviroTrac will immediately attempt to contain the solution by constructing berms of absorbent material to the best of our ability. All incompatible and combustible materials will be removed from the area. The sodium permanganate solution will be further diluted with water and neutralized with a solution of one (1) part water, one (1) part 3% hydrogen peroxide, and one (1) part white vinegar, which is stored in the three gallon garden sprayer.

PERSONNEL TRAINING

Field team personnel associated with those activities in which the potential for exposure to hazardous substances exists are required to participate in a health and safety training program that complies with the OSHA standard 29 CFR 1910.120 and 1910.1200. This program instructs employees on general health and safety principles and procedures, proper operation of monitoring instruments, and use of personnel protective equipment.

In addition, field team personnel must undergo Site-specific training prior to the start-up of any given project or task. As activities change at a particular work Site, related training must be provided as necessary. The Site-specific training will address potential hazards and associated risks, Site operating procedures, emergency response and Site control methods to be employed. On-Site personnel will be properly instructed regarding applicable pollution control laws, rules, and regulations; and in the operation and maintenance of equipment to prevent the discharge of materials.

Appendix E
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.

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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.

Hazard		Yes	No	N/A
A.	Lack of Oxygen	☐	☐	☐
B.	Combustible Gases	☐	☐	☐
C.	Combustible Vapors	☐	☐	☐
D.	Combustible Dusts	☐	☐	☐
E.	Toxic Gases	☐	☐	☐
F.	Toxic Vapors	☐	☐	☐
G.	Chemical Contact	☐	☐	☐
H.	Electrical Hazards	☐	☐	☐
I.	Mechanical Exposure	☐	☐	☐
J.	Temperature	☐	☐	☐
K.	Engulfment	☐	☐	☐
L.	Entrapment	☐	☐	☐
M.	Others	☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐

8. Check or list the measures used to isolate the permit space and to eliminate or control permit space hazards before entry.

☐	A.	Purge-Flush and Vent
☐	B.	Ventilation
☐	C.	Lockout/Tag Out
☐	D.	Inerting
☐	E.	Blanking, Blocking, Bleeding
☐	F.	External Barricades
☐	G.	Confined Space Identification/Signs

DO NOT DESTROY THIS PERMIT - PERMIT MUST BE RETAINED FOR ONE YEAR AFTER CANCELLED

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CONFINED SPACE ENTRY PERMIT

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	☐ Hard Hats	☐ Hand	
				☐ Respiratory	☐ Eye	☐ Foot	
					☐ Ear	☐ Clothing	
					☐ Face		
☐	☐	☐	(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 _____ _____ AM PM _____
Entry Permit Supervisor Time Date

DO NOT DESTROY THIS PERMIT - PERMIT MUST BE RETAINED FOR ONE YEAR AFTER CANCELLED

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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?	☐	☐	☐

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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

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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

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NOTES

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EXHIBIT 1

RECORD OF DECISION

RECORD OF DECISION

Smart Set Cleaners
State Superfund Project
Oceanside, Nassau County
Site No. 130194
March 2015

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - RECORD OF DECISION

Smart Set Cleaners
State Superfund Project
Oceanside, Nassau County
Site No. 130194
March 2015

Statement of Purpose and Basis

This document presents the remedy for the Smart Set Cleaners site, a Class 2 inactive hazardous waste disposal site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375, and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the Smart Set Cleaners site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented for the area shown in Figure 2 to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

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

2. Groundwater Hot zone In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat chlorinated volatile organic compounds (CVOCs) over 1000 ppb in the groundwater plume. A chemical oxidant will be injected into the subsurface to destroy the contaminants in an approximately 25,000-square foot area located west of the site where drycleaner-related compounds were elevated in the groundwater above 1000 ppb via injection wells as shown on Figure 3. The details of injections will be determined during the remedial design. Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to more clearly define design parameters.

3. Continued operation and maintenance of the existing Soil Vapor Extraction system to continue treatment of soil in the source area.

4. On-Site Cover System

A site cover currently exists and will be maintained to allow for commercial use of the site. Any site redevelopment will maintain a site cover, which may consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

5. Soil Vapor Intrusion Mitigation

A sub-slab depressurization system (SSDS) will be installed within each of the three 100 ft long by 80 ft wide buildings consisting of a fan-powered vent and piping system to draw vapors from the soil beneath the building slabs and emit the vapors to the atmosphere.

The existing soil vapor extraction system (Element #3) will also function in place of the SSDS, as a vapor mitigation system, within the established radius of influence of that system.

6. Institutional Control

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

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

7. Site Management Plan

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

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

Institutional Controls: The Environmental Easement discussed in Paragraph 6 above.

Engineering Controls: The groundwater hot zone ISCO program discussed in paragraph 2, Soil vapor extraction system discussed in paragraph 3 above, the soil cover discussed in Paragraph 4, and the sub-slab depressurization system discussed in Paragraph 5.
This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- a provision for investigation beneath the existing on-site building and off-site buildings if the buildings are demolished to determine if further remedial action is warranted;
- a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the affected off-site areas, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.
- Soil vapor intrusion sampling (sub-slab vapor and indoor air) was offered to a property owners of off-site buildings in 2013/14 by the NYSDOH. The owner did not grant an access. Should the owner request to have their property sampled in the future, the NYSDEC, in consultation with the NYSDOH, shall determine whether soil vapor intrusion sampling is still appropriate. If appropriate, soil vapor intrusion sampling will be completed and actions recommended to address exposures related to soil vapor intrusion will be implemented.

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

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

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

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

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

March 31, 2015
Date

Robert W. Schick, P.E., Director
Division of Environmental Remediation

RECORD OF DECISION

Smart Set Cleaners
Oceanside, Nassau County
Site No. 130194
March 2015

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of hazardous wastes at this site, as more fully described in this document, has contaminated various environmental media. The remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This Record of Decision (ROD) identifies the selected remedy, summarizes the other alternatives considered, and discusses the reasons for selecting the remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repository:

Oceanside Library
Attn: Marcia Ratcliff
30 Davison Ave
Oceanside, NY 11572
Phone: (516) 766-2360

A public meeting was also conducted. At the meeting, the findings of the remedial investigation

(RI) and the feasibility study (FS) were presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period was held, during which verbal or written comments were accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The Smart Set Cleaners Site is located in a mixed commercial and residential area at 16 Atlantic Ave in Oceanside, NY in Nassau County. It is one tenant unit within a small shopping center and sidewalk behind the tenant unit. The strip mall is bounded by Smith St to the north, Atlantic Ave to the south, Lincoln Ave to the west and Long Beach Rd to the east.

Site Features: The Site is one tenant unit with a basement and occupies approximately 0.090 acres. It is located in a small strip mall shopping center. The shopping center property is approximately 3.9 acres and is covered in building or pavement. The property has 2 buildings, one with 15 tenant units including the site and the other with 2 tenant units. The strip mall was built in 1955.

Current Zoning/Use(s): The site is zoned commercial. It is currently an active nail salon and spa. The surrounding building is commercial space leased for commercial purposes. The nearest residential area is 0.1 mile to the east.

Past Use of the Site: The dates of operation of the dry cleaner are approximately 1956 through 2005. A routine inspection of the Smart Set Cleaners facility by the Nassau County Department of Health (NCDOH) in the mid 1990's revealed the existence of interior floor drains. These drains were considered injection wells by the USEPA. In 1998, a groundwater sample was collected from a floor drain that showed the presence of the dry cleaning solvent tetrachloroethylene (PCE). The NCDOH in conjunction with the USEPA pursued the investigation of the source of groundwater contamination. In 2001, the NCDOH oversaw removal of contaminated soils from the rear of the facility by the owner. The owner's consultant, with oversight by the NCDOH proceeded with a subsurface investigation that was completed in May 2001. Based on the 2001 investigation, a Soil Vapor Extraction/Air Sparge (SVE/AS) system was installed by the owner and started in 2002. That system is still in operation and

reports are submitted quarterly on its performance. This site was added to the NYS Registry of Inactive Hazardous Waste Disposal Sites in November 2008 with USEPA maintaining the lead role in regulating the owner. The lead was transferred to the Department in August 2009 at the request of USEPA.

Site Geology and Hydrogeology: Groundwater flow is to the west-southwest, towards the nearby Powell Creek located approximately 0.4 miles from the site. No public or private wells have been identified downgradient of the site. Depth to groundwater is approximately 10 ft below ground surface.
There appears to be no clear delineation between the Upper Glacial and Magothy aquifers. The geology of the area consists predominantly of thick unconsolidated sediments.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) were/was evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the RI to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Great Lincoln, LLC

The PRPs for the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the

nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- surface water
- soil
- soil vapor
- indoor air
- sub-slab vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

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. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data.

The contaminant(s) of concern identified at this site is/are:

TETRACHLOROETHYLENE (PCE)	TRICHLOROETHENE (TCE)
Dichloroethene (cis-1,2-)	1,2-DICHLOROETHANE

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- surface water
- soil
- soil vapor intrusion

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

The following IRM(s) has/have been completed at this site based on conditions observed during the RI.

Chemical Oxidation

In 2010 the owner undertook In-situ Chemical Oxidation injection program in the subsurface below the basement of the Former Smart Set Cleaners to treat groundwater contamination on-site. Chemical oxidant was injected through six injection wells located in the basement of the former Smart Set Cleaners. This was highly effective and concentrations of PCE, TCE, and cis-1,2-DCE dropped by an order of magnitude in groundwater from 1900 ppb of PCE to 200 ppb.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU 01.

Nature and Extent of Contamination: Based upon prior investigations only volatile organic compounds were sampled for as part of the Remedial Investigation and the primary constituent of concern is tetrachloroethene (PCE) and its breakdown products, trichloroethene (TCE) and cis-1,2-dichlorothene (DCE).

