Former Packaged Lighting Site

ORANGE COUNTY, NEW YORK

Site Management Plan

NYSDEC Site Number: C336079

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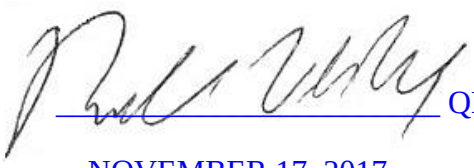
Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date

NOVEMBER 2017

CERTIFICATION STATEMENT

I Russell Urban-Mead certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375, and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



_____ QEP

__NOVEMBER 17, 2017_____DATE

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ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan (SMP) which includes and Operations and Maintenance Plan (O&M Plan), and attendant Environmental Easement:

Site Identification:	BCA C336079 Former Packaged Lighting Systems Site
Institutional Controls (ICs):	1. The property may be used for restricted-residential, commercial and industrial uses as defined by Part 375-1.8(g), subject to local zoning laws, provided that the long-term Engineering and Institutional Controls included in this SMP are employed.
	2. The property may not be used for a higher level of use, such as unrestricted or residential uses without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC.
	3. All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP.
	4. The use of the groundwater underlying the property is prohibited without necessary water quality treatment determined by the NYSDOH or the Orange County Department of Health rendering it safe for use as drinking water or for identified industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
	5. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP.
	6. Data and information pertinent to the Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP.
	7. All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP.

Site Identification: BCA C336079 Former Packaged Lighting Systems Site

	8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
Institutional Controls (continued):	9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy (engineering controls) shall be performed as defined in this SMP.
	10. Access to the site must be provided to agents, employees or other representative of the State of New York with reasonable prior notice to the property owner to assure compliance with the restriction identified by the Environmental Easement
	11. The potential for vapor intrusion must be evaluated for any buildings developed on the site, and any potential impacts that are identified must be monitored or mitigated.
	12. Vegetable gardens and farming on the property are prohibited.
	13. All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP.
Engineering Controls:	1. Cover system
	2. Sub-Slab Depressurization System (SSDS).

Inspections:	Frequency
1. Cover and SSDS inspection 2. Compliance with ICs, SMP, and O&M Plan	Annually
Monitoring: with records to be kept on file at site.	
1. SSDS sampling: two indoor air (basement and crawlspace), basement SSDS exhaust, and outdoor ambient.	Annual monitoring during the first five years for TO-15 VOCs. Potential subsequent sampling reduction is subject to NYSDEC and NYSDOH approval.

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2. Groundwater Monitoring Wells: MW-1, MW-3, MW-8, and MW-10	Semi-annual monitoring during the first two years for Full List VOCs. Potential subsequent sampling reduction is subject to NYSDEC approval.
Maintenance:	
1. Cover maintenance	As needed
2. Blower maintenance	Annual
Reporting:	
1. Air Monitoring	Annually, with groundwater data within six weeks of completing field work.
2. Groundwater Sampling	Semi-annually, within six weeks of completing field work.
3. Periodic Review Report	Annually, within 30 days of the end of each certification period.

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

SITE MANAGEMENT PLAN

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required as an element of the remedial program at the Former Packaged Lighting Systems Site (hereinafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The site was remediated in accordance with Brownfield Cleanup Agreement (BCA) Index# C336079, which was executed on September 20, 2011.

1.1.1 General

The Estate of Hy Hilzen entered into a BCA with the NYSDEC to remediate a three-acre property located in Town of Montgomery, Village of Walden, Orange County, New York (see **Figure 1**). This BCA required the Remedial Party, The Estate of Hy Hilzen, a volunteer in the BCP, to investigate and remediate contaminated media at the site. Following acquisition of the property, Grant Street Factory, Inc. was added to the BCA as a volunteer. On August 11, 2015, the BCA was amended to reduce the size of the BCP site to 1.53 acres and the cleanup goal was changed from commercial to restricted-residential. A figure showing the site location and boundaries is provided in site survey included as **Figure 2**. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement in **Appendix B**.

After completion of the remedial work described in the Interim Remedial Measures Work Plan and supplements, some contamination was left in the surface and subsurface at this site, which is hereafter referred to as 'remaining contamination.' This Site Management Plan (SMP) was prepared to manage remaining contamination at the site until the site is redeveloped or the Environmental Easement is extinguished in

accordance with ECL Article 71, Title 36. All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Chazen Engineering, Land Surveying, and Landscape Architecture CO., D.P.C. (Chazen), on behalf of the "volunteer", Grant Street Factory, Inc. and The Estate of Hy Hilzen, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the site.

1.1.2 Purpose

The site contains contamination left after completion of the interim remedial measures. Engineering Controls have been incorporated into the site remedy to control exposure to remaining contamination during the use of the site to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Orange County Clerk on January 9, 2017, requires compliance with this SMP and all ECs and ICs placed on the site. The ICs place restrictions on site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary ensure compliance with all ECs and ICs required by the Environmental Easement for contamination that remains at the site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) operation and maintenance of all treatment, collection, containment, or recovery systems; (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports; and (5) defining criteria for termination of treatment system operations.

To address these needs, this SMP includes two plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; and (2) a Monitoring Plan for implementation of Site Monitoring. This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the environmental easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA (Site #C336079) for the site, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

The site is located in the Town of Montgomery, Village of Walden, County of Orange, New York and is identified as Section 309 Block 14 and Lot 4 on the Orange County Tax Map. The site is a 1.53-acre area of a 3.08-acre parcel and is bounded by Grant Street to the north, an Ampac Paper commercial/industrial use facility to the south, by two residences and Elm Street to the east, and an active railroad to the west (see Figure 1). The boundaries of the site are shown on the site survey (**Figure 2**) and are more fully described in **Appendix B** – Metes and Bounds. The property is serviced by municipal water and sewer.

1.2.2 Site History

The site has a history of industrial use dating back to the mid-1800s. From 1885 to 1894, the site was operated by the Rider Engine Company, a manufacturer of steam engines. From 1900 to 1939 the facility operated under the name Rider-Ericsson Engine Company, and continued manufacturing steam engines. From the 1920s until 1967, the facility was owned and operated by Spence Engineering, a manufacturer of steam regulators and valve mechanisms. The Village of Walden owned the site in 1968 when it was sold to Lillian Hilzen. It remained in the Hilzen family from 1968 until 2008, and the facility was used by Packaged Lighting Systems, Inc., which designed unique lighting systems for New York City theaters. Following Hy Hilzen's death in 2008, the property has remained vacant and in a deteriorating condition, as part of The Estate of Hy Hilzen.

The site has four commercial buildings: the Main Building (including multiple additions), the Lab Building, the Paint Building, and a garage.

Previous environmental investigations of the property include a December 2008 Phase I Environmental Site Assessment (ESA) and a November 2010 Phase II ESA.

- The 2008 Phase I ESA identified historic industrial and manufacturing operations and two identified onsite underground storage tanks (USTs). The following known or suspected sources of contamination were identified:
    - One 10,000-gallon suspected heating oil UST, in place, but inactive since the 1990s.
    - One 500 to 1,000-gallon UST within the building, in place, use unknown.
    - Two former 275-gallon fuel oil aboveground storage tanks (ASTs), reportedly located adjacent to the Paint Building.
    - Five interior floor drains, with unknown discharge points. At least three of the floor drains were identified in parts of the building known to have been used for cleaning and degreasing activities. The 2010 Phase II report suggests that the floor drain in this central degreasing room discharges to a sealed sump within that room which has no identifiable discharge to the environment.
    - Underground infrastructure, including, but not limited to, USTs, gas piping and an "underground gas machine" dating back more than a century.
    - Industrial site operations dating back to the late 1800s including machine shops, a foundry and coal storage.

- An historic on-site rail spur formerly extended from the adjacent railroad to a former onsite coal storage building.

- A 2010 Phase II included a magnetometer and ground penetrating radar surveys, and installation of nine test pits and five soil borings.
    - The site soil and groundwater investigation identified organic loam overlaid with historic fill that included metal slag. Groundwater was encountered at approximately 8 feet bgs in the northern area of the site and at 6 feet bgs in the southern area of the site. Metals were reported in the site fill layer. Solvent-range VOCs were detected in the five groundwater samples. The most elevated VOC concentrations were near the center of the site, by the south side of the Main Building and adjacent to an area of identified floor drains; groundwater in this area contained TCE at a concentration of 340 ug/L (parts per billion (ppb)). TCE concentrations in groundwater samples collected elsewhere on the site decreased to between 54 ug/L to 2.7 ug/L and a groundwater sample collected from a test pit on the southeastern-most corner of the property contained only a trace concentration of TCE at 1 ug/L. The investigation showed decreasing TCE concentrations near property boundaries.
    - As part of the Phase II work, an attempt was made to inspect building floor drains with a camera snake, however, most floor drains were found to be plugged with debris, blocking exploration efforts.
    - No evidence of an “underground gas machine”, referenced on a Sanborn fire insurance map, was found during this test pitting or boring program.

1.2.3 Geologic Conditions

A review of the Surficial Geologic Map of New York (Lower Hudson Sheet, 1989) indicates that surficial soils in the northern portion of the Site are mapped as recent deposits consisting of fine sand to gravel typically confined to valley floodplain areas. Soils on the southern portion of the Site are mapped as lacustrine silt and clay.

Soils encountered during the BCP remedial investigation included several feet of urban fill overlying native primarily silty clay and clayey silt soils and including a sand

layer encountered in several soil borings between 6 and 8 feet below the ground surface (bgs). The Fill materials included brown soil, coal and ash, masonry debris, metalworking cuttings, gravel, lumber and scrap metal. Bedrock was not encountered during RI activities.

The groundwater interface in the unconfined aquifer was encountered at depths between 6 and 9 feet bgs across the Site during the BCP remedial investigation. Groundwater elevation data indicate that groundwater flow through the unconfined aquifer is to the north-northeast, generally toward the Tin Brook located off-site to the northeast.

The groundwater flow direction was assessed using 11 groundwater monitoring wells installed as part of the remedial investigation. The relative groundwater elevation in each monitoring well was determined by referencing a benchmark established on the Site at a location of known elevation, and then surveying the top-of-well elevations relative to the benchmark. The groundwater elevations were calculated by subtracting the depth to water from the corresponding top-of-well elevation.

A groundwater flow figure is shown in **Figure 3**.

1.3 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

A Remedial Investigation (RI) was performed to characterize the nature and extent of contamination at the site. The results of the RI are described in detail in the following reports:

Remedial Investigation Report, Former Packaged Lighting Site, BCP Site No. C336079, dated July 2013, was prepared by Chazen.

Generally, the RI determined that groundwater at the site has been impacted by concentrations of chlorinated VOCs (CVOCs) cis-1,2-Dichloroethene, tetrachloroethene (PCE) and trichloroethene (TCE), with TCE being the primary constituent. The greatest TCE impacts were reported at the northern end of the site along Grant Street and near the southern end of the Main Building. Off-site groundwater sampling indicates that lower concentrations of TCE were detected off the site to the north side of Grant Street. A specific source area for the TCE-impacted groundwater was not identified and was likely to be the result of occasional handling/storage/disposal practices in various locations near the current area of highest residual CVOC concentrations. In-situ treatment of impacted groundwater via injections of persulfate was conducted in July 2013 by Chazen as an IRM. Follow-up

sampling identified an average decrease of 38 percent in remaining dissolved solvents in groundwater across the impacted on-site wells.

In addition, the RI identified impacts to shallow surface soils (e.g. the fill layer) from semi-volatile organic compounds (SVOCs) and arsenic and copper. The distribution of detected SVOCs in the surface soils and lack of SVOCs in deeper subsurface samples and groundwater support the conclusion that there is no discrete spill area of SVOCs and that these impacts are restricted to the historical fill brought to and distributed across the site as part of historic development and use of the property.

Below is a summary of site conditions when the RI was performed:

Soil

Site surface soil samples (0 to 2 inches) reported concentrations of SVOCs, arsenic, and copper greater than Restricted-Residential Use SCOs (RRUSCOs). **Figure 4A** depicts areas that exceed Unrestricted Use SCOs (UUSCOs) and **Figure 4B** depicts areas that exceed RRUSCOs. SVOCs were reported in surface soil across the site exceeding Restricted-Residential Use SCOs. Copper, lead, and mercury exceeded the Restricted-Residential Use SCOs in three of 12 shallow soil samples, with results suggesting that surface soil impacts are focused to the shallow surface soil near the east/northeastern side of the Main Building.

Site subsurface soil samples reported a VOC, one PCB aroclor, and two metals at concentrations that exceed the Unrestricted Use SCOs. One subsurface soil sample, collected from 10 feet below grade, reported a 46 ppm TCE concentration in soil that is greater than the Restricted-Residential Use SCO. **Figure 4C** depicts areas that exceed UUSCOs and **Figure 4D** depicts the subsurface area that exceeds RRUSCOs.

Site-Related Groundwater

VOC constituents reported in groundwater at concentrations greater than the SCGs in four rounds of RI samples are presented in **Figures 5A, 5B, 5C and 5D**. Groundwater flows in a northeastern direction across the Site. No source soil impacts have been identified.

- On site concentrations of CVOCs, primarily TCE, from initial groundwater monitoring activities in September 2012 are depicted on **Figure 5A**. Concentrations of CVOCs reported in a supplemental sampling event in May 2013 are depicted on **Figure 5B**. Results of groundwater sampling after the

injection program are depicted on **Figure 5C** (2014) and **Figure 5D** (2016). The remaining highest CVOC concentrations were identified near the southern side of the Main Building in the center of the Site at MW-1 and near the northern side of the Main Building in MW-10. On-Site PCE concentrations meet the SCG except for MW-10 which reported 50 ppb, TCE concentrations are less than 70 ppb except for MW-10 which reported 250 ppb, and cis 1,2-dichloroethene concentrations have decreased to be less than or just slightly greater than the SCG. Off-site wells MW-12 and MW-13 are located north/northeast of the site. PCE and TCE concentrations in these wells have decrease from 210 ppb to 150 ppb.

