Alternatives Analysis and Remedial Work Plan
Former Baron Blakeslee Property
Site #C152204
Bay Shore, Suffolk County, New York

Prepared for

General Electric Company, Albany, New York

January 2015

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Site #C152204
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Prepared for
General Electric Company
319 Great Oaks Blvd.
Albany, New York 12203

January 2015

Project Number: 146524

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Certification Statement

I, Marek Ostrowski, certify that I am currently a NYS registered professional engineer, this Alternatives Analysis and Remedial Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

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Jan 9, 2015
Date

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List of Abbreviations

a	Ampere
AAR	Alternatives Analysis Report
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CVOC	Chlorinated Volatile Organic Compound
DCE	Dichloroethylene
DEC	New York State Department of Environmental Conservation
DER	Division of Environmental Remediation (DEC)
DOH	New York State Department of Health
DQO	Data Quality Objective
DUSR	Data Usability Summary Report
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Approval Program (NYSDOH)
EM	Electromagnetic
EPA	United States Environmental Protection Agency
eV	Electron Volt
FSP	Field Sampling Plan
GAC	Granular Activated Carbon
GC/MS	Gas Chromatography/Mass Spectrometry
GE	General Electric Company
GIS	Geographic Information System
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HHEA	Human Health Exposure Assessment
IDW	Investigation Derived Waste
IRM	Interim Remedial Measure
LCS	Laboratory Control Spike
MS	Matrix Spike
MSD	Matrix Spike Duplicate
mg	Milligram
msl	mean sea level
NAPL	Non-Aqueous Phase Liquid
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
p	Phase (alternating electrical current)

PCE	Perchloroethylene aka Tetrachloroethylene
PDI	Pre-Design Investigation
PDF	Portable Document Format
PID	Photoionization Detector
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RWP	Remedial Work Plan
SAP	Sampling and Analysis Plan
SC	Site Characterization
SCDH	Suffolk County Department of Health
scfm	Standard Cubic Feet per Minute
SCGs	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective (NYCRR Part 375-6)
SCWA	Suffolk County Water Authority
SMP	Site Management Plan
SSDS	Sub-Slab Depressurization System
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCE	Trichloroethylene
TCL	Target Compound List
ug	Microgram
v	Volt
VPGAC	Vapor-Phase Granular Activated Carbon
VOC	Volatile Organic Compound
WC	Water Column

Section 1

Introduction and Purpose

This Remedial Work Plan (RWP) has been prepared pursuant to the Brownfield Cleanup Agreement (BCA) between General Electric Company (GE) and the New York State Department of Environmental Conservation (DEC), dated December 31, 2013 (Index C152204-11-13). The BCA sets forth GE's obligations under the DEC's Brownfield Cleanup Program (BCP) for remediating the Site known as the Former Baron Blakeslee Property, Site #C152204, located at 86 Cleveland Avenue, Bay Shore, Suffolk County, New York (hereinafter, Site). GE is a "Volunteer" in the BCP. The principal goal of this project is to select and implement a remedy that is protective of public health and the environment, taking into account the current, intended and anticipated industrial use of the Property; and to enhance the opportunities for the largely vacant, underutilized industrial Site property to be put back into productive use. To this end, the project further delineates and remediates the residual volatile organic compound (VOC) impacts in on-Site, unsaturated soils that were identified during the Site Characterization investigations conducted by GE in 2011-2013. It is anticipated that a soil vapor extraction (SVE) system will be used to remediate these impacts.

The overall scope of this BCP project consists of the following tasks:

1. Develop and implement a Pre-Design Investigation to complete delineation of the extent of residual VOC impacts in shallow soil, determine the spacing of SVE points, and evaluate other design criteria including SVE system components.
2. Prepare an Alternatives Analysis Report (AAR) and draft Remedial Work Plan (RWP). The AAR/RWP submittal will include the results of the PDI as well as a qualitative human health exposure assessment (HHEA) based on the SC and PDI data. The AAR will consider both the unrestricted and industrial use scenarios. The draft RWP will be a conceptual level document and serve as the remedial design work plan. It is anticipated that the RWP will provide the framework for implementation of the SVE system, implementation of institutional controls, and preparation of a Site Management Plan (SMP).
3. Prepare a Remedial Design. Following New York State Department of Environmental Conservation (DEC) and New York State Department of Health (DOH) approval of the RWP, a detailed Remedial Design (RD) will be prepared in accordance with the requirements of DER-10 (DEC, 2010) and submitted for DEC approval. The RD will include a draft Operation and Maintenance (O&M) Plan specifying periodic SVE performance monitoring and reporting requirements.
4. Implement remedial construction. The SVE system, whether implemented as an Interim Remedial Measure (IRM) or pursuant to an RWP, will be installed and subjected to initial testing to verify that it is achieving the specified performance criteria.
5. Continued SVE operation, maintenance, monitoring and periodic reporting will be conducted in accordance with the O&M Plan included in the SMP.
6. The DEC will be granted an environmental easement on the Property.

This document completes project items 1 and 2 above. In addition to the typical elements of a RWP, it includes a detailed report of the recently completed PDI, a qualitative HHEA, and the AAR.

Section 2

Site History and Description

This section describes the Site and the industrial area in which it is situated, the Site's history, and prior remedial actions and investigations.

2.1 Location

The industrial zoned Site consists of approximately 1.84 acres located at 86 Cleveland Avenue in an industrial-zoned area of the Town of Islip (Figure 2-1). The Site includes a +47,000 square foot building, comprised of three interconnected buildings constructed of concrete block and corrugated steel on concrete slabs (Figure 2-2). The grounds consist of asphalt-paved parking and driveway areas with landscaped and limited vegetated areas occurring along the northern, eastern, and southern Site boundaries. A chain link fence separates the abutting commercial and industrial properties to the west and south from the Site. A small portion of the building is currently occupied by a GE appliance repair shop, while the remaining areas of the building are unoccupied and vacant. The Site is currently serviced with municipal water from the Suffolk County Water Authority (SCWA). Public sewer services are not available in the area, and the Site utilizes a SPDES-permitted septic system.

The surrounding properties are used for commercial/industrial purposes including, but not limited to, chemical manufacturing, wood working and metal operations, vehicle maintenance/transmission shops, recycled materials and concrete production. The Site is surrounded to the north and across South 3rd street by an unimproved lot utilized for the parking/storage of school buses, and to the east and across Cleveland Avenue by a commercial building associated with school bus maintenance (190 Fehr Way) and Precision Metals Corp (221 Skip Lane), a sheet metal company. The Site is abutted to the west by a concrete, gravel and soil recycling center (3rd Street Recycling & Materials LLC) and to the south by a redi-mix concrete facility operated by the Deer Park Sand and Gravel Corp (90 Cleveland Avenue). The Site is currently serviced with municipal water from the Suffolk County Water Authority (SCWA). Public sewer services are not available in the area, and the Site utilizes a SPDES-permitted septic system.

The nearest residential area is located approximately 1,500 feet east of the Site. The nearest recreational area is the Oak Brush Plains State Preserve, located approximately one-half mile northwest of the Site. The preserve consists of pitch pine-scrub oak barrens, and is habitat for common animal species, including several types of warblers, red-tailed hawks, eastern cottontail, red fox and hognose snakes. Several species of rare invertebrates are present, including the coastal barrens buckmoth. The Site does not contain any wetlands, critical habitat or important natural resources.

2.2 History

The following table summarizes Site ownership since approximately 1969. More details are available in the SC reports (BC, 2012, 2013).

Owner	Begin Date (approx.)	End Date (approx.)	Notes
Standard Precast Products Corporation	Unknown	September 1976	Operations unknown. Circa 1969 aerial photograph shows a receiver and hopper in the central-eastern portion of the Site, and storage of finished products and wire mesh.
Purex Corporation	September 1976	August 1982	Under Purex ownership, a warehouse/shop building was constructed in the southwestern portion of the Site and an office building was constructed in the northeastern portion of the Site.
Baron Blakeslee Inc./Purex	August 1982	June 12, 1984	Baron Blakeslee Inc. was a division of Purex Corporation. The Site operated as a solvent/chemical storage, repacking, and distribution center. Operations reportedly closed in April/May 1983.
Town of Islip Industrial Development Authority (IDA)	June 12, 1984	November 1991	Aircraft Turbine Services (ATS), a subsidiary of Airwork Corporation/Purex Corporation, became a tenant of the Site in 1985 and assumed responsibility of ongoing environmental remediation.
Aircraft Turbine Services	November 1991	July 1994	ATS purchased the Site from the IDA.
UNC Accessory Services NY/CAMCO (UNC)	July 1994	1997	UNC purchased the Site from ATS.
Greenwich Air Services, Inc.	1997	1997	UNC became a subsidiary of Greenwich Air Services, Inc. in 1997
General Electric	1997	Present	1997 Greenwich Air Services acquired by GE, renamed GE Engine Services. Operations reportedly ceased by April 1998.

During the Purex/Baron Blakeslee ownership, the Site was operated as a solvent/chemical storage, repacking, and distribution center. Materials reportedly handled at the Purex/Baron Blakeslee facility included solvents, chlorinated hydrocarbons, fluorinated hydrocarbons, aromatic hydrocarbons, aliphatic hydrocarbons, ketones and glycols. The materials were reportedly transported to the Site in bulk tankers and 55-gallon drums; transported from the trucks and within the warehouse building *via* "fill and draw distribution piping" and portable tankage; and stored on-Site in 29 ASTs and in 55-gallon drums. The solvents/chemicals were then transferred to smaller drums or tankers for delivery to customers. Purex/Baron Blakeslee reportedly utilized a bulk storage area in the southwestern portion of the Site, referred to as the "Tank Pit." A secondary concrete containment area reportedly surrounded the Tank Pit.

Aircraft Turbine Services (ATS), a subsidiary of Airwork Corporation/Purex Corporation, conducted aircraft engine maintenance operations, including cleaning processes for steel, aluminum and magnesium parts that involved immersion in 400-gallon open process tanks containing various cleaning solutions and sodium hydroxide and water. Used solutions were reportedly pumped into drums, classified and disposed of off-Site by a registered disposal contractor (Chemical Pollution Control, Inc.). While awaiting pickup for disposal, the waste fluids were reportedly stored in the rooms where the cleaning tanks were located.

There are no records or reports reflecting the release of hazardous substances or spills on the Site during or after UNC operations. Aircraft accessory equipment was reportedly cleaned in dip tanks, and other operations included shot blasting and painting. An interim permit (050491) for UNC to operate as a hazardous/toxic material storage facility was issued by the Suffolk County Department of Health (SCDH) on August 26, 1996 and listed 10,000 and 550 gallons of diesel fuel, 1,500 gallons of unspecified "organic solvent", and 2,420 gallons of drum storage.

2.3 Prior Investigations

The Site has been the subject of a recent Site Characterization (SC) investigation conducted and completed pursuant to an Order on Consent and Administrative Settlement between the DEC and GE, dated September 27, 2010. More details are available in the SC reports (BC, 2012, 2013).

Earlier groundwater remediation, including a pump and treat system, had been conducted by the prior owner/operator to address historic solvent-related impacts in groundwater. The SC Order on Consent and Administrative Settlement noted that the Applicant acquired the Site after the time that hazardous substances had been released on the Site. The objectives of the SC were to determine the nature of remaining contamination attributable to the former historic solvent storage and distribution operations within soils and groundwater underlying the Site, and to evaluate the potential for intrusion of soil vapor into the existing building from such residual historic conditions. The SC investigation was conducted from 2011 to 2013, and included the following:

- Extensive groundwater profile sampling and analysis for VOCs and metals;
- Supplemental groundwater sampling and analysis for metals *via* conventional monitoring wells;
- Sampling of soil gas at sub-slab and exterior locations (on- and off-Site);
- Indoor/outdoor air sampling and analysis for VOCs; and
- Sampling and analysis of shallow (vadose zone) soils for VOCs.

The key SC findings were:

1. Groundwater samples from the vertical profile boreholes confirmed the effectiveness of the earlier groundwater treatment system, with only trace concentrations of VOCs detected in shallow groundwater.
2. Sodium was the only dissolved metal present in groundwater above Part 703 standards, with the highest concentration found upgradient, near South Third Street. The metals concentrations previously detected in direct-push groundwater profile samples were artifacts of high sample turbidity.
3. Soil samples from borings advanced inside the building indicate the presence of residual chlorinated VOCs (CVOCs) in vadose zone soils in a localized area mainly beneath the former Baron Blakeslee warehouse building in the southern portion of the facility. No VOCs were detected in soil above the Part 375-6 Industrial Soil Cleanup Objectives (SCOs) for Protection of Human Health. VOC concentrations at seven sample locations were detected above the SCOs for protection of groundwater; however, extensive groundwater analytical data indicate these VOCs are not adversely impacting groundwater quality.
4. Sub-slab soil vapor sampling detected Perchloroethylene (PCE) and Trichloroethylene (TCE) at concentrations for which DOH guidance recommends mitigation to minimize potential soil vapor intrusion. The TCE and PCE vapors are desorbing from shallow, vadose zone soils under the building. Indoor air data indicate the concrete floor slab is significantly restricting or eliminating vapor intrusion.
5. Exterior soil gas data indicated PCE and TCE vapors diminish away from the building but may be migrating toward Cleveland Avenue. Concentrations on the near side of Cleveland Avenue are generally 1 to 2 orders of magnitude lower than those under the building, and have generally diminished an additional order of magnitude along the far side of Cleveland Avenue.

2.4 Conceptual Site Model

The SC activities conducted from 2011 to 2013 included a review of historic information and environmental data, and the analysis of soil, groundwater, soil vapor and air samples. The information assembled and reported support a conceptual Site model incorporating limited impacts by chlorinated VOCs in soil and soil vapor.

The former Baron Blakeslee facility consists of a slab-on-grade structure situated over relatively permeable glacial outwash deposits known collectively on Long Island as the Upper Glacial Aquifer. Groundwater in the Upper Glacial Aquifer is unconfined, with the water table at the Site approximately seven to ten feet below ground surface. In this part of Long Island, groundwater generally flows south and discharges along the south shore. In the immediate vicinity of the Site, groundwater flows southeasterly.

Historical industrial processes on the Site resulted in the release of chlorinated solvents to the subsurface soils and groundwater beneath the building. However, extensive vertical profile sampling of groundwater in 2011 demonstrated that little or no solvent impacts remain in the groundwater, a result of several factors including the elimination of infiltration by precipitation afforded by overlying structures and paving and the resulting restriction of leaching beneath the buildings, and the operation of an on-Site groundwater pump and treat system by a previous Site owner for a number of years. Elevated concentrations of a number of metals were found in the vertical profile samples; however, subsequent installation of conventional monitoring wells and sampling by conventional low-flow procedures demonstrated that sodium is the only dissolved metal present in groundwater above Part 703 standards, with the highest concentration found upgradient, near South Third Street.

Soil samples from borings advanced inside the building indicate the presence of residual CVOCs in vadose zone soils in a localized area mainly beneath the former Baron Blakeslee warehouse building in the southern portion of the facility. The relatively low soil concentrations indicate that the residual CVOCs have degraded naturally and desorbed into soil vapor. Indoor air concentrations of the CVOCs are several orders of magnitude lower than the soil vapor concentrations and are comparable to outdoor air concentrations, indicating that the floor slab is greatly restricting or eliminating intrusion of the soil vapors.

Exterior soil vapor concentrations diminish significantly with distance from the source under the building. Concentrations on the near side of Cleveland Avenue are generally 1 to 2 orders of magnitude lower than those under the building, and have generally diminished an additional order of magnitude along the far side of Cleveland Avenue.

Section 3

Pre-Design Investigation

This section reports the results of the Pre-Design Investigation that was conducted in March-April 2014 in accordance with the DEC-approved PDI Work Plan (BC, 2014).

3.1 Objectives of Investigation

The specific remedial objective is to reduce the mass of the VOCs in the unsaturated zone at the Site, and consequently to reduce the corresponding VOC impacts to soil vapor. Since a SVE system might be used to accomplish this objective, the primary objective of the PDI was to obtain information that will allow for the design of a SVE system. The PDI focused on the following:

- Delineating the source area of the VOC soil vapor impacts; and
- Obtaining SVE design information (e.g., extraction rates, spacing of extraction facilities, VOC mass loading, pressure distribution in subsurface).

PDI tasks to achieve these objectives are described below in Section 3.2.

3.2 Investigation Methods and Materials

The following subsections provide a summary of the investigation methods and materials and note deviations, if any, from the DEC-approved work plan.

3.2.1 Utility Markouts

Prior to drilling, the locations of subsurface utilities were marked in the field by UFPO/Dig Safely New York. In addition, the interior and exterior drilling areas were surveyed using EM (electromagnetic) and GPR (ground penetrating radar) techniques to identify potential subsurface obstructions such as water pipes, electrical conduits or foundation footings.

3.2.2 Soil Delineation Sampling

In order to further define the source area and establish the area targeted for SVE, shallow soil was sampled at 4 additional locations (SB-13 through SB-16, Figure 3-1). The borings were advanced with GeoProbe® direct-push technology to 10 ft bgs in accordance with the SOPs in the PDI Work Plan. Continuous soil samples were collected from each soil boring using a 4 ft macro-core sampler with a dedicated, clean acetate liner. The barrel was advanced the full 4 feet for each push for this application. Soil in each liner was screened in the field using a photoionization detector (PID). At each location, one soil sample was collected from the six-inch interval with the greatest PID readings (refer to borings logs in Appendix A for details) and analyzed for full target compound list (TCL) VOCs plus 10 tentatively identified compounds (TICs) *via* EPA SW-846 Method 8260.

3.2.3 Installation of SVE Test Wells and Monitoring Points

The SVE pilot test wells and monitoring points were installed at the locations shown in Figure 3-2, primarily in the area of the appliance repair shop, where the highest VOC concentrations have been identified. One monitoring point was installed north of the partition between the repair shop and the main building to evaluate the effect of the foundation on subsurface air flow.

One extraction well, seven monitoring points and three air inlet wells were installed. Well and monitoring point construction diagrams are provided in Appendix A. The 4-inch diameter PVC extraction well (SVE) was advanced to a depth of approximately 7 feet bgs, and screened between the depths of 2 and 7 feet bgs. Seven 1-inch PVC monitoring points (MP-1a/b/c through MP-5) were installed in five monitoring locations. In one of the monitoring locations, three observation points (MP-1a/b/c) were installed, screened at depths 2-4 feet, 4-6 feet, and 6-8 feet bgs to facilitate the evaluation of vertical air flow between the surface and the extraction well. Three 4-inch diameter PVC air inlet wells (AIR INLET 1 – AIR INLET 3) were installed, screened at the same interval as the extraction well. The wells will be equipped with a screw-on plug. All wells and extraction points were fitted with screw on plugs for connection with measuring instrumentation.

3.2.4 SVE Test

The SVE test was performed on March 6, 2014, following procedures outlined in the Work Plan. The schematic of the test setup is shown on Figure 3-3.

Prior to commencing the test, base-line pressure readings at the extraction well and monitoring wells were collected for a period of 40 minutes at 5-to-10-minute intervals. Soil vapor extraction began at 8:31 and terminated at 16:20. Three approximately 2-hour long extraction steps with the use of a single blower were performed by progressively increasing the speed of the blower motor, and therefore also increasing the vacuum at the extraction well and the corresponding extraction rate. At the end of the 3rd extraction step, the three air inlet wells were opened sequentially. Each inlet well was open for the period of approximately 15 minutes, and was closed before opening of the next inlet well. Air flow measurements from each open well were collected at two-to-three intervals using a portable air velocity meter (i.e., a hot wire anemometer). Afterwards, a fourth and last extraction step was performed, with two blowers connected in series and set to the maximum speed for the period of approximately 15 minutes.

During the entire SVE test, the pressure at the extraction well and all monitoring wells was recorded at intervals of approximately 5 to 20 minutes, using a digital pressure gauge 9TEC model DG-700. The extraction rate was recorded using a rotary vane anemometer (TSI RVA-801) at similar time intervals. Atmospheric pressure was monitored throughout the test using a dedicated TSI VelociCalc 9565-P Anemometer. The concentration of VOCs was monitored at the discharge location using a calibrated photoionization detector (PID) at intervals of approximately 10 minutes to one hour. Ambient air quality readings were taken at the exterior of the AC shop building at four points in time, using a 10.6 eV lamp PID.

Data collected during the test are presented in Tables 3-2a and 3-2b.

At the conclusion of the test, one discharge air sample was obtained for analysis of VOCs using EPA Method TO-15. The sample was collected over a 30 minute sampling period using a Summa® canister, following the sample collection procedure outlined in the Work Plan.

Results of discharge sampling are presented in Table 3-3.

3.2.5 Analytical Data Validation

The soil and soil vapor samples were analyzed by TestAmerica. Complete data packages are provided on CD-ROM in Appendix B. Data Usability Summary Reports (DUSRs) were prepared for each data package (Appendix C). Based on the data usability review, no data were rejected. Minor data quality issues were identified; only some required qualification of the data.

3.2.6 Investigation-Derived Waste

Investigation-derived waste (IDW) generated from field activities included soil cuttings, acetate direct-push sleeves, and personal protective equipment (PPE). The IDW was containerized in labeled 55-gallon DOT-approved steel drums and staged in a single location on the property pending characterization and disposal. Information contained on the label included the drum contents, name, address and telephone number of generator, date(s) the material was placed in the drum, and a BC contact name/telephone number. Wastes were separated based on type and inventoried. A total of 4 drums of IDW were generated during the PDI activities. Available analytical data from environmental media will be correlated with the particular contents of each drum and forwarded to the disposal subcontractor for preparation of waste profiles. Based on the available data, the IDW is not considered to be a RCRA Hazardous Waste.

3.3 Results

This section describes the results of the soil delineation sampling and SVE testing.

3.3.1 Delineation of VOCs in Soil

The analytical results of shallow soil sampling are summarized in Table 3-1 and Figure 3-1. The data indicate the chlorinated VOCs present in vadose zone soils are sufficiently delineated for remedial purposes. PDI soil borings SB-15 and SB-16 were located in the building interior, adjacent to soil boring SB-6, where relatively elevated concentrations of 1,1,1-trichloroethane; cis-1,2,-dichloroethene; tetrachloroethene (PCE), and trichloroethene (TCE) had been identified during the SC. The VOC concentrations at SB-15 and SB-16 were non-detect or well below the concentrations detected at SB-6, indicating the soil contamination does not extend much beyond SB-6.

PDI soil borings SB-13 and SB-14 were located outside the building to evaluate the extent of the VOC impacts previously identified under the floor slab at soil borings SB-1, SB-9 and SB-11. The VOC concentrations at SB-13 and SB-14 were non-detect or three orders of magnitude lower than concentrations at SB-6, indicating the sub-slab soil contamination does not extend beyond the building foundation.

The SC and PDI soil sampling indicate that the residual chlorinated VOC impacts in the vadose zone are limited to an elongated north-south area under the western portion of the appliance repair facility, and extend north a short distance under the adjoining building.

3.3.2 SVE Test Results

As shown in Table 3-2a, both the extraction rates and the vacuum readings at the SVE extraction well SVE-EX reached their ultimate values for each of the steps essentially instantaneously. The variation of the two parameters throughout each step was negligible. Similarly, the development of the maximum vacuum at the monitoring wells was essentially immediate following each adjustment of the blower speed. Therefore, for each of the four steps, the results can be discussed in terms of a single characteristic vacuum at the well head with a single corresponding extraction rate, and a single vacuum distribution in the subsurface.

The graph of extraction rate versus well-head vacuum is shown on Figure 3-4. Within the interval of approximately 9 to 19 inches of water column (in W.C.) of well-head vacuum, the relationship between the vacuum at the well head and the corresponding extraction rate is linear, producing flow rates between approximately 70 and 120 scfm. There is a slight departure from the linear pattern within the interval of 19 to 24 in W.C. (170 scfm at 24 in W.C.); however, as the 24-inch vacuum was the maximum value developed during the test, it is difficult to ascertain whether this is an actual change in pattern that would continue, or whether it is a result of the normal scatter of data.

It appears that the extraction rate from an SVE well located at the Site will be on the order of 10-100 scfm for typical vacuums used in SVE systems. These flow rates are relatively high, considering that the unsaturated zone is less than 10 feet thick. The rates may indicate that the unsaturated zone materials are relatively permeable, or that there is significant leakage from the ground surface once the vacuum is applied to the subsurface. In the latter case, air would generally enter the subsurface in the immediate vicinity of the SVE well, and the corresponding venting rate of regions located farther from the well could be low. However, vacuum readings collected during the test at monitoring wells, as well as information gathered from the flow measurement at the air inlet wells, indicate that the leakage from the surface is negligible, pointing to the relatively high permeability of the unsaturated zone materials as the cause of the high flow rates.

Vacuum at the monitoring wells observed during the four steps completed as part of the test is shown on Figures 3-5a, b, c, and d. For each step, the semi-logarithmic plots of vacuum versus distance closely approximate a linear distribution, indicating that the flow in the monitored area is close to being horizontal and that leakage is negligible (significant leakage is generally shown as a noticeable departure from the linear pattern). In addition, for each step, vacuum levels at monitoring wells MP-1A, B, and C are essentially identical, also indicating a horizontal flow. These three wells were installed at the same location, with screens placed at three different depths within the unsaturated zone. In case of significant vertical flow from the ground surface, vacuum measurements at these wells would have shown large differences reflecting the curvature of the equipotential lines characteristic of vertical flow.

Another indication of lack of significant surface leakage is the result obtained from monitoring of the flow rate at the inlet wells, which were sequentially opened at the end of the third test step. If significant leakage from the surface is present, most of air extracted by the SVE well enters the subsurface as an areal downward flow near the well. Under those conditions, an air inlet well supplies little to no flow. However, as shown in Table 3-2a, the inlet wells located approximately 5, 10, and 15 feet from the SVE wells, when opened, provided approximately 50, 25, and 15 percent of the extracted flow, respectively. This reinforces the findings of the vacuum monitoring that most of the flow occurring in the subsurface was near-horizontal.

Vacuum contours in the subsurface at the end of each test step are shown on Figures 3-6a, b, c, and d. A significant vacuum of between 0.5 and 1 in W.C. was created in an area with the overall dimension of approximately 40-50 feet.

PID readings of VOC concentrations at the discharge throughout the test, as well as results of an air sample collected *via* Summa canister from the discharge at the end of the test step 3, are shown in Tables 3-2a and 3-3, respectively. Total VOC concentrations recorded using the PID decreased from approximately 17 parts per million (or milligrams per liter – mg/L) at the beginning of the test to approximately 4 mg/L towards the end. A PID can be considered a semi-quantitative tool; therefore, the actual mass flux is not calculated using the PID data. However, the PID readings show that the most concentrated soil vapor was removed during the first hours of the test, and that the VOC concentration likely plateaued afterwards. The air sample was collected towards the end of the test, likely corresponding to conditions representative of the long-term operation of the SVE system. Using the extraction rate of 100 cubic feet per minute (cfm) (2.8 m^3/min), and the total VOC concentration of 15,000 µg/m^3 from Table 3-3, the order-of-magnitude mass flux rate from an SVE well can be calculated to be 42,000 µg/min, or 60 g/day (2.8 m^3/min *15,000 µg/m^3 = 42,000 µg/min = 60 g/day).

Results of the SVE test indicate that the floor slab of the on-Site buildings provides an effective seal, resulting in predominantly horizontal flow within the unsaturated zone in response to the applied vacuum. This means that the zone around the SVE wells where significant vacuums are observed also receives significant flow and associated venting. The extraction rates under typical well-head vacuums are anticipated to be on the order of 10-100 scfm per well, while the dimension of the zone of influence of a single SVE well is anticipated to be approximately 50 feet. The total concentration of volatile compounds in the extracted air can be anticipated to be on the order of 10,000 ug/m^3, establishing that significant mass can be removed by means of soil vapor extraction.

The large influence area of the SVE test well under moderate extraction rates, the good surface seal, and the significant mass removal rate indicate that soil vapor extraction is well suited for remediating the residual chlorinated solvent impacts in the unsaturated zone under the building.

Section 4

Human Health Exposure Assessment

A qualitative assessment was conducted to evaluate whether or not complete exposure pathways exist between Site-related contaminants and potential human receptor populations. This assessment was conducted consistent with DOH guidance provided in Appendix 3B of "DER-10: Technical Guidance for Site Investigation and Remediation" (DEC, May 2010).

A complete exposure pathway requires the following components:

- A source of the contaminants.
- A mechanism for the release of the contaminants to the media in the environment and, in some cases, a mechanism for transfer of contaminants from one medium to another and/or for transport of the contaminants to a potential exposure point.
- A receptor population.
- A route of exposure for the contaminants at the exposure point to the potential receptor.

This evaluation was based on available data and information for the Site and an understanding of current and foreseeable future land uses at the Site.

Pathways identified through this assessment are potential exposure pathways. The identification of a potential pathway does not imply that the exposures are actually occurring, but that the potential for exposure exists. Further, the identification of a potentially complete exposure pathway is not an indicator of impact to the receptor in and of itself; the potential for impact to the receptor depends on the degree and duration of the actual exposure. The results of this human health exposure assessment will be used, in conjunction with other information and data, to evaluate remedial alternatives for Site-related impacts.

4.1 Current and Future Site Use

This section provides additional background information pertinent to the exposure assessment. The industrial Site is improved with a +47,000 square foot building, comprised of three interconnected buildings, constructed of concrete block and corrugated steel on a concrete slab. Remaining grounds are comprised mainly of asphalt-paved parking and driveway areas with limited landscaped and vegetated areas occurring along the northern, eastern, and southern property boundaries (see Figure 2-2). A chain link fence separates the abutting commercial and industrial properties to the west and south from the Site.

The southeastern most portion of the commercial/industrial building is occupied by a GE appliance repair shop while the remaining areas of the building, consisting of a large centrally located former warehouse/production area and a two-story office area in the northeastern portion of the building, are unoccupied and vacant. The concrete containment structure that formerly housed several above ground storage tanks (ASTs) is present along the exterior southern production area wall and a formerly used concrete storage pad is present west of the GE Repair portion of the building.

The Site is located in an area of Bay Shore zoned 2-Industrial. Industrial usage of surrounding properties includes, but is not limited to, chemical manufacturing, wood working and metal operations, vehicle maintenance/transmission shops, recycled materials and concrete production facilities The Site is surrounded to the north and across South 3rd street by an unimproved lot utilized for the parking/storage of school buses/vehicles and to the east and across Cleveland Avenue by a commercial building associated with school bus maintenance (190 Fehr Way) and Precision Metals Corp (221 Skip Lane), a sheet metal company. The Site is abutted to the west by a concrete, gravel and soil recycling center (3rd Street Recycling & Materials LLC) and to the south by a redi-mix concrete center operated by the Deer Park Sand and Gravel Corp (90 Cleveland Avenue). The Site is currently serviced with municipal water from the Suffolk County Water Authority (SCWA). Public sewer services are not available in the area and the Site is presumed to utilize an on-Site septic system. Given the current industrial use of the Site and surrounding properties, it is likely that the Site will remain in industrial use for the foreseeable future.

4.2 Impacted Media

As reported during the SC investigations (BC, 2012, 2013), various media at the Site were impacted as a result of historic Site operations. These impacts are discussed below.