Groundwater: PCE and its daughter compounds are found in the groundwater on the property and off-site to the west of the site. The latest sampling of groundwater on the property(analyzed

for VOCs) found PCE at approximately 56 parts per billion (ppb) which exceeds the groundwater standard (5 ppb).

PCE and its breakdown products TCE and DCE have been detected up to 800 yards to the west of the site. PCE has been observed in the off-site groundwater at a maximum concentration of 4100 ppb, approximately 87 ft below ground surface near the intersection of Lincoln Avenue and Atlantic Avenue.

During the Remedial Investigation, the off-site plume was investigated and sampled only for VOCs, compounds related to dry-cleaning activities. This investigation found a maximum of 5105 ppb of chlorinated VOCs located approximately 1550 ft to the west of the site.

Soil: In January 2001, the PRP excavated eight cubic yards of contaminated soil from behind the building, at the source location behind Smart Set Cleaners. Soil samples were collected from the sides and bottom of the excavation when the excavation was finished, and the soil sample collected from the east side of the excavation contained PCE at 2.9 parts per million (ppm) and the bottom contained PCE at 8.5 ppm. The excavation was backfilled with clean fill and covered with a cement sidewalk which acts as a cover for the site.

Soil samples were collected from beneth the floor slab of the basements of the stores adjacent to Smart Set Cleaners, and residual contamination was found beneath those stores to the east and west. In the east store's basement PCE contamination was found to be 0.280 ppm and in the store to the west's basement contamination was found to be 0.011 ppm.

Soil Samples were also collected from the leeching pools and cesspools and results were below unrestricted standard for all contaminants.

A soil sample was collected from the beneath the sidewalk (0.5-1 ft bgs) during the RI. It was analyzed for VOCs, SVOCs, pesticides, PCBs, and metals and no contamination was found in this sample. However, there is still the potential for suspected inaccessible source areas beneath the existing building.

Soil Vapor Intrusion: In early 2001, as part of the subsurface investigation, sub-slab vapor samples were collected from all vacant stores in the strip mall. None of the vapor samples indicated the presence of chlorinated solvents above detection limits.

During the RI, sub-slab vapor and indoor air samples were collected from the on-site tenant unit and off-site buildings in the strip mall, downgradient of the site. PCE was found to exceed the mitigation guidance values in most of the tenant units within the same building as Smart Set Cleaners. The on-site tenant unit did not exceed monitoring or mitigation guidance values due to the presence of the SVE system on-site.
Soil vapor samples were collected from near the property boundaries to the north and west of the property to evaluate potential for soil vapor intrusion off-site. These sampling points showed there was the potential for soil vapor intrusion in the nearest buildings.

Surface Water: During the RI, surface water was sampled from five locations upstream to downstream of the off-site plume in Powell Creek which is located 2100 ft to the west of the site. Samples upstream of the plume intersection with the creek exceeded the standard for PCE (1 ppb) with 4 ppb. Samples collected in the creek near the plume exhibited the same PCE concentration as upstream, while samples collected downstream of the plume were non-detect.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure*.

Direct contact with contaminants in the soil is unlikely because the site is covered with buildings and pavement. People are not coming into contact with the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in the soil and/or 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. A soil vapor extraction system (a system that removes soil vapor from beneath the building) has been installed on-site and prevents the indoor air quality from being affected via soil vapor intrusion in the on-site tenant unit and the two adjacent off-site tenant units immediately east and west of the site. Sampling indicates the potential for soil vapor intrusion to impact indoor air quality of the rest of the tenant spaces in the strip mall and an adjacent building. Soil vapor intrusion is a concern for additional off-site buildings, however access was not granted to evaluate the potential for soil vapor intrusion to affect the indoor air of these structures.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

Surface Water

RAOs for Environmental Protection

- Restore surface water to ambient water quality criteria for the contaminant of concern.

Soil Vapor

RAOs for Public Health Protection

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

SECTION 7: SUMMARY OF THE SELECTED REMEDY

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the feasibility study (FS) report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's remedy is set forth at Exhibit D.

The selected remedy is referred to as the Groundwater Hot Zone In-Situ Chemical Oxidation remedy.

The estimated present worth cost to implement the remedy is $3,779,000. The cost to construct the remedy is estimated to be $2,332,000 and the estimated average annual cost is $63,000.

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented for the area shown in Figure 2 to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

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

2. Groundwater Hot zone In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat chlorinated volatile organic compounds (CVOCs) over 1000 ppb in the groundwater plume. A chemical oxidant will be injected into the subsurface to destroy the contaminants in an approximately 25,000-square foot area located west of the site where drycleaner-related compounds were elevated in the groundwater above 1000 ppb via injection wells as shown on Figure 3. The details of injections will be determined during the remedial design. Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to more clearly define design parameters.

3. Continued operation and maintenance of the existing Soil Vapor Extraction system to continue treatment of soil in the source area.

4. On-Site Cover System

A site cover currently exists and will be maintained to allow for commercial use of the site. Any site redevelopment will maintain a site cover, which may consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient

quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

5. Soil Vapor Intrusion Mitigation

A sub-slab depressurization system (SSDS) will be installed within each of the three 100 ft long by 80 ft wide buildings consisting of a fan-powered vent and piping system to draw vapors from the soil beneath the building slabs and emit the vapors to the atmosphere.

The existing soil vapor extraction system (Element #3) will also function in place of the SSDS, as a vapor mitigation system, within the established radius of influence of that system.

6. Institutional Control

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

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

7. Site Management Plan

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

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

Institutional Controls: The Environmental Easement discussed in Paragraph 6 above.

Engineering Controls: The groundwater hot zone ISCO program discussed in paragraph 2, Soil vapor extraction system discussed in paragraph 3 above, the soil cover discussed in Paragraph 4, and the sub-slab depressurization system discussed in Paragraph 5.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- a provision for investigation beneath the existing on-site building and off-site buildings if the buildings are demolished to determine if further remedial action is warranted;
- a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the affected off-site areas, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and

• the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.
• Soil vapor intrusion sampling (sub-slab vapor and indoor air) was offered to a property owners of off-site buildings in 2013/14 by the NYSDOH. The owner did not grant an access. Should the owner request to have their property sampled in the future, the NYSDEC, in consultation with the NYSDOH, shall determine whether soil vapor intrusion sampling is still appropriate. If appropriate, soil vapor intrusion sampling will be completed and actions recommended to address exposures related to soil vapor intrusion will be implemented.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
• monitoring of groundwater and soil vapor intrusion to assess the performance and effectiveness of the remedy;
• a schedule of monitoring and frequency of submittals to the Department;
• monitoring for vapor intrusion for any buildings developed on the affected off-site areas, as may be required by the Institutional and Engineering Control Plan discussed above, as well as the separate building on the property.

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
• compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
• maintaining site access controls and Department notification; and
• providing the Department access to the site and O&M records.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting groundwater, surface water, and soil vapor.

Wastes are defined in 6 NYCRR Part 375-1.2(aw) and include solid, industrial and/or hazardous wastes. Source areas are defined in 6 NYCRR Part 375(au). Source areas are areas of concern at a site where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium.

Prior to this Remedial Investigation, (2000-2002) the Smart Set Cleaners suspected source areas, a window well and Underground Injection Control (UIC) wells were investigated and found to have high concentrations of tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (DCE) in the soil and groundwater. An excavation of the window well yielded eight cubic yards of dense non-aqueous phase liquid- (DNAPL) contaminated soils which was disposed of properly. The endpoint sample exhibited 8.5 ppm PCE, however the excavation could not continue further due to the groundwater table being reached.

A Soil Vapor Extraction/Air Sparge (SVE/AS) system was installed in 2002 to address contaminated groundwater and soils on-site from the UIC wells and former window well soils. In 2010 an In-situ Chemical Oxidation (ISCO) injection was completed to address the continuing high levels of contamination seen in the on-property groundwater. This was highly effective and concentrations of PCE, TCE, and cis-1,2-DCE dropped by an order of magnitude in groundwater. The air sparge system was shutdown at that time. As of now, the SVE system continues to operate to treat the soil contamination. The PCE in the groundwater in the source area has decreased from a high of 2,800 ppb to 3.4 ppb.

The waste/source areas identified at the site were addressed by the IRM(s) described in Section 6.2 and the Past Uses section of the Site Description.

Groundwater

Groundwater was analyzed for volatile organic compounds (VOCs). The primary volatile organic compound on and off site is tetrachloroethene (PCE), a dry-cleaning chemical and its daughter compounds trichloroethene (TCE) and cis-1,2-Dichloroethene (DCE).

As part of the Remedial Investigation, groundwater samples were collected to assess groundwater conditions off-site at shallow, intermediate, and deep depths within the aquifer. Monitoring wells and groundwater profile samples were installed throughout the investigation area (Figure 2) to determine the extents of the PCE plume both areally and vertically.

The results indicate that in the shallow, 0 to 40 ft below ground surface (bgs) groundwater contamination is traveling on a straight path to the west towards Powell Creek, but tends to decrease the further it travels from the site. The highest concentration of PCE was exhibited at 600 ppb at CMT-2 at the 35.4 ft to 38.4ft bgs range. Groundwater collected from the shallow zone also contained TCE and DCE above the NYS Standard of 5 ppb in the location closest to the site. Groundwater elevations collected at this shallow range indicated that groundwater and contamination are diving downward.

The highest concentrations of PCE collected in the intermediate zone (between 40 and 75 ft bgs) was observed at GWP-05 at the 71 to 75 ft range with 4100 ppb. GWP-05 exhibited the next greatest concentrations of PCE with 1000 ppb at the 56 to 60ft bgs and 780 ppb at the 41 to 45 ft bgs range. This is the same location that exhibited the highest concentration for PCE in the shallow zone. Groundwater collected from the intermediate zone also contained TCE and DCE above the standard with the highest being 570 ppb and 430 ppb respectively. Groundwater elevations in the intermediate zone indicate that the contamination in the groundwater is diving downward.