- Two on-site groundwater samples reported elevated iron, manganese, and sodium; however, these exceedances were generally similar to the up gradient groundwater sample. In addition, iron and manganese concentrations are likely related to local native soils and/or laboratory digestion of low turbidity in acid-preserved samples, and the sodium concentrations are likely associated with winter parking lot salt application. Thus, it appears that no site soils appear to have been otherwise impacted by these three metals.

Site-Related Soil Vapor Intrusion

Sub-slab vapor and indoor air sampling was conducted within site buildings in February 2012 to assess building floor drains as potential source areas. TCE was reported in sub-slab vapor in areas of the Main Building with the greatest concentration of 2,203 ug/m^3 in the basement at the northern end of the building (near MW-10). The concentrations were not suggestive of a free-phase TCE source area and, based on the findings, NYSDEC and NYSDOH determined that no additional sampling was needed and that building floor drains could be sealed in place without the need for any related excavation.

The vapor sampling indicates that mitigation of sub-slab vapors is warranted for occupied spaces, and consist of a sub-slab depressurization system (SSDS) to be expanded as needed during re-occupancy of additional building areas. Indoor air and sub-slab vapor sampling locations are mapped on **Figure 6**.

Underground Storage Tanks

A 550-gallon water-filled UST was formerly sited inside of the Main Building; it is believed to have been an exterior fuel oil tank before additional structures were added

on the site. This 550-gallon UST was removed in March 2012 as an IRM. No evidence of a release was observed during tank removal activities and confirmatory post-excavation sampling did not report VOC or SVOC compounds above Unrestricted Use SCOs.

A 10,000-gallon fuel oil UST was sited near the southwestern side of the Main Building. The UST was cleaned in March 2012 in preparation for removal as an IRM; during cleaning, it was determined that the UST extended beneath the footing of the building so the UST could not be removed without risk of damaging the building. Instead, additional site characterization sampling was conducted around the UST during RI activities in July 2012, identifying no VOC or SVOC concentrations greater than Unrestricted Use SCOs or Part 703 SCGs. Subsequently, in accordance with regulations and with NYSDEC concurrence, the UST was filled and decommissioned in-place as an IRM.

1.4 SUMMARY OF REMEDIAL ACTIONS

Site IRMs were performed in accordance with the NYSDEC-approved Interim Remedial Measure Work Plan dated May 2013 and revised June 2013.

The following is a summary of the Remedial Actions performed as IRMs or as part of the Remedy at the site:

1. Removal of a 550-gallon former heating oil UST inside of the Main Building in March 2012 (IRM).
2. In-place closure of a 10,000-gallon heating oil UST near the southwestern side of the Main Building in July 2012 (IRM).
3. Sealing of interior building floor drains to prevent future discharges in November 2012 (IRM).
4. One round of in-situ sodium persulfate injections was performed in July 2013 as an IRM. Injection locations are shown on **Figure 7**. A total of 2,090 pounds were injected across the two treatment areas. Post-injection groundwater sampling results showed a reduction in CVOC concentrations averaging 38% as of the most recent sampling event in 2016.
5. As part of the Site remedy, a protective cover has been installed across the exposed surface soil on the site (southeast of the Main Building), primarily

consisting of asphalt paving (small stone binder). The cover limits infiltration and human health contact with fill soils.

6. As part of the Site remedy, a sub-slab depressurization systems have been installed. Operation of the systems began in early November 2017. To prevent human exposure to sub-slab vapors beneath buildings, a ventilation system was installed within the basement of the Main Building and in the crawlspace under the two-story structure on the site, below the area of proposed residences. **Figure 9** shows these ventilation system areas.
7. Execution and recording of an Environmental Easement to restrict land use and prevent future exposure to any contamination remaining at the site.
8. Development and implementation of a Site Management Plan for long term management of remaining contamination as required by the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, and (3) reporting;

The IRMs listed above were completed at the site in July 2013 and the remedy activities were implemented in July and August 2017. The Site is vacant and is planned ready for new occupancy following issuance of the Certificate of Completion.

1.4.1 Site-Related Treatment Systems

No long-term treatment systems were installed as part of the site remedy.

1.4.2 Remaining Contamination

Remaining residual impacts to surface soil (0 to 2 inches) considered representative of the Site's fill horizon include PAH-range SVOCs, PCBs and metals arsenic and copper in surface soils at concentrations greater than Unrestricted Use SCOs, with SVOCs and some metals also above RRUSCOs.

In addition, isolated instances of TCE were detected in three deeper subsurface soil samples exceeding Unrestricted Use SCOs, with only one location greater than RRUSCO.

No other subsurface impacts to the site were reported.

Tables 1.4.2a through 1.4.2d and **Figures 4A and 4C** summarize the results of soil samples remaining at the site that exceed the UUSCOs. **Figures 4B** and **4D** summarize the results of remaining soil samples that exceed RRUSCOs of the site that were mitigated by soil cover.

Groundwater at the site indicates the detection of chlorinated VOCs, primarily TCE, with lower concentrations of PCE and cis-1,2-dichloroethene. Following in-situ groundwater treatment IRM, VOC concentrations in groundwater on the site have decreased.

Table 1.4.2e summarizes groundwater VOC concentrations at the site pre- and post- the in-situ groundwater treatment. **Figures 5A and 5B** summarize the results of VOCs in groundwater prior to the in-situ groundwater treatment and **Figures 5C** and **5D** summarizes the results of groundwater after the treatment. **Tables 1.4.2f** summarizes indoor air and sub-slab VOC concentrations at the site.

Table 1.4.2a VOCs in Soil that Exceed Unrestricted and Restricted-Residential Use SCOs (ppm)

Sample Location:	**NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives (ppm)**		***TP-16***	***MW-1***	***MW-10***
Sample ID:			*PL-TP-TPX16-X10*	*PL-MW-XX1-XX6-XL*	*PL-MW-X10-XX6-XL*
Lab Sample ID:	Unrestricted	**Restricted-Residential**	*D1765-06*	*D3578-06*	*D3578-12*
Sampling Date:			*3/6/2012*	*7/23/2012*	*7/24/2012*
Sample Depth (feet):			*10*	*6*	*6*
COMPOUND					
Trichloroethene	0.47	21	**46**	1.6	3.4

NOTES

Yellow shading indicates concentration exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Orange shading and **bold** font indicate concentration exceeds the NYSDEC Part 375 Restricted-Residential Use SCO.

Table 1.4.2b SVOCs in Soil that Exceed Unrestricted and Restricted-Residential Use SCOs (ppm)

Sample Location:	NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives (ppm)		*SS-1*	*SS-2*	*SS-3*	*SS-6*	*SS-8*	*SS-18*	*SS-19*	*SS-20*	*SS-21*	Minimum Concentration	Average Concentration	Maximum Concentration
Sample ID:			*PL-SS-XX1-XX2-XL*	*PL-SS-XX2-XX2-XL*	*PL-SS-XX3-XX2-XL*	*PL-SS-XX6-XX2-XL*	*PL-SS-XX8-XX2-XL*	*PL-SS-X18-XX2-XL 1112*	*PL-SS-X19-XX2-XL 1112*	*PL-SS-X20-XX2-XL 1112*	*PL-SS-X21-XX2-XL 1112*			
Lab Sample ID:	Unrestricted	**Restricted-Residential**	*D3576-01*	*D3576-02*	*D3576-03*	*D3576-06*	*D3576-10*	*12K0079-09*	*12K0079-10*	*12K0079-11*	*12K0079-12*			
Sampling Date:			*7/25/2012*	*7/25/2012*	*7/25/2012*	*7/23/2012*	*7/24/2012*	*11/1/2012*	*11/1/2012*	*11/1/2012*	*11/1/2012*			
Sample Depth (feet):			*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*			
COMPOUND														
Benzo(a)anthracene	1	1	**110**	**5.6**	**22**	**13**	**130 J**	**6.79**	**13.1**	**6.39**	0.638	5.6	34.17	140
Benzo(a)pyrene	1	1	**93**	**7.8**	**31**	**12**	**130 J**	**9.2**	**8.31**	**6.11**	0.965	6.11	33.15	140
Benzo(b)fluoranthene	1	1	**130**	**11**	**48**	**16**	**160 J**	**8.59**	**7.59**	**6.26**	0.960	6.26	43.16	180
Benzo(g,h,i)perylene	100	100	**130**	5.6	21	7.8	88 J	5.98	1.45 J	3.89	0.642	130	29.37	130
Benzo(k)fluoranthene	0.8	3.9	**27**	**3.6**	**13**	**4.8**	**65 J**	**10.4**	**8.63**	**6.65**	1.18	1.18	15.58	65
Chrysene	1	3.9	**100**	**6**	**22**	**12**	**140 J**	**6.25**	**12.5**	**5.16**	0.581	5.16	33.83	140
Dibenz(a,h)anthracene	0.33	0.33	**12**	**1.3 J**	**5.3**	**1.6 J**	**15 J**	3.88 U	3.96 U	3.85 U	0.232	1.3	5.24	15
Dibenzofuran	7	59	7.2	1.9 U	3.5 U	1.9 U	2.7 J	3.88 U	3.96 U	3.85 U	0.176 U	7.2	3.23	7.2
Fluoranthene	100	100	**310**	8.3	22	26 D	**300 J**	12.6	25.9	12.2	0.802	300	79.76	310
Indeno(1,2,3-cd)pyrene	0.5	0.5	**100**	**5.8**	**23**	**7.8**	**79 J**	**5.97**	**2.03 J**	**4.03**	**0.620**	0.62	25.36	100
Phenanthrene	100	100	**220**	3.8	5.7	7.9	63 J	3.23 J	9.51	9.75	0.184	220	35.90	220
Pyrene	100	100	**250**	9	28	23	**260 J**	11.5	24.5	10.4	1.01	250	68.60	260

NOTES

Yellow shading indicates concentration exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Orange shading and **bold** font indicate concentration exceeds the NYSDEC Part 375 Restricted-Residential Use SCO.

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than MDL.

D - The reported value is from a secondary analysis with a dilution factor. The original analysis exceeded the calibration range

Table 1.4.2c PCBs in Soil that Exceed Unrestricted and Restricted-Residential Use SCOs (ppm)

Sample Location:	NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives (ppm)		***SB-14***	***MW-1***	***SS-2***
Sample ID:			*PL-SB-X14-XX6-XL*	*PL-MW-XX1-XX6-XL*	*PL-SS-XX2-XX2-XL*
Lab Sample ID:	Unrestricted	**Restricted-Residential**	*D3578-03*	*D3578-06*	*D3576-02*
Sampling Date:			*7/23/2012*	*7/23/2012*	*7/25/2012*
Sample Depth (feet):			*6 feet*	*6 feet*	*0-2 inch*
COMPOUND					
Aroclor-1260	0.1	1	0.96	0.26	0.11

Sample Location:	NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives (ppm)		***SS-6***	***SS-7***	***SS-8***
Sample ID:			*PL-SS-XX6-XX2-XL*	*PL-SS-XX7-XX2-XL*	*PL-SS-XX8-XX2-XL*
Lab Sample ID:	Unrestricted	**Restricted-Residential**	*D3576-06*	*D3576-07*	*D3576-10*
Sampling Date:			*7/23/2012*	*7/23/2012*	*7/24/2012*
Sample Depth (feet):			*0-2 inch*	*0-2 inch*	*0-2 inch*
COMPOUND					
Aroclor-1260	0.1	1	0.11 J	0.19 J	0.13

Notes

Yellow shading indicates concentration exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Orange shading and **bold** font indicate concentration exceeds the NYSDEC Part 375 Restricted-Residential Use SCO.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than MDL.

Table 1.4.2d TAL Metals in Soil that Exceed Unrestricted and Restricted-Residential Use SCOs (ppm)

Sample Location:	NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives (ppm)		*MW-1*	*SS-1*	*SS-2*	*SS-3*	*SS-6 and field duplicate*		*SS-7*	*SS-8*	*SS-22*	*SS-23*	**Minimum Concentration**	**Average Concentration**	**Maximum Concentration**
Sample ID:			*PL-MW-XX1-XX6-XL*	*PL-SS-XX1-XX2-XL*	*PL-SS-XX2-XX2-XL*	*PL-SS-XX3-XX2-XL*	*PL-SS-XX6-XX2-XL*	*PL-FD-001-XXX-XL*	*PL-SS-XX7-XX2-XL*	*PL-SS-XX8-XX2-XL*	*PL-SS-X22-XX2-XL 1112*	*PL-SS-X23-XX2-XL 1112*			
Lab Sample ID:	Unrestricted	**Restricted-Residential**	*D3578-06*	*D3576-01*	*D3576-02*	*D3576-03*	*D3576-06*	*D3578-14*	*D3576-07*	*D3576-10*	*12K0079-13*	*12K0079-14*			
Sampling Date:			*7/23/2012*	*7/25/2012*	*7/25/2012*	*7/25/2012*	*7/23/2012*	*7/23/2012*	*7/23/2012*	*7/24/2012*	*11/1/2012*	*11/1/2012*			
Sample Depth (feet):			*6*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*	*0-2 inch*			
COMPOUND															
Chromium	30	180	17.4 J	21.8 J	31.4 J	22.1 J	16.8 J	21.2 J	19.8 J	18.9 J	12.1	18.5	12.1	20	31.4
Copper	50	270	38.8 J	41.1 J	168 J	**524 J**	82.3 J	77.6 J	38.6 J	53.3 J	161	**503**	38.6	169	524
Lead	63	400	15.4 N*	80.5	**497**	388	54.1	45.3 N*	249	59.8	96.9	188	15.4	167	497
Mercury	0.18	0.81	0.034	0.071	0.293	**2.02 D**	0.084	0.08	0.344	0.055	0.109 U	0.116 U	0.034	0	2.02
Nickel	30	310	34 J	30.7 J	35.6 J	36 J	21.3 J	26.3 J	25.4 J	33.3 J	27.0	39.4	21.3	31	39.4
Selenium	3.9	180	0.445 UN	0.466 U	0.42 U	0.429 U	0.433 U	0.515 UN	0.53 U	0.424 U	4.16	5.29	0.42	1	5.29
Zinc	109	10,000	72.2 J	165 J	210 J	224 J	98.3 J	142 J	198 J	104 J	92.6 B	183 B	72.2	149	224

NOTES

0.12 Yellow shading indicates concentration exceeds the NYSDEC Part 375 Unrestricted Use SCO

351 Orange shading and **bolded** text indicates the concentration exceeds the NYSDEC Part 375 Restricted-Residential Use SCO.