4.2.1 Soil

Four sub-slab soil borings (SB-1 through SB-4) were installed during Site characterization efforts in 2011 to access soil quality conditions beneath the existing building (Figure 3-1). Borings were advanced five (5) feet below the concrete slab. Each soil sample was submitted for analysis of VOCs plus TICs, SVOCs plus TICs, and Metals (including mercury). All reported concentrations of metals were below the applicable criteria and SVOCs were not detected in the tested soil sample. Concentrations of PCE (at 23 mg/kg) and TCE (at 1.4 mg/kg) were detected in soils collected from beneath the GE Appliance Repair shop (SB-1) below commercial and industrial SCOs, but in excess of their respective SCOs for Protection of Groundwater[1]. Other VOCs in SB-1, including 1,1,1-TCA and chloroform, were detected; however, they were observed at concentrations below applicable standards. PID readings up to 136 ppm were observed from this borehole. VOCs were not detected in the remaining three soil boring locations.

Soil borings were advanced at eight locations in the building during supplemental SC efforts in 2012. The concrete floor slab at each boring location was penetrated using a core drill and borings were advanced to the apparent depth of the water table, as indicated by saturated conditions observed in the soil samples (depths ranging from 7.7 to 10.7 ft bgs). Continuous soil samples were collected from each boring using a 4 ft macro core sampler. Soil in each liner was screened in the field using a photoionization detector (PID) and soil samples were collected from the six-inch interval with the greatest PID reading.

All VOC concentrations detected in the shallow soil samples were below the SCOs for Protection of Public Health (Industrial Use). Four VOCs (PCE; cis-DCE; 1,1,1-TCA; acetone) were detected at concentrations slightly above the SCOs for Protection of Groundwater; however, none of these residual detections presently threaten groundwater quality due to their shallow depth and the cover afforded by the building, as confirmed by recent (2011) groundwater profile sampling.

As noted in Section 3.3, the soil samples from the four PDI borings inside and outside of the buildings have delineated VOC impacts within an elongated north-south area under a portion of the appliance repair facility and the adjoining building to the north.

Delineation of the impacted area is shown on Figure 4-1.

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[1] These shallow soil impacts are not in contact with groundwater and are isolated by the overlying structures and floor slabs. As demonstrated by extensive groundwater sampling and analysis conducted during the SC investigations, these soils have no adverse impact on groundwater quality.

4.2.2 Groundwater

Groundwater samples from the vertical profile boreholes advanced during the SC investigations confirm the effectiveness of the earlier groundwater treatment system, with only trace concentrations of VOCs detected in shallow groundwater.

The turbid groundwater samples collected from the vertical profile boreholes contained certain metals (including aluminum, arsenic, barium, beryllium, chromium, cobalt, copper, iron, lead, manganese, nickel, potassium, sodium, and vanadium) that were associated with the suspended solids in the samples. Subsequently, groundwater samples were collected by low-flow techniques from conventional monitoring wells installed and screened at depths where the greatest concentrations of these metals had been previously detected. No chromium, cadmium or lead was detected in any of the conventional groundwater samples. Thallium was detected in one unfiltered sample at an estimated concentration of 5.2 J µg/L (the MDL was 5.2 µg/L). This result is not considered significant because it is at the limit of detection and because thallium was not detected in the corresponding filtered sample.

Two metals, iron and sodium, were found in unfiltered conventional groundwater samples at concentrations exceeding the Part 703 groundwater standards. Iron was not detected above standards in any of the filtered samples, indicating it is likely present predominantly in solid form, as an insoluble oxide or component of the naturally occurring minerals comprising the Upper Glacial Aquifer deposits. Sodium was detected in filtered and unfiltered groundwater samples at concentrations exceeding the Part 703 standard in wells MW-GWP-1 and MW-GWP-6R. The concentrations of sodium in filtered and unfiltered samples were generally similar, indicating it is present primarily in the dissolved phase. Neither iron nor sodium is considered a contaminant of concern (COC) at the Site.

4.2.3 Soil Vapor

Sub-slab soil vapor sampling during the SC investigations detected PCE and TCE at concentrations for which NYSDOH guidance recommends mitigation to minimize potential soil vapor intrusion. The TCE and PCE vapors are desorbing from shallow, vadose zone soils under the building. PCE and TCE were also detected in nearby shallow soil samples.

Exterior soil vapor sampling data indicate that PCE vapor and, to a lesser extent, TCE vapor may be migrating a short distance eastward in soil vapor from the building. Soil vapor concentrations on the west side of Cleveland Avenue are generally 1 to 2 orders of magnitude lower than those under the former Baron Blakeslee building. Concentrations generally diminish an additional order of magnitude at the sample locations in the public ROW along the east side of Cleveland Avenue.

There were no exceedances of the DOH Air Guideline values in indoor air. It should be noted that the indoor air concentrations are several orders of magnitude lower than sub-slab concentrations, indicating that the floor slab is significantly limiting or preventing intrusion of VOCs. Furthermore, carbon tetrachloride, benzene and 1,3-butadiene were also detected in the outdoor air sample (on the up-wind portion of the Site) at concentrations at or above indoor air concentrations. These detections would not appear to be related to conditions on the property.

4.3 Fate-and-Transport of Site-Related Contaminants

4.3.1 VOCs

VOCs can readily volatilize and migrate *via* air (ATSDR, September 2000, August 2007, August 2007, September 2007). They can also migrate as vapors through unsaturated soil (i.e., soil vapor) and subsequently into outdoor (ambient) air or indoor air. These compounds degrade when exposed to the atmosphere. VOCs are somewhat soluble in water, and can migrate in the dissolved phase in groundwater. These compounds do not undergo substantial biomagnification in the food chain, as they are metabolized by organisms if ingested. Non-chlorinated VOCs readily biodegrade under aerobic conditions in soil, sediment and water. Chlorinated VOCs percolate through soil with less adsorption than non-chlorinated VOCs, and can reach groundwater faster. Once dissolved in water, chlorinated VOCs tend to be fairly mobile, traveling with water with little retardation. The more highly chlorinated VOCs are susceptible to anaerobic degradation, involving substitution of hydrogen atoms for chlorine atoms. However, chlorinated VOCs can persist in the environment for decades, particularly under aerobic conditions (Petrisor and Wells, 2008).

4.3.2 Metals

Metals associated with suspended solids in groundwater are typically not subject to movement with groundwater. This has been confirmed at the Site by the analytical results from non-turbid groundwater samples obtained by low-flow techniques from conventional monitoring wells. Unlike organic contaminants, metals cannot be degraded but some metals can be transformed to other oxidation states in soil, reducing their mobility and toxicity. Immobilization of metals, by mechanisms of adsorption and precipitation, will generally prevent movement of metals to ground water. Changes in soil environmental conditions over time, such as the degradation of organic material, changes in pH, redox potential, or composition of the soil solution (the aqueous liquid phase associated with the soil) may enhance metal mobility (EPA, 1992).

4.4 Potential Receptors

A potential receptor is a human population that is or may be exposed to Site-related contaminants at a point of exposure, if there is a completed exposure pathway. In the area at or near the Site, the following potential receptors may be present under current conditions:

- Utility/Construction Worker
- Trespassers/Site Visitors
- Outdoor Worker
- Indoor Worker

Under possible future conditions at the industrial zoned Site the existing, vacant buildings may be occupied or an alternative industrial/commercial building may be constructed and occupied. Accordingly, the potential receptors under possible future conditions would include all those identified above for current conditions.

4.5 Potential Exposure Routes and Pathways

Potential exposure pathways to potential receptor populations were evaluated, for both current and possible future Site conditions. Table 4-1 provides an assessment of the potential pathways by evaluating in sequence:

- **Impacted medium:** The medium (e.g., soil, groundwater, etc.) that is the source of contaminants in the exposure medium.
- **Exposure medium:** The impacted medium to which a receptor may be exposed, including where contaminants transfer from one medium to another before the receptor is potentially exposed.
- **Exposure point:** The location of potential contact between a receptor and a contaminant in the exposure medium.
- **Potential receptor:** Potentially exposed human individual, or population of human individuals.
- **Exposure route:** The means by which a receptor comes in contact with a contaminant (e.g., inhalation, dermal contact, etc.).

The potential exposure pathways and the potential exposure routes for contaminants in each medium are discussed below.

4.5.1 Soil

Under current and future conditions, since all residual VOC concentrations observed in the shallow soil samples were below the SCOs for Protection of Public Health (Industrial Use), no direct contact exposure pathway for contaminants in surface soil exists at the Site. However, due to exceedance of the NYSDOH Air Guideline values in sub-slab soil vapor at the Site, the potential for vapor intrusion of residual VOCs in on-Site shallow soil represents a potential current and future exposure pathway from constituents in shallow (vadose zone) soil. Indoor workers (current and future) could potentially be exposed to constituents *via* inhalation of VOCs that have migrated from the shallow soil, through the vadose zone and into the indoor air of a building, assuming, as described above, that the future use of the Site includes occupation of the existing or future commercial building(s). However, an SVE system can be installed in the current building and new structures can be designed with vapor barriers and/or sub-slab venting systems to mitigate potential exposure.

4.5.2 Groundwater

One potential (albeit very unlikely) exposure pathway exists for groundwater. The turbid groundwater samples collected from the vertical profile boreholes contained certain metals (including aluminum, arsenic, barium, beryllium, chromium, cobalt, copper, iron, lead, manganese, nickel, potassium, sodium, and vanadium) that were associated with the suspended solids in the samples. Construction workers could be exposed to these metals through incidental ingestion under a future scenario if excavation is required below the water table. Because such exposure would be of limited duration and controlled by worker health and safety measures such as personal protective equipment, this potential pathway is not carried forward for consideration.

Other impacts to on-Site or off-Site groundwater receptors as a result of Site conditions are not likely to exist. The only dissolved contaminant detected in groundwater above applicable Part 703 standards is sodium, which is not considered a Site-related COC. Further, potable water supply is available in the entire Site vicinity from the Suffolk County Water Authority (SCWA) such that private wells are not generally used for potable water. The source of the water to the SCWA is reported to be deep wells tapping the Magothy Aquifer. And it is worth noting that even the historic Site data did not reflect a substantial impact to the deeper Glacial Aquifer, which is above the Magothy aquifer. According to documentation provided by the SCWA, there are several supply wells located within a 5-mile radius of the Site, with the two closest side-gradient and down-gradient wells located approximately 1.2-miles east/southeast and 1.75- miles south of the Site, respectively. These supply wells are installed at depths ranging from 283 ft bgs to 818 ft bgs.

Available records indicate that most area residences and businesses utilize the available public (SCWA) water supply. However, during the SC investigations, it was noted that the Redi-Mix concrete property located immediately south of the Site (90 Cleveland Ave), did not appear to utilize a connection despite the presence of an active commercial facility, including at least one occupied commercial structure. It is not known if the industrial well on the Redi-Mix property is employed for potable uses.

In summary, the Site is in a highly industrialized area, a public water supply is available to the area, the detection of residual VOCs are at trace, single digit parts per billion concentrations, and there are no apparent receptors to the groundwater on the property. The indoor air does not exceed DOH guidelines for the chemicals of concern. The supplemental SC investigation identified sodium at dissolved concentrations exceeding the Part 703 standards. Concentrations of sodium appear to vary across the

Site; however, the highest concentrations were found in an up gradient well. The use of public water supply by area businesses and residents combined with the lack of constituents of concern indicates that potentially complete exposure pathways for contaminants in groundwater do not exist at the Site.

4.6 Conclusion

Based on this qualitative assessment, the only potential exposure pathways exist through the potential for soil vapor intrusion into the current building and/or future buildings at the Site, and unlikely incidental ingestion of metals in groundwater by future construction workers, should a deep excavation be required. Construction worker exposure can be controlled through worker health and safety measures. GE is evaluating the implementation of an SVE system to address both residual low levels of VOCs in shallow soils and mitigate potential soil vapor intrusion. It is anticipated that SVE points can be installed through the building floor slab in the vicinity of identified soil impacts, which appear to be concentrated in the elongated north-south area noted previously. Analytical results for indoor air samples indicate the concrete floor slab is functioning as an effective barrier against intrusion of sub-slab vapors. Nevertheless, if warranted by future conditions, additional vacuum points could be installed elsewhere in the building to depressurize the entire sub-slab space, thereby eliminating any potential for vapor intrusion into the indoor environment.

Section 5

Alternatives Analysis

5.1 Introduction

5.1.1 Scope

This Alternatives Analysis (AA) documents the development, evaluation and recommendation of a remedial alternative to address the remaining residual environmental impacts at the Site.

5.1.2 Applicable Regulations

The AA has been conducted in accordance with the substantive portions of Title 6 of the New York Code of Rules and Regulations Part 375 for remedial action selection. The AA is also consistent with the applicable portions of the New York State Department of Environmental Conservation (DEC) guidance document "DER-10, Technical Guidance for Site Investigation and Remediation" (DEC, 2010).

5.1.3 Purpose and Report Organization

The purpose of this AA is to develop and evaluate remedial alternatives to address the environmental impacts on the Site arising from prior commercial/industrial operations. As discussed below and in the SC reports (BC, 2012, 2013), these impacts consist mainly of residual concentrations of VOCs found in shallow (vadose zone) soils.

The AA process begins with the establishment of remedial action objectives (RAOs) to address the risks posed by the presence of contaminants at concentrations in excess of the cleanup objectives and cleanup levels established for the Site. General response actions (GRAs) are then developed for the impacted media that can address the RAOs. The identification and screening of technologies applicable to each GRA is the next step in the AA process. Following the identification of process options for the retained technologies, representative process options are combined to form a remedial alternative. The remedial alternatives are screened to determine which alternatives are candidates for detailed evaluation consistent with the guidelines established in DER-10. The detailed evaluation is conducted by applying the following criteria:

- Overall protection of public health and the environment;
- Compliance with Standards, Criteria and Guidelines (SCGs);
- Short-term effectiveness;
- Long-term effectiveness;
- Reduction of toxicity, mobility or volume through treatment;
- Implementability;
- Cost; and
- Land use.

The results of this AA will be used for the selection of a final remedial action for the Site and the preparation of a Proposed Remedial Action Plan (PRAP) and Record of Decision (ROD) by the DEC.

This AA report is comprised of eight sections and is organized in accordance with Section 4.4(b) of DER-10 "Remedy Selection Reporting Requirements". The organization and content of the report are as follows:

- **Section 5.1 - Introduction** - This section describes the scope of this report.
- **Section 5.2 - Site Description and History** - This section describes the Site features, location, surrounding area and historical information about the Site use. It also summarizes the regulatory and investigative activities related to the Site.
- **Section 5.3 – Site Conditions** - This section summarizes the Site geology and hydrogeology, as well as the nature and extent of contamination and results of the human health exposure assessment.
- **Section 5.4 - Remedial Action Goals and Objectives** - This section lists the goals and objectives of the remedial alternatives evaluated for this Site.
- **Section 5.5 - General Response Actions** - This section describes the general types of remedial actions that were evaluated for this Site.
- **Section 5.6 - Identification and Screening of Technologies** - This section includes a listing of potential remedial technologies that meet the GRAs and a preliminary evaluation of each technology with regard to effectiveness, implementability and cost.
- **Section 5.7 – Development and Evaluation of Remedial Alternatives** - This section includes the development of remedial alternatives from the technologies carried forward in the screening process and the evaluation of each remedial alternative with regard to the evaluation criteria specified in DER-10.
- **Section 5.8 - Recommended Remedial Alternative** - This section describes the remedial alternative recommended for implementation at this Site and the basis for the recommendation.

5.2 Site Description and History

Section 2 of this document provides a summary description of the Site and its history. Additional details regarding these topics are provided in the previously referenced SC Reports.

5.3 Site Conditions

This section of the AA summarizes pertinent findings of the SC and PDI.

5.3.1 Hydrogeology and Groundwater Flow

Soil borings advanced during the SC investigations encountered reworked soils (fill) consisting predominantly of sand with varying amounts of gravel and silt, immediately under the ground surface and the concrete building slabs to approximately 5 feet bgs. Below the fill, the borings encountered typical Upper Glacial Aquifer deposits consisting of coarse to fine sands with varying amounts of silt and gravel. These materials were found to depths of 60-62 feet bgs in monitoring well borings.

Water elevations were measured during the January 2013 groundwater sampling event. Although based on limited data points, the potentiometric surface reflected by the monitoring wells is consistent with historic mapping by others, which indicates groundwater flow is generally to the south-southeast (BC 2012, Figure 2-2).

5.3.2 Nature and Extent of Contamination

The results of the SC investigations and the PDI have been described Sections 2 and 3 of this report. The condition that is the subject of Site remediation consists of residual chlorinated VOCs existing in vadose zone soils under the Site buildings (Figure 4-1).

5.3.3 Human Health Exposure Assessment

The results of the qualitative Human Health Exposure Assessment have been described in Section 4 of this report. Based on the assessment, the only potential exposure pathways exist through soil vapor intrusion into the current building and/or future buildings at the Site, and incidental ingestion of metals in groundwater by future construction workers, should a deep excavation be required.

5.4 Remedial Action Goal and Objectives

5.4.1 Remedial Action Goal

The goal for Site remediation, as stated in 6 NYCRR Subpart 375 2.8(a), is to "…restore that Site to pre-disposal conditions, to the extent feasible. At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by contaminants disposed at the Site through the proper application of scientific and engineering principles and in a manner not inconsistent with the national oil and hazardous substances pollution contingency plan as set forth in section 105 of CERCLA, as amended as by SARA."

Where Site restoration to pre-release conditions is not feasible, the DEC may approve alternative criteria based on the Site-specific conditions as stated in 6 NYCRR Sub-Part 375-2-8(b)(1): "The remedial party may propose Site-specific soil cleanup objectives which are protective of public health and the environment based upon other information."

5.4.2 Remedial Action Objectives

As defined in DER-10, RAOs are medium-specific objectives for the protection of public health and the environment. RAOs are developed based on the Standards, Criteria and Guidance (SCGs) to address contamination identified at the Site in consideration of the intended land use.

Remedial activities at the Site are being performed under the Brownfield Cleanup Agreement (BCA) between General Electric Company (GE) and the New York State Department of Environmental Conservation, dated December 31, 2013 (Index C152204-11-13). In accordance with 6 NYCRR Subpart 375-1, DEC-issued permits are not required for remedial activities conducted at the Site. The activities are evaluated and implemented based on the substantive elements of the applicable state environmental laws and regulations. Federal applicable or relevant and appropriate requirements (ARARs) must be complied with fully, including the requirements to obtain permits, if necessary. Since New York does not have ARARs in its statute, these State environmental laws and regulations, in conjunction with the Federal environmental laws and regulations, are collectively referred to as Standards, Criteria and Guidance. SCGs are defined in DER-10. Standards and Criteria are New York State regulations or statutes which dictate the cleanup standards and other substantive environmental protection requirements, criteria, or limitations which are generally applicable, consistently applied, officially promulgated and are directly applicable to a remedial action. Guidance are non-promulgated criteria and guidance that are not legal requirements; however, those responsible for investigation and/or remediation of the Site should consider guidance that, based on professional judgment, is determined to be applicable to the Site.

5.4.3 Standards, Criteria, and Guidance (SCGs)

SCGs include chemical-specific, action-specific, and location-specific SCGs. SCGs that are considered potentially applicable to remediation activities at the Site are summarized below.

Chemical-Specific SCGs

Chemical-specific SCGs that are applicable to the Site include:

- NYS Soil Cleanup Objectives (6 NYCRR Subpart 375-6);
- 6 NYCRR Subpart 375-1: General Remedial Program Requirements;
- 6 NYCRR Subpart 375-2: Inactive Hazardous Waste Disposal Site Remedial Program;
- New York State Department of Health (DOH) air guideline values as found in Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (DOH, 2006).
- United States Environmental Protection Agency (EPA) Draft Guidance for Evaluating the Vapor Intrusion Indoor Air Pathway from Groundwater and Soils (EPA, 2002);
- Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP) Limits (40 CFR 261 and 6 NYCRR Part 371);

Action-Specific SCGs

Action-specific SCGs that are considered potentially applicable to the proposed remedial actions at the Site include:

- DEC DER-10, Technical Guidance for Site Investigation and Remediation (DEC, 2010);
- General health and safety requirements, including Occupational Safety and Health Administration (OSHA) regulations;
- DOH decision matrices for selected VOCs as found in Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (DOH, 2006);
- Resource Conservation Recovery Act (RCRA) Land Disposal Restrictions (LDRs), which govern the land disposal of hazardous wastes;
- RCRA and New York State Department of Transportation (NYSDOT) regulations for the transportation and management of hazardous materials; and
- National Pollutant Discharge Elimination System (NPDES) program (administered in New York State under the State Pollutant Discharge Elimination System Program – SPDES), which governs discharges of wastewater and storm water.

Location-Specific SCGs

Location-specific SCGs that are considered potentially applicable to the Site include:

- Building permits from the Town of Islip; and
- Town of Islip and Suffolk County requirements regarding stormwater management and sewage disposal.

5.4.4 Remedial Action Objectives (RAOs)

RAOs for the environmental media were developed based on the applicable SCGs, the nature of the Site related impacts, and the overall goal of mitigating the significant threats to public health and the environment presented by contaminants disposed at the Site. The following RAOs were developed:

Soil RAOs

- Prevent, to the extent practicable, ingestion/direct contact with soils and fill contaminated with Site-related VOCs.
- Remove/treat to the extent practicable the source of soil vapor contamination.
- Remove/treat to the extent practicable the potential future source of Site-related groundwater impacts.

Soil Vapor RAOs

- Prevent, to the extent practicable, contact with or inhalation of VOCs resulting from intrusion into on-Site buildings of sub-slab soil vapor derived vadose-zone soils.

The recommended remedial alternative for the Site will be developed to meet the above RAOs.

5.5 General Response Actions (GRAs)

Based on the results of the SC and PDI, vadose zone soils and soil vapor have been determined to be the impacted media of concern to be addressed by this AA and are considered for the evaluation of GRAs. This section describes the potential GRAs that are available to address the impacted media of concern.

5.5.1 Treatment

Treatment can be applied to unsaturated soils and, if necessary, to soil vapor. Treatment alters the physical and/or chemical nature of the medium to produce a reduction in contaminant mass, mobility, or toxicity. Treatment can be accomplished *in situ* or *ex situ* and can involve physical, chemical, thermal and/or biological processes.

Examples of *in situ* treatment technologies include bioremediation, *in situ* thermal desorption (ISTD), *in situ* chemical oxidation (ISCO), and *in situ* solidification/stabilization (ISS).

Ex situ treatment technologies for soil include thermal desorption, incineration, solidification, and biotechnologies. Extracted soil vapor can be treated by catalytic oxidation, biotechnologies or granular activated carbon (GAC). On-Site *ex situ* treatment of soil may require the installation of large treatment systems and/or large staging areas and, due to the size of the Site, may be not feasible. *Ex situ* treatment of soils would also require extensive handling of the excavated soils which may generate significant air emissions, as well as increase risk of impacts to Site workers and adjacent properties. Therefore, on-Site *ex situ* treatment of soils is not considered to be a viable general response action as applied on-Site. *Ex situ* treatment may be applied off Site, at the disposal facility, as part of disposal.

This GRA is retained for further consideration in the form of *in situ* treatment applied to the soil medium, and *ex situ* treatment applied to excavated wastes and extracted soil vapor.

5.5.2 Extraction

This response action consists of the removal of contaminated fluids, including groundwater, non-aqueous phase liquids (NAPLs) and soil vapor. The SC data establish that on-Site groundwater is no longer impacted by VOCs. No NAPL is present on the Site. The chlorinated VOCs present in the vadose zone soils are impacting the soil vapor beneath the slab. Therefore, soil vapor extraction by means of wells or trenches is carried forward for further analysis.

5.5.3 Containment

Containment is an engineering control that may be used to isolate contaminated materials and to control the movement of such materials. Containment technologies provide protection of public health and the environment by reducing the mobility of contaminants and/or eliminating pathways of exposure. Barriers may consist of physical impediments to prevent contact with the impacted media and/or migration of contaminants to potential receptors. Examples include installation of sub-slab vapor barriers, asphalt or concrete pavement, soil caps or membrane liners. The latter may be used in conjunction with sub-slab depressurization to control the intrusion of soil vapor into a building. As the Site is, and is likely to remain used for industrial purposes, containment in the form of pavement, vapor barriers and/or sub-slab depressurization is a viable option. As with all engineering controls, barriers require monitoring and maintenance to maintain their protectiveness and periodic certifications to document their effectiveness.

This response action is applicable to soil and soil vapor at the Site. Containment in the form of vapor barriers, capping and sub-slab depressurization are retained.

5.5.4 Excavation

This response action consists of the removal and subsequent treatment or off-Site disposal of impacted soils. It is applicable to all soil and source materials. Excavation in the unsaturated zone can be accomplished using conventional construction equipment and methods. Excavation would also require the replacement of excavated material with clean fill from off-Site sources. Excavation is retained for soil materials in the unsaturated zone.

5.5.5 Disposal

This response action is typically combined with other response actions. Disposal consists of transporting excavated, treated, or extracted contaminated media off-Site to a landfill, treatment facility, or recycling facility licensed and permitted to accept the various type of wastes. For the Site, disposal would be a component of the excavation response actions. This GRA is retained for the soil medium.

5.5.6 Natural Attenuation

Like disposal, this response action is typically combined with other response actions such as source removal, treatment or containment. Monitored natural attenuation (MNA) has application in soil where the constituents of concern are amenable to degradation *via* microbial or other mechanisms and are further attenuated through dispersion, sorption and other physical processes. MNA is retained for soil.

5.5.7 Institutional Controls

Institutional controls are response actions that minimize the potential for human exposure to the contaminated media by establishing legal and administrative limitations on the Site's future use. Types of institutional controls include access controls, environmental easements or deed restrictions, and established procedures for managing future ground-intrusive activities (e.g., Site Management Plan, Health and Safety Plans, etc.). Institutional controls would also establish protection of any engineering controls that may be part of the remedy, and restrict future use of the Site. Periodic certification would be required to document the continued effectiveness of the institutional controls. This response action is retained, and is applicable to soil at the Site.

5.5.8 Summary of Retained GRAs

The following is the summary of the GRAs retained for further analysis in identifying the remedial technologies and in assembling the remedial alternatives.

Table 5-1. Summary of Evaluation of General Response Actions							
	General Response Actions						
Medium and Remedial Action Objectives	Treatment	Extraction	Containment	Excavation	Disposal	Natural Attenuation	Institutional Controls
Soil 1) Minimize direct contact. 2) Minimize source of soil vapor impacts. 3) Minimize potential source of future groundwater impacts.	R[1]	R	R	R	R	R	R
Soil Vapor 4) Prevent intrusion to indoor air.	R[2]	R	R	-	-	-	R

R *Retained*

\- *Not Retained*

1 Applied in situ only.

2 Applied to extracted soil vapor.

5.6 Identification and Screening of Technologies

5.6.1 Introduction

The remedial technology types associated with each of the GRAs identified in Section 5.5 were developed from experience on other hazardous substance Sites, knowledge of conventional as well as developing and emerging technologies, and the professional judgment of engineers performing the AA. Technology identification and screening involved the following steps:

- Assessment of technical issues posed by the Site and contaminants (Site constraints).
- Identification of potentially applicable technologies.
- Preliminary screening of the technologies with respect to effectiveness and implementability.

5.6.2 Site Constraints

The technical issues affecting the implementability and effectiveness of potentially applicable technologies at the Site include the following:

- Site dimensions, location and use;
- Physical and chemical characteristics of contaminants; and
- Soil characteristics.

Each of the Site-specific technical issues is discussed in further detail in the following paragraphs.

Site Dimensions, Location, and Use

For a variety of economic and community reasons it is desirable to promote the beneficial use of this largely underutilized commercial/industrial property. It includes a +47,000 square foot building, comprised of three interconnected buildings constructed of concrete block and corrugated steel on concrete slabs. The southern-most building is currently occupied by a GE appliance repair shop that services local business and residential customers. The remaining buildings are unoccupied and vacant. Disruption of the existing business operations or demolition of the vacant buildings would not serve the economic interests of the community.

Considering the nature of the Site surroundings (densely developed with commercial establishments and city streets), implementation of some remedial technologies would pose increased risk of impacts to adjacent property owners or the public due to dust. To minimize noise, traffic and the generation and migration of contaminated dust to off-Site areas, technologies that involve extensive handling of soils (e.g., *ex situ* treatments) would require additional controls.

Physiochemical Characteristics of Contaminants

Chlorinated VOCs are characterized by relatively high solubility in water. The cover provided by the existing Site structures and pavement has blocked precipitation from percolating through the vadose zone soils and contaminating groundwater *via* leaching of the VOCs. Removal of the structures and pavement, even temporarily, would create a potential for impacts to groundwater quality. The chlorinated VOCs present at the Site are highly volatile and amenable to removal by vapor extraction. In general, chlorinated VOCs are less amenable to natural attenuation through biological processes than other VOCs such as benzene, toluene, ethylbenzene and xylenes (BTEX). Biodegradation is relatively difficult to implement in the unsaturated zone which typically needs to be flooded or irrigated to maintain levels of water saturation required for biodegradation to be effective.

Soil Characteristics

The hydrogeologic characteristics of the Site must be considered in evaluating remedial technologies. In the vadose zone, the heterogeneity and variable permeability of the Upper Glacial Aquifer materials (predominantly reworked as fill) would result in the diversion of injected reagents into high permeability sand and gravels or utility trench backfill, bypassing less permeable zones where contaminants may be sequestered. This limits the efficacy of injection-based technologies such as ISCO and surfactant/cosolvent flushing. On the other hand, extraction-based technologies would capture chlorinated VOCs as they diffuse from less permeable materials.

5.6.3 Identification and Screening of Potential Remedial Technologies

This section presents potentially applicable technologies and the results of the screening evaluation conducted to determine which technologies could be successfully implemented at the Site. The results of this process are presented in Table 5-2. Potential remedial technologies were initially identified for each GRA and environmental medium (soil, soil vapor). Screening of the technologies was conducted based primarily on the technology's effectiveness in achieving the RAOs and its implementability at the Site. The evaluation also considered the Site-specific and contaminant-specific conditions discussed above.

Table 5-2 presents the summary of the screening process and the technologies that were retained for use in remedial alternatives development. The following technologies have been retained for assembly into Site-wide remedial alternatives for further evaluation:

- Soil Vapor Extraction
- Excavation/Off-Site Disposal
- Containment (Capping, Vapor Barrier, Sub-Slab Depressurization)
- Institutional Controls (Site Management Plan, Health and Safety Plan, Environmental Easement)

5.7 Development and Evaluation of Remedial Alternatives

This section presents the remedial alternatives developed from the retained remedial technologies detailed in Section 5.6. Each remedial alternative was evaluated with respect to the eight criteria set forth in 6 NYCRR Subpart 375-2.8(c)(2)(i) and Section 4.3 of DER-10. The development of the alternatives is summarized in Table 5-3, and their evaluation against the eight criteria is summarized in Table 5-4.

5.7.1 Development of Remedial Alternatives

Two remedial alternatives were developed to address the Site RAOs identified in Section 5.4. In accordance with the DEC's Brownfield Cleanup Program requirements, one of these alternatives would achieve conditions necessary for unrestricted (i.e., residential) Site use. The selected alternatives are summarized as follows:

- Alternative 1 – Restoration to industrial use conditions.
- Alternative 2 – Restoration to unrestricted use conditions.