The highest concentration of PCE collected in the deep zone (greater than 75 ft bgs) was observed at GWP-5 at the 83 to 87 ft bgs range with 610 ppb. The next greatest concentration of PCE with 270 ppb at 101 to 105 ft bgs is GWP-07 which is southwest of the site. Groundwater collected from the deep zone also contained TCE and DCE above the standard with 110 ppb and 85 ppb respectively. Groundwater elevation in this zone indicate that the contamination in the groundwater is not traveling downward, but staying relatively flat.

The areal extent of the contamination can be seen in Figure 3 and the vertical extent can be seen in Figure 4. The flow of groundwater in the region can be seen in Figure 5.

Table 1 - Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
PCE	ND – 4100	5 ppb	38/102
TCE	ND - 570	5 ppb	23/102
DCE	ND – 430	5 ppb	18/102
Tert-Butyl Methyl Ether	ND - 200	10 ppb	15/102
Acetone	ND - 87	50 ppb	1/102
1,2-Dichloroethane	ND - 190	0.6 ppb	13/102

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
chloroform	ND - 8	7 ppb	1/102

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

The primary contaminants are PCE, TCE, and DCE associated with the operation of the former dry-cleaners. The 1,2-DCA although not a contaminant associated with the breakdown of PCE, will be remediated by the proposed treatment system. The MTBE found in the monitoring wells and intermediate borings was also seen in the upgradient monitoring well and are considered to represent site background conditions. Therefore the MTBE found in the groundwater is not considered a site specific contaminant of concern.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are: PCE, TCE, DCE, and 1,2-DCA.

Soil

During the previous investigation, soil samples were collected from the basements of the tenant unit to the east and to the west. The soil samples collected beneath the basement slab of the tenant unit to the east exhibited a PCE concentration of 0.280 ppm. The maximum PCE concentration in the tenant unit to the west was 0.011 ppm of PCE.

During the Remedial Investigation, a subsurface soil sample was collected from behind the former Smart Set Cleaners on the north side of the building beneath the sidewalk between 0 and 1 ft bgs. This is near the location of the source area. It was analyzed for VOCs, SVOCs, metals, PCBs, and pesticides. The concentrations of some analytes were above non-detect however none exceeded commercial or unrestricted soil cleanup objectives (SCOs). However, some contaminated soil may still be beneath the buildings or pavement in locations that are not reachable for characterization.

No surficial soil samples were collected at the site due to there being no surface soil exposed.

Table 2 - Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
VOCs					
Tetrachloroethene	0.014	1.300	0/1	150	0/1
Acetone	0.005	0.050	0/1	500	0/1
Methylene chloride	0.002	NA	0/1	NA	0/1
SVOCs					
No Exceedances					

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
Inorganics					
No Exceedances					
Pesticides/PCBs					
No Exceedances					

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Use, unless otherwise noted.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Groundwater

Soil contamination identified during the RI was addressed during the IRM described in Section 6.2 and the historical uses section of the Site Description.

Surface Water

Surface water samples were collected in two rounds of sampling events. PCE, TCE, and DCE were evaluated at five locations along the course of the Powell Creek. PCE exceeded the surface water standard (1 ppb) in all but two samples. During the first sampling event three samples were collected with the two samples in the area of the plume being the greatest (5 ppb PCE) concentrations and decreasing downstream. During the second sampling event five samples were collected. The sample upstream of the plume exceeded the standard (with 3 ppb). The PCE concentration increased in the area of the plume but then decreased to non-detect downstream of the plume. This decreasing trend may be a factor of dilution. Powell Creek is a gaining stream. Figure 6 shows the location of the surface water samples obtained.

Table 3 - Surface Water

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
MTBE	ND – 2J	NS	NA
PCE	ND – 5 J	1 ppb	7/9
TCE	ND – 3 J	NS	NA
DCE	ND – 7 Z	NS	NA

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b-SCG: Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1) and 6 NYCRR Part 703: Surface Water and Groundwater Quality Standards.
ND – Non-Detect, NS – No Standard, Z – Blank contamination

The primary surface water contaminants are chlorinated volatile organic compounds associated with historical disposal of dry-cleaning chemicals at the former Smart Set Cleaners. MTBE was also seen in surface water samples downstream of the plume. MTBE was an oxygenate that was a component of gasoline and is not considered a site specific contaminant of concern.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of surface water. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of surface water to be addressed by the remedy selection process are PCE, TCE, and DCE.

Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of soil vapor, sub-slab soil vapor under structures, and indoor air inside structures. At this site, due to the presence of buildings in the impacted area a full suite of samples were collected to evaluate whether actions are needed to address exposures related to soil vapor intrusion.

The soil vapor and indoor air at the former Smart Set Cleaners has been addressed by the installation of the SVE system.

Indoor air and sub-slab vapor samples were collected from six of the tenant units west of the former Smart Set Cleaners as shown on Figure 7 as well as the former Smart Set Cleaners. The SVE system is mitigating the spaces that are east and west of the site. PCE, the primary VOC present in the sub-slab vapor and indoor air samples, was detected in sub-slab vapors at concentrations as high as 3,400 ug/m^3 downgradient of the site. The PCE concentration in sub-slab vapor was greater than 1,000 ug/m3 in three tenant units and greater than 100 ug/m3 in two tenant unit. Indoor air concentrations did not exceed guidelines in offsite tenant spaces.

Soil vapor samples were collected from the northern and western boundaries of the property to assess the extent of soil vapor contamination and determine whether sampling of buildings downgradient and side-gradient of the site was warranted. PCE was found to be generally low to the west. A soil vapor sample point located northwest of the site collected had 380 ug/m3 of PCE showing the potential for high concentrations of PCE in the sub-slab vapor. However, the adjacent property owner refused access to sample the property for soil vapor intrusion. The groundwater elevations demonstrated that the contamination was diving the further west it traveled within the plume. The groundwater at the top of the water table was non-detect or low as far as 850 ft downgradient of the site. There is a low potential for soil vapor intrusion where this is the case.

Based on the concentration detected, and in comparison with the State's Soil Vapor Intrusion Guidance (NYSDOH 2006), the primary soil vapor contaminant is tetrachloroethene (PCE) which is associated with dry-cleaning operations at the former Smart Set Cleaners. As noted on Figure 7, the primary soil vapor contamination is found underneath the tenant units downgradient of the Smart Set Cleaners. Mitigation is necessary for the tenant units west of the former Smart Set Cleaners and monitoring is necessary for the separate building on the property.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil vapor. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of soil vapor to be addressed by the remedy selection process are PCE.

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 6.2. This alternative leaves the site in its present condition and does not provide any additional protection of the environment.

Alternative 2: No Further Action with Site Management

The No Further Action with Site Management Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 6.2 and the SVE system addressed in the historical uses of the Site Description. Site Management and Institutional Controls and Engineering Controls are necessary to confirm the effectiveness of the IRM. This alternative maintains engineering controls which were part of the IRM and includes institutional controls, in the form of an environmental easement and site management plan, necessary to protect public health and the environment from contamination remaining at and near the site after the IRMs and continues to operate the SVE system.

Present Worth: *$773,000*
Capital Cost: *$50,000*
Annual Costs: *$47,000*

Alternative 3: Restoration to Pre-Disposal or Unrestricted Conditions

This alternative achieves all of the SCGs discussed in Section 6.1.1 and Exhibit A and soil will meets the unrestricted soil clean objectives listed in Part 375-6.8 (a). This alternative would include: a groundwater extraction system to capture and treat groundwater impacted by CVOCs at concentrations greater than SCGs, long term monitoring of groundwater within and downgradient of the plume outside the active remediation zone, and installation of SSDS systems in tenant units in the strip mall which are downgradient of the former Smart Set Cleaners unit. For costing purposes a line of delineation of 50 ppb cVOCs was used to determine the starting point of the treatment area. Also continued operation of the SVE system to treat soil contamination in the source area.

Present Worth: *$10,961,000*
Capital Cost: *$3,515,000*
Annual Costs: *$240,000*

Alternative 4: Groundwater Hot Zone Extraction and Treatment

This alternative would include, groundwater extraction and ex-situ treatment where CVOC concentrations exceed 500 ppb. Long-term Monitoring will be implemented outside the active remediation zone and installation of SSDS systems in tenant units downgradient of the former Smart Set Cleaners unit would be implemented. An on-site

cover system would be implemented. This alternative maintains engineering controls which were part of the IRM and includes institutional controls, in the form of an environmental easement and site management plan, necessary to protect public health and the environment from contamination remaining at the site after the IRMs and continues to operate the SVE system.

Present Worth: *$8,089,000*
Capital Cost: *$2,589,000*
Annual Costs: *$186,000*

Alternative 5: In-Situ Chemical Oxidation in Area with >500 ppb CVOCs in groundwater

This alternative would include implementation of in-situ chemical oxidation program within the remediation area where CVOC concentrations exceed 500 ppb. Long-term monitoring will be implemented outside the active remediation zone and installation of SSDS systems in tenant units downgradient of the former Smart Set Cleaners unit would be implemented. This alternative maintains engineering controls which were part of the IRM and includes institutional controls, in the form of an environmental easement and site management plan, necessary to protect public health and the environment from contamination remaining at the site after the IRMs and continues to operate the SVE system.