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than MDL. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

D - The reported value is from a secondary analysis with a dilution factor. The original analysis exceeded the calibration range.

Table 1.4.2e VOCs in Groundwater that Exceed NYCRR Part 703.5 Groundwater Standards of 5 ug/L

Sample Location:	MW-1					MW-2			MW-3					
Lab Sample ID:	D4122-01	E2300-01	E3553-01	F2944-01	H1766-07	D4122-04	F2944-02	H1766-06	D4122-05	E2300-02	E3553-02	F2944-03	H1766-01	H1766-08
Sampling Date:	09/06/12	05/17/13	09/03/13	06/26/14	03/10/16	09/06/12	06/26/14	03/10/16	09/07/12	05/17/13	09/03/13	06/26/14	03/10/16	03/10/16
Sample Depth (feet):	10	10	10	10	10	10	10	10	9	9	9	9	9	9
COMPOUND														
cis-1,2-Dichloroethene	1.6	0.5 U	0.2 U	1 U	1 U	1.5	0.75 J	0.36 J	**8**	**5.1**	**5.7**	**5.4**	3.1	2.9
Tetrachloroethene	0.73 J	3.6 U	2.6	2.6	2.1	**17**	**7.3**	**6.8**	**12**	**7.3**	**9.4**	4.6	**5.3**	4.9
Trichloroethene	**420 D**	**73.9**	**56.8 J**	**43.1**	**34**	**60**	**26.6**	**19.1**	**180**	**100**	**130 J**	**100**	**71.5**	**69.3**

Sample Location:	MW-8							
Lab Sample ID:	D4122-12	E2300-03	E2300-07	E3553-03	E3903-01	E3903-02	F2944-04	H1766-05
Sampling Date:	09/06/12	05/17/13	05/17/13	09/03/13	09/27/13	09/27/13	06/26/14	03/10/16
Sample Depth (feet):	10	10	10	10	10	10	10	10
COMPOUND						Inj Point		
cis-1,2-Dichloroethene	**5.9**	3.5	3.6	4.8	4.2	1 U	4.1	3.4
Tetrachloroethene	0.42 J	0.77 J	0.63 J	0.64 J	**19.6**	**14.4**	1 U	0.45 J
Trichloroethene	**200**	**120**	**120**	**160 J**	**150**	**55.6**	**99.3**	**100**

Sample Location:	MW-10							MW-12			MW-13		
Lab Sample ID:	D4122-14	E2300-04	E3553-03	E3903-03	E3903-04	F2944-05	H1766-02	E2300-05	E3553-05	F2944-06	E2300-06	E3553-06	F2944-07
Sampling Date:	09/07/12	05/17/13	09/03/13	09/27/13	09/27/13	06/26/14	3/10/2016	05/17/13	09/03/13	06/26/14	05/17/13	09/03/13	06/26/14
Sample Depth (feet):	8	8	8	8	8	8	8	10	10	10	5	5	5
COMPOUND					Inj Point								
cis-1,2-Dichloroethene	**8.4**	**11.1**	**9.1**	**7.5**	2.3	**8.6**	**6.5**	4.1	2	2.7	1	2.6	1.8
Tetrachloroethene	**66**	**71.7**	**110**	**100**	**44.2**	**41.7**	**49.3**	**38**	**30.5**	**16.4**	**14.7**	**44.2**	**16.4**
Trichloroethene	**440 D**	**480 D**	**440 DJ**	**380 D**	**290 D**	**250 D**	**250**	**210 D**	**210 D**	**150**	**100**	**210 D**	**150**

Notes:

Yellow shading indicates concentration exceeds the NYSDEC NYCRR Part 703.8 groundwater quality standard of 5 ug/L

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than MDL. The concentration given is an approximate value.

D - The reported value is from a secondary analysis with a dilution factor. The original analysis exceeded the calibration range.

Table 1.4.2f VOCs in Vapor Requiring Action Steps (ug/m^3)

IA indicates indoor air samples; SV indicates sub-slab vapor samples.

			Matrix 1 TCE (µg/m^3)
LOCATION	Date	SAMPLE ID	
AOC-1: Lab Building	2/8/2012	PL-IA-XX2	0.91
		PL-SV-XX2	9.14
AOC-1: Parts Cleaning and Warehouse Area	2/8/2012	PL-IA-XX3	0.86
		PL-SV-XX3	**91.4 D**
		PL-SV-XX4	ND
		PL-SV-XX5	ND
		PL-SV-XX6	**81 D**
AOC-1: Degreasing Room, East Garage and Cistern Areas	2/8/2012	PL-IA-XX5	ND
		PL-SV-XX7	**1,300 D**
		PL-SV-XX8	33.3
		PL-SV-XX9	**505 D**
AOC-1: Basement	2/8/2012	PL-IA-XX4	**11.3**
		PL-SV-X10	**2203 D**
AOC-1: Office	2/8/2012	PL-IA-XX6	0.81
		PL-IA-XX7 (crawl space)	1.13
AOC-2: Paint Building	2/8/2012	PL-IA-XX1	ND
		PL-SV-1	ND
Outdoor Background	2/8/2012	PL-OA-XX1	ND

Notes:

"ND" indicates that the compound was not detected at a concentration equal to or greater than the laboratory determined minimum detectable limit.

"J" indicates that the compound was detected and provides a usable estimation of the conditions being measured

"D" indicates that the reported value is from a secondary analysis with a dilution factor. The original analysis exceeded the calibration range.

Take reasonable and practical actions to identify source(s) and reduce exposure

Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is needed to determine if the indoor air or sub-slab vapor have changed.

Monitor/Mitigate

Mitigation is needed to minimize current or potential exposures associated with soil vapor intrusion.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Since remaining contaminated surface soil, groundwater, and soil vapor exist beneath the site, Engineering Controls and Institutional Controls (EC/ICs) are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

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

2.2 ENGINEERING CONTROLS

2.2.1 Engineering Control Systems

2.2.1.1 Soil Cover

Exposure to remaining contamination in soil/fill at the site is prevented by a soil cover system placed over the site. This cover system is comprised of asphalt pavement, concrete-covered sidewalks, or concrete building slabs. The Excavation Work Plan that appears in **Appendix A** outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection and maintenance of this cover are provided in the Monitoring Plan included in Section 4 of this SMP.

2.2.1.2 Sub-Slab Depressurization System/Venting Program

To mitigate remaining soil vapors beneath building(s), a vapor barrier and ventilation system were installed within the basement of the Main Building and in the crawlspace under the two-story structure on the northeastern structure, below the area of proposed residences. **Figures 8 and 9** show the areas of the vapor barrier and ventilation system that are described as follows:

- In the northern side of the basement, an approximately 35-foot long 4-inch diameter schedule 40, slotted PVC pipe was installed in the unpaved utility trench. A solid pipe elbowed out vertically, a 4-inch radon mitigation fan was installed on top of the riser, and the exhaust stack was extended through an outside wall of the building and up to the roofline where a vent cap was installed. The slotted trench pipe was covered with a well-sorted course sand or pea gravel, the metal covers were put back over the lateral and sealed. The basement's concrete floor had limited areas of damage that were repaired.
- To address the eastern half of the structure, a 10-foot 2-inch slotted PVC stringer attached to a 2-inch lateral was installed in the crawl space in lieu of an SSDS, and within the western half of the structure, a 4-inch diameter schedule 40, slotted PVC pipe was installed in the subfloor and angles towards the southwestern end

of the building where it exits the building and is attached to the extraction fan. The exhaust stack was extended up to the roofline where a vent cap was installed.

Periodic checks of the SSDS/Venting program must be conducted to confirm that the system is operating within design parameters.

Procedures for operating and maintaining the SSDS are documented in an Operation and Maintenance Plan. Procedures for monitoring the system are included in the Monitoring Plan. The Monitoring Plan also addresses a severe condition inspection to follow in the event that a severe condition occurs which might interrupt operation of this engineering control.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.6 of NYSDEC DER-10.

2.2.2.1 Composite Cover System

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity.

2.2.2.2 Sub-slab Depressurization System (SSDS)

The active SSD system will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the SSD system is no longer required, a proposal to discontinue the SSD system will be submitted by the property owner to the NYSDEC and NYSDOH.

2.3 INSTITUTIONAL CONTROLS

A series of Institutional Controls is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the site to Restricted-

Residential, Commercial, and Industrial uses only. Adherence to these Institutional Controls on the site is required by the Environmental Easement and will be implemented under this Site Management Plan. These Institutional Controls are:

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

Institutional Controls identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The site has a series of Institutional Controls in the form of site restrictions. Adherence to these Institutional Controls is required by the Environmental Easement. Site restrictions that apply to the Controlled Property are:

1. The property may be used for restricted-residential, commercial and industrial uses as defined by Part 375-1.8(g), subject to local zoning laws, provided that the long-term Engineering and Institutional Controls included in this SMP are employed.
2. The property may not be used for a higher level of use, such as unrestricted or residential uses without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;
3. All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
4. The use of the groundwater underlying the property is prohibited without necessary water quality treatment determined by the NYSDOH or the Orange County Department of Health rendering it safe for use as drinking water or for

identified industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

5. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
6. Data and information pertinent to the Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP;
7. All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in this SMP;
10. Access to the site must be provided to agents, employees or other representative of the State of New York with reasonable prior notice to the property owner to assure compliance with the restriction identified by the Environmental Easement;
11. The potential for vapor intrusion must be evaluated for any buildings developed on the site, and any potential impacts that are identified must be monitored or mitigated;
12. Vegetable gardens and farming on the property are prohibited;
13. The site owner or remedial party will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

2.3.1 Excavation Work Plan

The site has been remediated for restricted-residential, commercial, or industrial, uses. With notice to, and permission from, the NYSDEC, any future intrusive site work that will penetrate the soil cover or cap, or encounter or disturb the remaining contamination, including any modifications or repairs to the existing cover system will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix A to this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the site. A sample HASP is attached as **Appendix C** to this SMP that is in current compliance with DER-10, and 29 CFR 1910, 29 CFR 1926, and all other applicable Federal, State and local regulations. Based on future changes to State and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and re-submitted with the notification provided in Section A-1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all intrusive work, the structural integrity of excavations, proper disposal of excavation de-water, control of runoff from open excavations into remaining contamination, and for structures that may be affected by excavations (such as building foundations and bridge footings). The site owner will ensure that site development activities will not interfere with, or otherwise impair or compromise, the engineering controls described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

Prior to the construction or occupation of any enclosed structures not already provided with an SSDS and which are located over areas that contain remaining contamination and/or the potential for soil vapor intrusion (SVI) has been identified, an SVI evaluation will be performed to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed structure. Alternatively, an SVI mitigation system may be prospectively installed as an element of

the building foundation without first conducting an investigation; such a mitigation system must include a vapor barrier and passive sub-slab depressurization system that is capable of being converted to an active system.

Prior to conducting an SVI investigation or installing a mitigation system, a work plan will be developed and submitted to the NYSDEC and NYSDOH for approval. This work plan will be developed in accordance with the most recent NYSDOH "Guidance for Evaluating Vapor Intrusion in the State of New York". Measures to be employed to mitigate potential vapor intrusion will be evaluated, selected, designed, installed, and maintained based on the SVI evaluation, the NYSDOH guidance, and construction details of the proposed structure.

Preliminary (unvalidated) SVI sampling data will be forwarded to the NYSDEC and NYSDOH for initial review and interpretation. Upon validation, the final data will be transmitted to the agencies, along with a recommendation for follow-up action, such as mitigation.

SVI sampling results, evaluations, and follow-up actions will also be summarized in the next Periodic Review Report.

2.4 INSPECTIONS AND NOTIFICATIONS

2.4.1 Inspections

Inspections of all remedial components installed at the site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive site-wide inspection will be conducted annually, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether Engineering Controls continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If site records are complete and up to date; and

- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the Brownfield Cleanup Agreement BCA, 6NYCRR Part 375, and/or Environmental Conservation Law.
- 7-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or engineering control that reduces or has the potential to reduce the effectiveness of an Engineering Control and likewise any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

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

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the Brownfield Cleanup Agreement (BCA), and all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing.

2.5 CONTINGENCY PLAN

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to the owner's qualified environmental professional. These emergency contact lists must be maintained in an easily accessible location at the site.