The two remedial alternatives are described in detail below. The main components of Alternatives 1 and 2 are shown on Figures 5-1 and 5-2, respectively. Table 5-3 summarizes for each alternative the parameters set forth in DER-10 Section 4.3(a)(5). These parameters are:

- Size and configuration;
- Remediation time;
- Spatial requirements;
- Disposal options;
- Permit requirements;
- Limitations; and
- Beneficial and/or adverse impacts on fish and wildlife resources.

Alternative 1 (Figure 5-1) consists primarily of a Soil Vapor Extraction (SVE) system to remediate VOC-impacted soils in the vadose zone under the Site buildings in the area where there is an unacceptable potential for soil vapor intrusion as defined by the decision matrices provided by the New York State Department of Health (NYSDOH, 2006). This area also includes the locations where there are exceedances of the Part 375 SCOs for Protection of Groundwater. The SVE system would be operated until sub-slab soil vapor concentrations no longer present a potential for soil vapor intrusion and until the soil concentrations no longer exceed the Part 375 SCOs for Protection of Groundwater. It is estimated that the SVE system would be operated for approximately 2-5 years. During SVE system operation, sub-slab vacuum would be monitored at points throughout the buildings to confirm there is no potential for infiltration of sub-slab vapors. If necessary, supplemental air extraction points may be added to extend the sub-slab depressurization beyond the SVE target area. Also, exterior soil vapor sampling would be conducted during SVE operation to evaluate potential outward migration of soil vapor from the source area under the building. If the SVE system is terminated before chlorinated VOC concentrations in soil fall below the Part 375 SCOs for Protection of Groundwater, limited groundwater monitoring may be required to confirm the continued absence of impacts to groundwater quality. Alternative 1 would include the establishment of institutional controls *via* an environmental easement to restrict the Site to industrial use and implement a Site Management Plan (SMP). The SMP would specify a) maintenance of engineering controls (if any) such as a sub-slab depressurization system (SSDS), b) Health and Safety protocols for construction workers, and c) Site inspection and reporting requirements.

Alternative 2 (Figure 5-2) would achieve unrestricted use conditions through the removal of vadose zone soils containing VOC concentrations greater than the Part 375 SCOs for Protection of Human Health (Residential Use) and Protection of Groundwater (approximate area and depth of 7,000 square feet and 10 feet, respectively). The SCOs for Protection of Ecological Resources are not applicable at the Site because there are no surface water bodies or fish/wildlife resources on or adjacent to the Site. Prior to excavation of soils, the on-Site buildings would be demolished. Although the larger building is only partially underlain by VOC-impacted soils, it is not considered cost-effective to implement the shoring and foundation underpinning that would be required to demolish part of the larger structure, then reconstruct the demolished portion after remedial excavation is complete. Before any residences are constructed on the Site, soil vapor testing would be required to verify that VOC levels (residual or originating off-Site) would not require the residences to be equipped with SVI mitigation systems.

5.7.2 Evaluation Criteria

The evaluation of each remedial alternative considers the following criteria, consistent with DER 10 guidance:

- Overall Protectiveness of Public Health and the Environment
- Compliance with SCGs
- Reduction of Toxicity, Mobility, or Volume of Contamination
- Short-Term Impacts and Effectiveness
- Long-Term Effectiveness and Permanence
- Implementability
- Cost Effectiveness
- Land Use

Detailed descriptions of these criteria are provided below. A ninth criterion, Community Acceptance, will be considered by the DEC after public comments are received on the proposed remedy.

Overall Protectiveness of Public Health and the Environment

This criterion is an evaluation of the remedial alternative's ability to protect public health and the environment, assessing if risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. It evaluates the remedial alternative's ability to achieve the RAOs identified in Section 5.4. The overall assessment of protection overlaps with, and is based on, assessments performed under other evaluation criteria, particularly long-term effectiveness and permanence, short term effectiveness, and compliance with SCGs.

Compliance with Standards, Criteria, and Guidance (SCGs)

This criterion is an evaluation of a remedial alternative's ability to comply with applicable environmental laws, regulations, standards, and guidance. The specific remedial alternatives for the Site were evaluated to determine whether the remedial alternative would achieve compliance with the SCGs. For those SCGs that are not met, an evaluation of the impacts of each and whether waivers are necessary is performed. Refer to Section 5.4 for discussion of applicable SCGs.

Reduction of Toxicity, Mobility, or Volume with Treatment

This criterion evaluates the remedial alternative's ability to reduce the toxicity, mobility and/or volume of Site contamination. The evaluation focuses on the following specific factors for a particular remedial alternative:

- The amount of contaminated materials that would be destroyed or treated;
- The degree of expected reduction in toxicity, mobility, or volume;
- The degree to which the treatment would be irreversible; and
- The type and quantity of treatment residuals that would remain following treatment.

Preference is given to remedial alternatives that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the Site.

Short-Term Impacts and Effectiveness

This criterion evaluates the potential short-term adverse impacts and risks of the remedial alternative upon the community, the workers, and the environment during remedy construction and/or implementation. The evaluation includes how identified adverse impacts and health risks to the community or workers would be controlled, and the effectiveness of the controls. Further, this criterion considers engineering controls that would be used to mitigate short-term impacts (e.g., dust control measures). The length of time needed to achieve the remedial objectives is estimated and included in the evaluation.

Long-Term Effectiveness and Permanence

This criterion evaluates the long-term effectiveness of the remedial alternative after implementation. If wastes or treated residuals remain on-Site after the selected remedial alternative has been implemented, the following items are evaluated:

- The magnitude of the remaining risks (i.e., would there be any significant threats, exposure pathways, or risks to the community and environment);
- The adequacy of the engineering and institutional controls intended to limit the risk;
- The reliability of these controls; and
- The ability of the remedy to continue to meet RAOs in the future.

Implementability

This criterion evaluates the technical and administrative feasibility of implementing the remedial alternative. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedial alternative. Administrative feasibility includes the availability of the necessary personnel and material along with potential difficulties in obtaining specific operating approvals, access for construction, permits, etc. for remedial alternative implementation.

Cost Effectiveness

This criterion includes an evaluation of the capital, operation, maintenance, and monitoring costs. Under this criterion, capital, operation, maintenance, and monitoring costs for the remedial alternative are estimated and presented on a present worth basis for comparison. The estimated costs are considered a Class 4 Cost Estimate with an expected accuracy of -30% to +50%, which is consistent with EPA's RI/FS Guidance (EPA, 1988). A contingency of 25% is applied to address unforeseen costs and account for uncertainty. Present worth costs are estimated using a discount factor of 3%.

Land Use

This criterion includes an evaluation of the current, intended and reasonably anticipated future use of the Site and its surroundings, as it relates to the remedial alternative, when unrestricted levels would not be achieved.

5.7.3 Evaluation of Remedial Alternatives

This section compares the relative performance of each remedial alternative using the specific evaluation criteria presented in Section 5.7.2. Comparisons are presented in a qualitative manner and identify substantive differences between the alternatives. As part of the evaluation, consideration was given to an alternative to determine if it satisfies the criteria, meets the minimum applicable standards and is suitable for the Site based on Site specific conditions. The evaluation of the alternatives against the criteria is summarized in Table 5-4 and discussed in the following subsections. For each criterion, the alternative with the most favorable rating is discussed first, followed by the remaining alternative.

Overall Protectiveness of Public Health and Environment

Alternative 2, after implementation, is considered to offer slightly greater overall protectiveness of public health and environment than Alternative 1. It includes not only soil removal at the locations where VOC concentrations present a threat to SVI based on DOH decision matrices, but also removal at those locations where VOC concentrations exceed SCOs for Protection of Human Health (Residential) and Protection of Groundwater. Alternative 1 is rated slightly lower because it relies on engineering controls (SVE and/or SSDS). No SMP would be required after implementation of Alternative 2 to ensure residual contamination does not threaten human health or groundwater. Alternative 2, however, has significant short term impacts on the community as discussed below.

Compliance with SCGs

Alternative 2 offers the ability to more timely comply with chemical, action and location specific SCGs, as all impacted materials would be removed. Alternative 1 offers virtually full compliance with the chemical specific SCGs applicable to industrial sites as the SVI threat will be removed and nearly all VOC mass will be removed, with a potential for limited areas to retain soil VOC concentrations in excess of the SCOs for Protection of Groundwater.

Reduction of Toxicity, Mobility or Volume of Contamination

Alternative 2 with off-Site landfilling and/or incineration of excavated soil would achieve greater reduction in VOC toxicity and mobility than Alternative 1 unless the SVE exhaust gas were treated with GAC or another technology to immobilize and/or destroy the VOCs. Alternatively, if SVE exhaust were treated, Alternative 1 would surpass Alternative 2 in reducing toxicity, mobility and volume of VOCs. Given the low VOC concentrations in the targeted soils, neither alternative provides significantly greater benefit in terms of reducing total contaminant mass.

Short-Term Impacts and Effectiveness

Alternative 1 is more favorable in terms of short-term impacts because it only creates short-term air emissions, affects the current tenant only during installation of the SVE system, and creates brief, periodic disruptions to future tenant operations until O&M activities are no longer needed. While Alternative 1 may require ongoing O&M for several years, it is immediately effective in allowing occupancy of the buildings without the threat of exposure to sub-slab soil vapor. Alternative 2, by contrast, permanently ends the industrial use of the Site and disrupts the current tenant's business operations. Alternative 2 also creates construction traffic, air emissions, noise, vibration, dust, use of limited landfill space. and possible impacts to neighboring properties. Considering the immediate mitigation of potential SVI and the minimal impacts to the Site tenant(s), Alternative 1 is preferable to Alternative 2.

Long-Term Effectiveness and Permanence

Alternative 2 provides the greatest long term effectiveness and permanence because it does not require the institutional and engineering controls that are needed to prevent exposure to any VOCs left after SVE system operation is discontinued. Alternative 2 would not require preservation of the buildings and/or pavement for the purpose of preventing leaching of residual VOCs by precipitation, which might impact groundwater quality, although it would end the current commercial/industrial use of the property. In the event that residential development of the commercial/industrial Site is contemplated, Alternative 2 would require post-remediation monitoring of soil vapor to evaluate potential SVI caused by off-Site sources.

Implementability (Technical Feasibility)

Alternatives 1 and 2 are technically feasible to implement. Both SVE and demolition/remedial excavation are mature and widely available remedial technologies. O&M of the SVE system and post-SVE monitoring (soil vapor monitoring, possible SSDS) employ common technologies available from numerous providers.

Implementability (Administrative Feasibility)

Alternative 1 offers greater administrative feasibility because it does not interfere with the ongoing use of the Site by the active appliance repair business. The only future administrative requirement needed for Alternative 1 would be the recording of an environmental easement and development of a DEC-approved SMP governing future activities on the Site. Such matters are routinely completed with DEC oversight.

Alternative 2 would require terminating all tenant leases, removal of the buildings, and relocating the tenant business to another property. Alternative 2, while not requiring the recording of an environmental easement or development of a DEC-approved SMP, would create short term community impacts and would cause significant administrative difficulties if the Site were ever to be proposed for residential use. In addition to complying with local zoning ordinances, these obstacles would include obtaining approvals from the state and county health departments for mitigation of residential SVI arising from off-Site contamination.

Cost Effectiveness

A summary of the estimated costs for both alternatives is shown on Table 5-4. Detailed cost estimates are included in Appendix D. Costs associated with Alternative 1 include SVE system installation and operation (2 years), and inspection/reporting of engineering and institutional controls for 30 years thereafter. The net present value of Alternative 1 is estimated to be approximately $790,000.

Alternative 2 is substantially more costly. The capital costs for Alternative 2 consist of building demolition, excavation and off-Site disposal of VOC-impacted soils, and associated engineering costs. The estimated net present value of Alternative 2 is $4,120,000. This estimate does not include the economic and social costs arising from the loss of a viable on-Site business and the loss of a large, well-maintained industrial building suitable for a variety of commercial and industrial uses.

Land Use

Alternative 1 would allow the continued use of the Site for industrial purposes through the imposition of institutional and engineering controls. Any future modifications or construction would have to be in accordance with the requirements of the environmental easement and the SMP.

In theory, Alternative 2 would render the Site suitable for unrestricted (residential) use should a demand for this arise in the future. In practice, residential use would require modifying the local zoning ordinance, consideration of market-related and health-related disincentives arising from surrounding industrial usage, and potential residential SVI from off-Site sources. Given the technical, economic and administrate hurdles and the abundance of alternate residential properties nearby, it is unlikely Alternative 2 would lead to the Site being used for anything other than industrial purposes.

5.8 Recommended Remedial Alternative

Based on the results of the comparative analysis conducted as part of the AA process, Alternative 1 is the recommended alternative. Alternative 1 utilizes SVE and engineering/institutional controls to render the Site suitable for continued commercial/industrial usage. Alternative 1 implements a program that provides for the prompt expanded commercial use of the property consistent with the goals of the Brownfield Cleanup Program. The recently completed PDI demonstrates that SVE is ideal for the conditions found at the Site and will mitigate potential SVI, which is the only potential exposure pathway. Both SVE and demolition/excavation are effective and technically feasible; however, demolition/excavation would be much more costly in terms of capital expenditure, loss of an ongoing business enterprise, loss of well-maintained industrial infrastructure, and loss of opportunity for further industrial development.

Section 6

Remedial Work Plan

Upon DEC approval, this RWP will serve as the Remedial Design Work Plan (RDWP). The RWP/RDWP provides the framework for the design and implementation of a SVE/SSDS system, implementation of institutional controls, and preparation of a Site Management Plan (SMP). The SMP will be implemented pursuant to an Environmental Easement that will be placed on the property restricting its use to commercial /industrial uses.

6.1 Introduction

Based on results of the Site investigations presented earlier in the report, the environmental media in which residual Site-related impacts were identified are subsurface soil and soil vapor. Impacts to groundwater were found to be negligible; therefore, the data do not support any active remediation of the groundwater. Non-aqueous phase liquids were not identified at the Site.

The constituents detected in the subsurface soils are chlorinated VOCs. The concentrations of VOCs in the subsurface soil are on the order of 1-10 mg/kg. The data establish that PCE and TCE are the chemicals to be addressed by the remedial action. The residual impacts occur within the unsaturated zone to a depth of approximately 8 feet, within an elongated north-south area of approximately 6,000 square feet extending under a portion of the appliance repair facility and the adjoining building to the north.

Soil vapor is impacted in the unsaturated, sub-slab zone under the on-Site buildings. The constituents identified in the soil vapor are the same as in the subsurface soils (i.e., chlorinated VOCs). Total VOC concentration recorded in the effluent of the SVE test, which can be considered a good indication of the area-average value, was on the order of 10,000 ug/m^3, with the bulk of the mass being in the form of PCE and TCE. PCE and TCE appear to have migrated a short distance eastward from the buildings, although the concentrations detected in the soil vapor outside of the buildings area are several orders of magnitude lower. There were no exceedances of the DOH Air Guideline values in indoor air, indicating that the floor slab is significantly limiting or preventing intrusion of VOCs into the buildings.

The selected remedy is to implement SVE in the area where the VOC impacts to the unsaturated soil and soil vapor media exceed values acceptable for industrial use. In the soil medium. none the Part 375 SCOs for Protection of Human Health-Industrial Use are contravened; however, several exceedances of the Part 375 SCOs for Protection of Groundwater have been identified[2]. The commercial property is serviced by a municipal water system. In the soil vapor medium, concentrations at several locations reach levels at which DOH decision matrices recommend mitigation of potential soil vapor intrusion. While SVE is being implemented over the anticipated period of 2-5 years, this remedial technology will not only remediate the soil contamination but also address the soil vapor impacts and prevent potential soil vapor intrusion, if any, into the on-Site buildings. Following the termination of the SVE, an assessment of the remaining potential for soil vapor intrusion into indoor air will be performed and, if warranted, a sub-slab depressurization system may be implemented.

[2] Groundwater monitoring data establish that groundwater quality is not impacted and the overlying buildings are restricting leaching of the VOCs into the saturated zone.

6.2 Design Investigations

The design investigation has been completed. The methodology and results are discussed in earlier sections of the report. The key findings are:

- The Site COCs are chlorinated VOCs, primarily PCE and TCE.
- Impacts occur in the unsaturated-zone soils and soil vapor. The soils are impacted to a depth of approximately 8 feet within an area of approximately 6,000 square feet under the on-Site buildings. The total VOC concentrations in subsurface soils are relatively low. Soil vapor is impacted under the buildings and, to a much lesser extent, in the surrounding area. Total VOC concentrations in the sub-slab soil vapor have not impacted indoor air quality.
- The unsaturated zone soils are relatively permeable, while the floor slab of the on-Site buildings provides good air flow barrier between the subsurface and the atmosphere. As a result, an SVE well installed below the buildings is expected to induce a near-horizontal flow in the subsurface, and provide good venting as well as significant vacuum within an area of the dimension of approximately 50 feet.
- The volatility of the Site COCs, the relatively high permeability of the unsaturated zone deposits, and the good surface seal provided by the floor slab establish that SVE will be an effective remedial method to address the impacts. The relatively low soil concentrations and the sub-slab soil vapor concentrations of the Site COCs indicate that extraction of soil vapor should result in a relatively rapid depletion of the COC mass in the unsaturated zone.

6.3 Design Scope

The remedial action for addressing the residual VOC impacts identified at the Site is the implementation of soil vapor extraction. This section describes the SVE system, the system operation and monitoring, the conditions that would need to be met for the termination of the SVE operation, and the contingency to be implemented, if a potential for post-remediation soil vapor intrusion into the on-Site building remains a concern. The associated permits and post-construction plans are discussed in a subsequent section.

The system design presented herein is conceptual-level. During final design, design details will be further developed, and specific design changes may be proposed.

6.3.1 SVE System

The proposed SVE system will cover the area where VOC impacts above the applicable Part 375 SCOs and DOH soil vapor guidance values were identified in the unsaturated zone. The area, shown on Figure 4-1, encompasses approximately 6,000 square feet. SVE will be implemented within the unsaturated zone, extending from the floor slab to the water table, a thickness of approximately 8-10 feet. The volume of the subsurface to be addressed by the SVE is approximately 50,000-60,000 cubic feet.

Figure 6-1 shows the placement of the SVE wells. Based on the pre-design evaluation of the influence of an SVE well under the anticipated vacuum levels, five extraction wells are expected to achieve vacuum influents (> 0.001 inches of water column) over the entire impacted area. The wells will be four-inch diameter Schedule 40 PVC (Figure 6-2). The screens will be approximately five feet long, 0.010-inch slot size, installed with the top at two feet below the bottom of the floor slab. To minimize the disruption to the machine shop operation, the extraction wells in the shop area will be placed adjacent to the dividing wall between the main work area and the storage area. Each extraction well will be equipped with a pressure gauge for monitoring the vacuum at the well, a valve for control (throttling) and isolation, and a sampling port. A flow meter will be placed on the lateral leading to each SVE well.

As indicated, the SVE wells in the machine shop will be located near the dividing wall. The well laterals will extend vertically from each well to the ceiling, and then continue horizontally along the ceiling on pipe hangers until they reach the location of the equipment trailer. In the large building, the piping will be placed in an underground trench and the floor slab will be restored following the installation. All piping will be 2-inch diameter Schedule 40 PVC.

It is currently anticipated that the equipment trailer will be located in the exterior, roof-covered area located near the north-west corner of the machine shop building, as shown on Figure 6-1. Alternative, indoor locations may be considered depending on future tenant requirements. The enclosed SVE trailer will contain an influent SVE vacuum piping manifold, a condensate knockout vessel, and a SVE vacuum blower (Figure 6-3). Accessories to the system will include dilution air supply, vacuum and pressure relief valves and condensate storage. Temporary VPGAC off-gas treatment will be installed on the discharge line during the initial O&M period to comply with the Air Guide 1 requirements and corresponding SGCs/AGCs.

The trailer will be equipped with a 4-inch diameter PVC discharge stack that will be routed to an appropriate height above the roof of the large building. A 4-inch tee fitting will be installed at the top of the stack for horizontal discharge.

The SVE system will be equipped with sample ports at each influent vacuum line, at the combined vacuum influent line and at the discharge flow; hot wire anemometer ports will be available at each of the above for the measurement of velocity and temperature in the line.

The SVE system will be Programmable Logic Control automated with shutdown protocols for vacuum conditions, temperature conditions, and condensate levels. The trailer will be secured using locking man-door and/or equipment gate.

The trailer will require 60 A of 480V, 3P service to be provided by the existing building infrastructure. The industrial power service available throughout the building will be tapped and a 60A disconnect switch installed with service to the trailer installed thereafter.

Sub-slab vacuum monitoring points will be placed throughout the buildings, as shown on Figure 6-1. Locations of the monitoring points are selected to provide information about areas where the influence of the SVE system is likely to be least pronounced: outside of the anticipated well influence areas, and in locations approximately mid-distance between the SVE wells. Each monitoring point will be equipped with a port for connecting a differential pressure gauge (Figure 6-2). To minimize disruption to the use of the buildings, the monitoring points will be flush-mounted.

Six soil vapor monitoring points will be installed within the impacted area. The locations, shown on Figure 6-1 have been selected based on results of the Site investigation to provide information on the VOC concentrations in areas where higher soil vapor impacts have been identified, and to provide information on the vapor distribution in the subsurface. Monitoring points will consist of six-inch stainless steel, and will be attached to food-grate tubing through which the vapor will be drawn during sampling. Filter pack material consisting of glass beads will be placed around the screens (Figure 6-2). The screens will be centered approximately at the mid-point of the unsaturated thickness at each location. Each monitoring point will be flush-mounted, and will be equipped with a barbed brass fitting port for connecting a manometer and for collecting soil vapor samples.

Existing wells installed during the PDI for the purpose of the SVE test, as well as the proposed SVE wells, will also be used to monitor vacuum in the unsaturated zone.

Debris generated during the installation of the SVE system, such as concrete and drilling residuals, will be containerized and disposed of off-Site.

6.3.2 Operational Considerations

Based on results of the SVE test, as well as the parameters of the proposed air blower and conveyance system, it is anticipated that the applied vacuum and flow at each SVE well will be approximately 5 inches of water column and 50 cubic feet per minute, respectively. Wells will be operated three at a time in order avoid creating permanent stagnation zones at the boundaries of well influence zones, and thus provide venting throughout the entire impacted volume. Therefore, the total system extraction rate is anticipated to be approximately 150 cubic feet per minute (4,300 L/min). The SVE blower will, therefore, be required to deliver at least 150 cfm against the pressure head of 5 inches of water column at the wellhead plus additional head losses through the SVE system and conveyance piping. The initial VOC concentration in the discharge is likely to be similar to the value recorded during the SVE test – approximately 15,000 µg/m^3 (0.015 mg/L). Therefore, the corresponding total VOC mass extraction rate during the initial operation period can be estimated to be approximately 93 g/day (4,300 L/min * 0.015 mg/L = 65 mg/min = 93,000 mg/day = 93 g/day). This is equivalent to 75 lbs/yr. This initial mass flux may diminish relatively rapidly. This is because the VOC concentrations in the subsurface soil at the Site are relatively low, NAPL has not been identified and the effectiveness of the extraction system is expected to be high with substantial amounts of VOC removed. Under these conditions, the VOC mass in the subsurface is expected to deplete quickly, resulting in an exponential decrease of the concentrations in the soils vapor and corresponding decrease in mass extraction rate.

Based on results of the SVE test, the initial concentrations of VOCs in the extracted soil vapor may exceed the Air Guide 1 SGCs/AGCs. The operation of the system will, therefore, commence with the use of vapor-phase granular activated carbon (VPGAC) offgas treatment. However, the concentrations are expected to diminish over the course of the system operation. Monitoring data from the influent to the system, as well as the results of dispersion modeling presented in the Air Guide 1, will be used to evaluate when temporary offgas treatment may be discontinued. Treatment the offgas will be discontinued after it is determined that the Air Guide 1 SGCs/AGCs can be achieved without treatment.

It is expected that during the initial period the system will be operated continuously, maintaining three wells active and two wells inactive at any given time, with the exception of shut-downs for routine maintenance. As the VOC mass in the subsurface is depleted and the diffusion of VOCs from soil into soil gas becomes rate-limited the operation of the system will be reassessed. If continuous operation is determined to be inefficient from the stand-point of the cost-benefit, a pulsed operation regime may be implemented. The total system operation time-frame is expected to be between 2 and 5 years.

The system will include a condensate knock-out tank. The amount of treated condensate that will be disposed of is estimated to be very low:

Air flow rate:

Q_{air} = 4,300 L/min or 4.3 m^3/min

Water content in air, conservatively assuming zero bar pressure and 20 deg C temperature:

f_{wa} = 2 kg of water per 100 m^3 of air (www.EngineeringToolBox.com)

= 0.02 kg of water per m^3 of air

Conservatively, assume that all water will be removed in the knock-out tank:

$Q_{water} = Q_{air} * f_{wa}$ = 4.3 m^3/min * 0.02 kg/m^3 = 0.09 kg/min = 0.09 L/min = 0.02 gpm

This amount of water can be containerized and disposed of off-Site. It could also be potentially disposed of via permitted discharge to the sanitary sewer.

The concentration of VOCs in the condensate can be estimated by conservatively assuming that equilibrium conditions will be present inside the condensate tank, and using the Henry's law constant to calculate the partitioning of mass. PCE is the dominant contaminant in the soil gas, as determined based on the sample collected from the discharge during the SVE test, where 85% of the VOC mass was PCE and PCE concentrations were between approximately 10 to 250 times higher than concentrations of other constituents that were detected. Using PCE as the indicator of total VOC concentration:

PCE concentration in soil gas:

$$C_a = 13{,}000\ \mu g/m^3 = 0.013\ mg/L$$

Dimensionless Henry's law constant for PCE at 20 deg C (EPA On-line Tools for Site Assessment Calculation):

$$H = 0.6\ \text{conc. in air / conc. in water}$$

PCE concentration in condensate:

$$C_w = C_a / H = 0.013\ mg/L / 0.6 = 0.020\ mg/L\ (ppm) = 20\ ppb$$

Seven VOC s were identified in the soil vapor sample collected during the SVE test: Freon 22, methyl ethyl ketone (MEK), cis-1,2-dichloroethene, tetrahydrofuran, 1,1,1-trichloroethane, trichloroethene (TCE) and tetrachloroethene (PCE). The conservative equilibrium-based estimate of the corresponding concentration in the condensate for the dominant compound (PCE) is approximately 20 ppb, for the remaining compounds, present in the soil gas at significantly lower concentrations, the concentrations in the condensate would be similar or lower. Of the seven compounds that were detected, four have corresponding regulatory limits specified either in Table 1 or Table 3 of 6NYCRR Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations. These compounds are cis-1,2-dichloroethene, 1,1,1-trichloroethane, TCE and PCE; the limitation for each one is 5 ppb.

The operation of the SVE system will commence using the option of containerizing the condensate and disposing of it off-Site. Samples of the condensate will be collected periodically, analyzed for VOCs, and compared to the Part 703 regulatory limits. In addition, the actual volume of condensate generated during the system operation will be tracked. The ultimate method for the disposal of the condensate – either continuation of the off-Site disposal or discharge to the sanitary sewer - will be selected based on the VOC concentrations and regulatory considerations.

6.3.3 System Operation and Maintenance

The operation and maintenance (O&M) of the SVE system will require periodic visits by an operations technician to monitor the system operation and performance, collect performance samples, adjust system operations, perform regular and preventative maintenance, and make any needed repairs to the system.

System operation and performance will be monitored through the observation of vacuum readings and velocity/flow readings throughout the system during the Site visits and adjustments made to the system valving to maximize system performance.

Performance samples for internal optimization needs as well as regulatory compliance samples will be collected during the O&M visits.

Regular and preventative maintenance needs will be forecast and completed during the O&M visits. System repairs will be made as-needed; an operations technician will complete them within the scope of his ability and assess the need (if any) for a specialist.

An O&M Manual will be prepared which details the SVE system operational needs.

6.3.4 Monitoring and Reporting

As indicated previously, the SVE system will be equipped with an array of monitoring points. Information obtained from the monitoring program will be used to adjust the system operation and to determine the appropriate time for terminating the soil vapor extraction. It is anticipated that data will be collected during system start-up, during routine O&M Site visits that will take place approximately once a month after system startup/shakedown, and during system repairs.

The equipment trailer and each SVE well will be equipped with differential pressure gauges and dedicated ports for monitoring flow rates in out of each SVE well. Vacuums and extraction rates at each well, as well as vacuums upstream and downstream of the SVE blower, will be monitored during the system start-up, routine O&M and during system adjustments. The flow rate versus vacuum data will be used to establish the operating regime of the system by adjusting the valves at each well-head to produce the desired distribution of total extraction rate between the SVE wells.

The monitoring wells and the sub-slab monitoring points will be equipped with differential pressure gauges. Vacuum will be monitored at these locations during the system startup, routine monitoring and major system adjustments. The information will be used to assess the extent of the influence of the soil vapor extraction in the subsurface as well as the likelihood of soil vapor intrusion into the on-Site buildings, and to perform system adjustments to maximize venting and minimize any potential for vapor intrusion. In addition, the soil vapor monitoring points will be periodically sampled and analyzed by Method TO-15 to measure the concentrations of VOCs in the subsurface. This information will be used to assess the effectiveness of the remediation and to help determine the appropriate time for shutting down the system.

Ports will be provided for collecting air samples immediately prior to the discharge to the atmosphere, as well as at the influent into the blower. Vapor samples will be collected periodically to estimate the mass extraction rates, in conjunction with the flow rate measurements, and for compliance with Air Guide 1 requirements. Results of the system monitoring will be included in semi-annual performance reports. The reports will contain the data collected during the system start-up, routine Site visits and O&M events, as well as major system adjustments. At a minimum, the semi-annual reports will present information on:

- Flow rates from individual wells, and total system flow rates.
- Vacuum readings at extraction wells, monitoring wells and sub-slab points.
- VOC concentrations at individual extraction wells, monitoring wells, blower influent and system discharge.
- Results of air sampling at system discharge.
- Results of condensate sampling.
- Verbal description of the observed system operation.
- Description of major system adjustments.

6.3.5 Conditions for Terminating Operation

Data presented in the semi-annual reports will be reviewed to assess the progress of the remediation. The two main criteria for the assessment will be 1) the VOC mass flux, as measured at the individual extraction wells and at the influent to the system, and 2) the concentration of VOCs in the sub-slab soil vapor as measured in the soil vapor monitoring points. The assessment will include the time-history of these two parameters. The development of a trend showing that both the VOC mass extraction rate and the VOC concentrations in the subsurface have stabilized at low levels for a considerable time would indicate that the continued operation of the system is not deemed necessary to meet the RAOs. Under these conditions, terminating the system operation would be proposed.

6.3.6 Contingency for Sub-Slab Depressurization

Based on the anticipated procedure for terminating the SVE operation, post-remediation concentrations of residual VOCs in the soil vapor are expected to be low. However, before recommending the shut-down of the system, the likelihood of indoor air impacts from any residual Site-related VOCs will be evaluated. Should the results of the evaluation indicate that measures need to be taken to further mitigate the potential for soil vapor intrusion, a sub-slab depressurization system (SSDS) could be designed and constructed. Existing elements of the SVE system would be used as part of the SSDS, to the extent feasible. The SSDS would be implemented as a separate effort.