Present Worth: *$21,976,000*
Capital Cost: *$19,791,000*
Annual Costs: *$89,000*

Alternative 6: In-Situ Chemical Oxidation in Area with >1000 ppb CVOCs in groundwater

This alternative would include implementation of in-situ chemical oxidation (ISCO) program within the remediation area where CVOC concentrations exceed 1000 ppb. Long-term Monitoring will be implemented outside the active remediation zone and installation of SSDS systems in tenant units downgradient of the former Smart Set Cleaners unit would be implemented. This alternative maintains engineering controls which were part of the IRM and includes institutional controls, in the form of an environmental easement and site management plan, necessary to protect public health and the environment from contamination remaining at the site after the IRMs and continues to operate the SVE system.

Present Worth: *$3,779,000*
Capital Cost: *$2,332,000*
Annual Costs: *$63,000*

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Alternative 1: No Action	$0	$0	$0
Alternative 2: No Further Action with Site Management	$50,000	$47,000	$773,000
Alternative 3: Restoration to Pre-Disposal Conditions	$3,515,000	$240,000	$10,961,000
Alternative 4: Groundwater Extraction and Treatment	$2,589,000	$186,000	$8,089,000
Alternative 5: In-Situ Chemical Oxidation of area with >500 ppb CVOCs	$19,791,000	$89,000	$21,976,000
Alternative 6: In-Situ Chemical Oxidation of area with >1000 ppb CVOCs	$2,332,000	$63,000	$3,779,000

Exhibit D

SUMMARY OF THE SELECTED REMEDY

The Department has selected Alternative 6, In-Situ Chemical Oxidation (ISCO) treatment of the groundwater plume with greater than 1000 ppb of chlorinated volatile organic compounds (CVOCs) as the remedy for this site. Alternative 6 would achieve the remediation goals for the site by implementation of a groundwater treatment by ISCO, long-term monitoring outside the active remediation area, implementation of a cover system, and installation of Sub-Slab Depressurization Systems (SSDS) at tenant units west of the former Smart Set Cleaners unit. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 8 and 9.

Basis for Selection

The selected remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The selected remedy, Alternative 6, would satisfy this criterion by reducing the contaminant concentrations at the hot zone of the plume with over 1000 ppb of CVOCs via ISCO. The contaminants would be transformed into less toxic contaminants within a short period of time. The remainder of the plume would be monitored for the contamination in the groundwater and surface water at Powell Creek.

A benefit of Alternatives 3 and 4 is that they will provide hydraulic control over a large portion of the impacted groundwater plume and will mitigate the migration of contaminated groundwater from the source to down gradient areas including Powell Creek.

Alternative 5 is protective since contaminants will be chemically transformed to less toxic contaminants within a relatively short time period (1 – 2 years). Alternative 1 and 2 do not provide additional protection to human health or environment. They are not treating or removing contaminant from the groundwater nor are they mitigating exposures from soil vapor intrusion into the on-site and off-site buildings.

Alternative 1 is not protective of human health because it does nothing. Alternative 2 monitors the contamination in the groundwater but provides no remediation. Alterative 3 is protective because it removes all the contaminated groundwater and treats it. Alternative 4 and 5 are equally protective because they both will treat the groundwater with more than 500 ppb of CVOCs.

Alternative 1 and 2 are not protective of human health or the environment and will be removed from further consideration.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In

addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternatives 5 and 6 will reduce the concentrations of VOCs in groundwater within the remediation area allowing natural processes to attenuate remaining contamination over time to comply with the SCGs. Alternatives 3 and 4 should meet SCGs over time and will provide hydraulic control to prevent further migration of contaminated groundwater from the remediation area. Contaminated groundwater will be removed from the aquifer and therefore groundwater will meet SCGs.

Under Alternatives 3, 4, 5, and 6 long-term monitoring will be implemented outside the source remediation area. These areas will degrade naturally over a longer period of time and eventually will achieve the NYS Class GA GWQS. For all the alternatives it was assumed that natural degradation of contaminants would take at least 30 years. Institutional controls will also be implemented which will prevent the use of groundwater at the site until the SCGs are met.

Under Alternatives 3, 4, 5, and 6 SSDSs will be installed in the neighboring buildings to prevent soil vapor intrusion into the buildings. Emissions from the SSDS installed in the buildings will comply with the State and Federal ambient air quality regulations. If emissions exceed applicable air quality standards vapor will be treated using vapor phase granular activated carbon (GAC) prior to emitting vapors to the atmosphere.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 3, 4, 5, and 6 will provide significant mass removal of contaminants, with Alternative 5 providing the greatest mass removal over the shortest time period. Alternative 5 and 6 are expected to meet the RAOs in the remediation area in one year or less, while Alternatives 3 and 4 will take 20 years or longer. Both Alternatives 3 and 4 require the use of the effective and continued operation of treatment equipment which is dependent on the overall operation and routine maintenance of the treatment systems. Periodic repairs and equipment replacement will be needed to maintain the treatment system’s effectiveness.

All the alternatives will rely on institutional controls to restrict groundwater use until SCGs are met. All the alternatives will rely on long-term monitoring for areas of groundwater contamination outside the active remediation zone to monitor the natural degradation of contaminants.

Under Alternatives 3, 4, 5 and 6 SSDSs will be installed in the neighboring units at the shopping center. The long-term effectiveness and permanence of the SSDS will depend on the routine maintenance and operation of the systems. Periodic repairs and equipment replacement will be necessary for the systems to work effectively.

In terms of long-term effectiveness all alternatives will be equal in effectiveness and permanence.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternatives 5 and 6 use a chemical oxidation process to destroy contaminants and eliminate them from the aquifer within and downgradient of the treatment zone. Alternatives 3 and 4 use pump and treat to extract VOC mass in the source area and provide mass removal and hydraulic control of the contaminated groundwater. Extracted groundwater is then treated and spent GAC under Alternatives 3 and 4 will be reactivated or destroyed which will permanently destroy VOC contaminants.

Alternatives 3, 4, 5 and 6 rely on long-term monitoring for areas outside for remediation area. There will be minimal reduction in the toxicity, mobility or volume of contaminants outside the source area, and remediation of this area will require a long period of time to reduce the toxicity, mobility and volume of contaminants through natural processes.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternatives 3, 4, 5, and 6 will have short-term impacts to remediation workers, the public, and the environment during implementation, although engineering controls would minimize these impacts. Alternative 5 will have the highest degree of short-term impacts due to the large number of estimated injection wells (approximately 350) required for this alternative. Equipment and vehicles in the vicinity of the source area will need to be temporarily relocated during installation and during the second injection event under Alternative 5. Alternative 6 will pose similar logistical problems as 5 with the relocation of equipment or vehicles within the source treatment zone, although this will be on a much smaller scale with the estimated number of injection wells at 35. Alternative 5 and 6 pose the greatest potential risk to remediation workers due to the quantity of hazardous chemicals used. Construction during all the alternatives will create noise. The potential for remediation workers to have direct contact with contaminants in groundwater occurs when the wells are installed for all the alternatives and when the groundwater remediation system is operating under Alternatives 3 and 4. Alternatives 3 and 4 will require additional space for the construction of the transmission piping, pumping station and treatment building.

RAOs should be achieved under Alternatives 5 and 6 in a relatively short time-frame and under alternatives 3 and 4 within a longer timeframe. ISCO is expected to achieve groundwater RAOs within one year under Alternatives 5 and 6 with LTM for 30 years. Alternatives 3 and 4, Extraction and Treatment, are each expected to achieve RAOs in 20 years with LTM for 30 years.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Alternatives 3, 4, 5, and 6 all pose challenges in their implementability. The technology for each is readily available. However, the highest concentration on contaminants within the plume are located beneath Atlantic Avenue, a heavily trafficked road. The approximate location for the placement of the ISCO wells for Alternatives 5 and 6 and the extraction wells for Alternatives 3 and 4 lie along this busy road, necessitating closure of the road in the case of Alternative 5 or rerouting of a lane of traffic in the case of Alternatives 3 and 4. In the case of Alternative 6 wells may be placed along the side of the road necessitating rerouting of traffic or closure of a lane.

Alterative 6 is the most easily implementable alternatives, followed by alternative 4, then 3 with the least implementable being alternative 5.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The costs of Alternative 3 and 4 are very similar with high capital costs for the installation of piping, wells, and a treatment facility and moderate annual costs for the upkeep and operation of that facility. However, the present worth cost of Alternative 3 is higher than the Alternative 4 cost by approximately $3 million mostly due to the cost of additional extractions wells and a higher capacity pumping system. The capital cost of Alterative 5 is very high compared to Alternatives 3 and 4 with the cost of drilling hundreds of wells and the material costs for injection at three times the cost of Alternatives 3 and 4. The capital cost of Alternative 6 is the lowest of the remaining alternatives at $2.3 million due to fewer injection wells and materials.

All four alternatives have moderate annual costs due to the long-term monitoring of the groundwater outside the active remediation area, although the annual cost of Alternative 5 and 6 is much lower due to reaching the SCGs for groundwater quickly.