Table 2.5.1a: Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Table 2.5.1b: Other Contact Numbers

Qualified Environmental Professional: Russell Urban-Mead	845-486-1551 (office) 914-456-1095 (mobile)

Environmental Consultant Project Manager: Arlette St. Romain	518-266-7328 (office) 518-260-1811 (mobile)
NYSDEC Project Manager: John B. Miller, P.E.	518-402-9564
NYSDOH Project Manager: Anthony Perretta	800-458-1158 ext. 27880

* Note: Contact numbers subject to change and should be updated as necessary

2.5.2 Map and Directions to Nearest Health Facility

Site Location: 29 Grant Street, Walden, NY

Nearest Hospital Name: St. Luke's Cornwall Hospital

Hospital Location: 70 Dubois Street, Newburgh, NY

Hospital Telephone: 845-568-2311

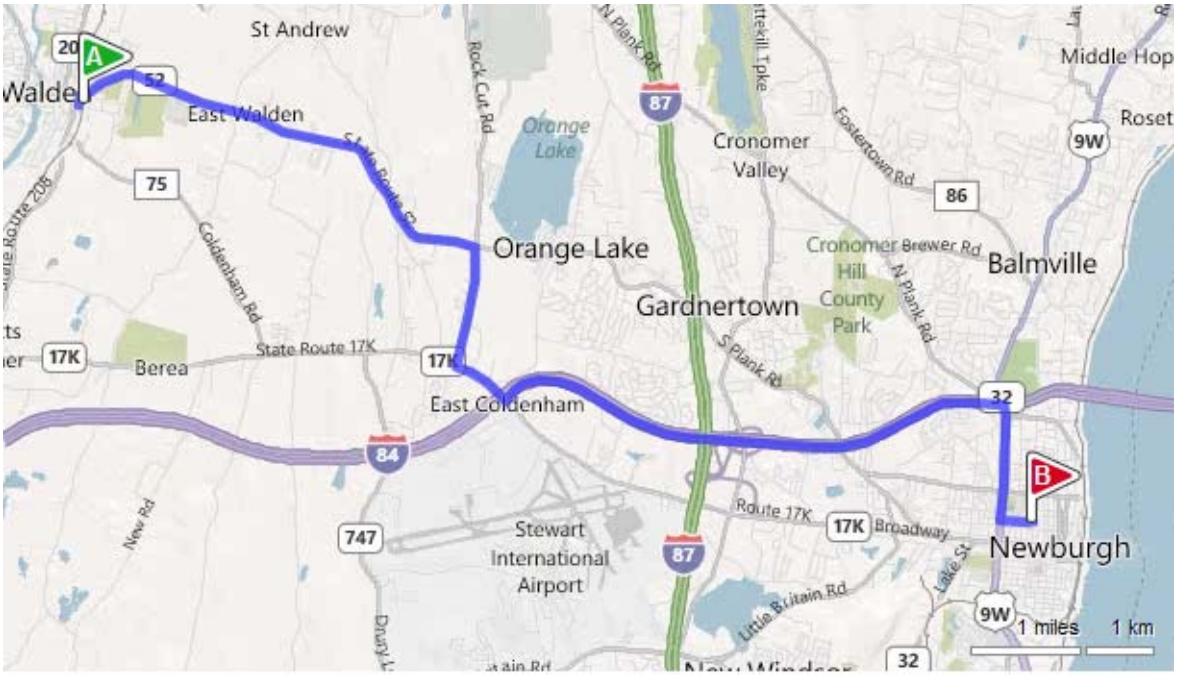
Directions to the Hospital:

1.	Depart Grant St. toward Hepper St.	143 feet
2.	Turn right onto Hepper St.	0.1 miles
3.	Turn right onto Route 52/East Main St.	4.3 miles
4.	Turn right onto Rock Cut Road/CR 23.	1.1 miles
5.	Turn left onto Route 17K/Newburgh Cochecton Tpke.	0.6 miles
6.	Take ramp left for I-84 East.	4.7 miles
7.	At Exit 10, take ramp right for Rt-32/US-9W toward Highland/Newburgh.	0.2 miles
8.	Turn right onto US-9W/Rt-32/Route 9W.	1.1 miles
9.	Turn left onto Carter St.	0.3 miles
10.	Turn right onto DuBois St.	206 feet

Total Distance: 12.4 miles

Total Estimated Time: 20 minutes

Map Showing Route from the site to the Hospital:



2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (**Table 2.5.1a**). The list will also be posted prominently at the site and made readily available to all personnel at all times.

3.0 SITE MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the site, the soil cover system, and all affected site media identified below. Monitoring of other Engineering Controls is described in Chapter 4, Operation, Monitoring and Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly ambient groundwater standards and Part 375 SCOs for soil;
- Assessing achievement of the remedial performance criteria.
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

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

- Sampling locations, protocol, and frequency;
- Information on all designed monitoring systems (e.g., well logs);
- Analytical sampling program requirements;

- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Semi-annual groundwater monitoring for the first two years with annual air monitoring of the performance of the remedy and overall reduction in contamination on-site will be conducted for the first five years. The frequency thereafter will be determined by NYSDEC. Trends in contaminant levels in air and groundwater in the affected areas, will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Monitoring programs are summarized in **Table 3.1.2** and outlined in detail in Sections 3.2 and 3.3 below.

Table 3.1.2: Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Matrix	Analysis
Groundwater	Semi-annual during the first two years. Then evaluate data for possible request to reduce sampling frequency thereafter. Sampling reduction is subject to NYSDEC approval.	Groundwater	Volatile Organic Compounds by EPA Method 8260
Air	Annual during the first five years. Anticipate request to reduce sample frequency to once every five years thereafter. Sampling reduction is subject to NYSDEC and NYSDOH approval.	Indoor Air	Volatile Organic Compounds by EPA Method T0-15

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

3.2 COVER SYSTEM MONITORING

Soil cover monitoring is addressed separately from the other engineering controls in this SMP because it is a passive component of the site remedy. The site cover consists of asphalt paving and will be maintained to allow for restricted-residential, commercial or industrial use of the site. A site cover may consist of either of the structures (such as buildings, pavement and sidewalks) or a soil cover in areas where the upper one foot of exposed surface soil exceeds the applicable soil cleanup objectives. Where a soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted-residential use. If a soil layer is used, it will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer.

The cover system must be inspected during periodic monitoring events. Inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the cover system has been reported or an emergency occurs that is deemed likely to affect the operation of the SSDS. Monitoring deliverables for the soil cover system occur annually with the annual site-wide inspection report.

3.3 MEDIA MONITORING PROGRAM

3.3.1 Groundwater Monitoring

Groundwater monitoring will be performed on a periodic basis to assess the performance of the in-situ remedy.

The network of monitoring wells has been installed to monitor both up-gradient and down-gradient groundwater conditions at the site **(Figure 3**). The following four wells are to be sampled: MW-1, MW-3, MW-8, and MW-10 and analyzed for VOCs via USEPA Method 8260.The network of on-site wells has been designed based on the following criteria:

- The monitoring wells are installed the shallow site aquifer water table.
- Pre-remedial groundwater conditions during September 2012 and May 2013 are included in **Table 1.4.2.e** and shown on **Figures 5A and 5B.**

- Post-remedial groundwater conducted in June 2014 and March 2016 are included in **Table 1.4.2e** and shown on **Figures 5C and 5D**.

Monitoring well construction logs are included in Appendix **D**.

The number of wells and sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. NYSDEC's Decision Document has a provision for additional groundwater treatment if they determine it is warranted based on the data.

Deliverables for the groundwater monitoring program are specified below.

3.3.1.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log presented in **Appendix E**. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

The water level in the groundwater monitoring wells will be gauged to determine the depth to groundwater. The well water will be sampled using low-flow methods to complete collection of groundwater samples considered representative of the surrounding aquifer.

Low-flow sampling methodology is implemented to slowly withdraw water from within the screened interval of a well without resulting in drawdown, until field parameters (pH, conductivity, temperature, turbidity, salinity, dissolved oxygen, and oxygen-reduction potential) are stabilized, indicating that groundwater is flowing directly from the formation through the screen into the sampling tube.

Groundwater samples will be collected into labeled laboratory-supplied bottles, and then immediately placed in a cooler with ice before being shipped to an ELAP certified analytical testing laboratory. The groundwater samples and one trip blank will be analyzed for NYSDEC list VOCs by EPA Method 8260.

Results of the groundwater sampling will be reported to NYSDEC on a semi-annual basis.

3.3.1.2 Monitoring Well Repairs, Replacement And Decommissioning

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.3.2 Indoor Air Monitoring

Indoor air monitoring will be performed annually to assess the performance of an SSDS and approximate sample locations are shown on Figure 9. The locations of the sampling will consist of one indoor sample from the basement and one from the first floor over the crawlspace, one sample from the basement PVC exhaust line to represent sub-slab conditions, plus one outdoor air reference sample.

The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

Deliverables for the indoor air monitoring program are specified below.

3.3.2.1 Sampling Protocol

All indoor air sampling activities will be recorded in a field book and field data sheet that includes canister start/end volumes and times. In general, indoor air samples are collected in the following manner:

- Sampling duration will reflect the exposure scenario without compromising the detection limit or sample flow collection rate and is typically an 8-hour sample. The sub-slab exhaust sample will be a grab sample.

- Sample flow rates will conform to the specifications in the sample collection method, and if possible, be consistent with the flow rates for the concurrent outdoor sample.

- Samples will be collected using conventional sampling methods, in an appropriate container which meets the objective of the samples and one that is certified clean by the laboratory.

Indoor air samples and a reference outdoor air sample will be collected in labeled laboratory-supplied canisters, and shipped to an ELAP certified analytical testing laboratory. Samples will be analyzed for VOCs by TO-15 Method.

Results of the indoor air sampling will be reported to NYSDEC on an annual basis.

3.4 SITE-WIDE INSPECTION

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections will also be performed after all severe weather conditions that may affect Engineering Controls or monitoring devices. During these inspections, an inspection form will be completed (**Appendix F**). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and

- Confirm that site records are up to date.

3.5 MONITORING QUALITY ASSURANCE/QUALITY CONTROL

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the site (**Appendix G**). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement;
- Sampling Program:
    - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
    - Sample holding times will be in accordance with the NYSDEC ASP requirements.
    - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
    - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
    - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures;
- Internal QC and Checks;
- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.

3.6 MONITORING REPORTING REQUIREMENTS

Forms and any other information generated during regular monitoring events and inspections will be kept on file on-site. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. The report will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (o be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether groundwater conditions have changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized in **Table 3.6** below.

Table 3.6: Schedule of Monitoring/Inspection Reports

Task	Reporting Frequency*
Semi-Annual Groundwater Monitoring	Semi-annual groundwater reporting for years 1 and 2. With annual indoor air results reporting. Subsequent frequency may be reduced with NYSDEC approval. Reporting within six weeks of completing field work.
Annual Indoor Air Quality Monitoring	

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

4.0 OPERATION AND MAINTENANCE PLAN

4.1 INTRODUCTION

The site remedy will rely on a soil cover and an SSDS to protect public health and the environment. Information on non-mechanical Engineering Controls (i.e., soil cover system) is provided in Section 3.2 - Engineering and Institutional Control Plan. The owner will maintain the asphalt cover consistent with standard commercial practices.

The SSDS Operation and Maintained Plan is attached as **Appendix H**. A copy of this Operation and Maintenance Plan, along with the complete SMP, will be kept at the site. The Operation and Maintenance Plan is not to be used as a stand-alone document, but as component documents of the SMP.

5. INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 SITE INSPECTIONS

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan of this SMP. At a minimum, a site-wide inspection will be conducted annually.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

A general site-wide inspection form will be completed during the site-wide inspection (see **Appendix F**). This form is subject to NYSDEC revision.

All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly; and, based on the above items,
- The site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.2 CERTIFICATION OF ENGINEERING AND INSTITUTIONAL CONTROLS

After the last inspection of the reporting period, a qualified environmental professional will prepare the following certification:

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

- The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;
- Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;

- If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the site is compliant with the environmental easement;
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program; and
- The information presented in this report is accurate and complete.
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Samuel Cichon, of Grant Street Factory, Inc., P.O. Box 422, Fishkill, New York 12524, am certifying as Owner for the site.

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

5.3 PERIODIC REVIEW REPORT

A Periodic Review Report will be submitted to the Department every year, beginning sixteen months after the Certificate of Completion is issued, or at greater intervals based on NYSDEC permission. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in **Appendix B** (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site;
- Results of the required annual site inspections and severe condition inspections, if applicable;

- All applicable inspection forms and other records generated for the site during the reporting period in electronic format;
- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific Decision Document;
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
    - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
    - The overall performance and effectiveness of the remedy.