6.4 Permits and Authorizations

The following permits will be required, unless otherwise exempted in accordance with the provisions of the BCA, [although substantive requirements will be met if exempted]:

1. Local building permits from the Town of Islip for the construction of the system.
2. NYSDEC Air Facility Registration Application submitted to the DEC (air discharge permit is not required, as the SVE system would produce approximately 75 pounds of VOCs per year, which is less than the 12.5 tons of VOCs per year threshold that would require a permit).
3. Permit from local POTW and from the local sewer authority for discharge of the condensate to the sanitary sewer (optional, to be determined after startup O&M).

6.5 Green Remediation

Green Remediation principles and techniques will be implemented to the extent feasible in the implementation the remedy as per DEC guidance. 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 gas 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 material which would otherwise be considered a waste.

Removing the VOCs from the soil *in situ,* rather than excavating and disposing of the soil in a landfill, is consistent with these principles. SVE will eliminate the consumption of fossil fuels and diesel emissions by the heavy equipment used for demolition, excavation, hauling wastes to a landfill, and landfill operations (e.g., placement of wastes and daily cover). In addition, SVE will eliminate the land consumption by the landfill and the borrow pits used to provide fill and cover material.

6.6 Post Construction Plans

Following completion of SVE, it is anticipated that an institutional control in the form of an environmental easement will be established that:

- Requires the remedial party or site owner to complete and submit to the DEC a periodic certification of institutional and engineering controls (if any) in accordance with Part 375-1.8(h)(3);
- Allows the use and development of the controlled property for commercial/industrial use as defined by Part 375-1.8(g), although the 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 State or County DOH; and
- Requires compliance with the DEC approved Site Management Plan.

The Site Management Plan (SMP) will include the following:

- A provision for evaluation of the potential for soil vapor intrusion in current and any additional buildings developed on the Site including provision for implementing actions (if needed) to mitigate potential soil vapor intrusion;
- A provision for the management and inspection of the SSDS, if such a system is installed;
- Provisions for DEC notification; and
- Requirements for periodic reviews and certifications of the institutional controls and SSDS (if one is installed).

Section 7

Project Management

The management approach and identification of key project personnel and subcontractors for the execution of the RWP are detailed in the following sections. Regular updates on progress will be provided to the DEC. Any significant variations from RWP will be reported and discussed accordingly. A summary of the roles, responsibilities and contact information for each individual appears below.

7.1 Environmental Consultant

The environmental consultant assigned to RWP activities is Brown and Caldwell Associates (BC), a wholly owned subsidiary of Brown and Caldwell. BC is licensed to provide professional engineering services in New York State. BC will execute the RWP in accordance with the Brownfield Cleanup Agreement between GE and the DEC, dated December 31, 2013 (Index C152204-11-13), and applicable regulations.

Michael Miner, PE will serve as project manager for the remedial activities.

Frank Williams, PG will be responsible for overall management and communication with GE and the DEC.

Marek Ostrowski, PE will serve as the design engineer for the SVE system.

Responsibility for maintaining QA/QC during the RWP lies with the project manager and the QA Officer, Greg Cole. Mr. Cole will be responsible for validating all analytical data and preparing Date Usability Summary Reports (DUSRs).

7.2 Subcontractors

Other contractors will be retained to provide various services, as described below:

SVE System Construction (TBD): Construction, electrical and plumbing services will be identified following approval of the Remedial Design.

Direct-Push Drilling Services: The drilling subcontractor will be Zebra Environmental. It will be responsible for acquiring drilling permits, UFPO utility clearances, and supplying services (including labor, equipment, and materials) required to perform the drilling activities, including soil borings and SVE test well installation and development. It will also be responsible for the maintenance and quality control of the equipment needed to perform those activities. The drilling subcontractor will be responsible for containerizing and transporting investigation-derived waste (IDW) to the temporary staging area on the Site. The drilling subcontractor will also be responsible for following equipment decontamination procedures. Upon completion of the work, the drilling subcontractor will be responsible for decontaminating all equipment prior to demobilizing from the Site.

Analytical Laboratory: The analytical laboratory subcontractor will be TestAmerica Buffalo, which provided the analytical services for the previous SC investigation. It will provide analytical services for air and solid media, and will be responsible for providing Summa® canisters, sample bottles and preservatives (as necessary) and providing laboratory analysis and appropriate data reporting. TestAmerica Buffalo is a DOH ELAP-certified laboratory.

Surveying Services (TBD): The survey subcontractor will be licensed in New York. The surveyor will be responsible for providing land survey data as required, including the horizontal coordinates and vertical elevations of the ground surface for soil sample locations, SVE test locations, and other locations as directed by BC.

Section 8

Schedule

The overall scope and schedule for the remediation of the Site was set forth in GE's application to the Brownfield Cleanup Program, which is attached to the Brownfield Cleanup Agreement (BCA) between GE and the DEC (Index C152204-11-13). In accordance with the BCA, and upon approval of this RWP, GE will prepare a Remedial Design (RD) to be submitted for DEC approval. Given the level of SVE system detail provided in this RWP, it is anticipated that the RD will be limited primarily to additional specifications needed for subcontracting SVE system construction, and a draft Operation and Maintenance (O&M) Plan specifying periodic SVE performance monitoring and reporting requirements. Once DEC approves the RD package, GE will install the SVE system. The SVE system will be subjected to initial testing to verify that it is achieving the specified performance criteria. GE will operate, maintain and monitor the SVE system in accordance with the O&M Plan, and provide regular reports to the DEC in accordance with Section 6.3.4 of this RWP. After an estimated period of 2 to 5 years, SVE system operation will be terminated in accordance with Section 6.3.5 and the need for any further SVI mitigation will be assessed in accordance with Section 6.3.6. A SMP will then be developed and the DEC will be granted an environmental easement on the Property.

The sequence and estimated durations of the above activities are summarized in table below.

Task	Estimated Duration	Completion
1. Submit Alternatives Analysis Report (AAR) and Remedial Work Plan (RWP)		October 17, 2014
2. Agency Review and Revision	4 weeks	TBD
3. Procurement, Construction and Startup of SVE System	20 weeks	TBD
4. Operation, Monitoring and Reporting of SVE System	2-5 years	TBD
5. Install SSDS (if needed)	12 weeks	TBD
6. Develop Site Management Plan, Institute Environmental Easement	12 weeks	TBD

Section 9

References

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Tables

TABLE 3-1
SOIL ANALYTICAL RESULTS
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Analyte Name	Protection of Public Health - Industrial Use[(1)]	Protection of Public Health - Residential Use[(1)]	Protection of Groundwater[(1)]	Location: / Sample Name: / Date: / Units	SB-1	SB-2	SB-3		SB-4
				Sample Name:	SB-1-1.5-2.5	SB-2-2.5-3.5	SB-3-3.0-4.0	DUP-071911	SB-4-2.0-3.0
				Date:	7/19/2011	7/19/2011	7/19/2011	7/19/2011	7/19/2011
				Units					
1,1,1-Trichloroethane	1000	100	0.68	mg/kg	0.16	0.00037 U	0.00038 U	0.00038 U	0.00037 U
1,1-Dichloroethane	480	19	0.27	mg/kg	0.00065 U	0.00063 U	0.00064 U	0.00064 U	0.00063 U
2-Butanone (MEK)	1000	100	0.12	mg/kg	0.002 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U
2-Hexanone	--	--	--	mg/kg	0.0027 U	0.0026 U	0.0026 U	0.0026 U	0.0026 U
4-Methyl-2-pentanone (MIBK)	--	--	--	mg/kg	0.0018 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U
Acetone	1000	100	0.05	mg/kg	0.0045 U	0.0043 U	0.0044 U	0.0044 U	0.0043 U
Carbon disulfide	--	--	--	mg/kg	0.0027 U	0.0026 U	0.0026 U	0.0026 U	0.0026 U
Chloroform	700	10	0.37	mg/kg	0.0068	0.00032 U	0.00032 U	0.00032 U	0.00032 U
cis-1,2-Dichloroethene	1000	59	0.25	mg/kg	0.00068 U	0.00066 U	0.00067 U	0.00067 U	0.00066 U
Ethylbenzene	780	30	1	mg/kg	0.00037 U	0.00036 U	0.00036 U	0.00036 U	0.00036 U
Isopropylbenzene	--	--	--	mg/kg	0.00081 U	0.00077 U	0.00079 U	0.00079 U	0.00078 U
Methylcyclohexane	--	--	--	mg/kg	0.00081 U	0.00078 U	0.00079 U	0.00079 U	0.00078 U
Tetrachloroethene	300	5.5	1.3	mg/kg	23	0.00069 U	0.0007 U	0.0007 U	0.00069 U
Toluene	1000	100	0.7	mg/kg	0.0004 U	0.00039 U	0.00039 U	0.00039 U	0.00039 U
Trichloroethene	400	10	0.47	mg/kg	1.6	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Xylenes, total	1000	100	1.6	mg/kg	0.0009 U	0.00086 U	0.00088 U	0.00088 U	0.00086 U

Notes:
(1) - Soil Cleanup Objectives (NYCRR Subpart 375-6)
Boxed result exceeds SCO for Protection of Groundwater.
Bold result exceeds SCO for Protection of Human Health (residential use only).
U - The analyte was analyzed for, but was not detected. Value shown is the method detection limit for the analyzed consituent.
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
B - The analyte was detected in one or more blanks (field blank, method blank, trip blank).
-- - Standard and/or guidance value not established.

TABLE 3-1
SOIL ANALYTICAL RESULTS
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Analyte Name	Protection of Public Health - Industial Use[(1)]	Protection of Public Health - Residential Use[(1)]	Protection of Groundwater[(1)]	Location: / Sample Name: / Date: / Units	SB-5 / SB-5-6-6.5 / 11/29/2012	SB-6 / SB-6-5-5.5 / 11/29/2012	SB-7 / SB-7-5-5.5 / 11/29/2012	SB-8 / SB-8-1.5-2 / 11/29/2012	SB-9 / SB-9-1-1.5 / 11/29/2012
1,1,1-Trichloroethane	1000	100	0.68	mg/kg	0.00022 J	2.4	0.007 U	0.0066 U	0.1 J
1,1-Dichloroethane	480	19	0.27	mg/kg	0.00029 J	0.035 J	0.015 U	0.014 U	0.014 U
2-Butanone (MEK)	1000	100	0.12	mg/kg	0.011	0.28 U	0.26 U	0.24 U	0.25 U
2-Hexanone	--	--	--	mg/kg	0.00014 U	0.061 U	0.056 U	0.053 U	0.055 U
4-Methyl-2-pentanone (MIBK)	--	--	--	mg/kg	0.00022 U	0.12 U	0.11 U	0.1 U	0.11 U
Acetone	1000	100	0.05	mg/kg	0.071 B	0.33 U	0.3 U	0.28 U	0.29 U
Carbon disulfide	--	--	--	mg/kg	0.00018 J	0.015 U	0.014 U	0.013 U	0.014 U
Chloroform	700	10	0.37	mg/kg	0.00026 U	0.0095 U	0.0088 U	0.0083 U	0.0086 U
cis-1,2-Dichloroethene	1000	59	0.25	mg/kg	0.00012 U	2.3	0.02 U	0.019 U	0.019 U
Ethylbenzene	780	30	1	mg/kg	0.0031	0.014 J	0.11	0.01 U	0.01 U
Isopropylbenzene	--	--	--	mg/kg	0.00027 J	0.0093 U	0.09 J	0.0081 U	0.0084 U
Methylcyclohexane	--	--	--	mg/kg	0.0072	0.021 J	4.5	0.014 U	0.015 U
Tetrachloroethene	300	5.5	1.3	mg/kg	0.015	**8.3**	0.062 J	**6.3**	**11**
Toluene	1000	100	0.7	mg/kg	0.0053	0.021 J	0.018 J	0.016 U	0.016 U
Trichloroethene	400	10	0.47	mg/kg	0.0036	0.22	0.01 U	0.0097 U	0.17
Xylenes, total	1000	100	1.6	mg/kg	0.0184	0.069 J	0.112 J	0.04 U	0.041 U

Notes:
(1) - Soil Cleanup Objectives (NYCRR Subpart 375-6)
Boxed result exceeds SCO for Protection of Groundwater.
Bold result exceeds SCO for Protection of Human Health (residential use only).
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J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
B - The analyte was detected in one or more blanks (field blank, method blank, trip blank).
-- - Standard and/or guidance value not established.

TABLE 3-1
SOIL ANALYTICAL RESULTS
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Analyte Name	Protection of Public Health - Industrial Use(1)	Protection of Public Health - Residential Use(1)	Protection of Groundwater(1)	Location: / Sample Name: / Date: / Units	SB-9 / DUP-112912 / 11/29/2012	SB-10 / SB-10-3-3.5 / 11/29/2012	SB-11 / SB-11-1-1.5 / 11/29/2012	SB-12 / SB-12-1-1.5 / 11/29/2012	SB-13 / SB-13-2.0-2.5 / 5/2/2014
1,1,1-Trichloroethane	1000	100	0.68	mg/kg	0.077 J	0.00086 J	0.019 J	0.024	0.00035 U
1,1-Dichloroethane	480	19	0.27	mg/kg	0.016 U	0.00011 U	0.015 U	0.00011 U	0.00059 U
2-Butanone (MEK)	1000	100	0.12	mg/kg	0.29 U	0.0046 J	0.27 U	0.00064 U	0.0018 U
2-Hexanone	--	--	--	mg/kg	0.063 U	0.00083 J	0.058 U	0.00013 U	0.0024 U
4-Methyl-2-pentanone (MIBK)	--	--	--	mg/kg	0.12 U	0.00084 J	0.11 U	0.0002 U	0.0016 U
Acetone	1000	100	0.05	mg/kg	0.34 U	0.02 B	0.31 U	0.006 J B	0.0041 U
Carbon disulfide	--	--	--	mg/kg	0.016 U	0.00031 J	0.014 U	0.00015 U	0.0024 U
Chloroform	700	10	0.37	mg/kg	0.0099 U	0.00023 U	0.0091 U	0.00072 J	0.0003 U
cis-1,2-Dichloroethene	1000	59	0.25	mg/kg	0.022 U	0.00011 U	0.02 U	0.00011 U	0.00062 U
Ethylbenzene	780	30	1	mg/kg	0.012 U	0.00017 U	0.011 U	0.00017 U	0.00033 U
Isopropylbenzene	--	--	--	mg/kg	0.0097 U	0.00011 U	0.0089 U	0.00011 U	0.00073 U
Methylcyclohexane	--	--	--	mg/kg	0.017 U	0.000097 U	0.016 U	0.0001 U	0.00073 U
Tetrachloroethene	300	5.5	1.3	mg/kg	**10**	0.054	**11**	0.35	0.016 B
Toluene	1000	100	0.7	mg/kg	0.019 U	0.0002 J	0.017 U	0.00017 J	0.00036 U
Trichloroethene	400	10	0.47	mg/kg	0.14	0.00099	0.073 J	0.063	0.0011 U
Xylenes, total	1000	100	1.6	mg/kg	0.047 U	0.00075 U	0.043 U	0.00079 U	0.00081 U

Notes:
(1) - Soil Cleanup Objectives (NYCRR Subpart 375-6)
Boxed result exceeds SCO for Protection of Groundwater.
Bold result exceeds SCO for Protection of Human Health (residential use only).
U - The analyte was analyzed for, but was not detected. Value shown is the method detection limit for the analyzed consituent.
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
B - The analyte was detected in one or more blanks (field blank, method blank, trip blank).
-- - Standard and/or guidance value not established.

TABLE 3-1
SOIL ANALYTICAL RESULTS
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Analyte Name	Protection of Public Health - Industrial Use[1]	Protection of Public Health - Residential Use[1]	Protection of Groundwater[1]	Location: / Sample Name: / Date: / Units	SB-14	SB-15		SB-16
				Sample Name:	SB-14-5.0-5.5	SB-15-7.0-7.5	DUP-050214	SB-16-5.5-6.0
				Date:	5/2/2014	5/2/2014	5/2/2014	5/2/2014
				Units				
1,1,1-Trichloroethane	1000	100	0.68	mg/kg	0.00029 U	0.00025 U	0.00029 U	0.00024 U
1,1-Dichloroethane	480	19	0.27	mg/kg	0.00049 U	0.00043 U	0.00049 U	0.00025 U
2-Butanone (MEK)	1000	100	0.12	mg/kg	0.0015 U	0.0013 U	0.0015 U	0.00041 U
2-Hexanone	--	--	--	mg/kg	0.002 U	0.0017 U	0.002 U	0.00017 U
4-Methyl-2-pentanone (MIBK)	--	--	--	mg/kg	0.0013 U	0.0011 U	0.0013 U	0.00026 U
Acetone	1000	100	0.05	mg/kg	0.015 J	0.0029 U	0.0034 U	0.022
Carbon disulfide	--	--	--	mg/kg	0.002 U	0.0017 U	0.002 U	0.00048 U
Chloroform	700	10	0.37	mg/kg	0.00025 U	0.00022 U	0.00025 U	0.00043 U
cis-1,2-Dichloroethene	1000	59	0.25	mg/kg	0.00051 U	0.00045 U	0.00052 U	0.00067 J
Ethylbenzene	780	30	1	mg/kg	0.00028 U	0.00024 U	0.00028 U	0.00026 U
Isopropylbenzene	--	--	--	mg/kg	0.0006 U	0.00053 U	0.00061 U	0.0011 U
Methylcyclohexane	--	--	--	mg/kg	0.00061 U	0.00053 U	0.00062 U	0.00051 U
Tetrachloroethene	300	5.5	1.3	mg/kg	0.0024 U	0.0013 U	0.0016 U	0.011 B
Toluene	1000	100	0.7	mg/kg	0.0003 U	0.00026 U	0.00031 U	0.00024 U
Trichloroethene	400	10	0.47	mg/kg	0.00088 U	0.00077 U	0.00089 U	0.026
Xylenes, total	1000	100	1.6	mg/kg	0.00067 U	0.00059 U	0.00068 U	0.0015 J

Notes:
(1) - Soil Cleanup Objectives (NYCRR Subpart 375-6)
Boxed result exceeds SCO for Protection of Groundwater.
Bold result exceeds SCO for Protection of Human Health (residential use only).
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J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
B - The analyte was detected in one or more blanks (field blank, method blank, trip blank).
-- - Standard and/or guidance value not established.

TABLE 3-2a
SUMMARY OF THE MARCH 6, 2014 SVE TEST DATA
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Step	Time	Vacuum Monitoring								Extraction Monitoring				Air Inlets Monitoring			Ambient Conditions	
		SVE-EX	MP-1A	MP-1B	MP-1C	MP-2	MP-3	MP-4	MP-5	Air Flow Velocity	Air Flow Rate	VOC Conc.	Air Sample	Air Flow Velocity	Air Flow Rate	Air Inlet Open	Atm. Pressure	Temp.
	[hr:min]	[]	[in H_2O]	[in H_2O]	[in H_2O]	[in H_2O]	[in H_2O]	[in H_2O]	[in H_2O]	[ft/min]	[cfm]	[ppm]		[ft/min]	[cfm]		[in Hg]	[°F]
Baseline	7:30		-0.0011	-0.0011	0.0015	0.004	-0.0015	0.001	-0.0018									
	7:38		0.0014	-0.0028	0.003	-0.0018	0.0014	-0.0028	-0.0024								29.99	
	7:45	0.0021	-0.0019	0.0011	0.0027	-0.0012	0.0025	-0.0012	0.002									64.5
	7:50	-0.0032	0.0041	0.0032	0.0039	0.0023	0.0022	0.0017	-0.0013									
	7:56	-0.0002	-0.001	-0.0007	-0.0021	0.0006	0.0003	-0.0028	-0.0024								29.99	66.0
	8:00	-0.0036	-0.0023	-0.0023	0.0007	-0.0052	-0.0013	-0.0014	-0.0034								30.01	
	8:10	-0.0049	-0.0011	-0.0013	-0.0034	-0.001	-0.0014	0.0016	-0.0006								30.00	66.5
Step 1	8:31	-8.86	-0.87	-0.852	-0.795	-1.628	-0.399	-1.91	-0.743	953	68	17.4						
08:31	8:36	-8.74	-0.89	-0.843	-0.781	-1.617	-0.398	-1.904	-0.742									
to	8:41	-8.75	-0.878	-0.844	-0.785	-1.618	-0.401	-1.903	-0.74									
10:51	8:44									942	67	15.9						
	8:51	-9.08	-0.929	-0.879	-0.812	-1.678	-0.418	-1.976	-0.77								30.01	67.2
	8:55									951	68	13.8						
	9:08									988	70	12.2						
	9:18									979	70							
	9:21	-9.23	-0.925	-0.883	-0.815	-1.673	-0.414	-1.977	-0.774									
	9:28									983	70	11.5						
	9:38									979	70	10.7						
	9:48									966	69							
	9:51	-9.15	-0.982	-0.935	-0.869	-1.672	-0.411	-1.969	-0.776									
	9:58									919	66	10.3						
	10:15									958	68	9.3						
	10:21	-9.13	-0.97	-0.931	-0.851	-1.663	-0.411	-1.966	-0.766									
	10:51	-9.07	-0.967	-0.931	-0.854	-1.654	-0.406	-1.948	-0.761									
	10:54									963	69	9.31						
Step 2	10:57	-13.88	-1.427	-1.366	-1.235	-2.45	-0.615	-2.88	-1.128	1,343	96	9.34						
10:57	11:00	-13.97	-1.418	-1.368	-1.269	-2.42	-0.603	-2.85	-1.114									
to	11:03	-13.92	-1.409	-1.367	-1.239	-2.41	-0.605	-2.84	-1.114									
12:57	11:07	-13.92	-1.409	-1.364	-1.244	-2.41	-0.607	-2.83	-1.112	1,347	96							
	11:17									1,295	92							
	11:27	-13.79	-1.379	-1.345	-1.228	-2.37	-0.596	-2.79	-1.093	1,314	94	8.71						
	11:45									1,267	90							
	11:57	-13.92	-1.371	-1.334	-1.223	-2.37	-0.597	-2.78	-1.085									
	12:00									1,305	93	8.12						
	12:20									1,285	92							
	12:27	-13.94	-1.376	-1.331	-1.223	-2.37	-0.595	-2.79	-1.095									
	12:30									1,324	94	7.58						
	12:35																29.97	68.8
	12:45									1,258	90							
	12:57	-13.97	-1.387	-1.347	-1.229	-2.38	-0.592	-2.8	-1.101									
	13:00									1,319	94	7.18						

TABLE 3-2a
SUMMARY OF THE MARCH 6, 2014 SVE TEST DATA
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Step	Time	Vacuum Monitoring								Extraction Monitoring				Air Inlets Monitoring			Ambient Conditions	
		SVE-EX	MP-1A	MP-1B	MP-1C	MP-2	MP-3	MP-4	MP-5	Air Flow	Air Flow	VOC	Air	Air Flow	Air Flow	Air Inlet	Atm.	Temp.
										Velocity	Rate	Conc.	Sample	Velocity	Rate	Open	Pressure	
	[hr:min]	[]	[in H_2O]	[in H_2O]	[in H_2O]	[in H_2O]	[in H_2O]	[in H_2O]	[in H_2O]	[ft/min]	[cfm]	[ppm]		[ft/min]	[cfm]		[in Hg]	[°F]
Step 3	13:03	-18.67	-1.786	-1.729	-1.54	-3.07	-0.772	-3.59	-1.408	1,677	120							
13:03	13:05	-18.75	-1.759	-1.727	-1.59	-3.05	-0.772	-3.59	-1.408	1,676	119							
to	13:08	-18.79	-1.753	-1.727	-1.583	-3.05	-0.771	-3.58	-1.417									
15:03	13:13	-18.78	-1.776	-1.722	-1.578	-3.03	-0.77	-3.57	-1.401									
	13:15									1,668	119						29.97	70.1
	13:25									1,665	119							
	13:33	-18.81	-1.77	-1.716	-1.571	-3.03	-0.768	-3.57	-1.398									
	13:35									1,663	119							
	13:45									1,665	119							
	13:55									1,652	118							
	14:03	-18.89	-1.765	-1.725	-1.569	-3.03	-0.766	-3.55	-1.394									
	14:05									1,653	118							
	14:15											6.2	collected					
	14:25												collected					
	14:33	-18.64	-1.744	-1.708	-1.557	-3	-0.754	-3.52	-1.383									
	14:35												collected					
	14:45									1,633	116							
	15:03	-18.67	-1.738	-1.685	-1.553	-2.99	-0.75	-3.51	-1.380									
	15:05									1,622	116							
	15:09	-16.86	-0.883	-0.857	-0.78	-2.16	-0.531	-2.45	-0.941	1,717	122	3.7		590	58	Air Inlet 1		
	15:17	-16.9	-0.858	-0.845	-0.764	-2.14	-0.514	-2.44	-0.925	1,686	120	3.5		600	59	Air Inlet 1		
	15:25	-17.02	-0.865	-0.831	-0.762	-2.21	-0.517	-2.46	-0.916	1,698	121			600	59	Air Inlet 1		
	15:30	-18.41	-0.979	-0.932	-0.873	-2.76	-0.684	-3.19	-1.223	1,638	117	5.1		305	30	Air Inlet 2		
	15:45	-18.56	-0.975	-0.937	-0.872	-2.76	-0.694	-3.2	-1.232	1,646	117	4.7		330	33	Air Inlet 2		
	15:47	-18.65	-0.936	-0.827	-0.804	-2.87	-0.715	-3.32	-1.26	1,635	117	4.7		195	19	Air Inlet 3		
	16:00	-18.68	-0.92	-0.832	-0.808	-2.85	-0.726	-3.33	-1.279	1,653	118	4.9		198	20	Air Inlet 3		
Step 4	16:07	-23.88	-2.12	-2.06	-1.866	-3.66	-0.95	-4.29	-1.696	2,355	168	4.2						
16:07	16:12	-23.96	-2.14	-2.07	-1.907	-3.65	-0.936	-4.3	-1.693	2,350	168	4.2						
to	16:20	-23.95	-2.12	-2.06	-1.907	-3.66	-0.932	-4.29	-1.689	2,360	168	4.4					29.95	70.7
16:20																		

Notes:
Negative vacuum readings indicates pressure is lower than the atmospheric pressure
Air velocity was measured at the shop vacuum exhaust using a Alnor RVA801 rotating vane anemometer
Air flow was calculated using a multiplication factor of 0.0713 provided by the subcontractor
Total VOC concentrations were measured at the end of the 4-in exhaust duct door using a ppbRAE PID
Ambient temperature and pressure were monitored inside the AC shop
The vacuum was set to 50% capacity during Step 1, 75% during Step 2, 100% during step 3. During Step 4, two vacuum units were connected in series and operated at 100% capacity
Blank entries indicate that the measurement was not taken, air sample was not collected, or that none of the air inlets were open
Shop vacuum model WD1851 by RIDGID (6.5 peak horsepower, 16 gallon drum) was used for SVE test
Units:
ft/min = feet per minute
cfm = cubic feet per minute
ppm = parts per million
in Hg = inches of mercury

TABLE 3-2b

RESULTS OF AMBIENT AIR QUALITY MONITORING DURING THE SVE TEST
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Time	VOCs Concentration (ppb)	Description
09:00	0	Readings taken at exterior AC shop building perimeter (west, south, and east sides)
09:40	0	Readings taken at exterior AC shop building perimeter (west, south, and east sides)
12:35	5[(1)]	Reading taken at south side of AC shop building, 0 ppb measured at eastern and western sides
16:20	0	Readings taken at exterior AC shop building perimeter (west, south, and east sides)

Notes:
VOCs measured with a 10.6 eV lamp PID
(1) At the time of this reading, the winds blowing south to northeast, detected VOCs likely from an offsite source.

TABLE 3-3
SUMMARY OF MARCH 6, 2014 SVE TEST DISCHARGE ANALYTICAL DATA
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Constituent	Concentration ($\mu g/m^3$)
1,1,1-Trichloroethane	1000
1,1,2,2-Tetrachloroethane	6.3 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	7.9 U
1,1,2-Trichloroethane	5.3 U
1,1-Dichloroethane	8.8 U
1,1-Dichloroethene	5.5 U
1,2,4-Trichlorobenzene	11 U
1,2,4-Trimethylbenzene	3.9 U
1,2-Dibromoethane (EDB)	8.8 U
1,2-Dichlorobenzene	4.8 U
1,2-Dichloroethane	3.9 U
1,2-Dichloroethene, total	44 J
1,2-Dichloropropane	8.5 U
1,2-Dichlorotetrafluoroethane (Freon 114)	14 U
1,2-Dimethylbenzene (o-Xylene)	4 U
1,3,5-Trimethylbenzene (mesitylene)	3.4 U
1,3-Butadiene	5.3 U
1,3-Dichlorobenzene	4.8 U
1,4-Dichlorobenzene	4.8 U
1,4-Dioxane	41 U
2,2,4-Trimethylpentane	7.2 U
2-Butanone (MEK)	87
2-Chlorotoluene	3.9 U
2-Hexanone	47 U
3-Chloropropene (allyl chloride)	6.1 U
4-Ethyltoluene	5.1 U
4-Isopropyltoluene (p-Cymene)	25 U
4-Methyl-2-pentanone (MIBK)	6.3 U
Acetone	170 U
Benzene	3.5 U
Benzyl chloride	24 U
Bromodichloromethane	6.5 U
Bromoethene (vinyl bromide)	7.5 U
Bromoform	5.9 U
Bromomethane	6.2 U
Butane	38 U
Carbon disulfide	12 U
Carbon tetrachloride	7.6 U
Chlorobenzene	2.1 U
CHLORODIFLUOROMETHANE	44 J
Chloroethane	4.5 U

TABLE 3-3
SUMMARY OF MARCH 6, 2014 SVE TEST DISCHARGE ANALYTICAL DATA
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Constituent	Concentration ($\mu g/m^3$)	
Chloroform	7	U
Chloromethane	16	U
cis-1,2-Dichloroethene	42	J
cis-1,3-Dichloropropene	7.3	U
Cyclohexane	4.9	U
Dibromochloromethane	9.8	U
Dichlorodifluoromethane (Freon 12)	8.5	U
Ethylbenzene	3.2	U
Hexachlorobutadiene	13	U
Isopropanol	30	U
Isopropylbenzene (Cumene)	4.5	U
Methylene chloride	25	U
Methylmethacrylate	7	U
Naphthalene	60	U
n-Butylbenzene	25	U
n-Heptane	11	U
n-Hexane	6.9	U
n-Propylbenzene	23	U
sec-Butylbenzene	25	U
Styrene	4.4	U
tert-Butyl alcohol	57	U
tert-Butyl methyl ether (MTBE)	4.5	U
tert-Butylbenzene	5.3	U
Tetrachloroethene (PCE)	13000	
Tetrahydrofuran	92	J
Toluene	3.7	U
trans-1,2-Dichloroethene	6.6	U
trans-1,3-Dichloropropene	5.7	U
Trichloroethene (TCE)	920	
Trichlorofluoromethane (Freon 11)	9.7	U
Vinyl chloride	5.6	U
Xylenes, m & p	5.7	U
Xylenes, total	8.5	U

Notes:
U - Constituent not detected above the associated detection limit
J - Concentration is estimated.