Alternative 6 is the most cost-effective alternative, followed by alternative 4, then 3, then the least cost-effective is 5.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Alternatives 3, 4, 5, and 6 will likely achieve SCGs for the remediation area. There are no potable water supply sources in the vicinity of the study area down gradient from the site. Therefore, future restrictions on groundwater use will not have an impact on the existing land use of the site. These four alternatives are equal in on-site land use as they all employ a cover system.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 6 has been selected because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

NYSDEC SMART SET CLEANERS (SITE No. 130194)
16 Atlantic Avenue
Oceanside, Nassau County, New York

Site Location

DATE 06/02/2014

FIGURE 1

Document Path: \\Prl-srv3\gis_projects\069678_NYSDEC\178626_NYSDEC_D007625_WA2_Smart_Set\GIS\Map_Docs\Draft\Figure 1 - Site Location.mxd

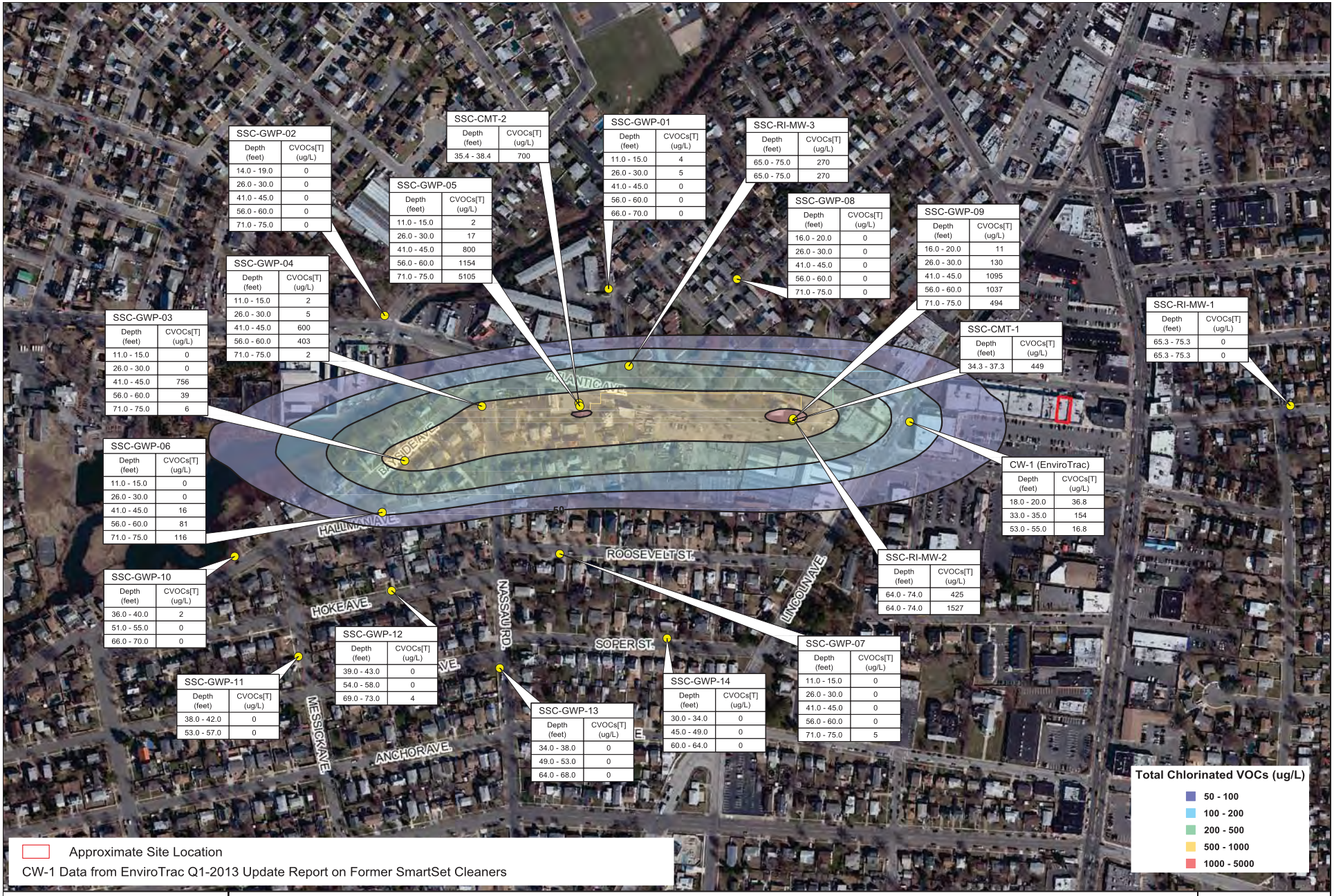
Last Saved: 6/2/2014 5:37:19 PM

NYSDEC SMART SET CLEANERS (SITE NO. 130194)
16 ATLANTIC AVENUE
OCEANSIDE, NASSAU COUNTY, NEW YORK

MONITORING WELL AND SURFACE WATER SAMPLE LOCATIONS

DATE 11/2014

FIGURE 2



Approximate Extent of Chlorinated Volatile Organic Compounds (ug/L)

SmartSet Cleaners Remedial Investigation - NYSDEC Site #130194

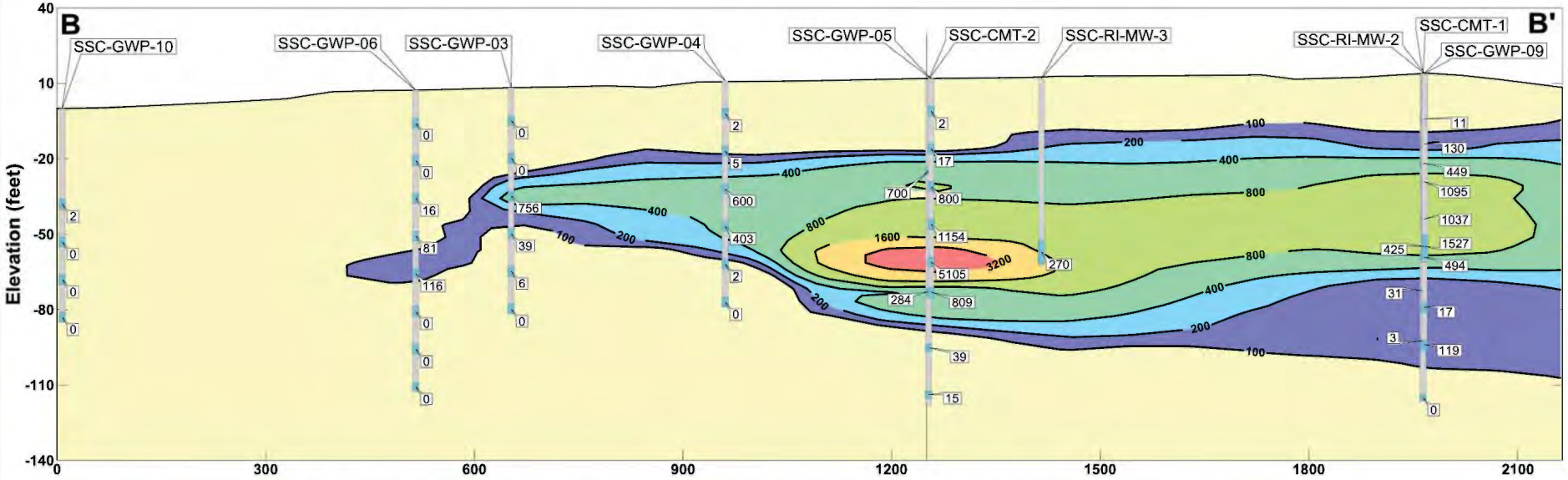
Oceanside, Nassau County, New York

Figure based on sample data collected between June 2012 and August 2013. Maximum result from each location used in contouring.

0 250 500 feet

DATE **06/10/2013**

FIGURE **3**



Total Chlorinated VOCs (ug/L)

- 100 - 200
- 200 - 400
- 400 - 800
- 800 - 1600
- 1600 - 3200
- 3200 - 5105

Monitoring Well Casing or Groundwater Profile Borehole

Monitoring Well Screen or Groundwater Profile Sample Interval

Site Location

Figure based on sample data collected between June 2012 and August 2013.

Vertical Cross Section of Total Chlorinated Volatile Organic Compounds

SmartSet Cleaners Remedial Investigation - NYSDEC Site #130194

Oceanside, Nassau County, New York

DATE 06/11/2014

FIGURE 4

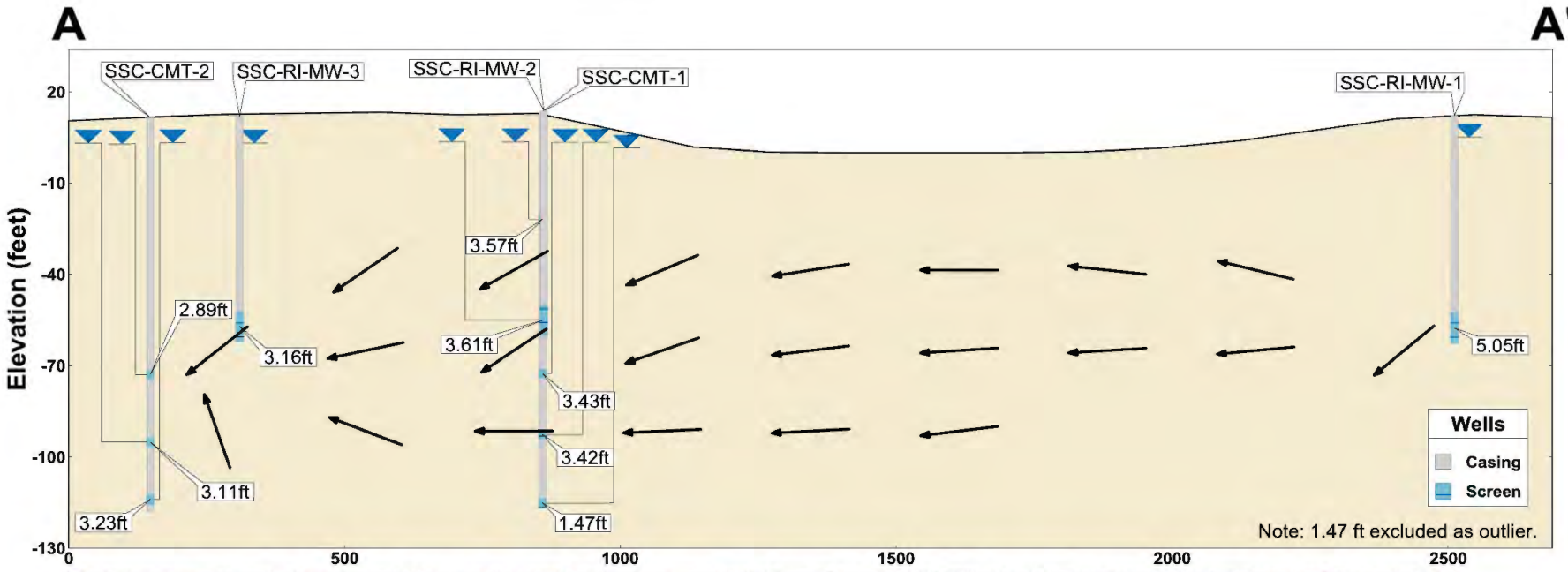


Figure based on sample data collected between June 2012 and August 2013.