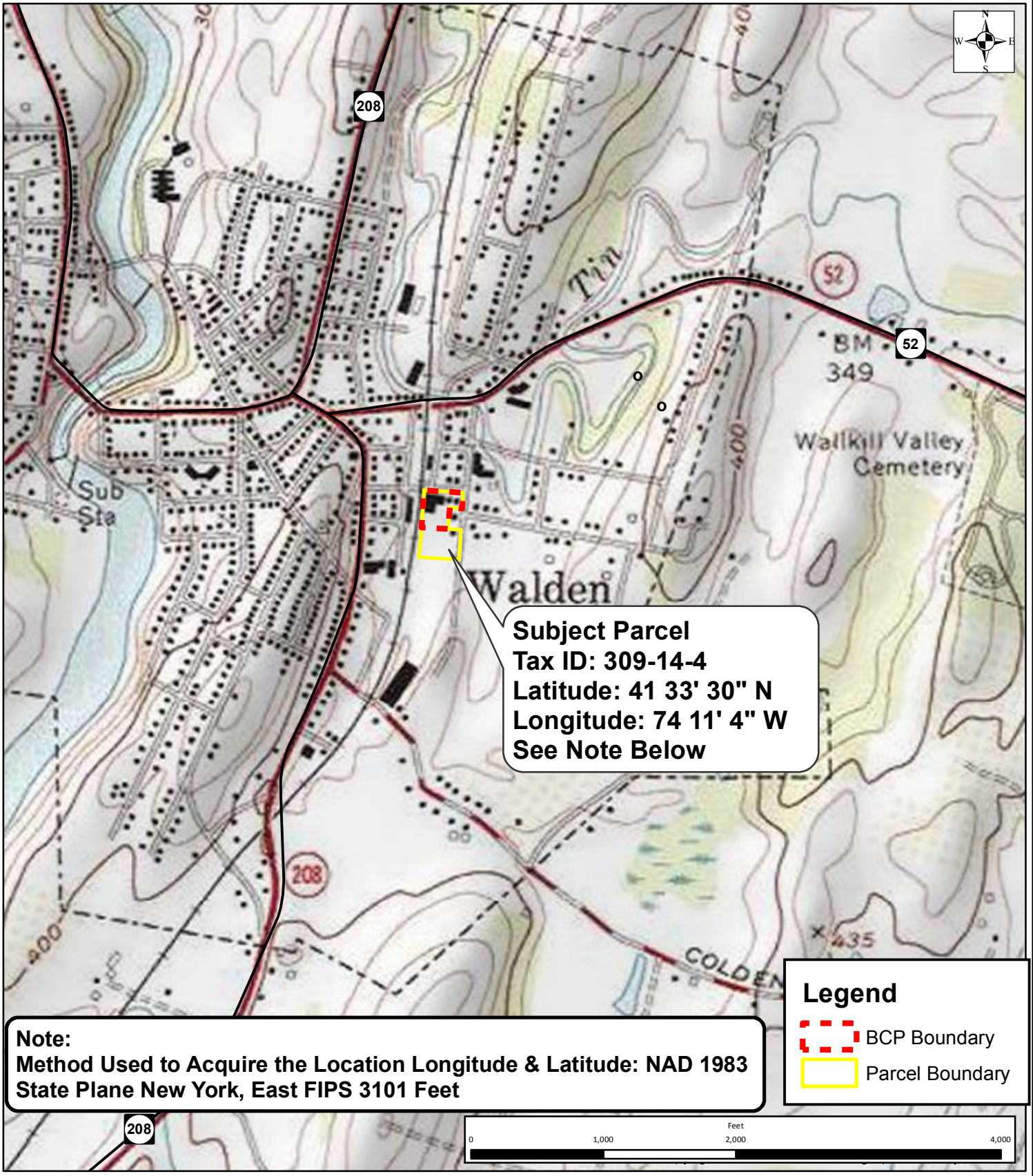
The Periodic Review Report will be submitted in electronic format to NYSDEC Central Office, Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 CORRECTIVE MEASURES PLAN

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a corrective measures plan will be submitted to the NYSDEC for approval. This

plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.

FIGURES



THE Chazen COMPANIES®
ENGINEERS/SURVEYORS
PLANNERS
ENVIRONMENTAL SCIENTISTS
LANDSCAPE ARCHITECTS

Dutchess County Office:
21 Fox Street, Poughkeepsie, NY 12601
Phone: (845) 454-3980

Capital District Office:
547 River Street, Troy, NY 12180
Phone: (518) 273-0055

Glens Falls Office:
100 Glen Street, Glens Falls, NY 12801
Phone: (518) 812-0513

Estate of Hy Hilzen

Figure 1 - Site Location Map

29 Grant Street
Village of Walden, Orange County, New York

Source: U.S.G.S. Topographic Map Dated 1978, Photo Revised 1980: USGS Ref. Code: Walden - 41074-E2-TF-024; Village of Walden 2007 Tax Parcel Data; State of New York DOT 2008 Roads dataset.

Drawn:	SCP/STF
Date:	July 2013/Feb. 2015
Scale:	1 inch = 1,000 feet
Project:	41115.00
Figure:	1

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LEGEND:

- PROPERTY LINE NO PHYSICAL BOUNDS
- ADJACENT PROPERTY LINE
- EXISTING PROPERTY EASEMENT
- EXISTING BUILDING
- CONC. CURB — EXISTING CURB/GUTTER
- GRAVEL — EXISTING GRAVEL DRIVEWAY
- EXISTING GUIDERAIL
- EXISTING FENCE
- EXISTING TREE LINE
- EXISTING BRUSH LINE
- OHW — EXISTING OVERHEAD WIRES
- G — EXISTING GAS LINE

SYMBOLS:

- EXISTING SIGN
- MB — EXISTING MAILBOX
- PST — EXISTING POST
- IPF — EXISTING IRON PIPE FOUND
- IRF — EXISTING IRON ROD FOUND
- MNS — EXISTING MAGNETIC NAIL SET
- TONE — EXISTING MAGNETIC READING/TONE
- STKF — EXISTING STAKE FOUND
- EXISTING SANITARY MANHOLE
- EXISTING CLEANOUT
- EXISTING DRAINAGE MANHOLE
- EXISTING CATCH BASIN
- RL — EXISTING ROOF DRAIN LEADER
- EXISTING GUY WIRE
- EXISTING UTILITY POLE
- EXISTING UTILITY POLE W/ LIGHT
- EXISTING AIR CONDITION COMPRESSOR
- EXISTING PANEL/SWITCH BOX
- UGC — EXISTING CONDUIT TO/FROM UNDERGROUND
- EXISTING SATELLITE DISH
- GAS — EXISTING GAS STRUCTURE
- EXISTING GAS VALVE
- EXISTING WELL
- EXISTING HYDRANT
- EXISTING AUTO SPKLR. HYDRANT
- EXISTING WATER SHUT OFF VALVE
- EXISTING WATER VALVE
- EXISTING UNKNOWN MANHOLE
- EXISTING MONITORING WELL
- EXISTING UTILITY VALVE
- VENT — EXISTING VENT

EASEMENT NOTES:

WITH RESPECT TO OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY TITLE NO. 437-O-ORT HAVING AN EFFECTIVE DATE OF NOVEMBER 15, 2013,
SCHEDULE B:

32. UTILITY COMPANY EASEMENT IN LIBER 3412 OF DEEDS AT PAGE 316 (20' WIDE EASEMENT AND RIGHT OF WAY FOR UNDERGROUND GAS PIPELINE). [AFFECTS THE SUBJECT PARCEL APPROXIMATE LOCATION SHOWN HEREON, THE CENTERLINE OF WHICH BEGINS AT A POINT ON THE WESTERLY SIDE OF ELM STREET 26' NORTHERLY OF POLE CRAMBERRED 38 OF LINE NUMBER 927, EXTENDING WESTERLY 102± AND 120'± SOUTHWESTERLY AND SOUTHERLY 2'± TO THE WESTERLY SIDE OF GRANTORS PACKAGED LIGHTING BUILDING].

33. RIGHTS AND AGREEMENTS FOUND IN LIBER 1798 CP 967.

34. DRIVEWAY EASEMENT RECITED IN MANY DEEDS OF RECORD (INCLUDING SUBJECT PARCEL DEED, LIBER 5915 OF DEEDS AT PAGE 303, PARCEL NO. 2) [AFFECTS THE SUBJECT PARCEL AND IS SHOWN HEREON]

DEED REFERENCE:

ESTATE OF HY HILZEN BY MICHAEL DANIELS AND WILLIAM MARLIEB, CO-EXECUTORS TO GRANT STREET FACTORY, INC. DATED JANUARY 21, 2014 AND FILED IN THE OFFICE OF THE ORANGE COUNTY CLERK ON FEBRUARY 7, 2014 IN BOOK 13714 PAGE 0186.

TAX PARCEL NUMBER:

VILLAGE OF WALDEN, ORANGE COUNTY, NEW YORK
SECTION 309 BLOCK 14 LOT 4

AREA:

SUBJECT PARCEL= 3.08 AC.

PROPERTY ADDRESS:

29 GRANT STREET, WALDEN, NY 12586

NOTES:

UNAUTHORIZED ALTERATION OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

ONLY COPIES FROM THE ORIGINAL OF THIS SURVEY MARKED WITH AN ORIGINAL OF THE LAND SURVEYOR'S INKED SEAL OR HIS EMBOSSED SEAL SHALL BE CONSIDERED TO BE VALID TRUE COPIES.

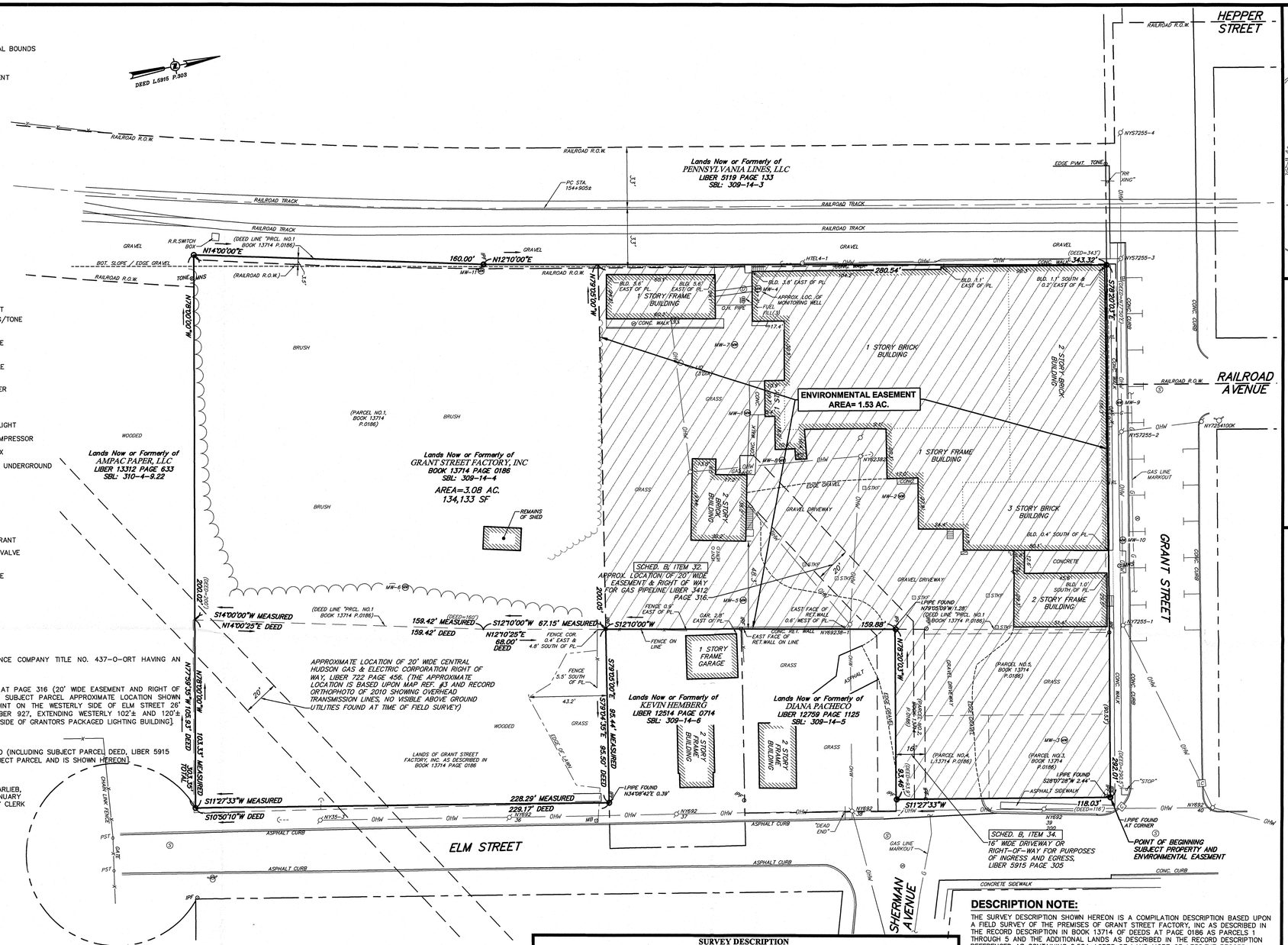
SURVEYED FROM RECORD DESCRIPTION AND AS IN POSSESSION.

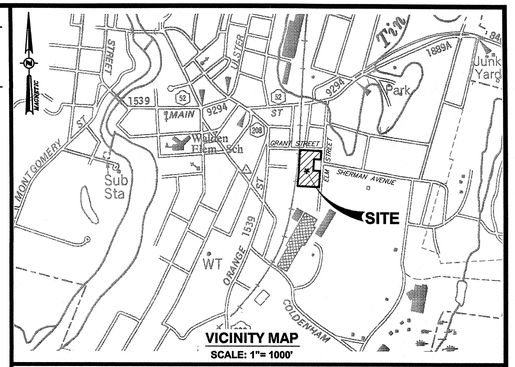
SUB-SURFACE STRUCTURES NOT VISIBLE OR READILY APPARENT ARE NOT SHOWN AND THEIR LOCATION AND EXTENT ARE NOT CERTIFIED.

BUILDINGS SHOWN HEREON SERVED BY UNDERGROUND UTILITIES.

ENVIRONMENTAL EASEMENT NOTE:

THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THIS EASEMENT ARE SET FORTH IN THE SITE MANAGEMENT PLAN (SMP). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP CAN BE OBTAINED FROM NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233.





SURVEY DESCRIPTION
SUBJECT PROPERTY
LANDS OF GRANT STREET FACTORY, INC.