TABLE 4-1
EVALUATION OF POTENTIAL EXPOSURE PATHWAYS
FORMER BARON BLAKESLEE PROPERTY
BAY SHORE, NEW YORK

				Receptors and Potential Exposure Routes (a)						
Medium	Contaminants	Exposure	Exposure	Receptor:	Outdoor	Indoor	Utility	Construction	Trespasser	Off-Site
		Medium	Point		Worker	Worker	Worker	Worker	or Visitor	Resident
				Scenario (b):	C and F	F	C and F	F	C and F	C and F
Soil	VOCs	Soil	Soil		--	--	--	--	--	--
		Dust	Dust in Air		--	--	--	--	--	--
		Vapor	Ambient Air		--	--	--	--	--	--
		Vapor	Indoor Air		--	I	--	--	--	--
Groundwater	VOCs	Groundwater	Groundwater		--	--	--	--	--	--
		Vapor	Ambient Air		--	--	--	--	--	--
		Vapor	Indoor Air		--	--	--	--	--	--
Groundwater	Metals	Groundwater	Groundwater		--	--	--	D	--	--

Notes:
(a) Exposure route abbreviations:
G - Ingestion
I - Inhalation
D - Dermal/Direct contact
-- - No potential exposure route
(b) Site condition scenario abbreviations:
C - Current site conditions and use
F - Possible future site conditions and use

TABLE 5-2
TECHNOLOGY IDENTIFICATION AND SCREENING SUMMARY
FORMER BARON BLAKESLEE PROPERTY, SITE #C152204
BAYSHORE, SUFFOLK COUNTY, NEW YORK

Media and RAOs	General Response Action	Technology	Advantages	Disadvantages	Implementability	Status for Alternative Development
Soil • Minimize direct contact. • Minimize source of soil vapor impacts. • Minimize potential future source of groundwater impacts. (continues next page)	Treatment	***In Situ* Chemical Oxidation (ISCO)** Involves applying reagent(s) to the subsurface to chemically break down the contaminants.	Can be applied to vadose zone soils via mixing	Potential for unforeseen negative impacts on groundwater quality in Upper Glacial aquifer. Potential for unforeseen vapor intrusion impacts. Recurring temporary disruptions to Site business and occupants.	Soil mixing difficult to implement inside building. Would require removal of floor slab. Difficult to control distribution of injected reagents in heterogeneous soils, utility trench backfill and foundation footings.	Not Retained. May not achieve RAOs. May have unintended consequences for groundwater quality in Upper Glacial aquifer and intrusion of VOC vapors into buildings. Implementability questionable.
		***In Situ* Solidification/Stabilization (ISS)** Involves *in situ* mixing of soil with solidification/stabilization agents to reduce the mobility of contaminants.	Relatively short disruption to Site occupants.	Generally not considered effective in treating VOCs[1].	Soil mixing not implementable beneath buildings.	Not retained.
		***In Situ* Biological Treatment** Involves the application of nutrients and/or microorganisms to enhance the population of microorganisms that use the contaminants as a food source.	Can be applied without dismantling buildings. Chlorinated VOCs amenable to certain processes/bacteria. Applied periodically, no continuous disruption.	Unproven with chlorinated VOCs in unsaturated soils. Monitoring of degradation byproducts (e.g., vinyl chloride) required. May require bench scale and field testing to ascertain microbial activity and identify effective enhancements.	Difficult to control distribution of injected reagents in heterogeneous soils, utility trench backfill and foundation footings.	Not retained. Potential for vinyl chloride production and vapor intrusion or impacts to groundwater . Implementability limitations.
		Phytotechnology Involves the use of plants to sequester, extract, or degrade contaminants in soil or groundwater.	Demonstrated effectiveness for chlorinated VOCs. Low capital cost	Buildings would have to be removed to accommodate plantings	Relatively easy to implement in open areas only.	Not retained.
		***In Situ* Thermal Destruction** Involves heating soils to volatize and mobilize contaminants. Mobilized contaminants are recovered via vacuum extraction and treated above ground.	Effective in treating volatile contaminants. Would accelerate volatilization of residual VOCs.	Lengthy periodic disruption to Site businesses and occupants. Potential destabilization and mobilization of contaminants, breakdown products and vapors in proximity to Upper Glacial aquifer and neighboring properties.	Not implementable beneath occupied buildings, would require delaying any site improvements.	Not Retained. Potential difficulties in controlling migration of mobilized vapors. Implementability limitations.
	Excavation, Disposal	**Excavation and Off-Site Disposal** Involves excavating soils and source material, and disposing of off-site.	Effective in treating VOCs in soil.	Would require demolition of buildings or temporary shoring /foundation underpinning. Short-term impacts from construction activities.	Not feasible without shoring/foundation underpinning.	Retained.
Soil (continued) • Minimize direct contact. • Minimize source of soil vapor impacts. • Minimize potential future source of groundwater impacts.	Extraction	**Soil Vapor Extraction** Involves the removal of VOCs from soil through in situ volatilization, extraction of soil vapor, and ex situ treatment of soil vapor, if required.	Effective at the Site because chlorinated VOCs are volatile and present in unsaturated, relatively permeable soils. On Site testing has demonstrated SVE effectiveness. Will facilitate mitigation of potential soil vapor intrusion.	SVE system will encumber portions of buildings until remedial objective completed. Periodic, brief disruption of Site business operations for O&M purposes	Readily implemented using existing technologies and vendors.	Retained.

[1] USEPA, 2009. Technology Performance Review: Selecting and Using Solidification/Stabilization Treatment for Site Remediation. United States Environmental Protection Agency Office of Research and Development, EPA/600/R-09/148, November 2009.

TABLE 5-2
TECHNOLOGY IDENTIFICATION AND SCREENING SUMMARY
FORMER BARON BLAKESLEE PROPERTY, SITE #C152204
BAYSHORE, SUFFOLK COUNTY, NEW YORK

Media and RAOs	General Response Action	Technology	Advantages	Disadvantages	Implementability	Status for Alternative Development
	Monitored Natural Attenuation	**Monitored Natural Attenuation** Utilizes naturally-occurring biodegradation, dispersion, dilution, adsorption to reduce the mass, toxicity, mobility, volume or concentration of contaminants. Monitoring of the processes ensures their effectiveness.	Given sufficient time, dispersion and dilution will reduce the concentration of the VOCs sorbed onto soil in the Vadose zone.	Provides no immediate mitigation of potential soil vapor intrusion.	Easily implemented.	Retained, potentially in conjunction with other technologies such as extraction and containment
	Containment	**Capping** Consists of a physical barrier that prevents contact with the impacted soil and source material.	Prevents direct contact with impacted media.	Does not treat or remove source materials.	Easy to implement.	Retained
	Institutional Controls	Environmental Easement, Site Management Plan, Health and Safety Plan	Prevents or manages exposure to impacted media.	Does not treat or remove source materials.	Readily implemented. Requires owner to grant environmental easement.	Retained
Soil Vapor • Prevent intrusion to indoor air.	Containment	**Vapor Barrier** Consists of an impermeable membrane installed under a floor slab to prevent intrusion of soil vapor.	Passive barrier requiring little or no maintenance.	Impractical to retrofit existing structure.	Readily implemented in new slab-on-grade construction.	Retained
		Sub-Slab Depressurization (SSDS) Involves actively maintaining a vacuum under the floor slab to prevent intrusion of soil vapor.	Mature technology well-suited for installation in existing structures.	Requires periodic maintenance of system components and monitoring of sub-slab vacuum.	Can usually be implemented in existing structures.	Retained. May be implemented in conjunction with SVE.

TABLE 5-3
SUMMARY OF REMEDIAL ALTERNATIVES
FORMER BARON BLAKESLEE PROPERTY, SITE #C152204
BAYSHORE, SUFFOLK COUNTY, NEW YORK

PARAMETER	ALTERNATIVE 1 Restoration to Industrial Use Conditions, Soil Vapor Extraction / Sub-Slab Depressurization, Engineering and Institutional Controls, Continued Monitoring of Soil Vapor	ALTERNATIVE 2 Restoration to Unrestricted (i.e., Residential) Use Conditions, Building Demolition, Soil Removal and Off-Site Disposal Continued Monitoring of Soil Vapor
Size and Configuration	1) Design and implement Soil Vapor Extraction (SVE) system to remediate VOC-impacted soils in the vadose zone under Site buildings. 2) Operate SVE system until sub-slab soil vapor concentrations no longer present an unacceptable potential for soil vapor intrusion, based on NYSDOH SVI decision matrices. 3) During SVE system operation, monitor sub-slab vacuum to confirm mitigation of potential soil vapor intrusion. 4) During SVE system operation, monitor exterior soil vapor to evaluate potential migration of soil vapor from source areas under building. 5) If SVE system operation is terminated before SCOs for Protection of Groundwater are met, groundwater monitoring would be required to verify the continued absence of impacts by chlorinated VOCs. 6) Establish institutional controls via environmental easement: restrict Site to industrial use, implement Site Management Plan, reporting.	1) Demolition of Site buildings followed by excavation and off-Site disposal of VOC contaminated soils exceeding Part 375 SCOs for Residential Use and Protection of Groundwater. 2) Evaluate soil vapor as necessary to confirm concentrations of chlorinated VOCs would not present threat of SVI in any future residential structures.
Remediation Time	Estimate 3-5 years for SVE system operation. Actual SVE duration will depend on monitoring results. Operation of a sub-slab depressurization system (SSDS) may continue after termination of SVE if warranted by residual soil vapor impacts. Environmental easement, institutional controls and SMP would continue for 30 years.	Approximately 12 months to complete building demolition and excavation of soils. Approximately 12 months to confirm soil vapor levels would be suitable for residential structures to be built without SVI mitigation.
Spatial Requirements	Confined to building footprint (Figure 5-1).	Confined to property boundaries (Figure 5-2).
Disposal Options	Wastes requiring off-Site disposal would consist of spent GAC (only if required for treatment of SVE system exhaust).	Demolition debris and excavated soils would need to be disposed of at one or more approved facilities. Depending on chlorinated VOC concentrations, impacted soil may be regulated as hazardous waste.
Substantive Permit Requirements	Site stormwater drainage subject to County and Town DPW requirements. Future structural modifications subject to building codes.	Site stormwater drainage subject to County and Town DPW requirements. Building demolition subject to County or Town permit. Future residential construction subject to zoning ordinance and building codes.
Limitations	Future intrusive activities or Site modifications will require compliance with provisions of SMP. Site cannot be used for residential purposes. Near-term Site development must preserve access to SVE system. SSDS operation may be required for limited time after termination of SVE.	Residential construction may require installation vapor barrier and/or SSDS to address intrusion of vapors originating off-Site.
Beneficial and/or Adverse Impacts on Fish and Wildlife Resources	There are no recognized fish/wildlife resources at or adjacent to the Site.	There are no recognized fish/wildlife resources at or adjacent to the Site.

Notes:
1. *The conceptual plans for Alternatives 1 and 2 are presented as Figures 5-1 and 5-2.*

TABLE 5-4
REMEDIAL ALTERNATIVES EVALUATION
FORMER BARON BLAKESLEE PROPERTY, SITE #C152204
BAYSHORE, SUFFOLK COUNTY, NEW YORK

Parameter	ALTERNATIVE 1 Restoration to Industrial Use Conditions, Soil Vapor Extraction / Sub-Slab Depressurization, Engineering and Institutional Controls, Continued Monitoring of Soil Vapor	ALTERNATIVE 2 Restoration to Unrestricted (i.e., Residential) Use Conditions, Building Demolition, Soil Removal and Off-Site Disposal Continued Monitoring of Soil Vapor
Overall Protectiveness of Public Health and Environment	Protective of public health and the environment under continued industrial use. Exposure to VOC contaminated soils and soil vapor eliminated by removal, sub-slab depressurization, SMP, and continued monitoring of potential SVI. Requires institutional controls (SMP) to address residual soil contamination in excess of SCOs for protection of Groundwater.	Offers slightly greater overall protectiveness of public health and the environment than Alternative 2. Includes the removal of all impacted soil to restore the Site to conditions suitable for unrestricted (residential) use. Requires no institutional controls to address residual VOCs in soil.
Compliance with the SCGs	Nearly full compliance with chemical specific SCGs given that SVE system will be operated until sub-slab soil vapor concentrations no longer present an unacceptable potential for soil vapor intrusion, based on NYSDOH SVI decision matrices. Some VOCs may remain at concentrations above SCOs for Protection of Groundwater, but will not threated groundwater quality due to isolation in vadose zone and presence of overlying cover (buildings).	Offers the greatest ability to comply with the SCGs. All unsaturated soils impacted with VOCs in excess of SCOs for Protection of Groundwater of Protection of Human Health (Residential Use) will be removed.
Reduction in Toxicity, Mobility, or Volume with Treatment	Toxicity and mobility of VOCs in vadose zone soils would be reduced if SVE exhaust is treated via GAC or catalytic oxidation. Toxicity of the minor contaminant mass remaining in unsaturated soils is expected to be reduced over time by biotic and abiotic degradation.	Landfilling excavated soils or off-Site treatment of excavated soils via thermal desorption or incineration offers slightly greater reduction of toxicity and mobility of VOCs than would be achieved by SVE without treatment of exhaust. However, given the low concentrations in these soils, this reflects minimal improvement over Alternative 1 in terms of total contaminant mass.
Short-Term Impacts and Effectiveness	Brief disruption of tenant operations during installation and periodic O&M of SVE system. No short-term impacts of construction traffic, noise, vibration or dust. Achieving RAOs for may require 3-5 years or more.	Alternative 2 would create significant short term impacts compared to Alternative 1. Building demolition and soil excavation would cause construction traffic, noise, vibration, dust, and possible impacts to neighboring properties. Alternative 2 may achieve RAOs quicker than Alternative 1.
Long-Term Effectiveness and Permanence	Provides long term effectiveness and permanence; however, requires continuous maintenance of engineering controls (SVE and/or SSDS) and institutional controls.	Provides long term effectiveness and permanence. Before any residential use is contemplated, soil vapor sampling required to verify SVI mitigation would not be required for residential structures.
Implementability		
a. **Technical Feasibility**	Technically feasible to implement. SVE testing during PDI demonstrated Site conditions are suitable for SVE. SVE is mature technology, easily implemented using widely available equipment and materials. One building is unoccupied. Tenant in other building can tolerate brief disruption during SVE system installation.	Technically feasible to implement using readily available demolition and soil excavation contracting resources.

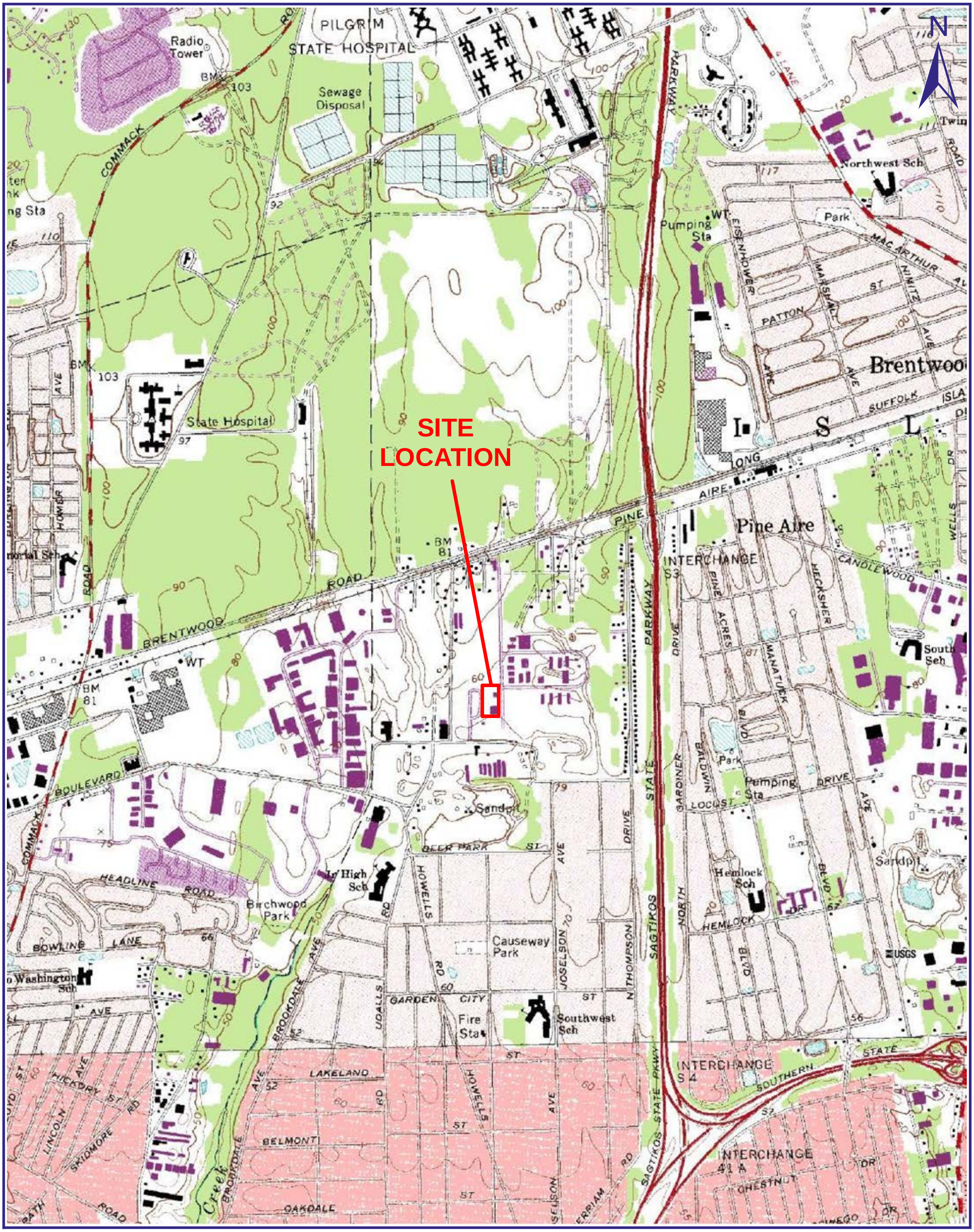
TABLE 5-4
REMEDIAL ALTERNATIVES EVALUATION
FORMER BARON BLAKESLEE PROPERTY, SITE #C152204
BAYSHORE, SUFFOLK COUNTY, NEW YORK

Parameter	ALTERNATIVE 1 Restoration to Industrial Use Conditions, Soil Vapor Extraction / Sub-Slab Depressurization, Engineering and Institutional Controls, Continued Monitoring of Soil Vapor	ALTERNATIVE 2 Restoration to Unrestricted (i.e., Residential) Use Conditions, Building Demolition, Soil Removal and Off-Site Disposal Continued Monitoring of Soil Vapor
b. **Administrative Feasibility**	Alternative 1 avoids significant disruption of existing business operations and loss of valuable space for future industrial development.	Alternative 2 would create significant administrative difficulties related to termination or relocation of existing appliance repair business. Administrative obstacles would arise when attempting use the Site for residential purposes. These would include obtaining approvals from state and county health departments for residential use and plans to mitigate SVI in residential structures caused by off-Site or residual on-Site contamination.
Cost Effectiveness	Capital Cost = $570,000 O&M Costs = $220,000 Total Cost = $790,000 Annual O&M costs reflect need for annual certification of SVE/SSDS operation and inspection/reporting of engineering and institutional controls for 30 years thereafter.	Capital Cost = $4,120,000 O&M Costs = $0 Total Cost = $4,120,000 Annual O&M costs assume no monitoring of residential SVI is required.
Land Use	Site is currently used for industrial activities and would be restricted to industrial use in perpetuity through an environmental easement. Any future uses and construction designs must be in accordance with the requirements of the SMP and institutional controls.	Site could theoretically be used for residential purposes subject to local zoning ordinance and the need to mitigate residential SVI caused by residual on-Site VOCs or contamination originating off-Site. Given technical and administrate hurdles and abundance of alternate residential properties, it is unlikely the Site would actually be used for anything other than industrial purposes.

Notes:
1. *The conceptual plans for Alternatives 1 and 2 are presented as Figures 5-1 and 5-2.*
2. *Costs are rounded to the nearest $10,000.*

Figures

1/22/2014



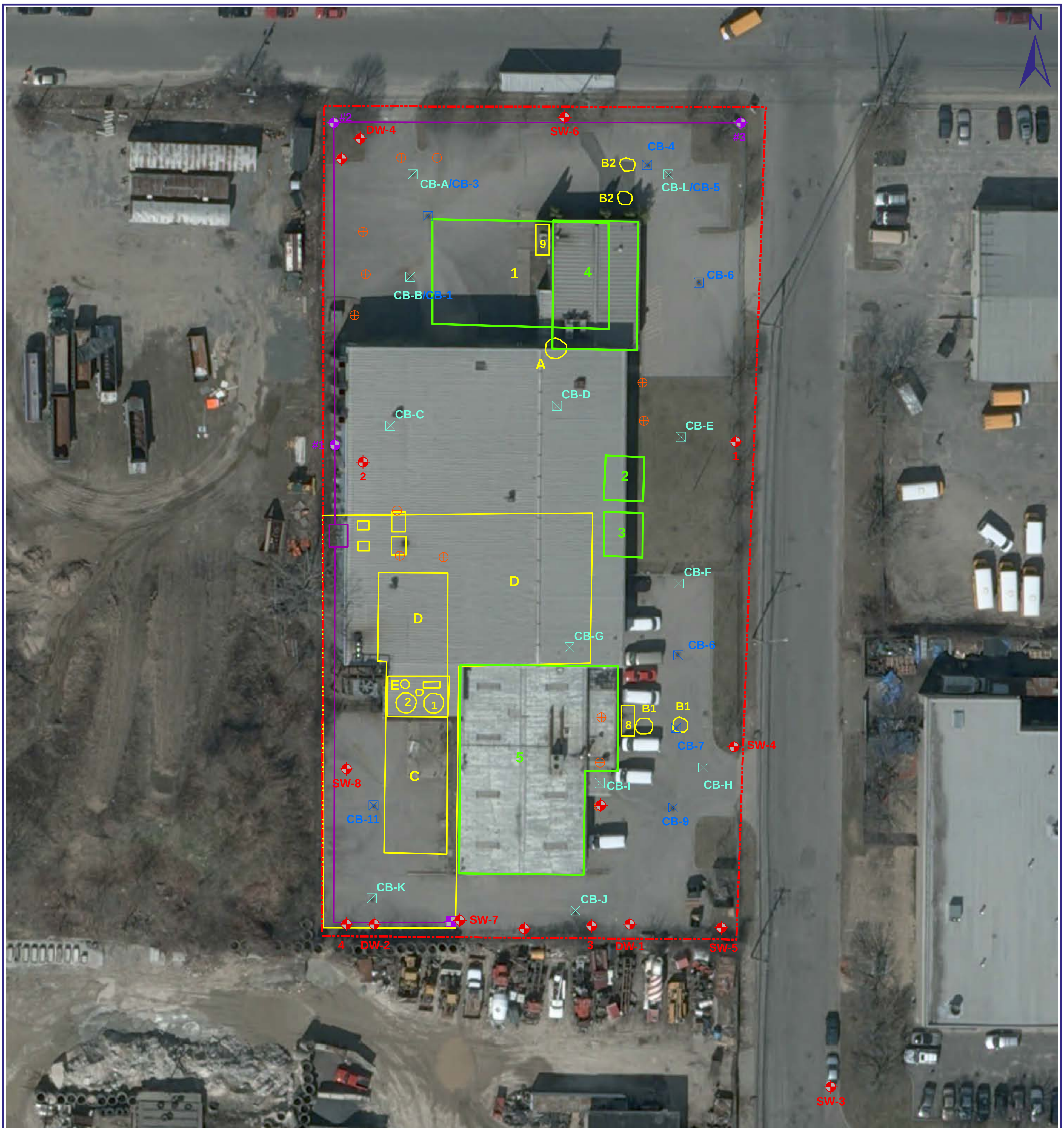
Author: PThorn Path: P:\GIS\GE\Bayshore\PDI_Workplan\Site_Location.mxd

Brown AND Caldwell

FIGURE 2-1
SITE LOCATION
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Source: USGS Topographic Quadrangles
Greenlawn abd Bay Shore West Quads

0 1,000 2,000
Feet



Legend

Approximate Site Boundary	HistoricTanks & Septic Features
Former Monitoring Wells	A - Septic System (SPPC)
Former Extraction Well	B1- Septic System (ATS/UNC/GE)
Former Recovery Wells	B2- Septic System (ATS/UNC/GE)
Historic Leaching Pools (SPPC)	C - Tank Pit (BB)
Historic Catch Basin/leaching pool (BB)	D - Secondary Concrete Containment Area (BB)
Existing Catch Basins (ATS/UNC/GE)	E - Concrete Pit with ASTs (ATS/UNC)

#1- 10,000-gallon Jet Fuel Above Ground Storage Tank (ATS)
#2- 10,000-gallon Jet Fuel AST (ATS)/ No.2/Diesel Fuel AST(UNC)
#3 - 1,500-gallon Waste Mineral Oil AST (ATS) & Organic Solvent AST(UNC)
#4- 400-gallon Caustic (NaOH) Process AST (ATS)
#5 - 400-gallon Organic Solvent Process AST(ATS)
#6 - Drum Storage Area (650-gallons)(ATS)
#7 - Drum Storage Area (550-gallons)((ATS)
#8 - 1,000-gallon #2 Fuel Oil UST (ATS)
#9 - 1,000-gallon #2 Fuel Oil UST (ATS)

Historic Buildings & Other Site Features
#1 - Shop/Office Building (SPPC)
#2 - Receiver (SPPC)
#3 - Hopper (SPPC)
#4 - Office Building (BB)
#5 - Warehouse Building (BB)

Groundwater Treatment System Features (ATS)
#1 - Air Stripping Towers/Groundwater Treatment

1/22/2014

Author: PThorn Path: P:\GIS\GE\Bayshore\PDI_Workplan\Site_Plan.mxd

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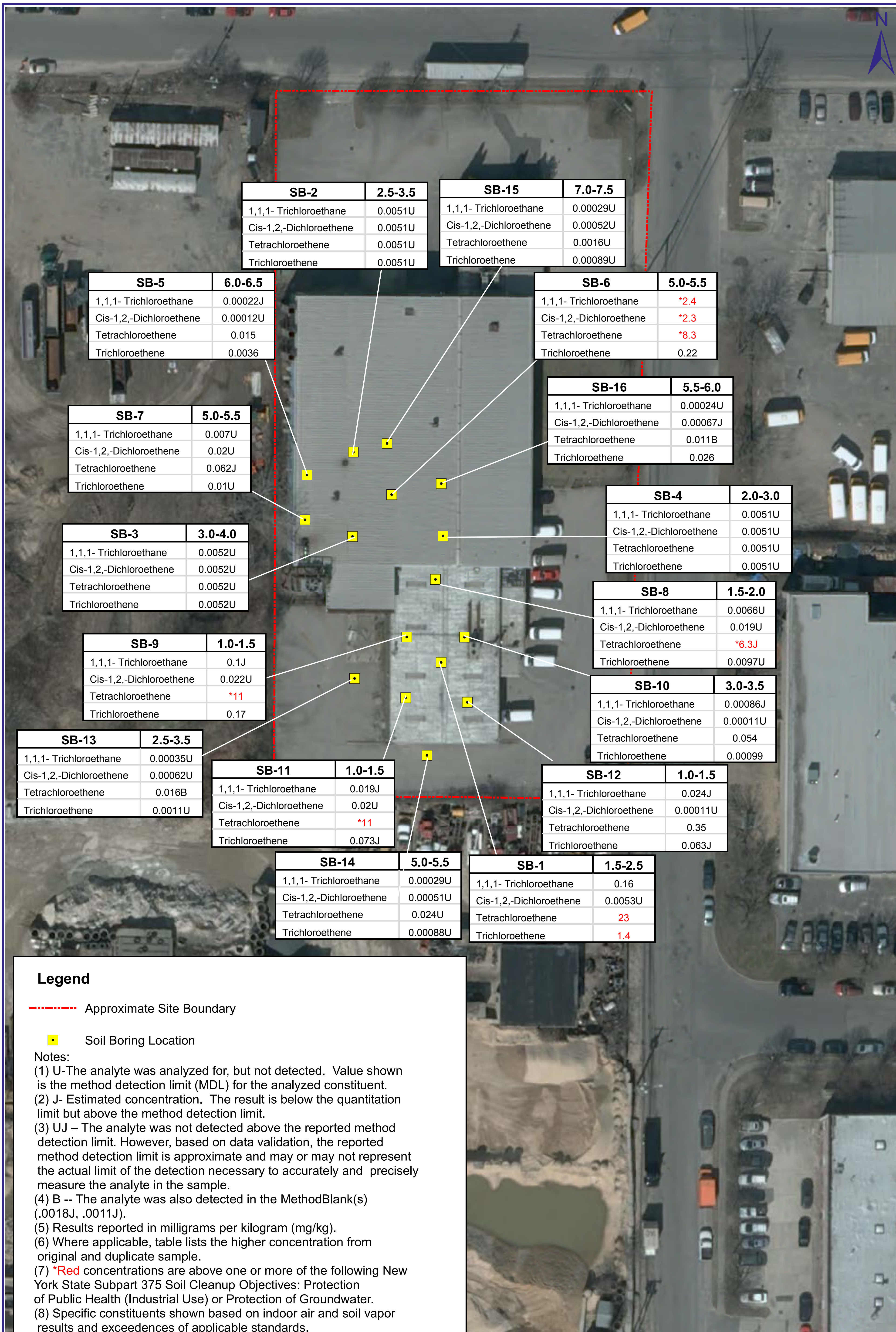
FIGURE 2-2
SITE PLAN
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

0 25 50
Feet

6/11/2014



SB-2	2.5-3.5
1,1,1- Trichloroethane	0.0051U
Cis-1,2,-Dichloroethene	0.0051U
Tetrachloroethene	0.0051U
Trichloroethene	0.0051U

SB-15	7.0-7.5
1,1,1- Trichloroethane	0.00029U
Cis-1,2,-Dichloroethene	0.00052U
Tetrachloroethene	0.0016U
Trichloroethene	0.00089U

SB-5	6.0-6.5
1,1,1- Trichloroethane	0.00022J
Cis-1,2,-Dichloroethene	0.00012U
Tetrachloroethene	0.015
Trichloroethene	0.0036

SB-6	5.0-5.5
1,1,1- Trichloroethane	*2.4
Cis-1,2,-Dichloroethene	*2.3
Tetrachloroethene	*8.3
Trichloroethene	0.22

SB-16	5.5-6.0
1,1,1- Trichloroethane	0.00024U
Cis-1,2,-Dichloroethene	0.00067J
Tetrachloroethene	0.011B
Trichloroethene	0.026

SB-7	5.0-5.5
1,1,1- Trichloroethane	0.007U
Cis-1,2,-Dichloroethene	0.02U
Tetrachloroethene	0.062J
Trichloroethene	0.01U

SB-4	2.0-3.0
1,1,1- Trichloroethane	0.0051U
Cis-1,2,-Dichloroethene	0.0051U
Tetrachloroethene	0.0051U
Trichloroethene	0.0051U

SB-3	3.0-4.0
1,1,1- Trichloroethane	0.0052U
Cis-1,2,-Dichloroethene	0.0052U
Tetrachloroethene	0.0052U
Trichloroethene	0.0052U

SB-8	1.5-2.0
1,1,1- Trichloroethane	0.0066U
Cis-1,2,-Dichloroethene	0.019U
Tetrachloroethene	*6.3J
Trichloroethene	0.0097U

SB-9	1.0-1.5
1,1,1- Trichloroethane	0.1J
Cis-1,2,-Dichloroethene	0.022U
Tetrachloroethene	*11
Trichloroethene	0.17

SB-10	3.0-3.5
1,1,1- Trichloroethane	0.00086J
Cis-1,2,-Dichloroethene	0.00011U
Tetrachloroethene	0.054
Trichloroethene	0.00099

SB-13	2.5-3.5
1,1,1- Trichloroethane	0.00035U
Cis-1,2,-Dichloroethene	0.00062U
Tetrachloroethene	0.016B
Trichloroethene	0.0011U

SB-11	1.0-1.5
1,1,1- Trichloroethane	0.019J
Cis-1,2,-Dichloroethene	0.02U
Tetrachloroethene	*11
Trichloroethene	0.073J

SB-12	1.0-1.5
1,1,1- Trichloroethane	0.024J
Cis-1,2,-Dichloroethene	0.00011U
Tetrachloroethene	0.35
Trichloroethene	0.063J

SB-14	5.0-5.5
1,1,1- Trichloroethane	0.00029U
Cis-1,2,-Dichloroethene	0.00051U
Tetrachloroethene	0.024U
Trichloroethene	0.00088U

SB-1	1.5-2.5
1,1,1- Trichloroethane	0.16
Cis-1,2,-Dichloroethene	0.0053U
Tetrachloroethene	23
Trichloroethene	1.4

Legend

Approximate Site Boundary

Soil Boring Location

Notes:

(1) U-The analyte was analyzed for, but not detected. Value shown is the method detection limit (MDL) for the analyzed constituent.
(2) J- Estimated concentration. The result is below the quantitation limit but above the method detection limit.
(3) UJ – The analyte was not detected above the reported method detection limit. However, based on data validation, the reported method detection limit is approximate and may or may not represent the actual limit of the detection necessary to accurately and precisely measure the analyte in the sample.
(4) B -- The analyte was also detected in the MethodBlank(s) (.0018J, .0011J).
(5) Results reported in milligrams per kilogram (mg/kg).
(6) Where applicable, table lists the higher concentration from original and duplicate sample.
(7) *Red concentrations are above one or more of the following New York State Subpart 375 Soil Cleanup Objectives: Protection of Public Health (Industrial Use) or Protection of Groundwater.
(8) Specific constituents shown based on indoor air and soil vapor results and exceedences of applicable standards.