Approximate Site Location

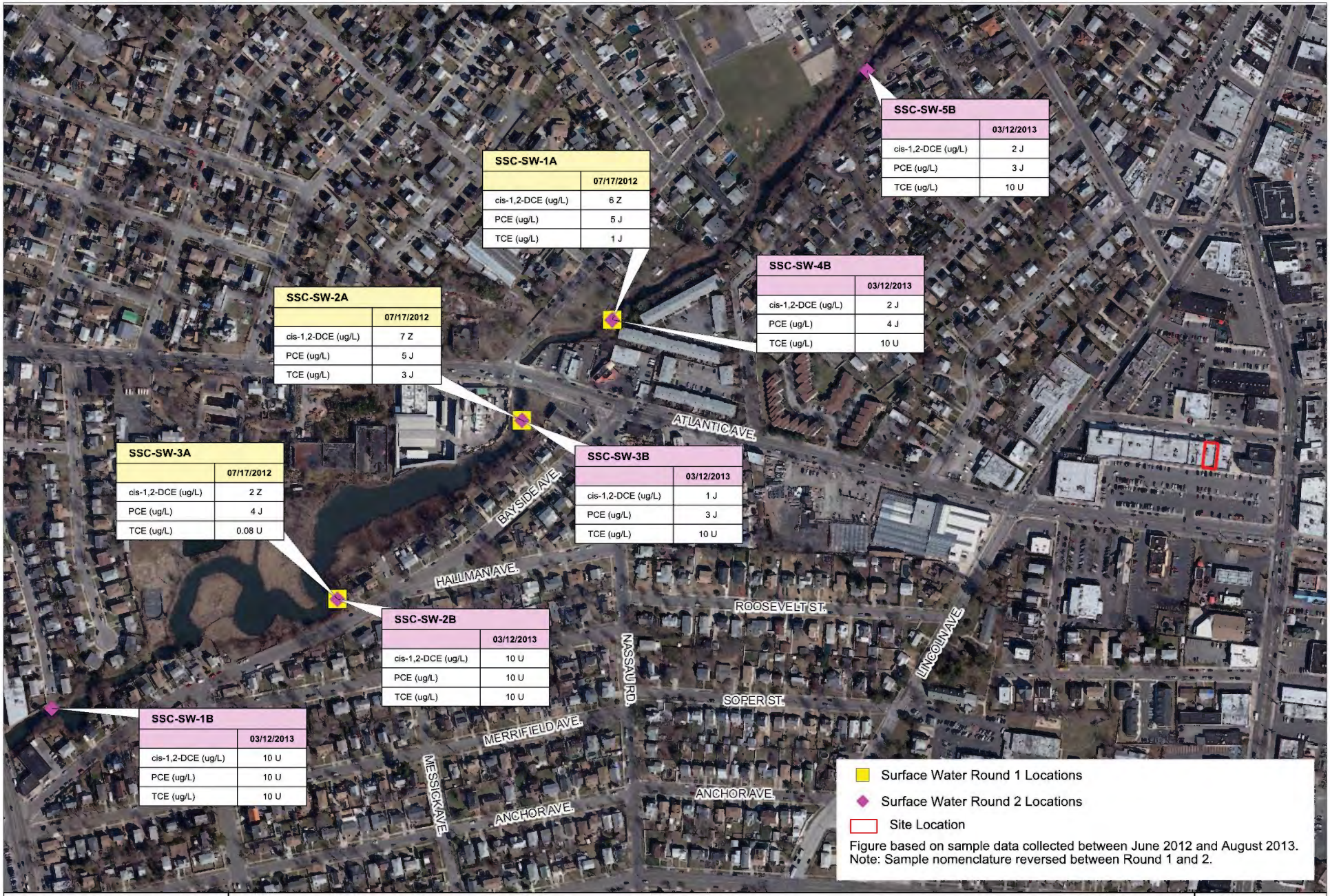
Water Table Elevations in Feet Above Mean Sea Level

SmartSet Cleaners Remedial Investigation - NYSDEC Site #130194

Oceanside, Nassau County, New York

DATE 06/03/2014

FIGURE 5



Surface Water Sample Results (Detected Analytes Only) (ug/L)

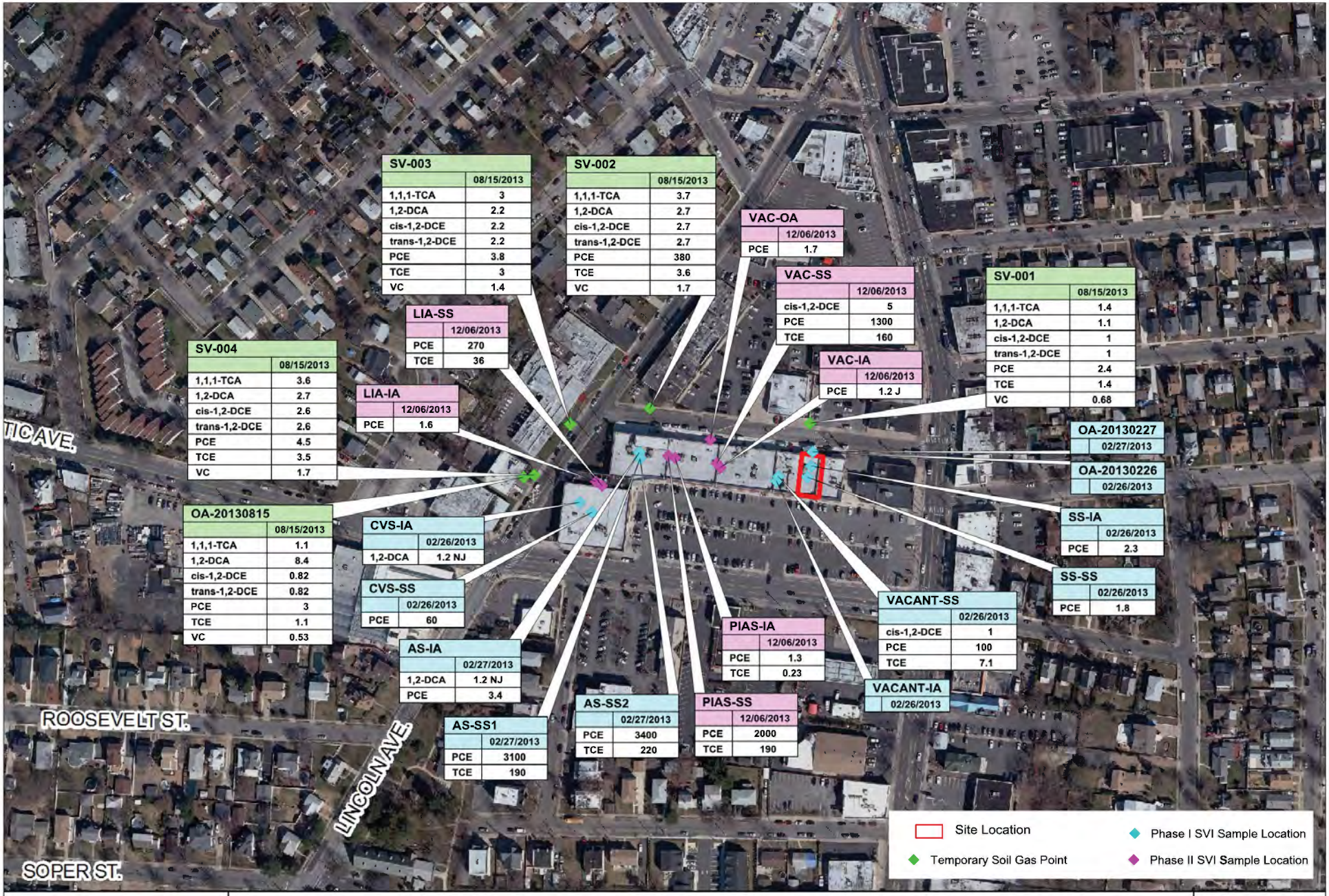
SmartSet Cleaners Remedial Investigation - NYSDEC Site #130194

Oceanside, Nassau County, New York

0 250 500 feet

DATE 06/03/2014

FIGURE 6



HDR

Subslab Soil Vapor, Indoor Ambient Air, Soil Gas Selected VOC results (ug/m3)