ALL that plot, piece or parcel of land situate and being in the Village of Walden, Town of Montgomery, County of Orange, State of New York, bounded and described as follows:

BEGINNING at a point marked by an iron pipe found at the intersection of the southerly line of Grant Street with the westerly side of Elm Street, said point being the northeasterly corner of the herein described parcel of land and being located N28°07'29"E 2.44 feet from another iron pipe found, and running; thence southerly along the westerly side of Elm Street S 11°27'33" W 118.03 feet to an iron pipe found; thence along the northerly line of lands now or formerly of Diana Pacheco as described in liber 12759 of deeds at page 1125, N 78°20'03" W 93.46 feet to a point being S79°05'09"E 1.28 feet from an iron pipe found; thence along the westerly line of said lands of Pacheco and also along the westerly line of lands now or formerly of Kevin Hemberg as described in liber 12514 of deeds at page 714, S 12°10'00" W 159.88 feet to an iron rod found; thence along the southerly line of said lands of Hemberg, S 79°05'00" E 95.44 feet to a point being S34°08'42"W 0.39 feet of an iron pipe found at the westerly side of Elm Street; thence along the westerly side of Elm Street, S 11°27'33" W 228.29 feet; thence westerly along lands now or formerly of Ampac Paper, LLC as described in liber 13312 of deeds at page 633, N 78°00'00" W 303.35 feet to a point; thence along the westerly line of the herein described parcel, N 14°00'00" E 160.00 feet to an iron pipe found; thence continuing along the westerly line of the herein described parcel, N 12°10'00" E 343.32 feet to a point on the southerly side of Grant Street; thence along the southerly side of Grant Street, S 78°20'03" E 292.01 feet, passing through an iron pipe found at 201.48 feet, to the point or place of beginning;

CONTAINING AN AREA OF 134,133 SF OR 3.08 AC. OF LAND MORE OR LESS

RECORD DESCRIPTION (AS IT APPEARS IN DEED BOOK 13714 PAGE 0186)
SUBJECT PROPERTY
LANDS OF GRANT STREET FACTORY, INC.

ALL that certain lot, pieces or parcel of land with the buildings and improvements thereon, situate, lying and being in the VILLAGE OF WALDEN, TOWN OF MONTGOMERY, County of Orange and State of New York, bounded and described as follows:

PARCEL NO. 1

BEGINNING at a point in the easterly line of Wallkill Valley Railway at the intersection of a high picket fence; RUNNING THENCE along the said Railroad Company's lands, North 14°00'00" East, 160 feet; THENCE along same North 12°10'00" East, 343 feet to its intersection with the southerly line of Grant Street; THENCE along said southerly line of Grant Street South 77°50'00" East, 200 feet to the line of H.B. Wooster's lot marked by an old picket fence; THENCE along the said Wooster and other lots South 12°10'00" West, 343 feet to a point in the fence; THENCE along same South 14°00'00" West, 160 feet to a corner post in the fence; and THENCE along the fence North 78°00'00" West, 200 feet to the point or place of BEGINNING.

PARCEL NO. 2

BEGINNING at a point on the westerly side of Elm Street, which said point is marked by an iron and is the northeasterly corner of the premises herein described; and RUNNING THENCE in a westerly direction along the southerly line of premises of Bodine and premises of DuBois; a distance of 93.9 feet, more or less, to a point marked by an iron set on the easterly line of premises owned by Spence Engineering Company, Inc.; THENCE in a southerly direction, along the easterly line of premises of the aforesaid Spence Engineering Company, Inc., a distance of 16 feet to a point marked by an iron set on the lands formerly of Mary Craplis and now of John R. Noonan; THENCE in an easterly direction through the lands formerly of Mary Craplis (now John R. Noonan) parallel to the first mentioned course, a distance of 93.9 feet, more or less, to an iron set on the westerly side of Elm Street; THENCE in a northerly direction along the westerly side of Elm Street a distance of feet to the point or place of BEGINNING.

FOR CONVEYEANCE ONLY:

EXCEPTING AND RESERVING to John R. Noonan, his heirs and amigos, the right and privilege of using the foregoing premises as a driveway or right-of-way for purposes of ingress and egress from premises of said John R. Noonan, lying southerly of the foregoing described premises.

PARCEL NO. 3

Bounded and described as follows: On the NORTH by Grant Street; on the EAST by Creamery Street, on the WEST by lands now or formerly of William Bray; and on the SOUTH by lands now or formerly of Thomas Hepper, being 45 feet 6 inches front and rear and 65 feet deep.

Bounded and described as follows: On the NORTH by lands now or formerly of C. Fred Fowler; on the EAST by Creamery Street; on the WEST by lands now or formerly of William Bray, and on the SOUTH by lands now or formerly of Thomas Hepper being 45 feet 6 inchesfront and rear and 35 feet deep.

PARCEL NO. 5

Bounded and described as follows: NORTH by Grant Street, EAST by lands formerly of John Cates, now or formerly of C. Fred Fowler; SOUTH by lands now or formerly of Thomas Hepper; WEST by lands belonging to the foundry. Being a lot of land 45 feet front and rear and 100 feet deep.

Note: Being District, Section 309, Block(s) 14, Lot(s) 4, Tax Map of the Town of Montgomery, County of Orange.
Note: Lot and Block shown for Informational purposes only.

Also the land described as follows:
All that certain piece or parcel of land, with buildings and improvements thereon erected, situate, lying and being in the Village of Walden, County of Orange, and the State of New York and being more particularly bounded and described as follows:

Beginning at an iron pipe found on the westerly side of Elm Street, said point being the southeasterly most corner of the lands reputedly of Hermberg and also being 158.31 feet southerly from an iron pipe found; thence from said point or place of beginning and along the westerly side of said Elm Street South 13°39'45" West a distance of 229.17 feet; thence along the lands reputedly of Interstate Acquisition Corp., North 75°10'00" West a distance of 105.93 feet; thence the following two (2) courses and distances through the lands of Hilzen, 1) North 16° 50'00" East a distance of 159.42 feet, 2) North 15°00'00" Est a distance of 68.00 feet; thence along the lands reputedly of said Hermberg, South 76°15'00" East a distance of 95.50 feet to the point or place of beginning, and containing 0..524 acres of land more or less.

DESCRIPTION NOTE:

THE SURVEY DESCRIPTION SHOWN HEREON IS A COMPILATION DESCRIPTION BASED UPON A FIELD SURVEY OF THE PREMISES OF GRANT STREET FACTORY, INC AS DESCRIBED IN THE RECORD DESCRIPTION IN BOOK 13714 OF DEEDS AT PAGE 0186 AS PARCELS 1 THROUGH 5 AND THE ADDITIONAL LANDS AS DESCRIBED IN THE RECORD DESCRIPTION REFERENCED AS CONTAINING 0.524 ACRES OF LAND MORE OR LESS.THE RECORD DESCRIPTION CONTAINS 2 DIFFERENT BEARING MERIDIANS FOR PARCEL 1 AND THE LAST PARCEL. CHAZEN CHOSE PARCEL 1 AS THE BASIS FOR THE SURVEY BEARING SYSTEM.

THE RECORD DESCRIPTION CONTAINS 6 PARCELS WITH PARCEL NO. 1 BEING DESCRIBED BY METES AND BOUNDS WITH A MIS-CLOSURE OF 0.58 FEET AND PARCELS NO. 2 THROUGH NO. 5 BEING GENERALLY DESCRIBED BY DISTANCE AND ADJOINING LAND OWNERSHIP AND SUBJECT TO THE INTERPRETATION OF FOUND EVIDENCE. THE ADDITIONAL 0.524 ACRE PARCEL REFERENCED ABOVE HAD A MIS-CLOSURE OF 0.01'.

MAP REFERENCE:

1. REFERENCE IS HEREBY MADE TO A CERTAIN MAP ENTITLED "RIGHT OF WAY AND TRACK MAP THE WALLKILL VALLEY R. R. OPERATED BY THE NEW YORK CENTRAL RAILROAD COMPANY AS LESSEE MAIN LINE WALDEN FROM STA. 147+754 TO STA. 158+314" PREPARED BY THE OFFICE OF VALUATION ENGINEER GRAND CENTRAL TERMINAL NEW YORK, NY, DATED JUNE 30th 1917.

2. REFERENCE IS HEREBY MADE TO A CERTAIN MAP ENTITLED "MAP OF LOTS OF THE ORANGE LAND COMPANY WALDEN, N.Y." FILED IN THE OFFICE OF THE ORANGE COUNTY CLERK ON JANUARY 5, 1911 AS MAP #893.

3. REFERENCE IS HEREBY MADE TO A CERTAIN MAP ENTITLED "CENTRAL HUDSON GAS & ELECTRIC CORP. WALDEN-MONROE 66 KV. LINE PLAN AND PROFILE" FILE NO. 20-P-3610, SHEET 3 OF 11 DATED "CHANGE NO. 11 8-4-04 UPDATE TINBROOK". (MAP PROVIDED BY CENTRAL HUDSON GAS & ELECTRIC CORP.)

SURVEY DESCRIPTION
ENVIRONMENTAL EASEMENT, SITE #C336079

ALL that plot, piece or parcel of land situate and being in the Village of Walden, Town of Montgomery, County of Orange, State of New York, bounded and described as follows:

BEGINNING at a point marked by an iron pipe found at the intersection of the southerly line of Grant Street with the westerly side of Elm Street, said point being the northeasterly corner of the herein described Environmental Easement and being located N28°07'28"E 2.44 feet from another iron pipe found, and running; thence southerly along the westerly side of Elm Street S 11°27'33" W 118.03 feet to an iron pipe found; thence along the northerly line of lands now or formerly of Diana Pacheco as described in liber 12759 of deeds at page 1125, N 78°20'03" W 93.46 feet to a point being S79°05'09"E 1.28 feet from an iron pipe found; thence along the westerly line of said lands of Pacheco and also along the westerly line of lands now or formerly of Kevin Hemberg as described in liber 12514 of deeds at page 714, S 12°10'00" W 159.88 feet to an iron rod found; thence through the lands of Grant Street Factory, Inc. as described in Book 13714 of deeds at page 0186, N 79°05'00" W 200.05 feet to the southwesterly corner of the herein described Environmental Easement; thence along the westerly line of Grant Street Factory, Inc. and the herein described Environmental Easement, N 12°10'00" E 280.54 feet to a point on the southerly side of Grant Street; thence along the southerly side of Grant Street, S 78°20'03" E 292.01 feet, passing through an iron pipe found at 201.48 feet, to the point or place of beginning;

CONTAINING AN AREA OF 1.53 AC. OF LAND MORE OR LESS

ALTA/ACSM CERTIFICATION:

TO:
NEW YORK STATE - DEPARTMENT OF ENVIRONMENTAL CONSERVATION
GRANT STREET FACTORY, INC.
OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE "2011 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS", JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2, 4, 7a, 8, 11A, 12, 13, AND 14 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON MAY 7, 2013.

STATE OF NEW YORK · STEVEN JAY ALEX · 050016 · LICENSED LAND SURVEYOR

November 13, 2014
Date

STEVEN J ALEX, PLS.
REGISTERED SURVEYOR, STATE OF NEW YORK
REGISTRATION NO. 050016

30 0 30
SCALE IN FEET
1"=30'

10M 0 10M
SCALE IN METERS

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rev.	date	description
1	11/12/14	REVISE LIMITS OF ENVIRONMENTAL EASEMENT AND SURVEY DESCRIPTION

29 GRANT STREET - GRANT STREET FACTORY, INC

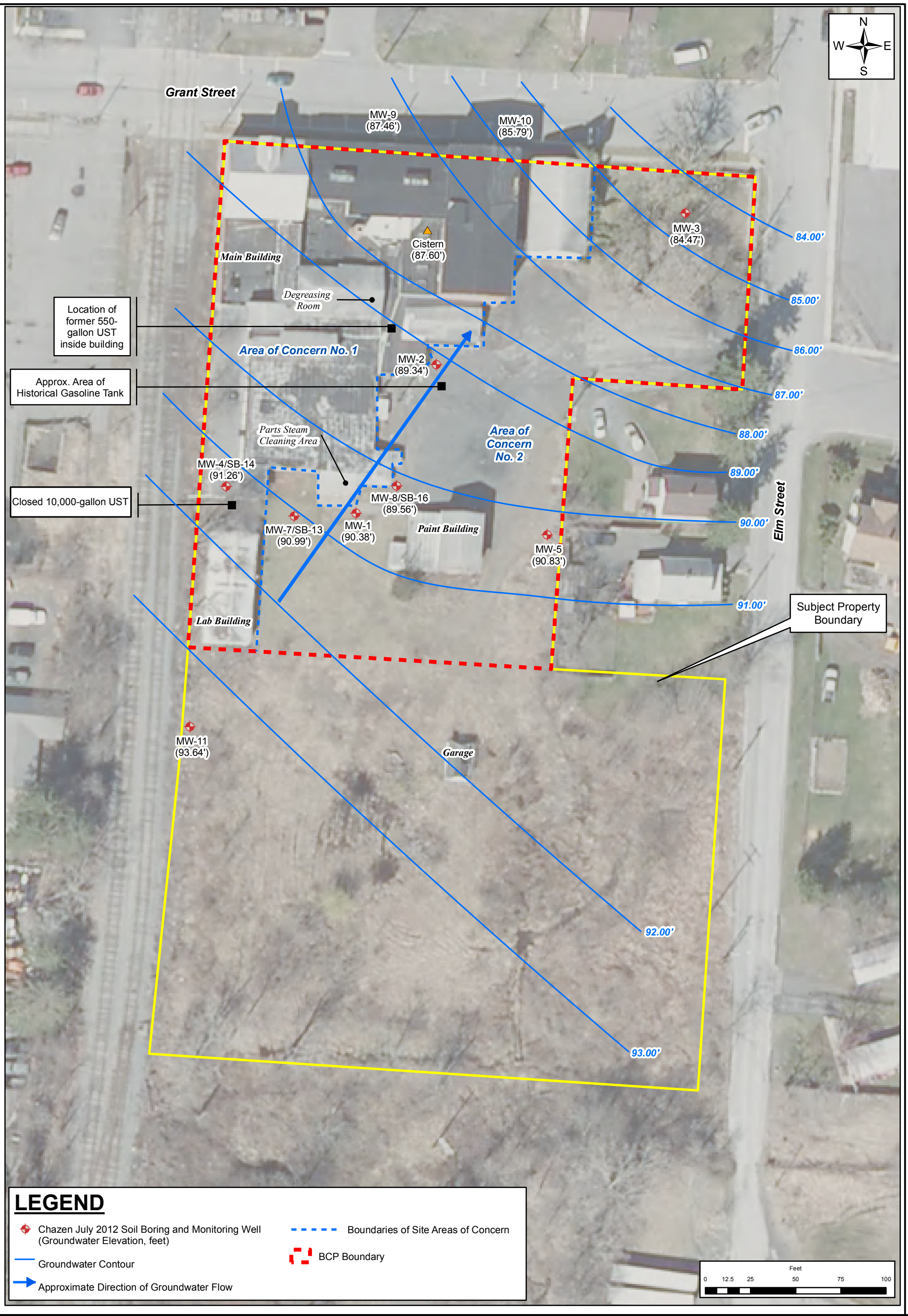
ALTA/ACSM LAND TITLE SURVEY PREPARED FOR STATE OF NEW YORK - DEPT. OF ENVIRONMENTAL CONSERVATION

VILLAGE OF WALDEN, TOWN OF MONTGOMERY, ORANGE COUNTY, NEW YORK

designed	checked
CJS	SJA
date	scale
05/30/13	1"=30'
project no.	
41115.01	
sheet no.	
SV1	
1 OF 1	

Drawing Name: X:\41100-41199\41115.00 Hilzen BCP Walden NY\SURVEY\DWG\05_SV1_41115-00_ALTA.dwg
Xref's Attached: XBASE-SVY_41115-00
Date Printed: Nov 13, 2014, 10:24am

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Former Packaged Lighting Systems, Inc. Site

Figure 3 - Groundwater Contour Map

29 Grant Street
Village of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010; Proposed Features Drawn by Chazen, 2011-2012.