Author: PThorn Path: \\bcalldc01\projects\GIS\GE\Bayshore\Soil_VOCs_2014.mxd

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FIGURE 3-1
VOLATILE ORGANIC COMPOUNDS IN SOIL
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

0 25 50
Feet

8/12/2014

Author: CMeyn Path: P:\GIS\GE\Bayshore\PDI_Workplan\SVE_Test_Well_Locations.mxd

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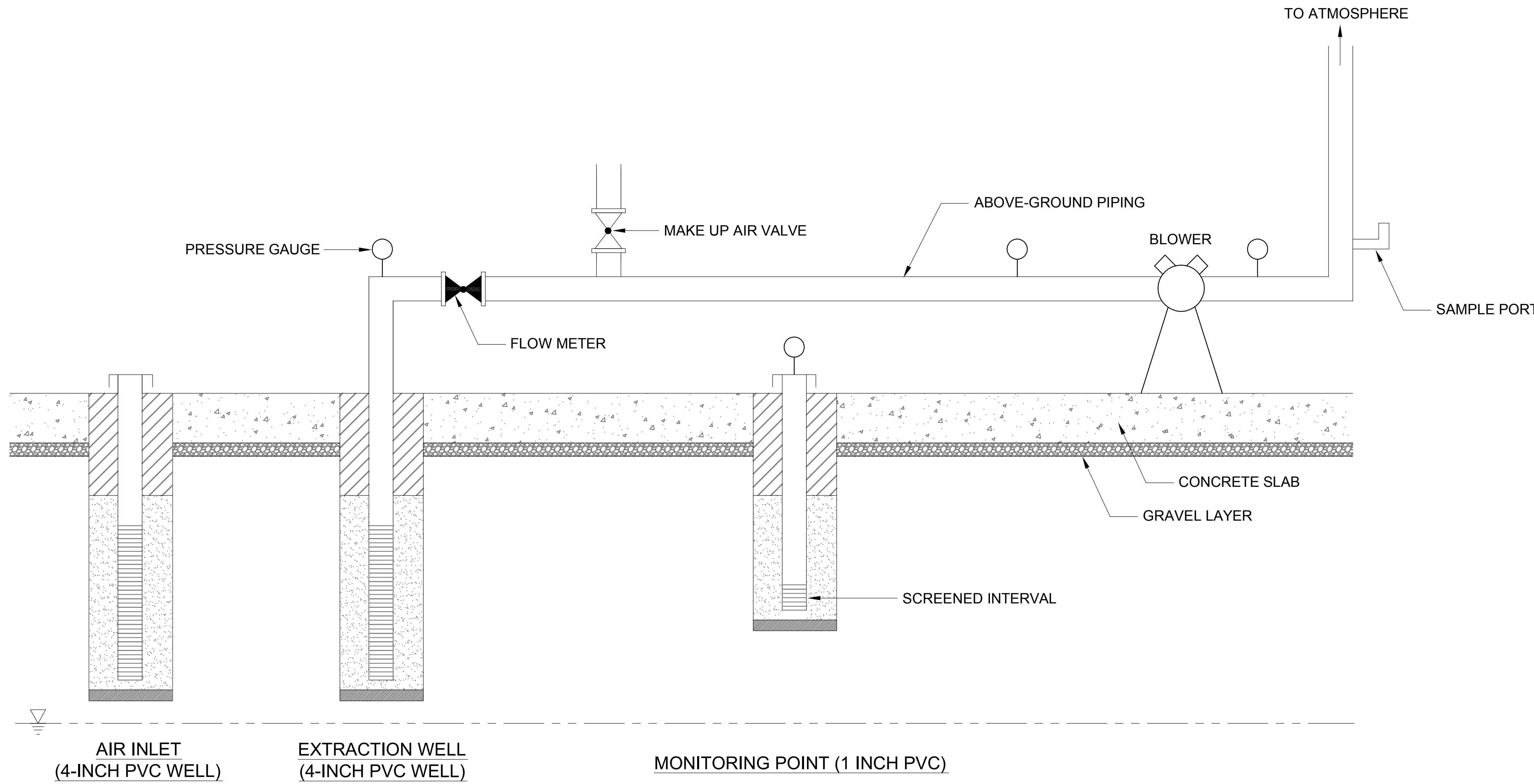
FIGURE 3-2
SVE TEST WELL LOCATIONS
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

Path: P:\General_Electric\Former_Baron_Blakeslee_Site\145539_GE_Bayshore_SVE_Deliverables\01_PDIWorkPlan\Figures\not-used File Name: FIG-3-2 Plot Date: August 12, 2014 4:00 PM Cadd User:



Brown AND Caldwell

N.T.S.

DATE: August 12, 2014

FORMER BARON BLAKESLEE SITE
86 CLEVELAND AVENUE
BAY SHORE, NEW YORK

SVE TEST SCHEMATIC

FIGURE
3-3

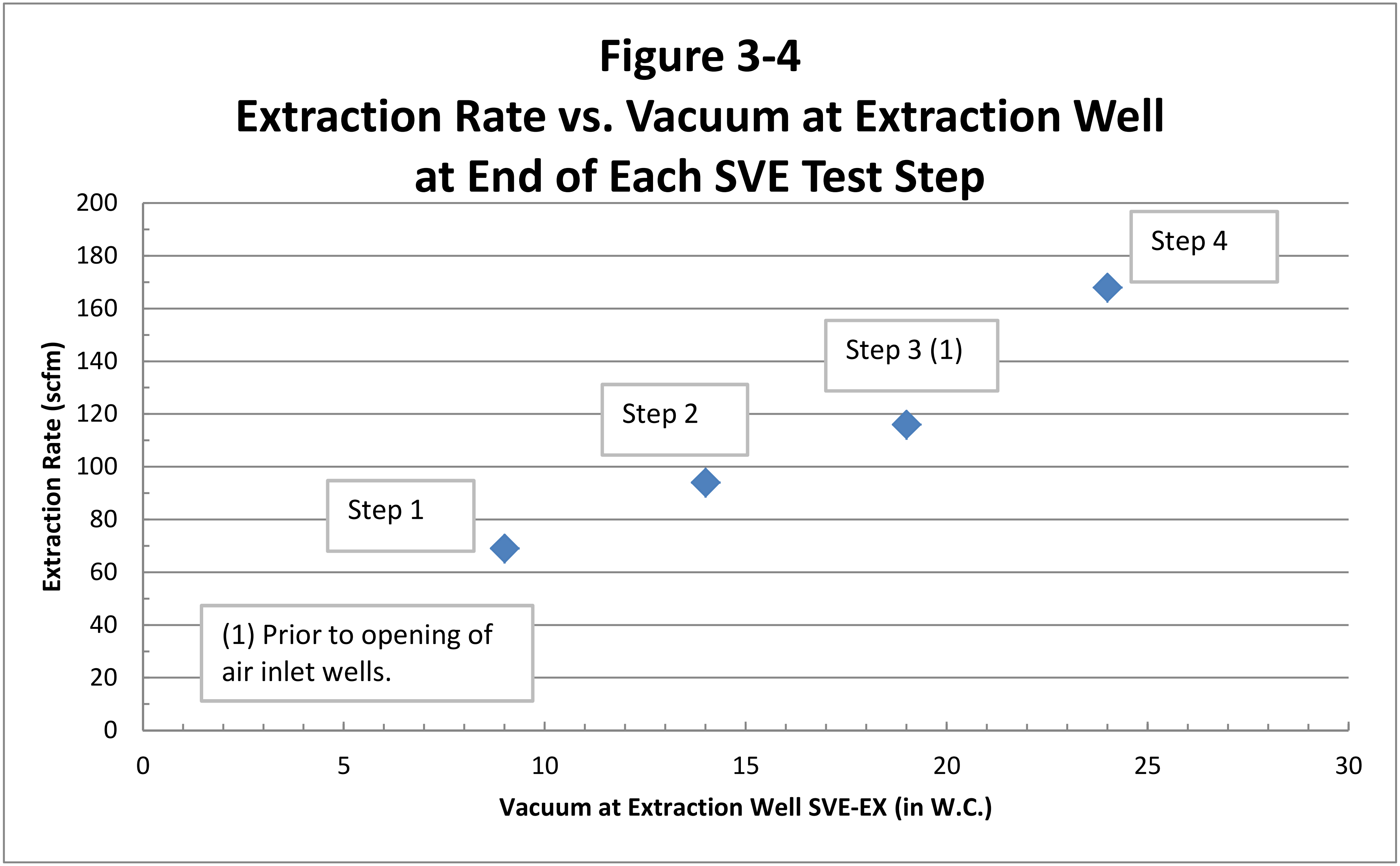


Figure 3-4
Extraction Rate vs. Vacuum at Extraction Well
at End of Each SVE Test Step
Extraction Rate (scfm)
200
180
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
Vacuum at Extraction Well SVE-EX (in W.C.)
Step 1
Step 2
Step 3 (1)
Step 4
(1) Prior to opening of air inlet wells.

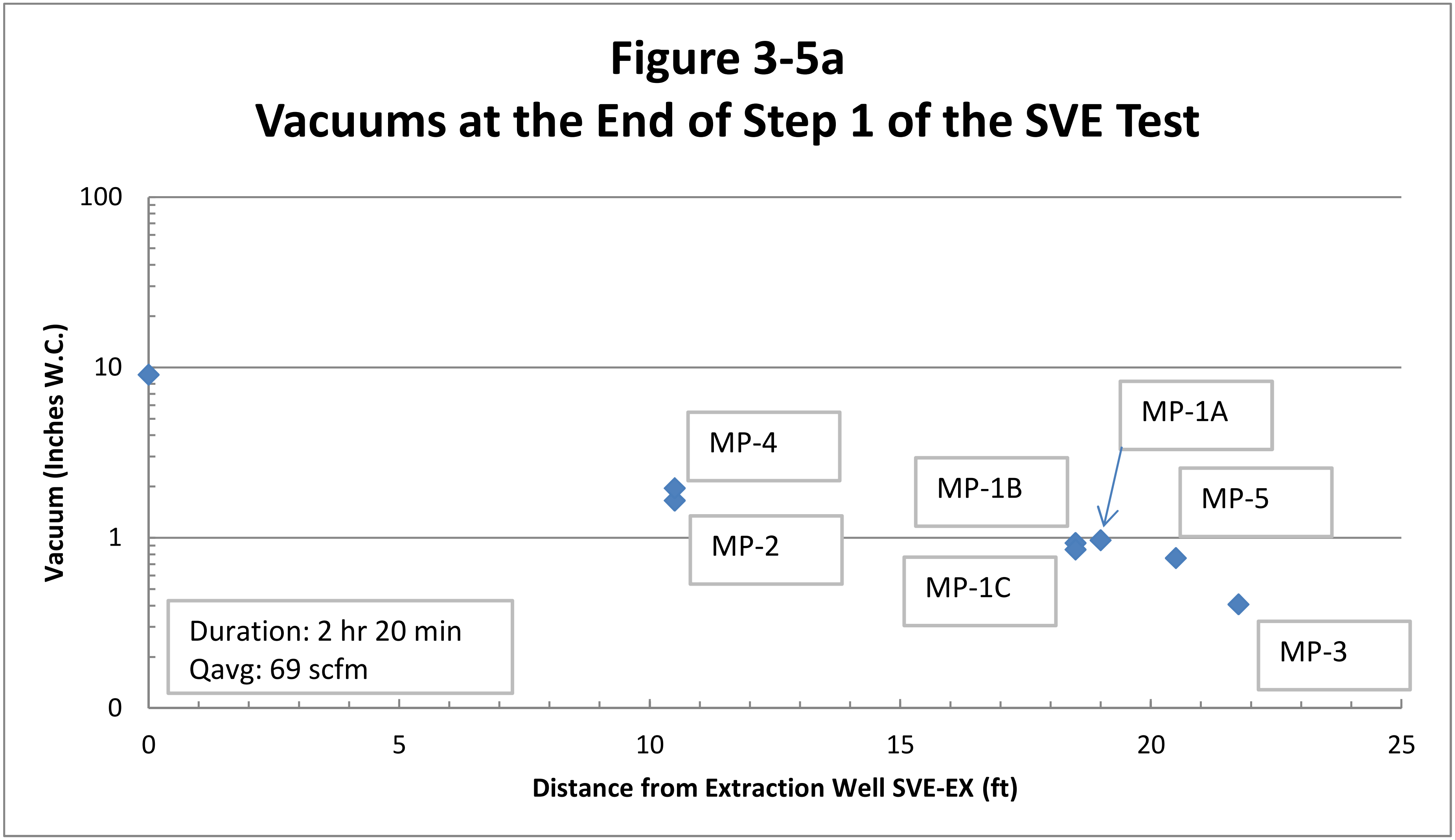


Figure 3-5a
Vacuums at the End of Step 1 of the SVE Test
100
10
1
0
Vacuum (Inches W.C.)
0
5
10
15
20
25
Distance from Extraction Well SVE-EX (ft)
MP-4
MP-2
MP-1B
MP-1C
MP-1A
MP-5
MP-3
Duration: 2 hr 20 min
Qavg: 69 scfm

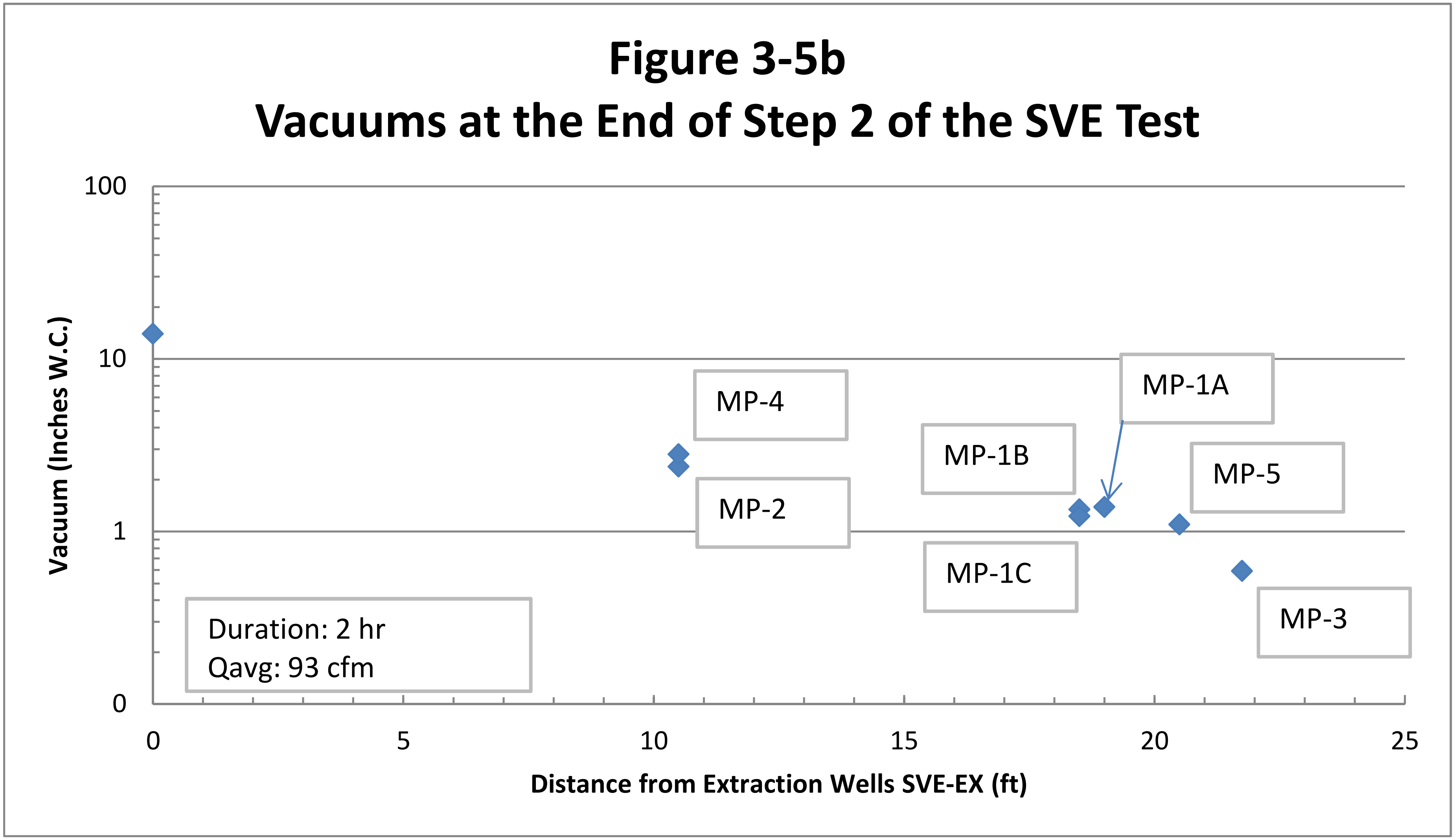


Figure 3-5b
Vacuums at the End of Step 2 of the SVE Test
100
10
1
0
Vacuum (Inches W.C.)
MP-4
MP-2
MP-1B
MP-1A
MP-5
MP-1C
MP-3
Duration: 2 hr
Qavg: 93 cfm
0
5
10
15
20
25
Distance from Extraction Wells SVE-EX (ft)

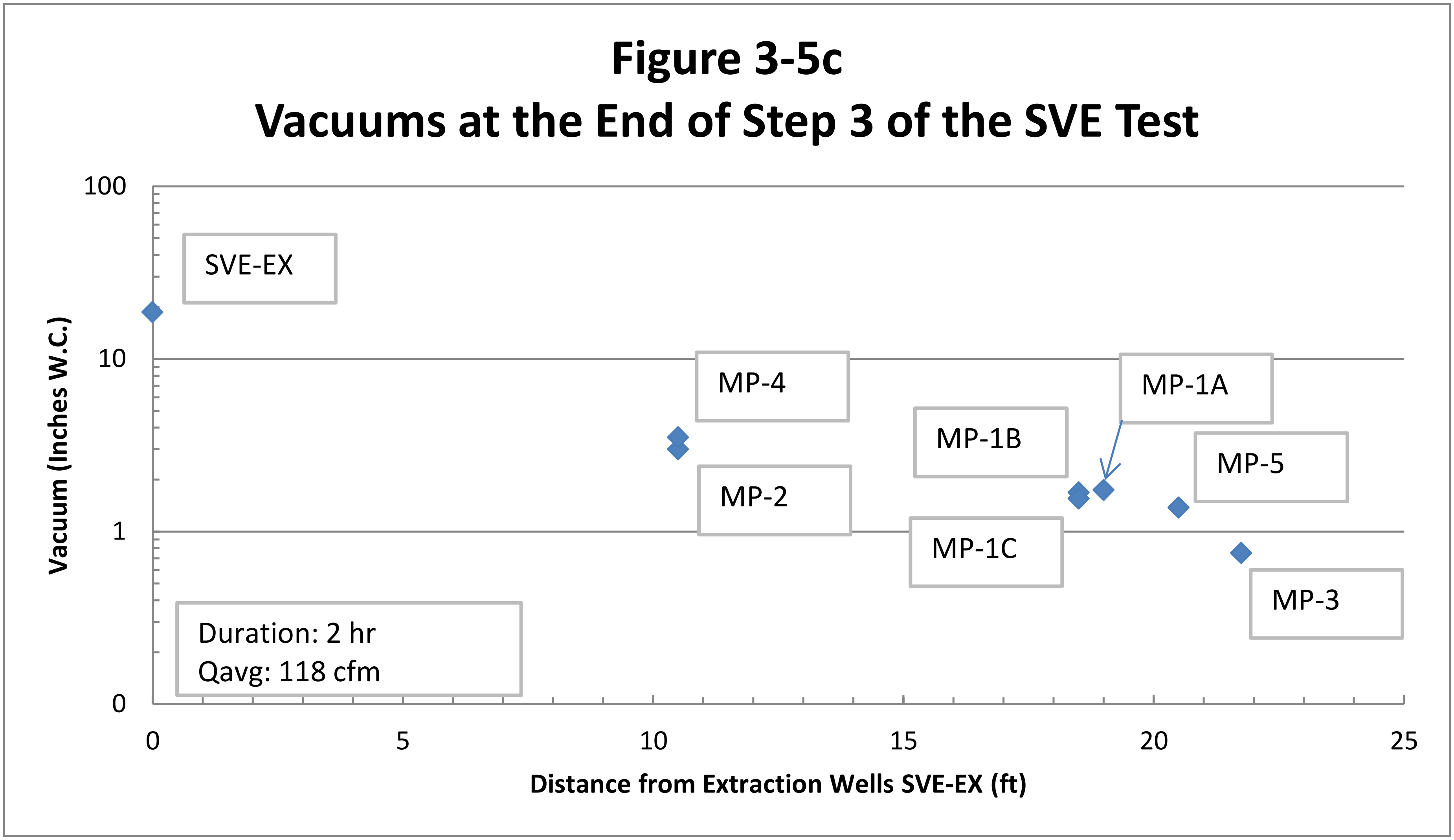


Figure 3-5c
Vacuums at the End of Step 3 of the SVE Test
100
10
1
0
Vacuum (Inches W.C.)
SVE-EX
MP-4
MP-2
MP-1B
MP-1A
MP-1C
MP-5
MP-3
Duration: 2 hr
Qavg: 118 cfm
0
5
10
15
20
25
Distance from Extraction Wells SVE-EX (ft)

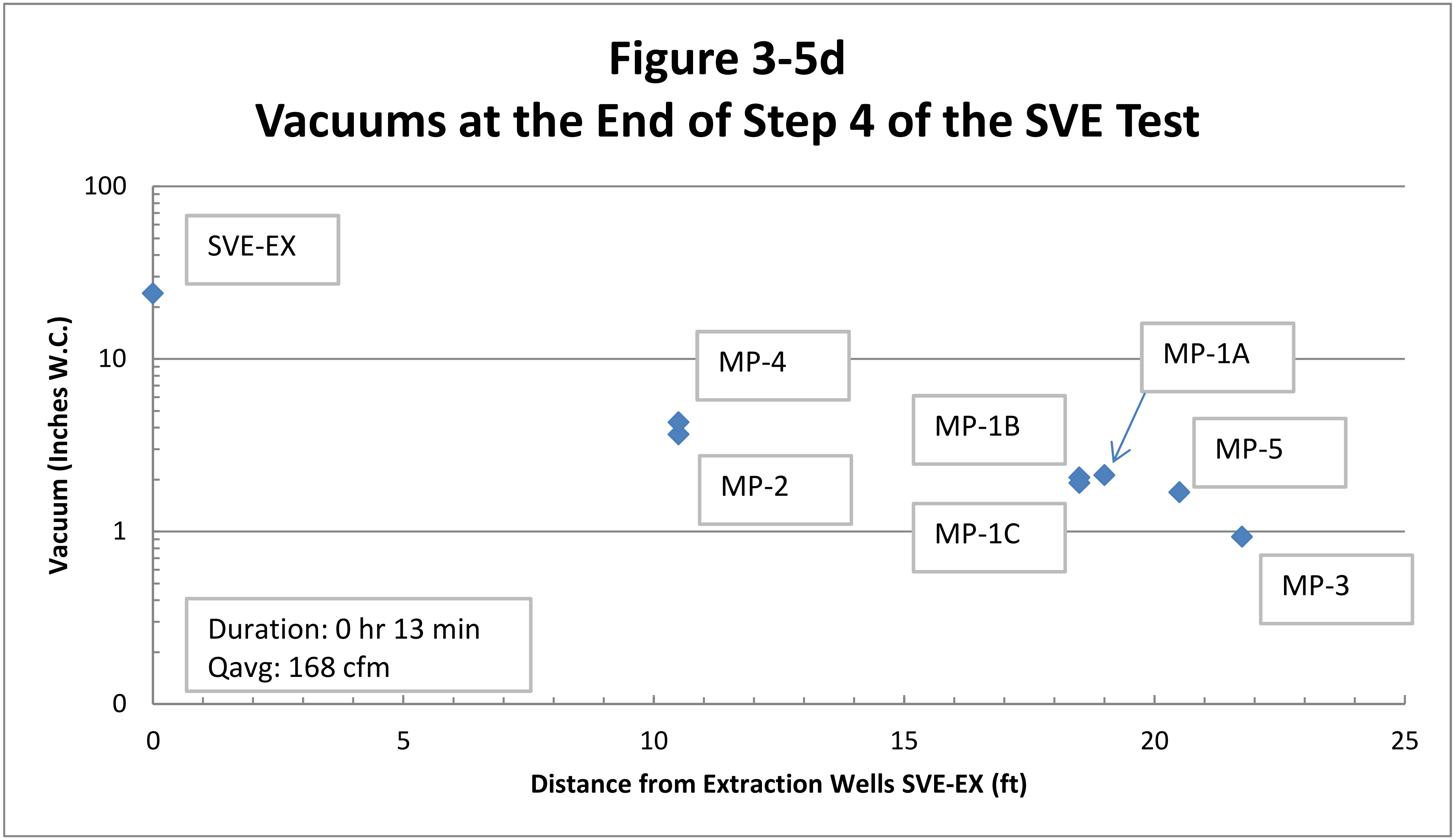
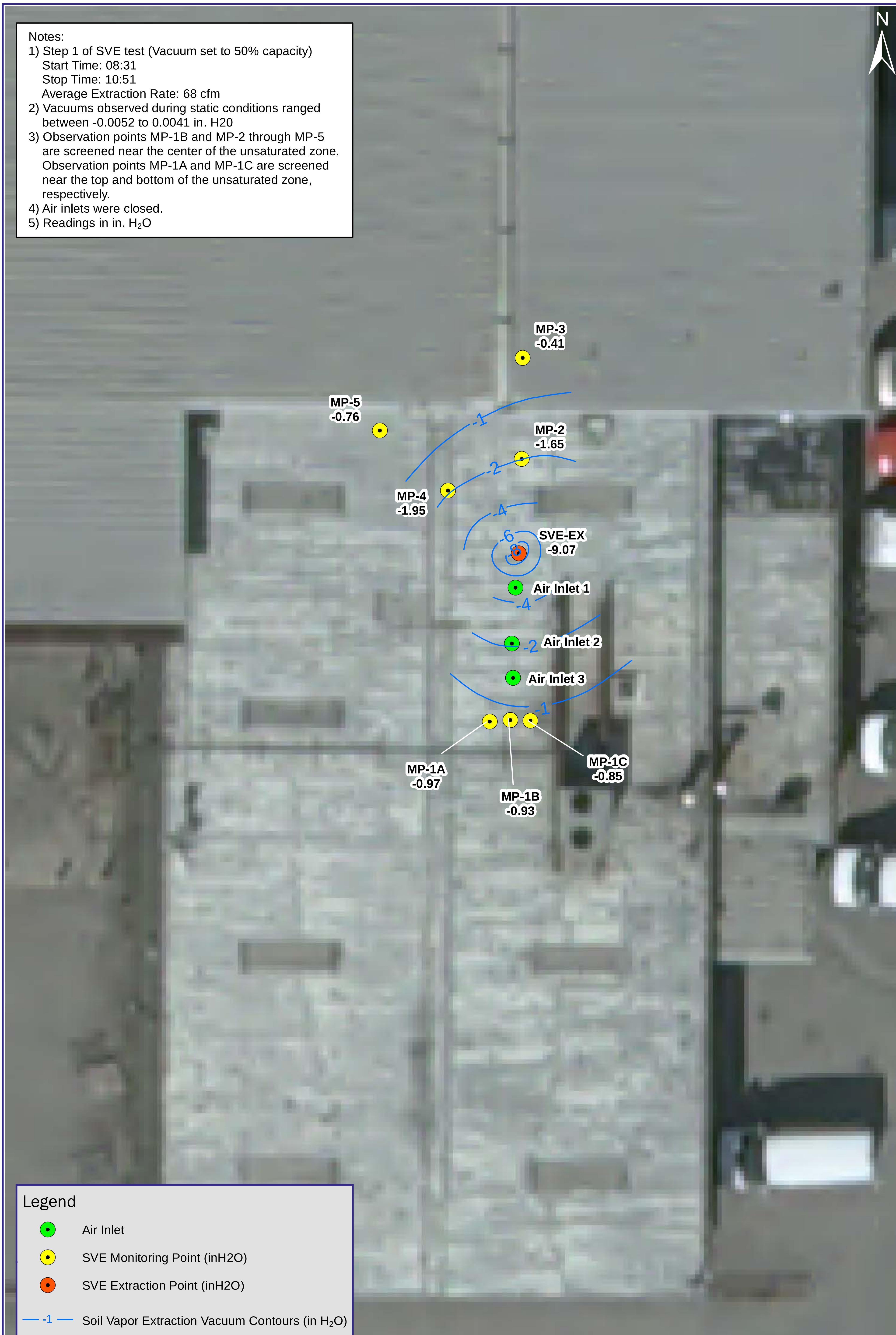


Figure 3-5d
Vacuums at the End of Step 4 of the SVE Test
100
10
1
0
Vacuum (Inches W.C.)
SVE-EX
MP-4
MP-2
MP-1B
MP-1A
MP-1C
MP-5
MP-3
Duration: 0 hr 13 min
Qavg: 168 cfm
0
5
10
15
20
25
Distance from Extraction Wells SVE-EX (ft)