SmartSet Cleaners Remedial Investigation - NYSDEC Site #130194

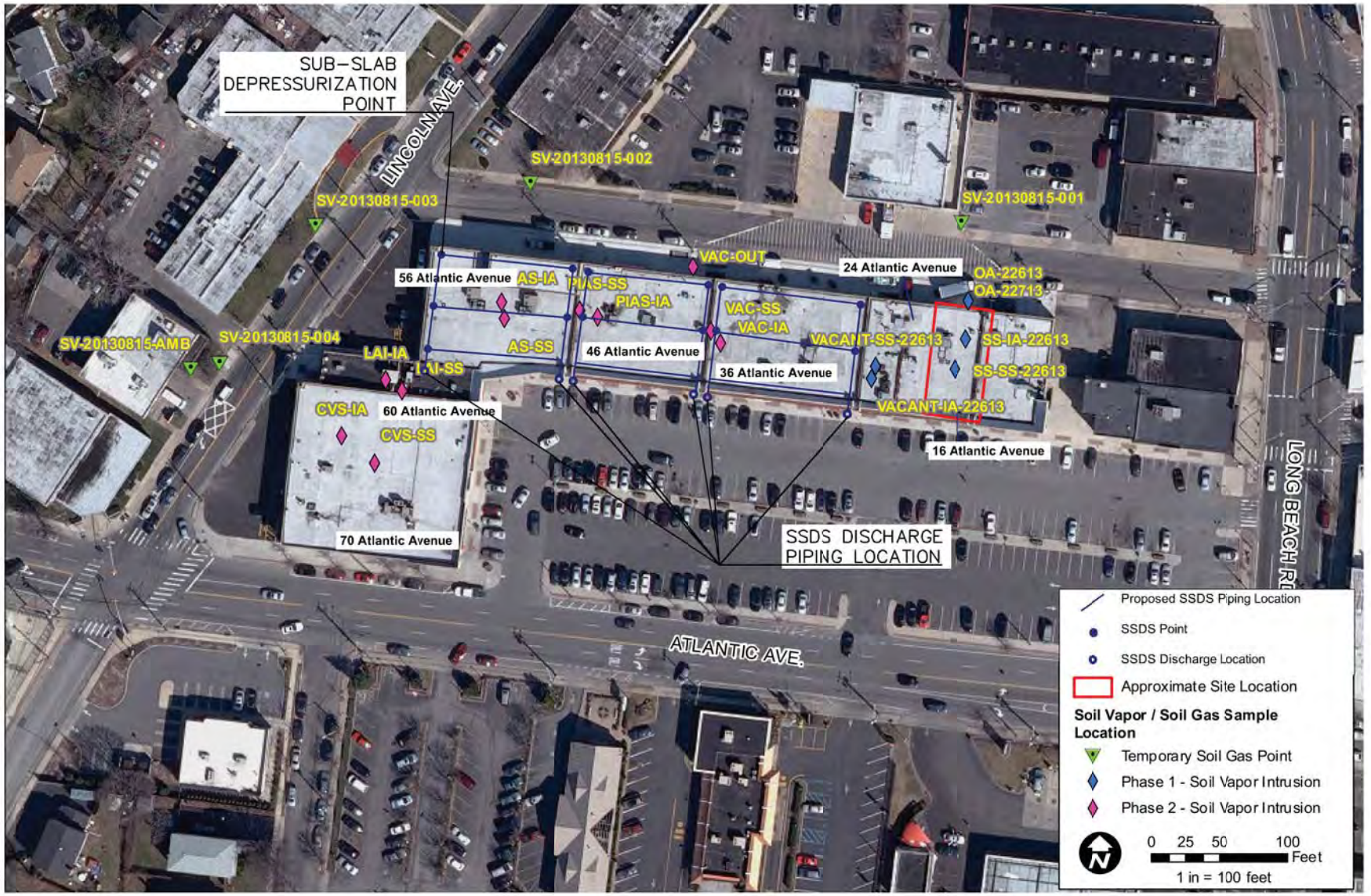
Oceanside, Nassau County, New York

0 100 200 feet

N

DATE
06/03/2014

FIGURE
7



N

100 50 0 100

SCALE IN FEET

HDR

NYSDEC SMART SET CLEANERS (SITE NO. 130194)

16 ATLANTIC AVENUE
OCEANSIDE, NASSAU COUNTY, NEW YORK

PROPOSED OFF SITE SSDS LOCATIONS

DATE 11/2014

FIGURE 8

NOTES:
1. THE APPROXIMATE AREA OF CVOC CONTAMINATION >1000 ug/L IS 21,482 SQ. FT.
2. PROPOSED SPACING BETWEEN INJECTION POINTS IS 30 FT. THE APPROXIMATE RADIUS OF INFLUENCE IS 15 FT.
3. THE ESTIMATED NUMBER OF INJECTION WELLS UNDER THIS APPROACH IS 31.

TOTAL CHLORINATED VOCs (ug/L) PER SAMPLE DATA COLLECTED BETWEEN JUNE 2012-AUGUST 2013

- 1000-5000
- 500-1000
- 200-500
- 100-200
- 50-100
- GROUNDWATER MONITORING WELL
- 5.80 GROUNDWATER ELEVATION (FT AMSL)
- PROPOSED SHALLOW, INTERMEDIATE AND DEEP INJECTION WELL POINTS (0-50 FT BGS, 0-70 FT BGS AND 0-80 FT BGS) WELLS WILL BE LOCATED IN THE FIELD TO MINIMIZE INTERFERENCE WITH STRUCTURES AND SUBSURFACE UTILITIES.

N

80 40 0 80

SCALE IN FEET

NYSDEC SMART SET CLEANERS (SITE NO. 130194)
16 ATLANTIC AVENUE
OCEANSIDE, NASSAU COUNTY, NEW YORK

PROPOSED TREATMENT AREA FOR ISCO INJECTION WHERE CHLORINATED VOLATILE ORGANIC COMPOUNDS CONTAMINATION > 1000 ug/L

DATE 11/2014

FIGURE 9

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Smart Set Cleaners
State Superfund Project
Town of Hempstead, Nassau County, New York
Site No. 130194

The Proposed Remedial Action Plan (PRAP) for the Smart Set Cleaners site was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on February 27, 2015. The PRAP outlined the remedial measure proposed for the contaminated soil, surface water, and groundwater at the Smart Set Cleaners site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on March 10, 2015, which included a presentation of the remedial investigation feasibility study (RI/FS) for the Smart Set Cleaners site as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on March 30, 2015.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: Which properties denied DEC's request for offsite sampling? Can we get a list of these properties?

RESPONSE 1: The properties that were offered sampling by the Department and declined were; 2909 Lincoln Ave, 2914 Lincoln Ave, and 2904 Lower Lincoln Ave, Oceanside, NY.

COMMENT 2: Does the owner of the shopping center have control over whether or not SVI sampling can be conducted? Can she deny the testing?

RESPONSE 2: Yes, any property owner can deny access for sampling. In this case the owner did allow the Department access to conduct SVI sampling in the shopping center tenant units.

COMMENT 3: It was stated the VOCs entered the creek. Have there been any environmental impacts on the creek? Fish kills? Dead birds?

RESPONSE 3: Volatile organic compounds were observed in Powell Creek. The highest PCE concentration observed was low, only slightly above the surface water standard of 1 ppb with 5 ppb. There have been no observed fish kills or dead birds in the area.

COMMENT 4: There is a county park adjacent to the creek. Any environmental impacts on the park?

RESPONSE 4: There have been no environmental impacts attributable to the site observed at the park area. Surface water samples were collected from Powell Creek adjacent to the park area as part of two different sampling events. While site contaminants of concern were observed, we believe that a portion of the observed contamination was from a source located upstream of the plume discharge area. Also see Response 3.

COMMENT 5: Who is paying for the cleanup? Are taxpayers paying for it?

REPONSE 5: At this point in time it has not been determined if the PRP will pay or if the remediation of the off-site plume will be State-funded. After the Record of Decision (ROD) is released, the Department will approach all identified PRPs to sign an Order on Consent to implement the remedy under Department oversight. Any order would also include past costs incurred by the state. If the PRPs' decline to sign the Order on Consent, the ROD would be implemented using State funds. In this case, the site would be referred to the Attorney General's office to attempt to recover the State costs from the PRP.

COMMENT 6: Has the landlord of the shopping center been cooperative? She is hard to get a hold of in the community.

RESPONSE 6: The landlord has been submitting quarterly reports to the Department on the groundwater monitoring of the shopping center and the operation and maintenance of the Soil Vapor Extraction System located at the Smart Set Cleaners Site and has agreed to the soil vapor intrusion sampling at the shopping center.

COMMENT 7: Do owners of a superfund site get any tax credits?

RESPONSE 7: The owners of State Superfund sites do not receive tax credits. A party who remediates a site included in the State Brownfield Cleanup Program (BCP) would receive tax credits. In this case, the owner of the shopping center is not eligible for the BCP since this is a class 2 Superfund site.

COMMENT 8: Can the community assist the State in any way with recouping the costs of the cleanup?

RESPONSE 8: Information leading to the identity of additional PRPs is welcome.

COMMENT 9: What type of legal actions can be taken to recoup the costs?

RESPONSE 9: Please see Response 5.

COMMENT 10: Will the community be notified if an Order on Consent is signed with a responsible party?

RESPONSE 10: The Department does not send notice to the community at the time an Order on Consent is signed. We will send out a Fact Sheet before the start of the Remedial Action and this Fact Sheet will indicate whether the remedy is being implemented by the PRP or by the State.

COMMENT 11: What is the timeframe for DEC to attempt to identify a potential responsible

party and recoup the costs of the cleanup?

RESPONSE 11: After the ROD is issued, the Department's will approach the PRPs as described in Response 5. While there is no deadline, we expect to either have an executed Consent Order or referral for a State funded remediation, by the third quarter of 2015. If the remediation is undertaken using State funds, cost recovery will take place after remedial construction has been completed.

COMMENT 12: Will the tenants in the shopping center be contacted about a cleanup and the signing of an order on consent?

RESPONSE 12: Tenants in spaces requiring sub-slab depressurization systems for vapor intrusion mitigation or other actions related to the remedy, will be contacted directly by the party undertaking the mitigation prior to any remedial activities. Therefore should the responsible party implement the remedy they will contact the tenants (under the DEC oversight). If the Department implements the remedy then we would contact the tenants. Also please see Response 10.

COMMENT 13: Would the shopping center owner be able to transfer liability for the cleanup to the tenant who caused the contamination?

RESPONSE 13: The property owner is currently identified as a Responsible Party and is responsible for remediation. There may be others and the property owner may have legal avenues to try to recover some or all of their costs in other venues.

COMMENT 14: Will the shopping center value increase after the cleanup?