Drawn:	EJO/STF
Date:	March 2015
Scale:	1 inch equals 50 feet
Project:	41115.00
Figure:	3

Document Path: X:\4\41100-41199\41115.00 Hilzen BCP Walden NY\RI\RI Report\Figures\GIS Maps\F5B_GW Contour_Nov 2012_WithBCPBoundary.mxd



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Former Packaged Lighting Systems, Inc. Site

Figure 4A - Surface Soil Sample Locations Exceeding Unrestricted Use SCOs

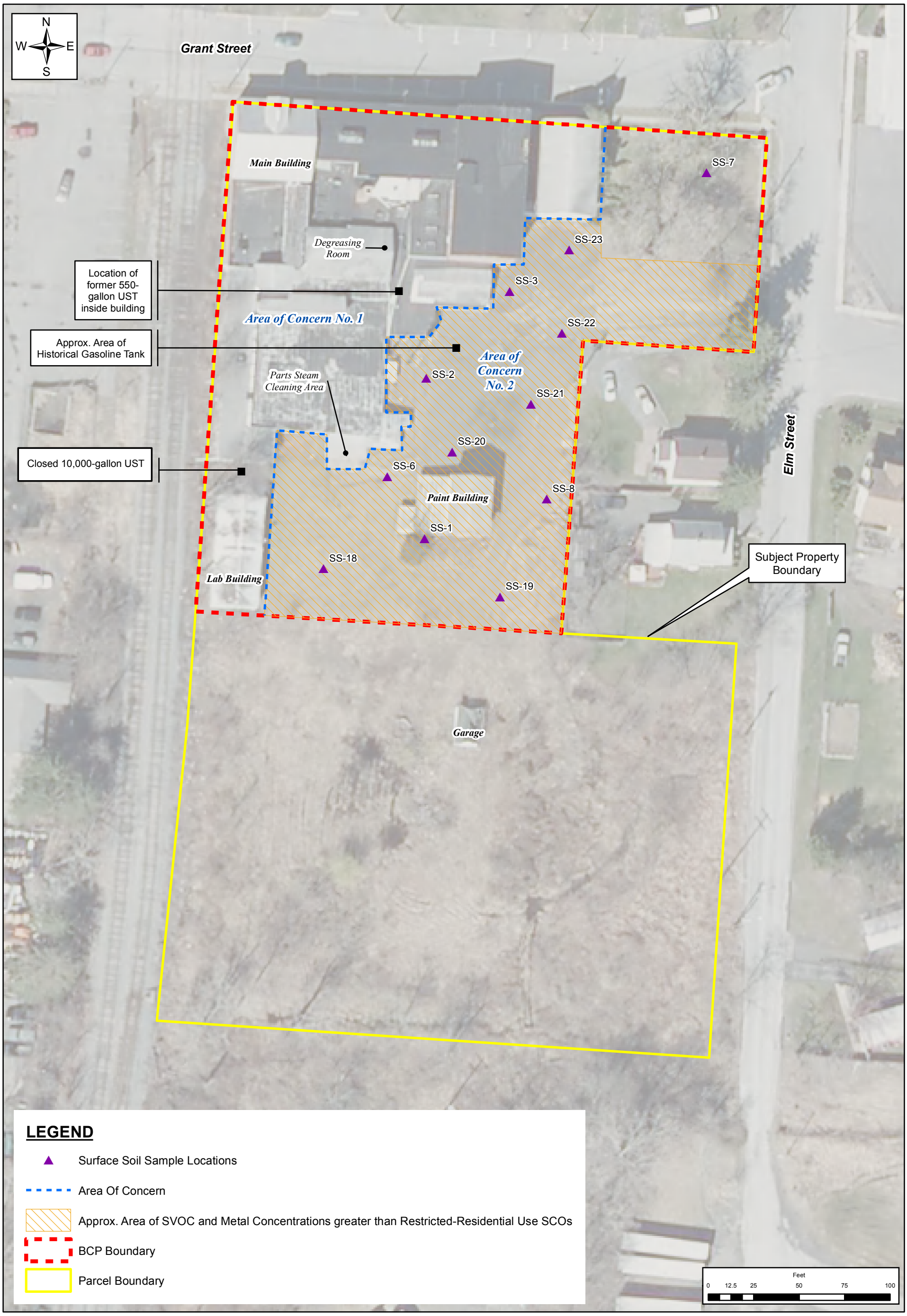
29 Grant Street

Village of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/STF
Date:	7/27/2017
Scale:	1 inch equals 50 feet
Project:	41115.00
Figure:	4A

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Former Packaged Lighting Systems, Inc. Site

Figure 4B - Surface Soil Sample Locations Exceeding Restricted-Residential Use SCOs

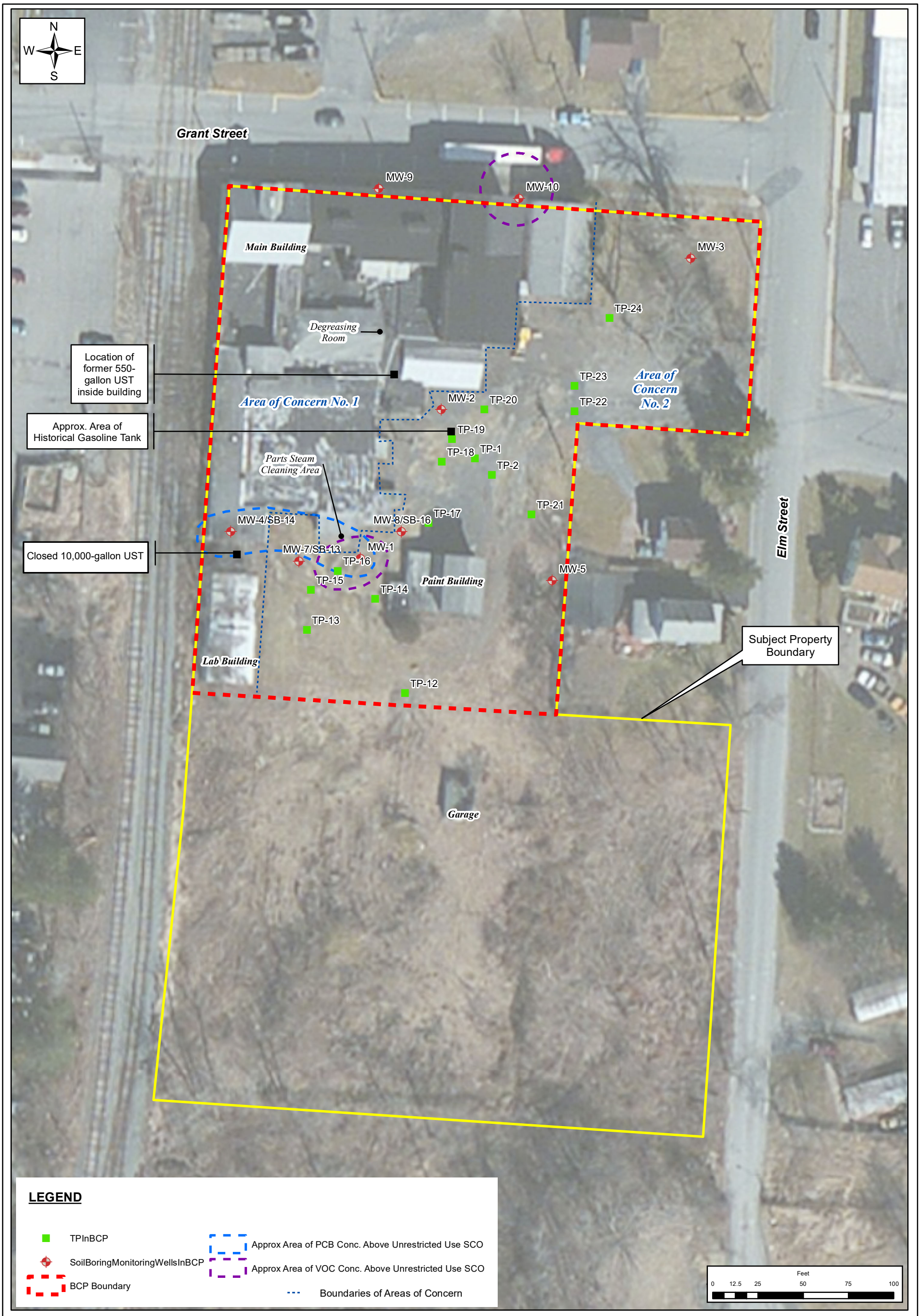
29 Grant Street

Village of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/STF
Date:	11/12/2015
Scale:	1 inch equals 50 feet
Project:	41115.00
Figure:	4B

Document Path: X:\4\41100-41199\41115.00 Hilzen BCP Walden NY\RI\RI Report\Figures\GIS Maps\F6_Surface Soil SVOC and Metals_Jul 2013_with BCP Boundary.mxd



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Former Packaged Lighting Systems, Inc. Site

Figure 4C - Subsurface Soil Exceeding Unrestricted Use Soil Cleanup Objectives

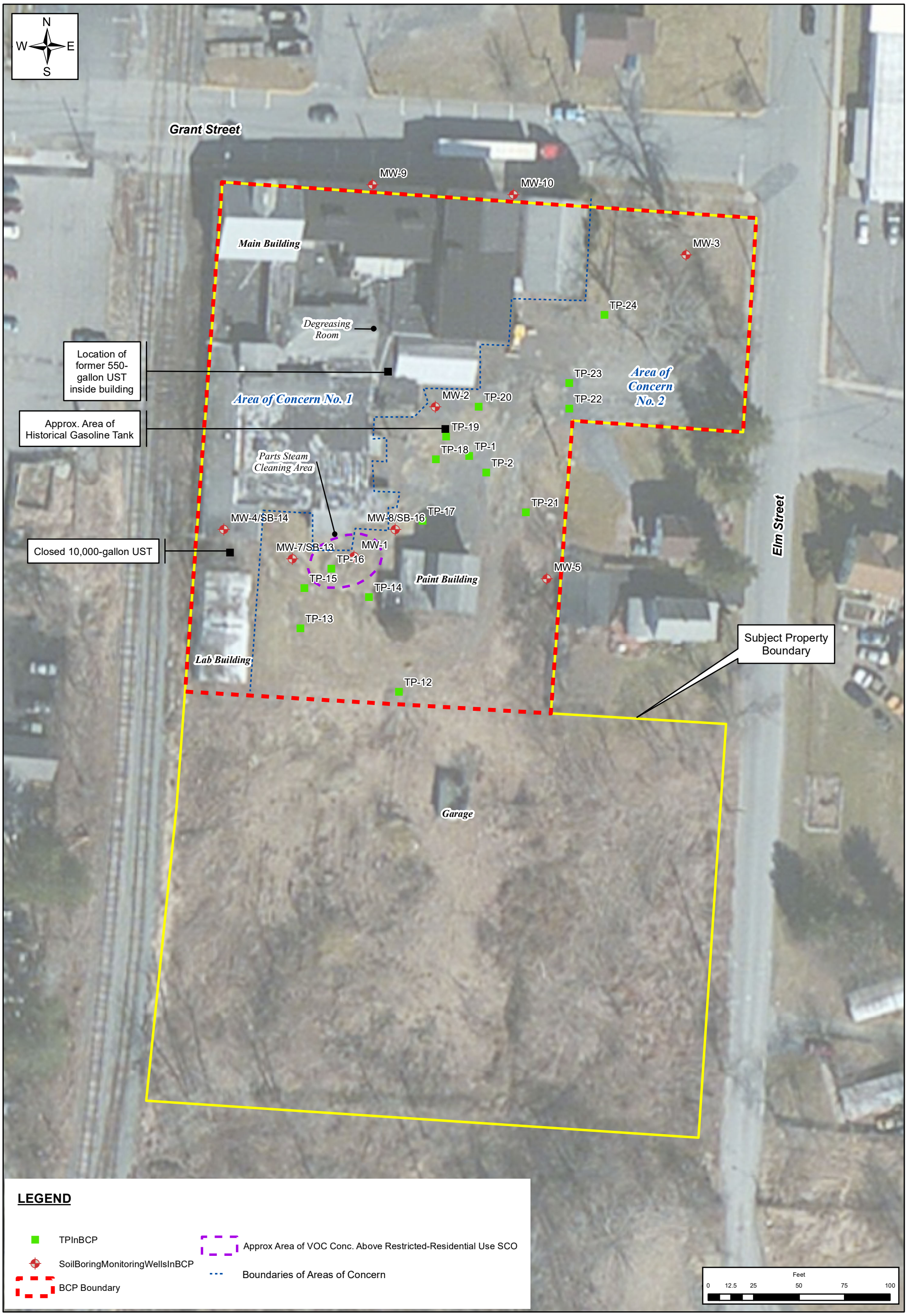
29 Grant Street

Town of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/STF
Date:	July 2017
Scale:	1:600
Project:	41115.00
Figure:	4C