8/12/2014



Author: CMeyn Path: P:\GIS\GE\Bayshore\Test_1_SVE_Pressure_05-2014.mxd

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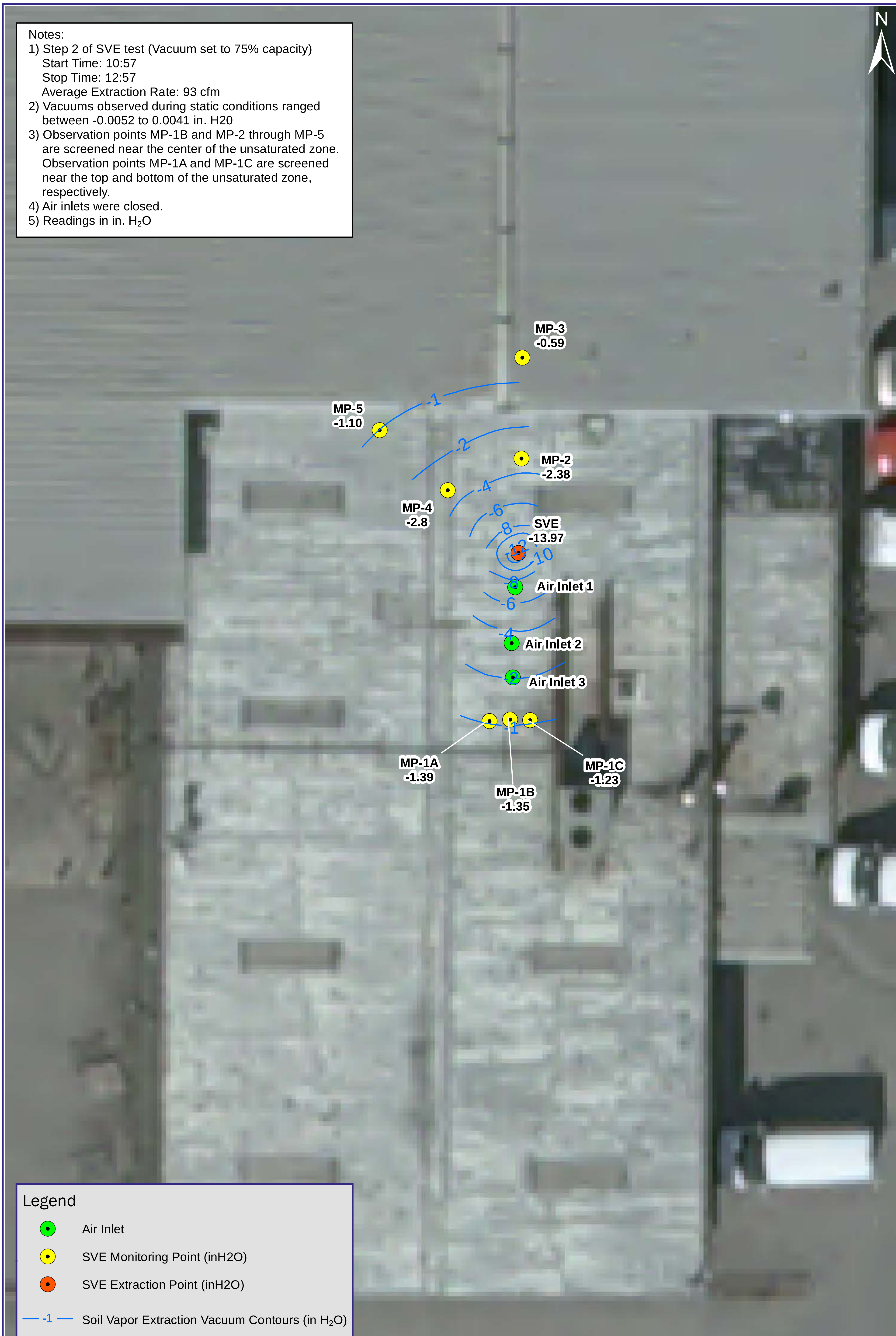
FIGURE 3-6A
VACUUM DISTRIBUTION AT THE END OF STEP 1 OF THE SVE TEST
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

0 5 10
Feet

8/12/2014



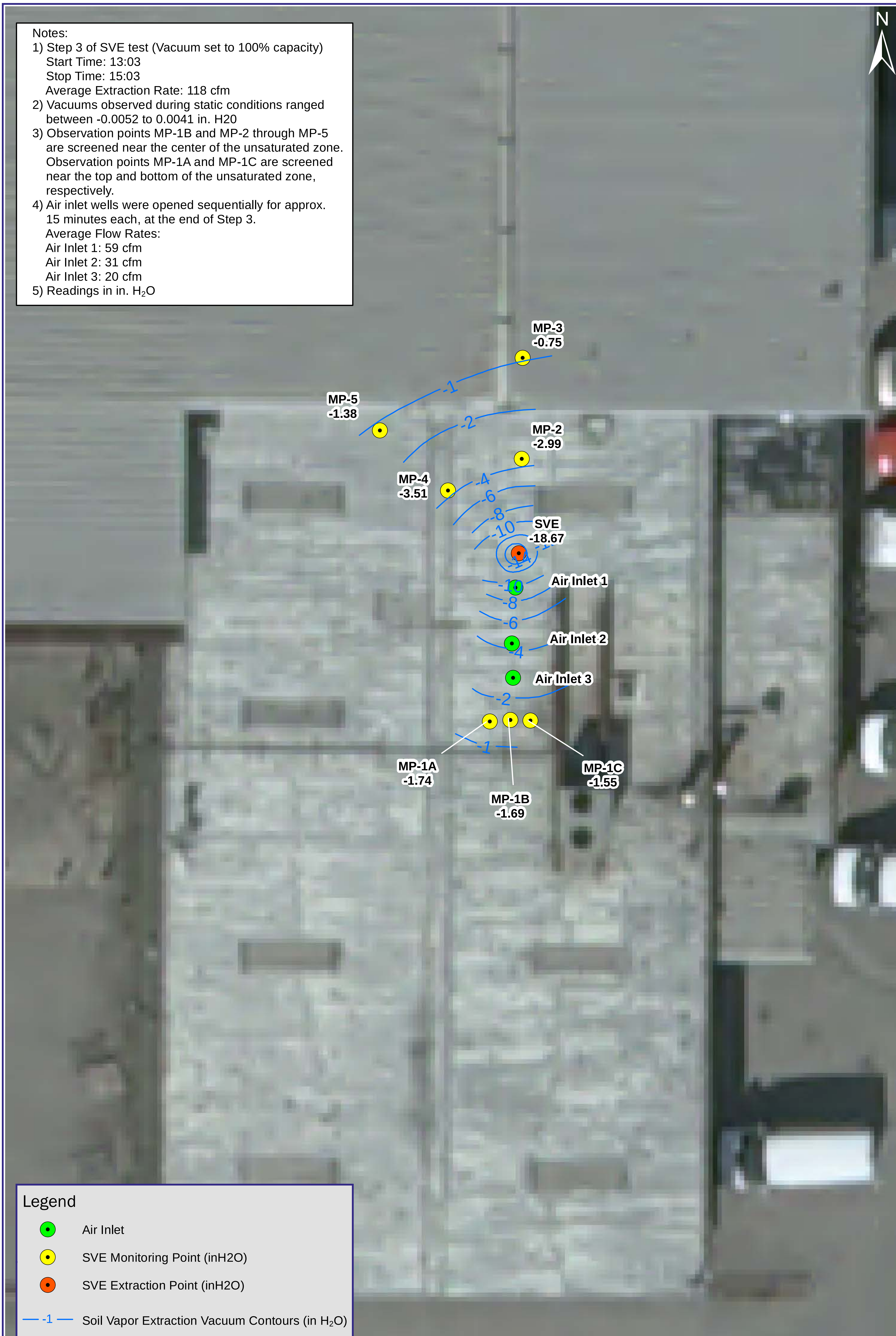
Author: CMeyn Path: P:\GIS\GE\Bayshore\Test_2_SVE_Pressure_05-2014.mxd

Brown AND Caldwell

FIGURE 3-6B
VACUUM DISTIBUTION AT THE END OF STEP 2 OF THE SVE TEST
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

0 5 10
Feet

8/12/2014

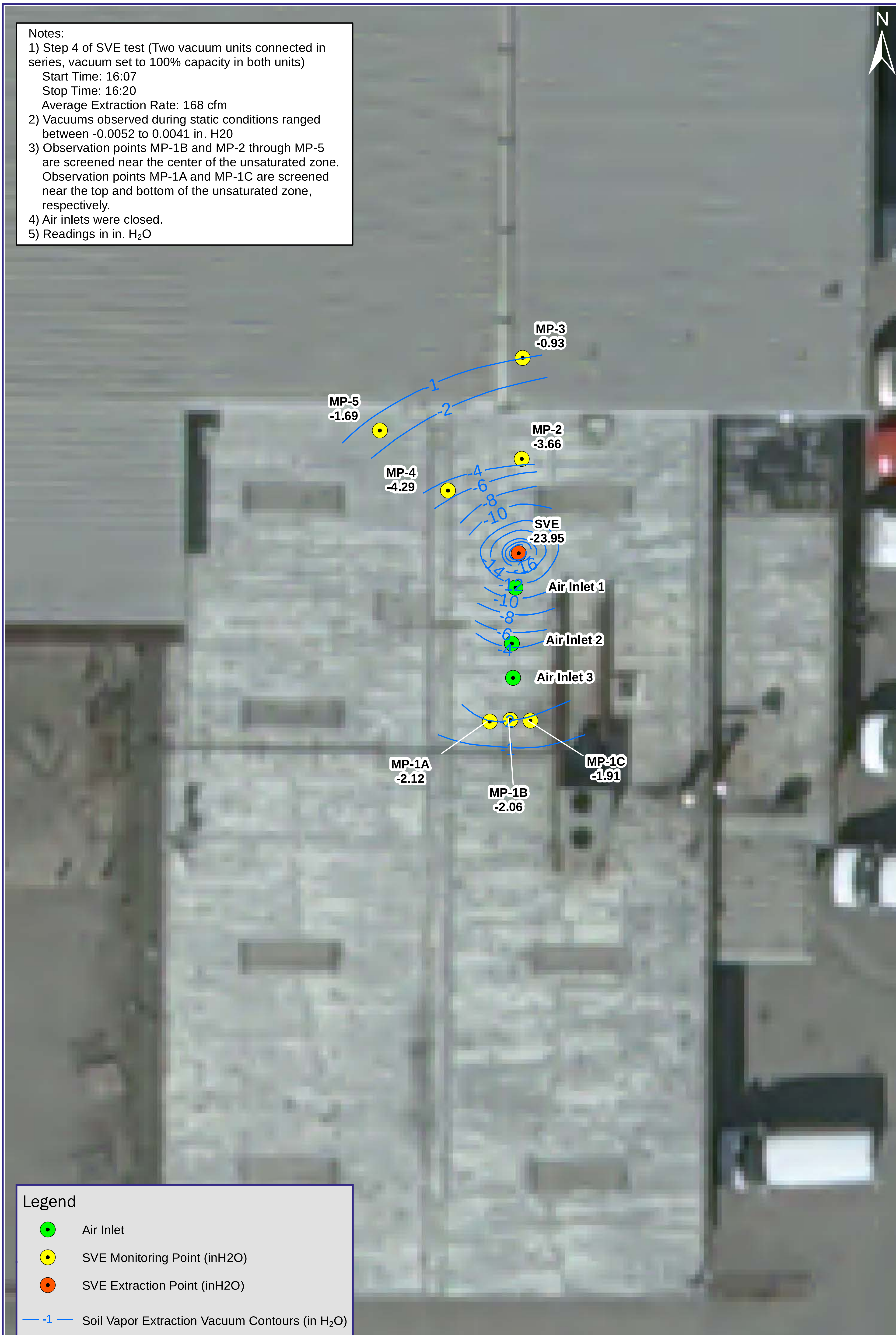


Brown AND Caldwell

FIGURE 3-6C
VACUUM DISTRIBUTION AT THE END OF STEP 3 OF THE SVE TEST
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

0 5 10
Feet

Author: CMeyn Path: P:\GIS\GE\Bayshore\Test_3_SVE_Pressure_05-2014.mxd



Notes:
1) Step 4 of SVE test (Two vacuum units connected in series, vacuum set to 100% capacity in both units)
Start Time: 16:07
Stop Time: 16:20
Average Extraction Rate: 168 cfm
2) Vacuums observed during static conditions ranged between -0.0052 to 0.0041 in. H20
3) Observation points MP-1B and MP-2 through MP-5 are screened near the center of the unsaturated zone. Observation points MP-1A and MP-1C are screened near the top and bottom of the unsaturated zone, respectively.
4) Air inlets were closed.
5) Readings in in. H_2O

Legend
- Air Inlet
- SVE Monitoring Point (inH2O)
- SVE Extraction Point (inH2O)
- -1 Soil Vapor Extraction Vacuum Contours (in H_2O)

8/12/2014

Author: CMeyn Path: P:\GIS\GE\Bayshore\Test_4_SVE_Pressure_05-2014.mxd

Brown AND Caldwell

FIGURE 3-6D
VACUUM DISTRIBUTION AT THE END OF STEP 4 OF THE SVE TEST
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

0 5 10
Feet

8/25/2014

Author: cmeyn Path: P:\GIS\GE\Bayshore\PDI_Workplan\Soil_Impacts.mxd

Brown AND Caldwell

FIGURE 4-1
SOIL IMPACTS
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

9/5/2014

Author: CMeyn Path: P:\GIS\GE\Bayshore\PDI_Workplan\Alternative_1_Modified.mxd

Brown AND Caldwell

FIGURE 5-1
ALTERNATIVE 1 - RESTORATION TO INDUSTRIAL USE
SOIL VAPOR EXTRACTION
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

8/20/2014

Author: cmeyn Path: P:\GIS\GE\Bayshore\PDI_Workplan\Alternative_2.mxd

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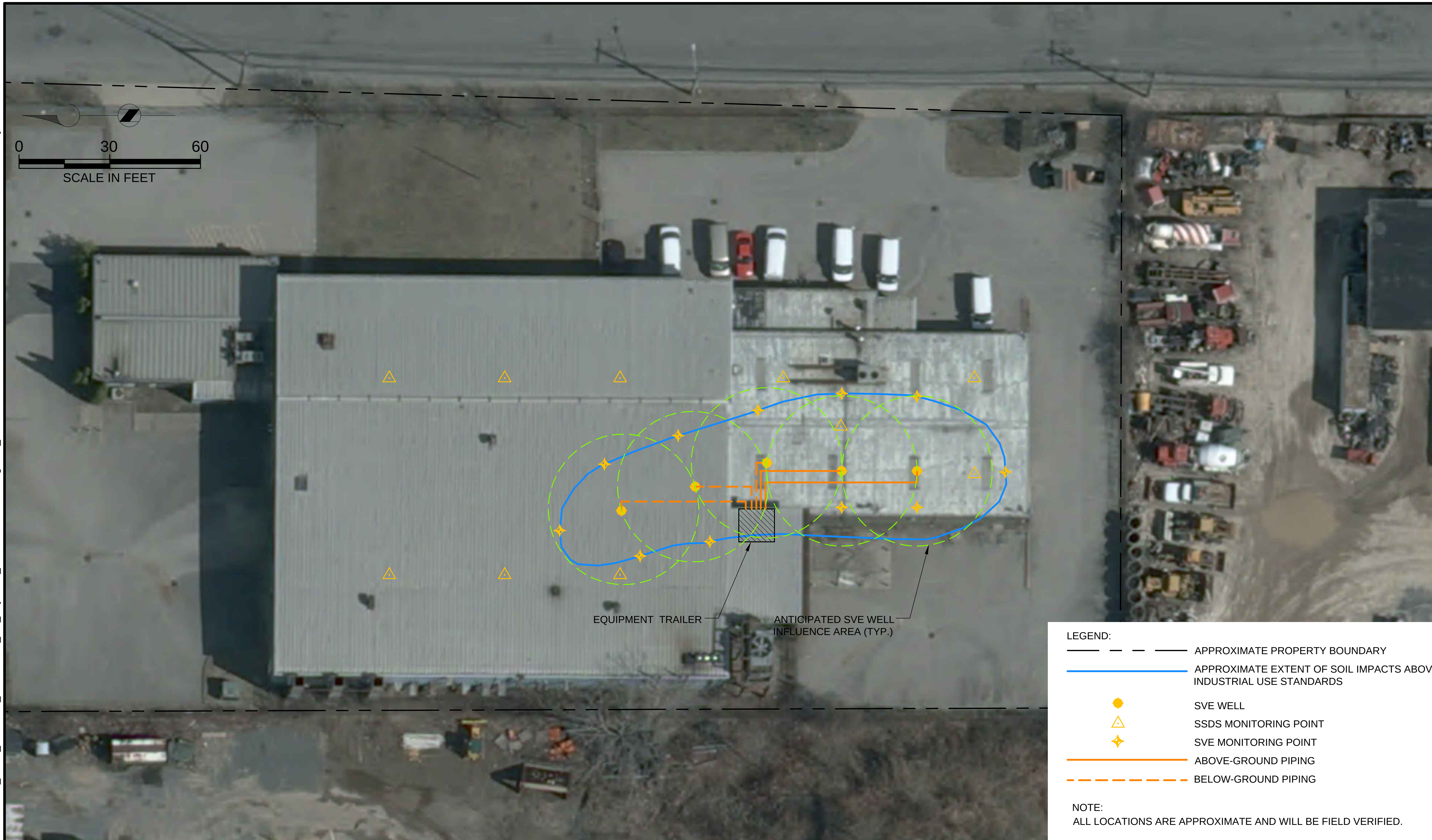
FIGURE 5-2
ALTERNATIVE 2 - RESTORATION TO UNRESTRICTED USE
EXCAVATION
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

0 40 80
Feet



Brown AND Caldwell

SCALE: 1" = 30'

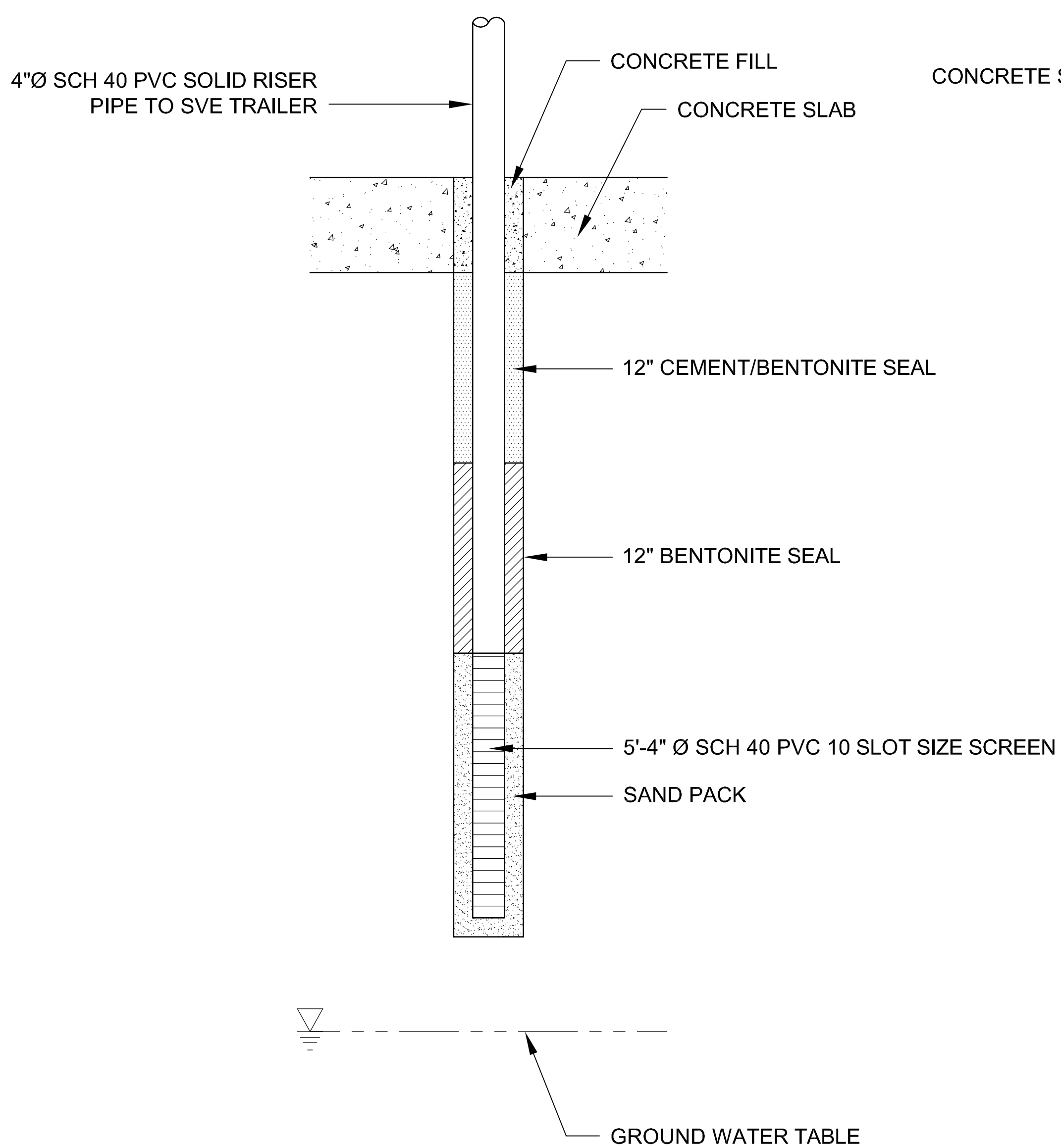
145361.100

DATE: January 7, 2015

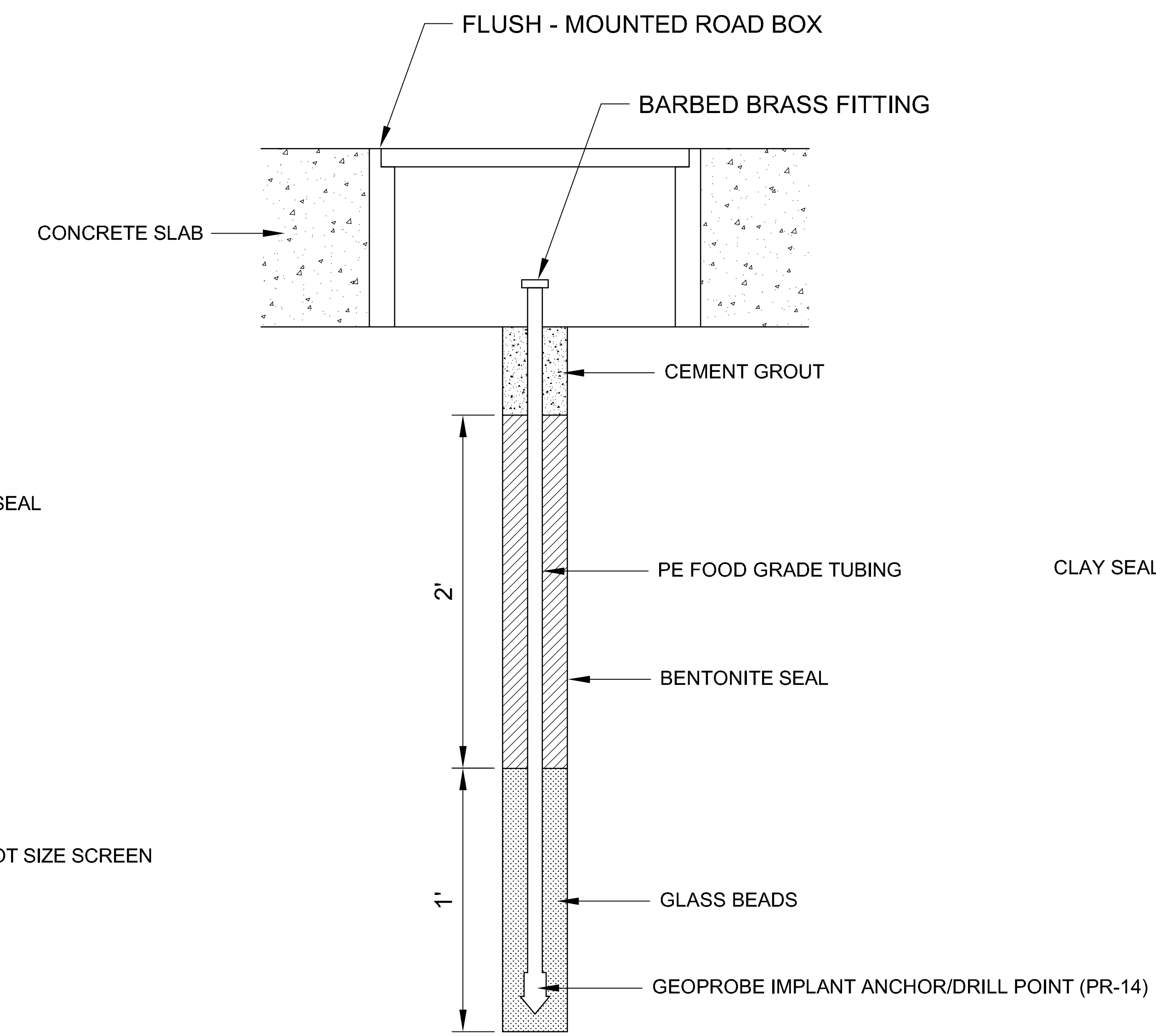
SYSTEM LAYOUT
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

FIGURE

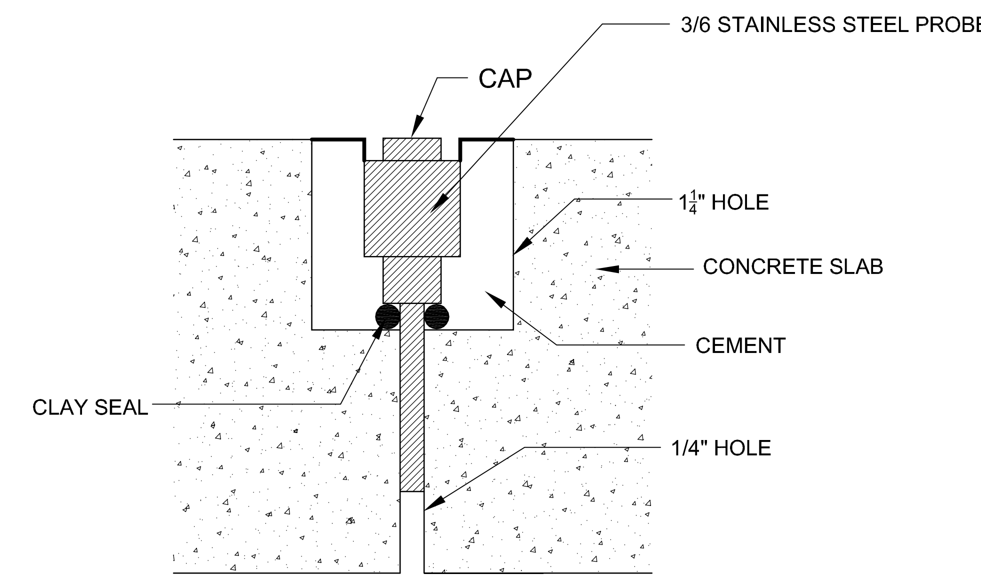
6-1



SVE WELL
SCALE: N.T.S.



SVE MONITORING POINT
SCALE: N.T.S.



SUB-SLAB SOILS
SCALE: N.T.S.

Brown AND Caldwell

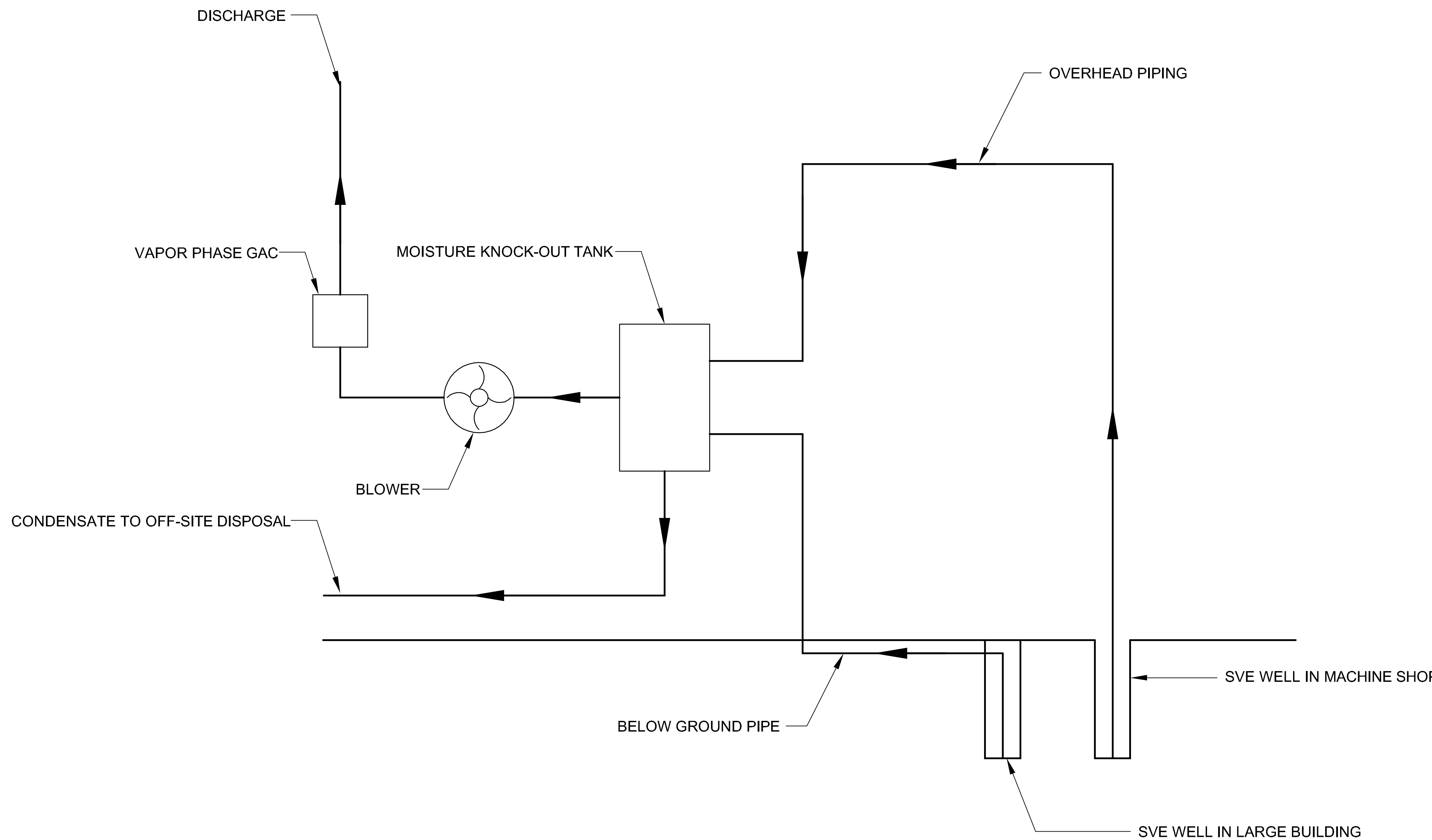
SCALE: N.T.S.

DATE: September 5, 2014

WELL CONSTRUCTION DETAILS
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

FIGURE
6-2

Path: P:\General_Electric\Former_Baron_Blakeslee_Site\146524_GE_Bayshore_Remediation\RWP\Figures_CAD\2-SHEETS\C-CIVIL File Name: FIG-6-3 Plot Date: September 5, 2014 10:29 AM Cadd Us



Brown AND Caldwell

SCALE: N.T.S.