RESPONSE 14: The Department cannot speculate on the value of the shopping center.

COMMENT 15: We do not want our community's money used to enhance the property value of the shopping center when the responsible parties are not cooperative with the cleanup.

RESPONSE 15: Comment noted. Also see Response 6.

COMMENT 16: What is the total price of Alternative 6?

RESPONSE 16: The total present worth cost of Alternative 6: In-Situ Chemical Oxidation in the Area with greater than 1,000 ppb total cVOCs (chlorinated volatile organic compounds) in groundwater is $3,779,000. The initial cost for construction is $2,332,000.

COMMENT 17: Has this alternative been shown to be effective on other highly contaminated sites?

RESPONSE 17: Yes, this remedial method has been used at many sites around the country by the EPA, private parties, and the Department to cleanup cVOC contamination. This method was used as an interim remedial measure to address on-site groundwater contamination at the Smart Set Cleaners site and contamination levels dropped an order of magnitude from 1,900 ppb of PCE to 200 ppb within a matter of months.

COMMENT 18: Are the stores in this shopping mall leaving because of this problem?

RESPONSE 18: The Department cannot speculate on the reasoning behind stores vacating the shopping center.

COMMENT 19: When does the Responsiveness Summary come out?

RESPONSE 19: The Responsiveness Summary will be released with the ROD.

COMMENT 20: My parents have a house … east of the site where Smart Set's contamination was reported. Is their property in any danger due to this [contamination]?

RESPONSE 20: The location of this property is hydraulically up-gradient of the site, thus is not impacted by the groundwater plume. Further, this property has no off-site soil contamination and the vapor intrusion evaluation concluded that potential exposures do not extend as far as this property. Therefore no site related impacts have been identified as impacting this property.

COMMENT 21: I am a regular customer at Ivy Nails Salon located at Atlantic Avenue, Oceanside, New York. Can you please advise whether there are any health concerns due my going to the salon all these years and whether there are any concerns in continuing to go to the salon?

RESPONSE 21: Smart Set Cleaners discontinued operations in 2005, and a soil vapor extraction system has been in operation since 2003, which continues to prevent contaminated soil vapor from moving into the indoor air of the site (which is now IVY Nail Salon.) Confirmation sampling conducted during the remedial investigation of the site showed that the PCE in the indoor air of the nail salon was well below any guidance levels. This confirmed that the soil vapor extraction system continues to protect the indoor air of the site from soil vapor intrusion.

As such, the Department would not expect any adverse health effects associated with site-related contamination.

COMMENT 22: I frequently eat at Lia's Pizzeria located in the same strip mall as the Former Smart Set Cleaners site on Atlantic Avenue. Is it safe to eat the food there? Should I be concerned about the indoor air quality?

RESPONSE 22: Soil vapor intrusion sampling conducted during the remedial investigation of the site showed that the PCE in the indoor air of Lia's Pizzeria was well below any guidance levels. The Department would not expect soil vapor intrusion to affect any food products served in the pizzeria. Sub-slab depressurization systems are proposed in the strip mall to ensure that indoor air of the various shops in the plaza continue to be unaffected by site contamination.

Assemblyman Todd Kaminsky submitted a letter dated March 10, 2015 which included the following comment.

COMMENT 23: It was truly disheartening to discover that dry-cleaning fluids had been dumped into a dry well in Oceanside, causing contamination to the groundwater and possibly affecting our drinking water. I am thankful that the New York State Department of Environmental Conservation has acted quickly to investigate the situation and to propose a solution of mitigation and monitoring

nearby homes and buildings.

This incident highlights the importance of eliminating pollutants from groundwater, which has the potential to seep into wells used for drinking water. It is vital that we protect our water supply, as pollution in drinking water has been linked to multiple severe health effects.

As a member on the Environmental Conservation Committee in the New York State Assembly, protecting our environment is a top priority of mine. I will continue to fight for legislation that penalizes those who threaten our environmental security and that ensures we have clean drinking water and a healthy environment for generations to come.

RESPONSE 23: Comment noted.

Jeffrey Bohlen of Envirotrac on behalf of the Potentially Responsible Party submitted a letter dated March 24, 2015 which included the following comments.

COMMENT 24: Groundwater Hot zone In-Situ Chemical Oxidation - In-situ chemical oxidation (ISCO) will be implemented to treat chlorinated volatile organic compounds (CVOCs) over 1,000 ppb in the groundwater plume. If additional ground water delineation is performed that further defines the extent of the 1,000 ppb plume can the square foot area depicted in Figure 3 be revised?

RESPONSE 24: A pre-design investigation will take place to further define the nature and extent of the area with 1,000 ppb of CVOCs in order to most effectively define the remediation area.

COMMENT 25: Remedial Design - Can the remedial design program include a phased approach to treat the 1,000 ppb plume, thereby allowing for the proper adjustment in the amount and distribution of chemical oxidant to treat the 1,000 ppb plume?

RESPONSE 25: This concept may be considered during the Remedial Design.

COMMENT 26: Soil Vapor Intrusion Mitigation - A sub-slab depressurization system (SSDS) is proposed in conjunction with the existing soil vapor extraction (SVE) system. Since the DEC considers the existing SVE system as an appropriate SSDS can the SVE system be expanded in place of installing a new SSDS?

RESPONSE 26: This approach may be considered during the Remedial Design.

COMMENT 27: Surface Water - On page 4 (Exhibit A) of the Proposed Remedial Action Plan it states that the chlorinated volatile organic compounds (CVOCs) detected in surface water sampling are associated with historical disposal of dry-cleaning chemicals at the former Smart Set Cleaners; however, surface water sampling of Powell Creek identified CVOCs upstream of the depicted groundwater plume in Figure 3 of the PRAP, which is indicative of an unknown source and not the result of a discharge from the former Smart Set Cleaners. Also, as depicted in Figure 4, the plume is at a deeper elevation than the presumed depth of Powell Creek and no upward movement of the plume to Powell Creek is apparent.

RESPONSE 27: Although there may be an upstream contribution to this stream, there is an increase in PCE contamination observed at the second downstream sampling point at the location

where the plume meets with Powell Creek as shown in Figure 6 indicating that contamination from the site may be impacting the creek

Figure 4 does not indicate the depth of Powell Creek in relation to the depth of the groundwater plume and it cannot be inferred from this figure that the contamination is not reaching the surface of Powell Creek. Powell Creek cuts a deep swath in the landscape, quite a few feet below the ground surface in the surrounding area.

Therefore, the Department concludes that a portion of the contamination in Powell Creek is attributable to the former Smart Set Cleaners and the statement on page 4 is accurate.

COMMENT 28: Finally, the "Z – blank contamination" qualifier for DCE suggests the data from that sampling event may not be usable. Therefore, should the statement of page 4 (Exhibit A) regarding the CVOCs and their association with the former Smart Set Cleaners be corrected accordingly?

RESPONSE 28: The blank contamination indicated by a "Z" in the figure and the text is viable data. Data that would be rejected is marked with an "R".

Kelly Lark and Yvette Hayes submitted a letter dated March 30, 2015 on behalf of neighborhood residents which included the following comments.

COMMENT 29: We are requesting that the NYSDEC conduct thorough testing of the westward areas bordered by Atlantic Avenue, Lincoln Avenue and Woods Avenue, in particular Court St, Davis Street, Stevens Street, Steven Court, Dilthy Street, Stewart Avenue and Roswell St.

RESPONSE 29: The Department's investigation of the groundwater plume found that the plume is traveling almost due west from the former Smart Set Cleaners and there is no northerly component to it. The Department conducted groundwater testing at its northwestern-most point on Davis Street. We found that the groundwater contained only 1 ppb of PCE and the groundwater standard for PCE is 5 ppb.

COMMENT 30: We also have another cleaner in the area, Elite Cleaners, located at 2864 Woods Ave, Oceanside. This cleaner is located at the corner of Woods Avenue and Davis Street and just a few blocks west of the former location of Smart Set Cleaners. We ask that your study of the area also encompass this establishment to insure that similar practices were not utilized.

RESPONSE 30: The Department will evaluate this request to determine whether Elite Cleaners qualifies as a potential inactive hazardous waste disposal site.

COMMENT 31: With respect to the refusal of New York Sports Club and Oceanside Medical Center to allow testing of their soil is there nothing that can be done to force soil testing for the safety and well-being of our community?

RESPONSE 31: The Department requested access to the New York Sports Club and the Oceanside Medical Center in order to test the indoor air and the sub-slab soil vapor, not the soil. The purpose would have been to evaluate the potential for soil vapor intrusion into these two facilities, resulting from the presence of the groundwater plume beneath them. While we offered

this opportunity at no cost to the property owner, a property owner has the right to deny access for sampling.

APPENDIX B

Administrative Record

Administrative Record

Smart Set Cleaners
State Superfund Project
Town of Hempstead, Nassau County, New York
Site No. 130194

1. *Proposed Remedial Action Plan for the Smart Set Cleaners site,* dated February 2015 prepared by the Department.

2. Referral Memorandum dated June 10, 2010 for Remedial Investigation and Feasibility Study.

3. Summary of Subsurface Investigation, May 2001, prepared by Miller Environmental Group.

4. Additional Investigation and Remedial Action Plan, May 2002, prepared by Envirotrac.

5. Final Remedial Investigation Report, December 2014, prepared by HDR.

6. "Update Report, July 2014 through September 2014", December 2014, prepared by Envirotrac.

7. Final Feasibility Study, February 2015, prepared by HDR.

8. March 10, 2015 letter from Assemblyman Todd Kaminsky, New York State Assembly.

9. March 24, 2015 letter from Jeffrey Bohlen of Envirotrac on behalf of the Potentially Responsible Party.

10. March 30, 2015 letter from Kelly Lark and Yvette Hayes.