DATE: September 5, 2014

SVE SYSTEM SCHEMATIC
FORMER BARON BLAKESLEE SITE
BAY SHORE, NEW YORK

FIGURE
6-3

Appendix A: Boring Logs and Well Construction Diagrams

BORING LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Boring No. SB-13 Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	2"	NA	NA"	10.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
5/2/14 - 5/2/14	Zebra	Hammer Type: NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 57.5 ft.	Easting: 1181217.3 ft. Northing: 218414.7 ft. TOC Elev: --
Evan Moraitio	Direct Push	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	ppm Readings (ppm)	Remarks
			Asphalt and base layer			3.4	Boring backfilled with sand.
	55	SP	Dark brown mf SAND, little (-) f Gravel, trace Silt. Dry.				PID Readings (ppm): 0.0'-2.2, 0.5'-2.4, 1.0'--2.7, 1.5'-2.8, 2.0'-3.1, 2.5'-3.4, 3.0'-1.7, 3.5'-1.6, 4.0'-1.8, 4.5'-1.4
		SP	Brown mf SAND, little (-) f Gravel. Dry.				2.0-2.5' BGS: Sample SB-13-2.0-2.5 collected
5		SW	Light Brown cmf SAND, trace f Gravel. Dry			3.1	2.7-6.3' BGS: Slight indistinct odor
	50	SW	Same as above.				PID Readings (ppm): 5.0'-1.6, 5.5'-2.5, 6.0'-2.7, 6.5'-3.1, 7.0'-2.6, 7.5'-1.4, 8.0'-1.3, 8.5'-1.2, 9.0'-1.1, 9.5'-1.3,
10		SW	Light brown/grey cmf SAND, little (-) f Gravel, trace (-) Silt. Moist to Saturated @ 8.2' BGS)				

BORING LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Boring No. SB-14 Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	2"	NA	NA"	10.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
5/2/14 - 5/2/14	Zebra	Hammer Type: NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 58.0 ft.	Easting: 1181257.8 ft. Northing: 218371.7 ft. TOC Elev: --
Evan Moraitio	Direct Push	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
			Asphalt and base layer				5.1	Boring backfilled with sand.
		SP	Brown mf SAND, some (+) mf Gravel, trace (-) Silt. Dry.					PID Readings (ppm): 0.0'-1.7, 0.5'-1.8, 1.0'-2.2, 1.5'-2.4, 2.0'-1.7, 2.5'-1.6. 3.0'-3.7, 3.5'-4.2, 4.0'-5.1
	55							
		SW	Light brown cmf SAND, little f Gravel. Dry.					
5		SP	Brown mf SAND, some (-) f Gravel, trace (-) Silt. Dry.				5.8	5.0-5.5' BGS: Sample SB-14-5-5.5 collected. PID Readings (ppm): 5.0'-5.7, 5.5'-5.8, 6.0'-4.1, 6.5'-3.2, 7.0'-1.7, 7.5'-1.8, 8.0'-2.1, 8.5'-2.2
		SP	Light brown mf SAND, little (-) f Gravel. Dry to Moist @ 7.5' BGS.					
	50	SW	Brown cmf SAND, little (-) f Gravel. Moist to Saturated @ 8.2' BGS.					
10								

BORING LOG

Brown AND Caldwell	**Project Name:** Former Baron Blakeslee Site **Project Number:** 145539 **Project Location:** Bay Shore, NY	**Permit Number:** NA	**Boring No.** **SB-15** **Page** 1 **of** 1

Geologist/Office	**Checked By:**	**Borehole Diameter:**	**Screen Diameter and Type:**	**Slot Size:**	**Total Boring Depth (ft)**
BFT/Albany, NY	FJW	2"	NA	NA"	10.0 ft.

Start/Finish Date	**Drilling Contractor:**	**Sampling:** Continuous Core	**Development Method:**
5/2/14 - 5/2/14	Zebra	**Hammer Type:** NA	NA

Driller:	**Drilling Method:**	**Drilling Equipment:**	**Horiz Datum/Proj:** NAD83 **Vert Datum:** NGVD29 **Ground Surface Elev:** 60.5 ft.	**Easting:** 1181235.4 ft. **Northing:** 218546.2 ft. **TOC Elev:** --
Evan Moraitio	Direct Push	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	ppm Readings (ppm)	Remarks
	60		Concrete			62.7	Boring backfilled with sand.
		SP	Brown mf SAND, little f Gravel, trace Silt. Dry.				PID Readings (ppm): 0.5'-13.5, 1.0'-31.4, 1.5'-50.3, 2.0'-56.8, 2.5'-57.2, 3.0'-54.1, 3.5'-61.1, 4.0'-60.4, 4.5'-62.7
		SP	Dark brown mf SAND, some (-) f Gravel. Dry.				
		SP	Grey f SAND, little Silt, trace f Gravel. Dry.				
5	55	SP	Brown mf SAND, little (-) f Gravel. Dry.			96.8	
		SP	Same as above.				
		SP	Light brown mf SAND, little (-) f Gravel. Dry.				PID Readings (ppm): 5.0'-70.2, 5.5'-68.4, 6.0'-70.9, 6.5'-81.4, 7.0'-94.7, 7.5'-96.8, 8.0'-71.2, 8.5'-22.3, 9.0'-10.2, 9.5'-9.7 7.0-7.5' BGS: Sample SB-15-7.0-7.5 collected
		SW	Brown cmf SAND, little (+) f Gravel. Moist.				
10		SW	Brown cmf SAND, some (-) mf Gravel. Saturated.				

Graphic Log: Sample Int | Recovery | Lithology | Backfill

BORING LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Boring No. **SB-16** Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	2"	NA	NA"	10.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
5/2/14 - 5/2/14	Zebra	Hammer Type: NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 60.5 ft.	Easting: 1181265.8 ft. Northing: 218523.8 ft. TOC Elev: --
Evan Moraitio	Direct Push	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	ppm Readings (ppm)	Remarks
	60		Concrete			122	Boring backfilled with sand.
		SP	Brown mf SAND, little (+) f Gravel, trace (-) Silt. Dry.				PID Readings (ppm): 0.5'-1.2, 1.0'-4.6, 1.5'-30.2, 2.0'-46.8, 2.5'-24.0, 3.0'-30.7, 3.5'-83.8, 4.0'-122.0, 4.5'-101.3
		SP	Grey mf SAND, little (-) f Gravel, little (+) Silt. Dry.				
5	55	SW	Brown cmf SAND, little f Gravel. Dry.			152.3	
		SW	Same as above.				5.5-6.0' BGS: Sample SB-16-5.5-6.0 collected
		SP	Grey/White f SAND, trace (-) f Gravel, trace Silt. Dry.				PID Readings (ppm): 5.0'-113.2, 5.5'-144.5, 6.0'-152.3, 6.5'-52.1, 7.0'-50.2, 7.5'-38.3, 8.0'-21.2, 8.5'-13.4, 9.0'-10.7, 9.5'-9.8, 10.0'-10.8,
		SP	Brown mf SAND, little (-) f Gravel. Dry to Moist @ 9.2' BGS.				
10		SW	Brown cmf SAND, little mf Gravel. Saturated.				

Graphic Log: Sample Int, Recovery, Lithology, Backfill

MONITORING WELL LOG

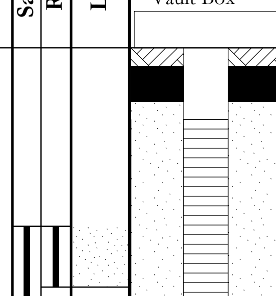
Brown AND Caldwell	**Project Name:** Former Baron Blakeslee Site **Project Number:** 145539 **Project Location:** Bay Shore, NY	**Permit Number:** NA	**Well No.** Air Inlet 1 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	6"	4" PVC	0.015"	7.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
5/1/14 - 5/1/14	Zebra	**Hammer Type:** NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83	Easting: 1181276.5 ft.
Evan Moraitio	HSA	Geoprobe 7720DT	**Vert Datum:** NGVD29 **Ground Surface Elev:** 58.7 ft.	**Northing:** 218457.7 ft. **TOC Elev:** 58.3 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well	ppm Readings (ppm)	Remarks
	55								Traffic Rated Vault Box		0-0.5' BGS: Cement/Bentonite Grout 0.5-1.5' BGS: Bentonite Plug 1.5-7.0' BGS: #00 Sand Filter Pack 2.0-7.0' BGS: 0.015" Slot PVC Screen
5		SP	Brown mf SAND, little (+) f Gravel. Dry.							N/A	



MONITORING WELL LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Well No. Air Inlet 2 Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	6"	4" PVC	0.015"	7.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
5/1/14 - 5/1/14	Zebra	Hammer Type: NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 58.7 ft.	Easting: 1181276.1 ft. Northing: 218451.4 ft. TOC Elev: 58.3 ft.
Evan Moraitio	HSA	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
	55										0-0.5' BGS: Cement/Bentonite Grout 0.5-1.5' BGS: Bentonite Plug 1.5-7.0' BGS: #00 Sand Filter Pack 2.0-7.0' BGS: 0.015" Slot PVC Screen
5		SW	Brown cmf SAND, trace f Gravel. Dry.							N/A	

MONITORING WELL LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Well No. Air Inlet 3 Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	6"	4" PVC	0.015"	7.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
5/1/14 - 5/1/14	Zebra	Hammer Type: NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 58.7 ft.	Easting: 1181276.2 ft. Northing: 218447.6 ft. TOC Elev: 58.3 ft.
Evan Moraitio	HSA	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
	55										0-0.5' BGS: Cement/Bentonite Grout 0.5-1.5' BGS: Bentonite Plug 1.5-7.0' BGS: #00 Sand Filter Pack 2.0-7.0' BGS: 0.015" Slot PVC Screen
5		SP	Brown mf SAND, little (-) f Gravel, trace (-) Silt. Dry.							N/A	

MONITORING WELL LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Well No. **MP-1A** Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	4"	1" PVC	0.015"	8.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core Hammer Type: NA	Development Method:
4/30/14 - 4/30/14	Zebra		NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 58.7 ft.	Easting: 1181273.6 ft. Northing: 218442.7 ft. TOC Elev: 58.3 ft.
Evan Moraitio	HSA	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log (Sample Int / Recovery / Lithology / Well: Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
			Concrete				N/A	0.0-0.5' BGS: Cement/Bentonite Grout 0.5-5.0' BGS: Bentonite Plug
		SP	Brown mf SAND, some (-) mf Gravel, little (-) Silt. Dry.					
	55	SP	Light brown/white mf SAND, little (-) mf Gravel, trace (-) Silt. Dry.					
5		SP	Same as above.				N/A	5.0-8.0' BGS: #00 Sand Filter Pack 6.0-8.0' BGS: 0.015" Slot PVC Screen
		SW	Light brown cmf SAND, little (-) mf Gravel. Dry to Moist @ 8' BGS.					
		SW	Light brown/gray cmf SAND, little f Gravel. Saturated.					

MONITORING WELL LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Well No. MP-1B Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	4"	1" PVC	0.015"	6.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core Hammer Type: NA	Development Method:
4/30/14 - 4/30/14	Zebra		NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 58.7 ft.	Easting: 1181276.0 ft. Northing: 218442.9 ft. TOC Elev: 58.4 ft.
Evan Moraitio	HSA	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
			Refer to MP-1A Log for Lithology.								0.0-0.5' BGS: Cement/Benonite Grout. 0.5-3.0' BGS: Bentonite Plug
	55										3.0-6.0' BGS: #00 Sand Filter Pack
5											4.0-6.0' BGS: 0.015" Slot PVC Screen

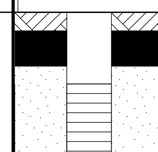
MONITORING WELL LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Well No. **MP-1C** Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	4"	1" PVC	0.015"	4.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core Hammer Type: NA	Development Method:
4/30/14 - 4/30/14	Zebra		NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 58.8 ft.	Easting: 1181278.2 ft. Northing: 218442.8 ft. TOC Elev: 58.6 ft.
Evan Moraitio	HSA	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
	55		Refer to MP-1A Log for Lithology.								0.0-0.5' BGS: Cement/Benonite Grout 0.5-1.5' BGS: Bentonite Plug 1.5-4.0' BGS: #00 Sand Filter Pack 2.0-4.0' BGS: 0.015" Slot PVC Screen

MONITORING WELL LOG

Brown AND Caldwell	**Project Name:** Former Baron Blakeslee Site **Project Number:** 145539 **Project Location:** Bay Shore, NY	**Permit Number:** NA	**Well No.** MP-2 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	4"	1" PVC	0.015"	6.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core Hammer Type: NA	Development Method:
4/30/14 - 4/30/14	Zebra		NA

Driller:	Drilling Method:	Drilling Equipment:	
Evan Moraitio	HSA	Geoprobe 7720DT	**Horiz Datum/Proj:** NAD83 **Vert Datum:** NGVD29 **Ground Surface Elev:** 58.7 ft. **Easting:** 1181277.2 ft. **Northing:** 218472.1 ft. **TOC Elev:** 58.6 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
			Concrete							N/A	0.0-0.5' BGS: Cement/Benonite Grout.
		SP	Brown mf SAND, some (-) mf Gravel, trace Silt. Dry.								0.5-3.0' BGS: Bentonite Plug
	55	SP	Light brown/white mf SAND, little f Gravel. Dry.								3.0-6.0' BGS: #00 Sand Filter Pack 4.0-6.0' BGS: 0.015" Slot PVC Screen
5		SP	Same as above.							N/A	
		SP	Light brown mf SAND, little (-) f Gravel, trace (-) Silt. Dry to Moist @ 8.1' BGS.								
		SW	Grey cmf SAND, trace f Gravel. Saturated.								

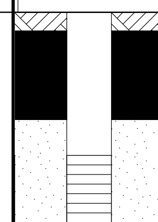
MONITORING WELL LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Well No. MP-3 Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	4"	1" PVC	0.015"	6.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
5/2/14 - 5/2/14	Zebra	Hammer Type: NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83	Easting: 1181277.3 ft.
Evan Moraitio	Direct Push	Geoprobe 7720DT	Vert Datum: NGVD29	Northing: 218483.3 ft.
			Ground Surface Elev: 58.7 ft.	TOC Elev: 58.5 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
	55		Refer to MP-2 Log for Lithology.								0.0-0.5' BGS: Cement/Benonite Grout. 0.5-3.0' BGS: Bentonite Plug 3.0-6.0' BGS: #00 Sand Filter Pack 4.0-6.0' BGS: 0.015" Slot PVC Screen
5											

MONITORING WELL LOG

Brown AND Caldwell	**Project Name:** Former Baron Blakeslee Site **Project Number:** 145539 **Project Location:** Bay Shore, NY	**Permit Number:** NA	**Well No.** MP-4 **Page** 1 **of** 1

Geologist/Office	**Checked By:**	**Borehole Diameter:**	**Screen Diameter and Type:**	**Slot Size:**	**Total Boring Depth (ft)**
BFT/Albany, NY	FJW	4"	1" PVC	0.015"	6.0 ft.

Start/Finish Date	**Drilling Contractor:**	**Sampling:** Continuous Core	**Development Method:**
4/30/14 - 4/30/14	Zebra	**Hammer Type:** NA	NA

Driller:	**Drilling Method:**	**Drilling Equipment:**	**Horiz Datum/Proj:** NAD83	**Easting:** 1181269.0 ft.
Evan Moraitio	HSA	Geoprobe 7720DT	**Vert Datum:** NGVD29	**Northing:** 218468.5 ft.
			Ground Surface Elev: 58.8 ft.	**TOC Elev:** 58.6 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
			Concrete							N/A	0.0-0.5' BGS: Cement/Benonite Grout. 0.5-3.0' BGS: Bentonite Plug
		SP	Brown mf SAND, some (-) mf Gravel, trace Silt. Dry.								
	55	SP	Light brown/white mf SAND, little (+) mf Gravel.								3.0-6.0' BGS: #00 Sand Filter Pack 4.0-6.0' BGS: 0.015" Slot PVC Screen
5		SP	Same as above.							N/A	
		SP	Light Brown mf SAND, little f Gravel. Dry to Moist @ 8' BGS.								
		SW	Grey cmf SAND, trace f Gravel. Saturated.								

MONITORING WELL LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Well No. MP-5 Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	4"	1" PVC	0.015"	6.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
4/30/14 - 4/30/14	Zebra	Hammer Type: NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 58.7 ft.	Easting: 1181261.4 ft. Northing: 218475.2 ft. TOC Elev: 58.4 ft.
Evan Moraitio	HSA	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
			Concrete							N/A	0.0-0.5' BGS: Cement/Benonite Grout.
		SP	Brown mf SAND, some (-) mf Gravel, trace Silt. Dry.								0.5-3.0' BGS: Bentonite Plug
	55	SP	Light brown/white mf SAND, little f Gravel. Dry.								3.0-6.0' BGS: #00 Sand Filter Pack
5		SP	Same as above.							N/A	4.0-6.0' BGS: 0.015" Slot PVC Screen
		SP	Light brown mf SAND, little (-) f Gravel. Dry to Moist @ 8.1' BGS.								
		SW	Grey cmf SAND, little (+) mf Gravel. Saturated.								

MONITORING WELL LOG

Brown AND Caldwell	Project Name: Former Baron Blakeslee Site Project Number: 145539 Project Location: Bay Shore, NY	Permit Number: NA	Well No. SVE Page 1 of 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
BFT/Albany, NY	FJW	6"	4" PVC	0.015"	7.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Continuous Core	Development Method:
5/1/14 - 5/1/14	Zebra	Hammer Type: NA	NA

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NAD83 Vert Datum: NGVD29 Ground Surface Elev: 58.7 ft.	Easting: 1181276.9 ft. Northing: 218461.5 ft. TOC Elev: 58.4 ft.
Evan Moraitio	HSA	Geoprobe 7720DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Sample Int	Recovery	Lithology	Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
	55										0-0.5' BGS: Cement/Bentonite Grout 0.5-1.5' BGS: Bentonite Plug 1.5-7.0' BGS: #00 Sand Filter Pack 2.0-7.0' BGS: 0.015" Slot PVC Screen
5		SW	Brown mf-cmf SAND, little (-) f Gravel. Dry.							N/A	

Appendix B: Analytical Data Packages (CD-ROM)

Appendix C: Data Usability Summary Reports

BROWN AND CALDWELL
Environmental Engineers & Consultants

QUALITATIVE
DATA USABILITY REPORT
GE Bayshore Site
May 2014 Soil Samples

SDG No.: 480-59152-1

Laboratory: TestAmerica Buffalo, Amherst, New York

Site: GE Bayshore Site, Bay Shore, New York

Date: August 4, 2014

Samples

Data from the following samples were reviewed:

Laboratory ID	Client ID	Matrix
480-59152-1	SB-16-5.5-6.0	Soil
480-59152-2	SB-15-7.0-7.5	Soil
480-59152-3	DUP-050214 (SB-15-7.0-7.5)	Soil
480-59152-4	SB-14-5.0-5.5	Soil
480-59152-5	SB-13-2.0-2.5	Soil
480-59152-6	FB-050214	Water
480-59152-7	Trip Blank	Water

A Qualitative Data Usability Review was performed on all analytical data from SDG 480-59152-1. The samples were collected at the GE Bayshore Site, in Bayshore, New York. The following table outlines the analytical methods used to analyze the samples;

Analysis	Method
Volatile Organic Compounds (VOC)	SW846 8260C
Percent Moisture	EPA Moisture

This review was performed in accordance with NYSDEC Guidance for the Development of Data Usability Summary Reports (revised September 1997).

Data Package Completeness

- The data packages were received complete as defined under the requirements for the NYSDEC ASP Category B and USEPA CLP deliverables.

Chains of Custody

The Chains-of Custody (COCs) were reviewed for completeness and accuracy. There were no discrepancies noted and all requested analyses were performed.

Organics

The following were reviewed for the organic analyses in this report:

- Case narrative
- Analysis data sheets (Form 1's)
- Holding time
- Surrogate recoveries
- Lab Control Sample/Lab Control Sample duplicate (LCS/LCSD) recoveries and RPDs
- Blank contamination

- Gas Chromatography/Mass Spectroscopy (GC/MS) tuning
- Initial and continuing calibration summaries
- Internal Standard area and retention time summary forms
- Field duplicate precision

The items listed above were technically and contractually in compliance with the method and Work Plan requirements, with the exceptions discussed in the following text.

Volatiles by Method SW8260C

The compound tetrachloroethene was detected in the method blanks associated with the samples. The compound methylene chloride was detected in the trip blank associated with the samples. Associated sample results for these compounds less than 5 times the blank concentration have been qualified as not detected (U) at the reported sample concentration.

Location	Compound	Result (ug/Kg)	Qualifier
SB-15-7.0-7.5	Tetrachloroethene	<1.3	U
DUP-050214	Tetrachloroethene	<1.6	U
SB-14-5.0-5.5	Tetrachloroethene	<2.4	U

Validation Qualifiers

The following validation qualifiers may have been applied to the data, as appropriate.

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ = The analyte was not detected above the sample reporting limit; and the reporting limit is approximate.
- U = The analyte was tested, but was not detected above the sample reporting limit.

- R = The sample result is rejected due to serious deficiencies. The presence or absence of the analyte cannot be verified.

Summary Evaluation of Data and Potential Usability Issues

Overall, the data is acceptable for the intended purposes. No Data were rejected as a result of this review; most data meet the criteria for the parameters reviewed. Minor data quality issues were identified, only some required qualification of the data. The primary QC issue was blank contamination. Detected results above the method detection limit (MDL) and below the practical quantitation limit (PQL) are qualified as estimated (J-flagged)

Signed: ______________________________ Dated: ______________

Gregory Cole

Senior Chemist

QUALITATIVE
DATA USABILITY REPORT
GE Bayshore Site
May 2014 Air Samples

SDG No.: 480-59418-1

Laboratory: TestAmerica Buffalo, Amherst, New York

Site: GE Bayshore Site, Bay Shore, New York

Date: August 4, 2014

Samples

Data from the following samples were reviewed:

Laboratory ID	Client ID	Matrix
480-59418-1	BS-SVE-01	Air

A Qualitative Data Usability Review was performed on all analytical data from SDG 480-59418-1. The sample was collected at the GE Bayshore Site, in Bayshore, New York. The following table outlines the analytical method used to analyze the sample;

Analysis	**Method**
Volatile Organic Compounds (VOC)	EPA Method TO-15

This review was performed in accordance with NYSDEC Guidance for the Development of Data Usability Summary Reports (revised September 1997).

Data Package Completeness

- The data packages were received complete as defined under the requirements for the NYSDEC ASP Category B and USEPA CLP deliverables.

Chains of Custody

The Chains-of Custody (COCs) were reviewed for completeness and accuracy. There were no discrepancies noted and all requested analyses were performed.

Organics

The following were reviewed for the organic analyses in this report:

- Case narrative
- Analysis data sheets (Form 1's)
- Holding time
- Surrogate recoveries
- Lab Control Sample/Lab Control Sample duplicate (LCS/LCSD) recoveries and RPDs
- Blank contamination
- Gas Chromatography/Mass Spectroscopy (GC/MS) tuning
- Initial and continuing calibration summaries
- Internal Standard area and retention time summary forms
- Field duplicate precision

The items listed above were technically and contractually in compliance with the method and Work Plan requirements, with the exceptions discussed in the following text.

Volatiles by Method TO-15

No data quality issues were noted.

Validation Qualifiers

The following validation qualifiers may have been applied to the data, as appropriate.

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ = The analyte was not detected above the sample reporting limit; and the reporting limit is approximate.
- U = The analyte was tested, but was not detected above the sample reporting limit.
- R = The sample result is rejected due to serious deficiencies. The presence or absence of the analyte cannot be verified.

Summary Evaluation of Data and Potential Usability Issues

Overall, the data is acceptable for the intended purposes. No Data were rejected as a result of this review. Results detected above the method detection limit (MDL) and below the practical quantitation limit (PQL) are qualified as estimated (J-flagged).

Signed: ______________________________ Dated: ______________

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Appendix D: Remedial Alternatives Cost Estimates

SUMMARY OF REMEDIAL ALTERNATIVE COST ESTIMATES
ALTERNATIVES ANALYSIS
Former Baron Blakeslee Site
Bayshore, Suffolk County, New York

	Remedial Alternative	Capital Cost	Annual O&M Cost	NPW of O&M[3]	Total NPV
1	Soil Vapor Extraction	$570,000	$90,500	$219,000	$790,000
2	Soil Excavation and Disposal	$4,120,000	$0	$0	$4,120,000

General Cost Estimate Notes

1) Cost estimates are based on Brown and Caldwell experience, vendor/contractor cost information, and Means Cost Estimating Guides. Costs are in 2014 dollars.

2) Cost estimates are considered Class 4 Cost Estimates with an expected accuracy of -30% to +50%, which is consistent with USEPA's RI/FS Guidance (USEPA, 1988).

3) Present worth based on a 3% discount factor.

ALTERNATIVE 1 - COST ESTIMATE
Restoration to Restricted Use (Soil Vapor Extraction)
Former Baron Blakeslee Site
Bay Shore, New York

CAPITAL COSTS					
ITEM [a]	UNIT [c]	QUANTITY [a]	UNIT COST [d]	INSTALLED COST [e]	NOTES [b]
Mobilization and Demobilization	LS	1	$ 15,000	$ 15,000	1
Surveying	LS	1	$ 5,000	$ 5,000	1
Erosion and Sediment Control	LS	1	$ 500	$ 500	1
Utility Preclearance					
Underground Utility Survey and Mapping	LS	1	$ 3,500	$ 3,500	1
SVE Installation					
Well Installations	EACH	5	$ 3,000	$ 15,000	2
SVE monitoring points	EACH	11	$ 500	$ 5,500	1
SVE monitoring points	EACH	11	$ 500	$ 5,500	1
Conveyance piping					
* Below-ground (saw-cut, excavate, piping, backfill)	LF	100	$ 50	$ 5,000	1
* Over-head (piping, supports)	LF	250	$ 50	$ 12,500	1
SVE Equipment with trailer	EACH	1	$ 100,000	$ 100,000	3
Discharge stack	EACH	1	$ 10,000	$ 15,000	4
Mechanical/instrumentation work at SVE System	LS	1	$ 20,000	$ 20,000	1
Power	LS	1	$ 15,000	$ 15,000	5
Site Restoration					
Concrete Restoration	SY	11	$ 500	$ 5,600	6
Soils disposal	DRUM	10	$ 150	$ 1,500	1
Concrete Debris Disposal	LS	1	$ 5,000	$ 5,000	1
SVE Startup and Testing					
Operations	LS	1	$ 10,000	$ 10,000	1
Sampling	LS	1	$ 3,000	$ 3,000	7
			SUBTOTAL	$ 242,600	
Permitting	LS	1	$ 20,000	$ 20,000	1
Engineering Design & Construction Support	LS	1	$ 100,000	$ 100,000	1
Post SVE Sampling	LS	1	$ 30,000	$ 50,000	8
Project Management	LS	1	$ 40,000	$ 40,000	1
			SUBTOTAL	$ 210,000	
Contingency		25%		$ 113,000	
			TOTAL CAPITAL COSTS	**$ 570,000**	
OPERATIONS AND MAINTENANCE COSTS					
SVE Systems Operations	ANNUAL	1	$ 50,000	$ 50,000	1
Expenses	ANNUAL	1	$ 3,000	$ 3,000	1
Equipment and Materials	ANNUAL	1	$ 8,000	$ 8,000	1
Reporting	ANNUAL	1	$ 5,000	$ 5,000	1
Power	ANNUAL	1	$ 12,000	$ 12,000	1
Vapor Phase Carbon Change-outs and Characterization	ANNUAL	1	$ 10,000	$ 10,000	1
			Annual Subtotal	$ 88,000	
			O&M NET PRESENT VALUE (2 yrs @ 3% discount rate)	**$169,000**	
Engineering Controls Inspection and Maintenance	ANNUAL	1	$ 2,500	$ 2,500	9
			O&M NET PRESENT VALUE (30 yrs @ 3% discount rate)	**$50,000**	
			TOTAL NET PRESENT VALUE	**$ 790,000**	

ALTERNATIVE 1 - COST ESTIMATE
Restoration to Restricted Use (Soil Vapor Extraction)
Former Baron Blakeslee Site
Bay Shore, New York

Notes:

1 Based on experience on similar projects.
2 ~10-ft 4-inch PVC well, based on previous site work costs.
3 Includes blower, condensate management (tank, carbon, transfer pump), electrical, mechanical and plumbing, trailer.
4 Discharge stack to terminate 10 feet above the roof of the large building.
5 Connection to the existing power supply in the building.
6 Re-build the floor slab - 8-inch reinforced concrete.
7 Collection and analysis of discharge samples.
8 Soil sampling program, cost based on similar work performed at the site during investigation.
9 Inspection of surface cover.

ALTERNATIVE 2 - COST ESTIMATE
Restoration to Unrestricted Use (Soil Excavation and Disposal)
Former Baron Blakeslee Site
Bay Shore, New York

CAPITAL COSTS					
ITEM [a]	UNIT [c]	QUANTITY [a]	UNIT COST [d]	INSTALLED COST [e]	NOTES [b]
Mobilization and Demobilization	LS	1	$ 15,000	$ 15,000	1
Surveying	LS	1	$ 5,000	$ 5,000	1
Erosion and Sediment Control	LS	1	$ 10,000	$ 10,000	1
Utility Preclearance					
Underground Utility Survey and Mapping	LS	1	$ 5,000	$ 5,000	1
Plant Building demolition	LS	1	$ 1,500,000	$ 1,500,000	2
Machine Shop Building demolition	LS	1	$ 400,000	$ 400,000	2
Soil Excavation					
Shoring/Excavation Support	LS	1	$ 50,000	$ 50,000	3
Excavation	CY	3,700	$ 35	$ 129,500	1
On-site trucking and stockpiling	CY	3,700	$ 20	$ 74,000	1
Backfill, compaction and testing	CY	3,700	$ 40	$ 148,000	1
Confirmation Sampling	EACH	30	$ 1,500	$ 45,000	4
Soils Disposal					
Characterization Sampling	EACH	50	$ 1,500	$ 75,000	1
Soils disposal	TON	5,550	$ 80	$ 444,000	5
Site Restoration					
Pavement	SY	3,333	$ 50	$ 166,700	1
			SUBTOTAL	$ 3,067,200	
Permitting	LS	1	$ 30,000	$ 30,000	1
Engineering Design & Construction Support	LS	1	$ 100,000	$ 100,000	1
Post Excavation Sampling	LS	1	$ 50,000	$ 50,000	1
Project Management	LS	1	$ 50,000	$ 50,000	1
			SUBTOTAL	$ 230,000	
Contingency		25%		$ 824,000	
			TOTAL CAPITAL COSTS	**$ 4,120,000**	
			TOTAL NET PRESENT VALUE	**$ 4,120,000**	

ALTERNATIVE 2 - COST ESTIMATE
Restoration to Unrestricted Use (Soil Excavation and Disposal)
Former Baron Blakeslee Site
Bay Shore, New York

Notes:

1 Based on experience on similar projects.
2 Demolition of both the repair shop and large building, cost based on similar projects.
3 For the depth of 10 feet and excavation above water table, assume the use of stacked trench boxes.
4 Confirmation soil samples collected from the bottom and side walls of excavation.
5 Non-hazardous, includes transportation. Based on similar projects.