Document Path: Z:\projects\41100-41199\41115.00 Hilzen BCP Walden NY\RI\RI Report\Figures\GIS Maps\4C_Subsurface Soil_Unrestricted Use_SVOC, Metals, PCBs-07272017.mxd



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Former Packaged Lighting Systems, Inc. Site

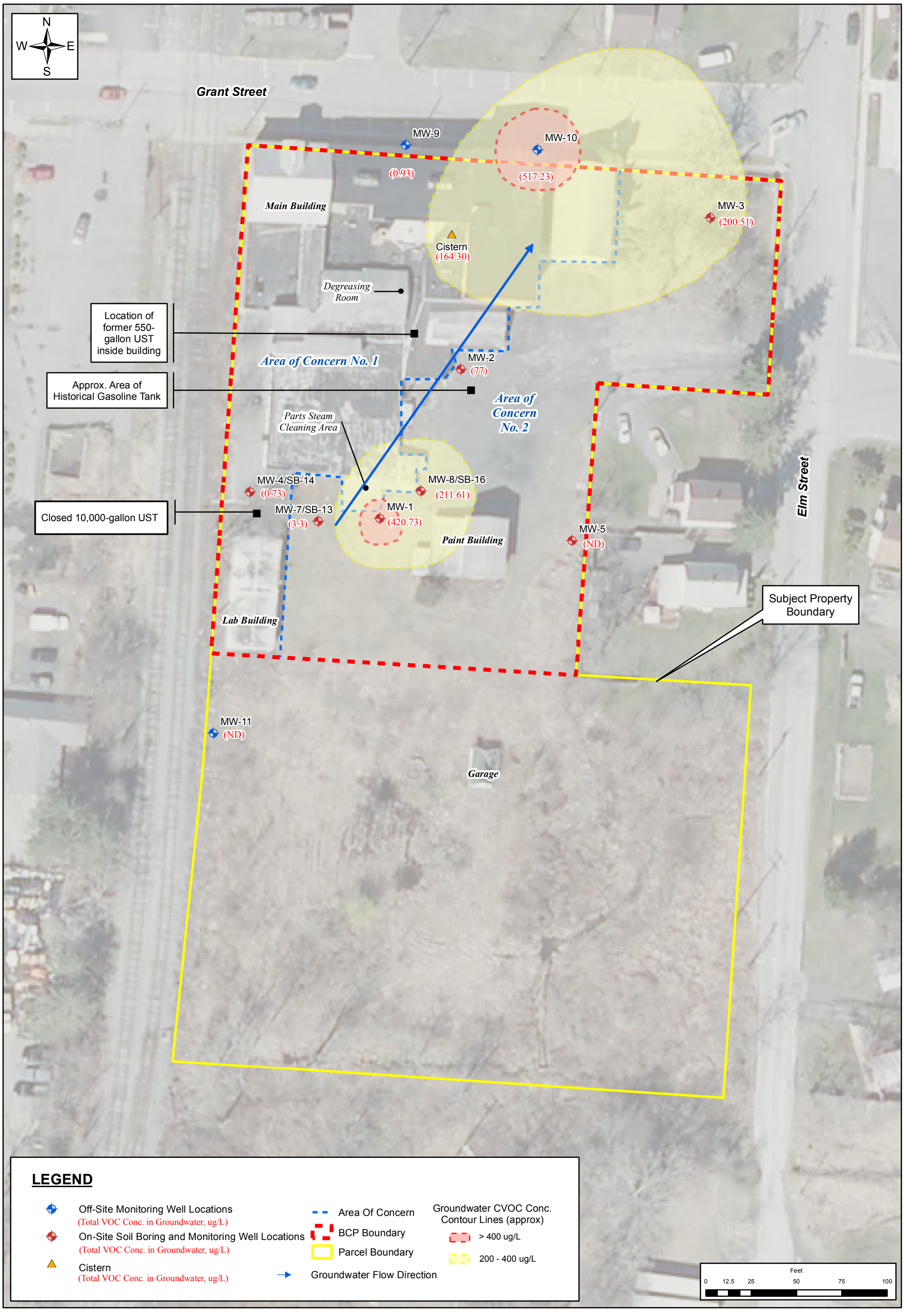
Figure 4D - Subsurface Soil Exceeding Restricted-Residential Use Soil Cleanup Objectives

29 Grant Street
Village of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/STF
Date:	July 2017
Scale:	1:600
Project:	41115.00
Figure:	4D

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Former Packaged Lighting Systems, Inc. Site

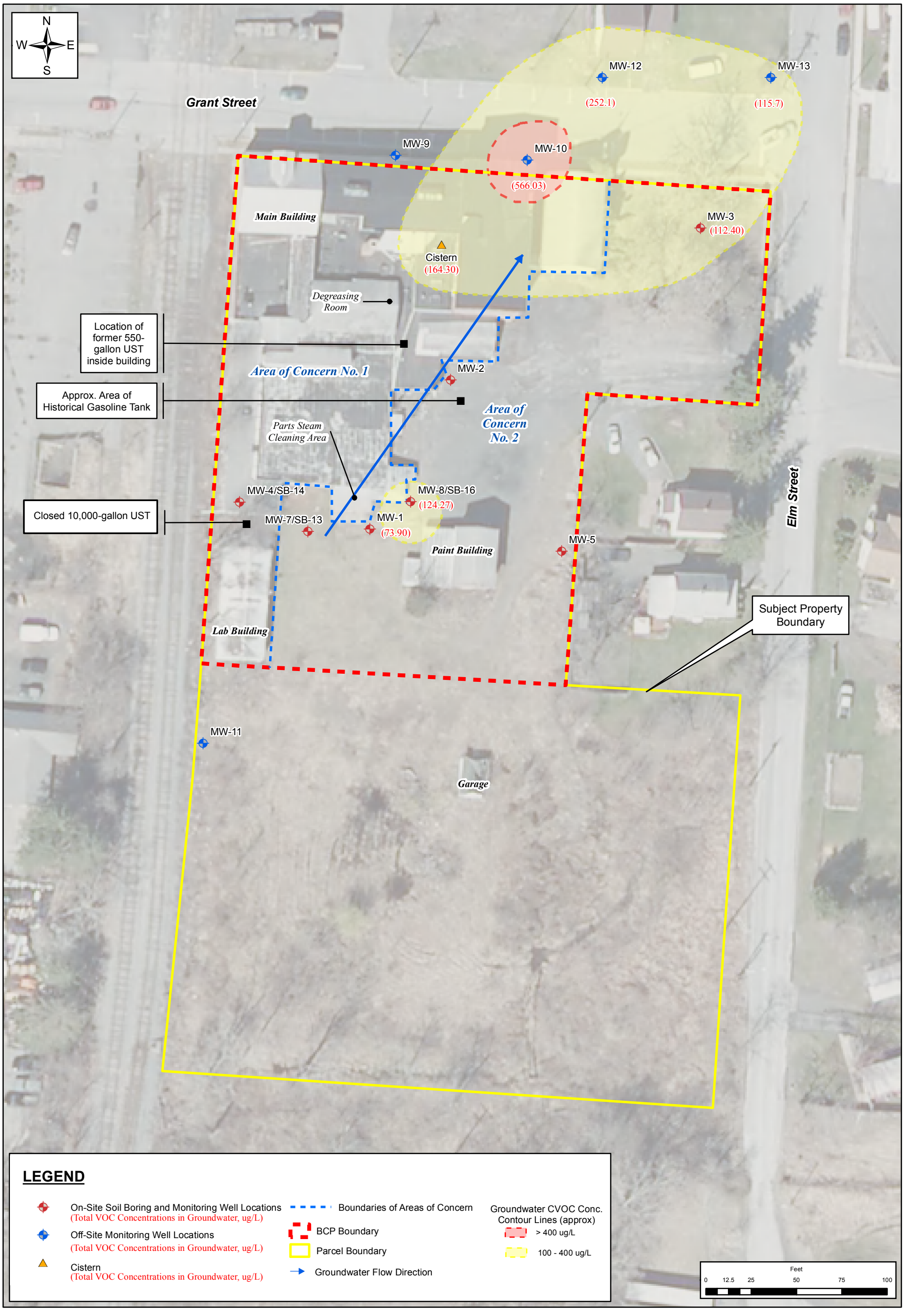
Figure 5A - CVOC Concentrations in Groundwater September 2012

29 Grant Street
Village of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/STF
Date:	March 2015
Scale:	1 inch equals 50 feet
Project:	41115.00
Figure:	5A

Path: X:\4\41100-41199\41115.00 Hilzen BCP Walden NY\RI\RI Report\Figures\GIS Maps\F7A_2012 GW Concentrations_Jul 2013_revised07302014_WithBCPBOundary.mxd



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Former Packaged Lighting Systems, Inc. Site

Figure 5B - CVOC Concentrations in Groundwater May 2013

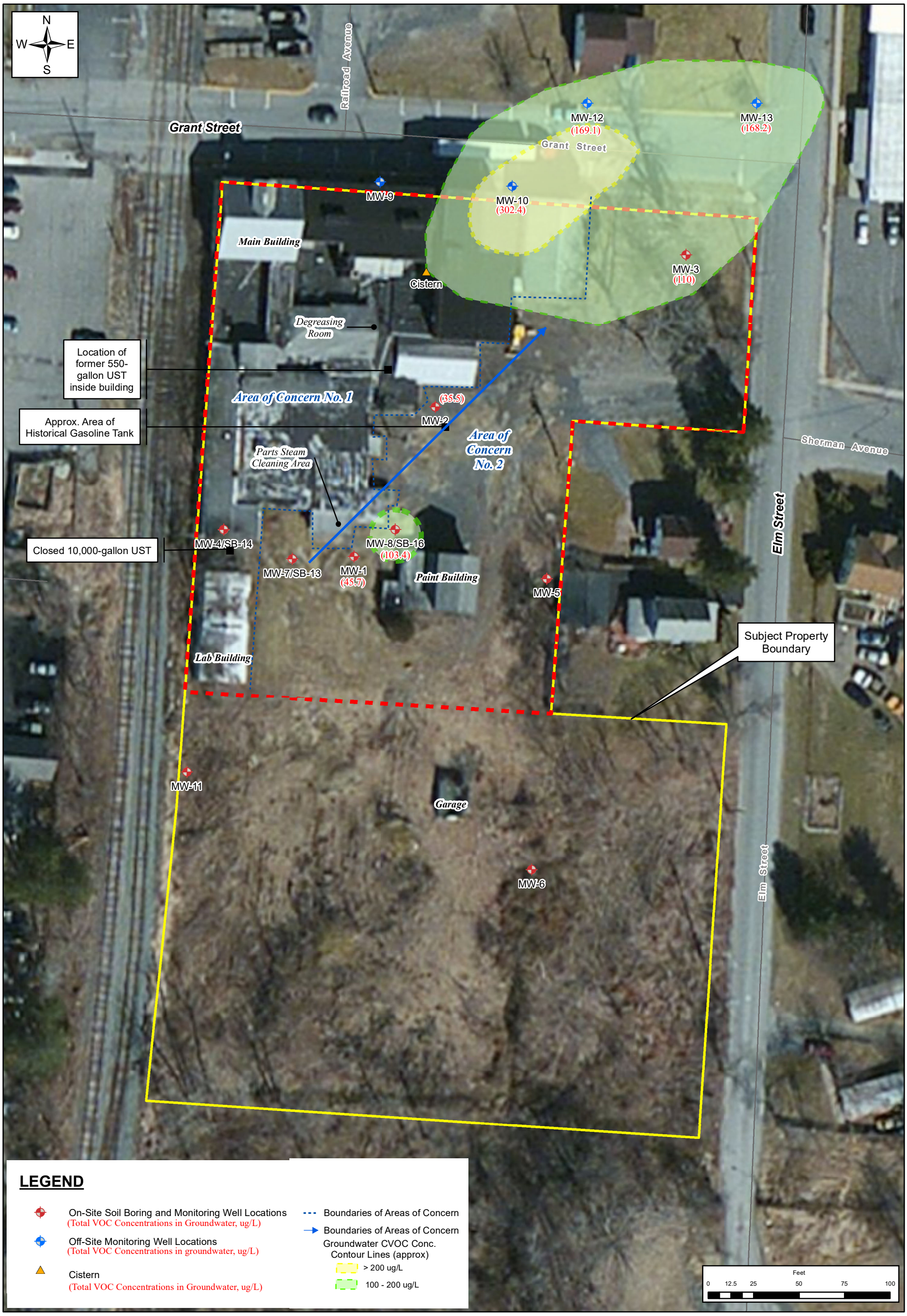
29 Grant Street

Village of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/STF
Date:	March 2015
Scale:	1 inch equals 50 feet
Project:	41115.00
Figure:	5B

Path: X:\4\41100-41199\41115.00 Hilzen BCP Walden NY\RI\RI Report\Figures\GIS Maps\F7B_2013 GW Concentrations_Jul 2013_revised07302014_WithBCPBOundary.mxd



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Former Packaged Lighting Systems, Inc. Site

Figure 5C - CVOC Concentrations in Groundwater June 2014

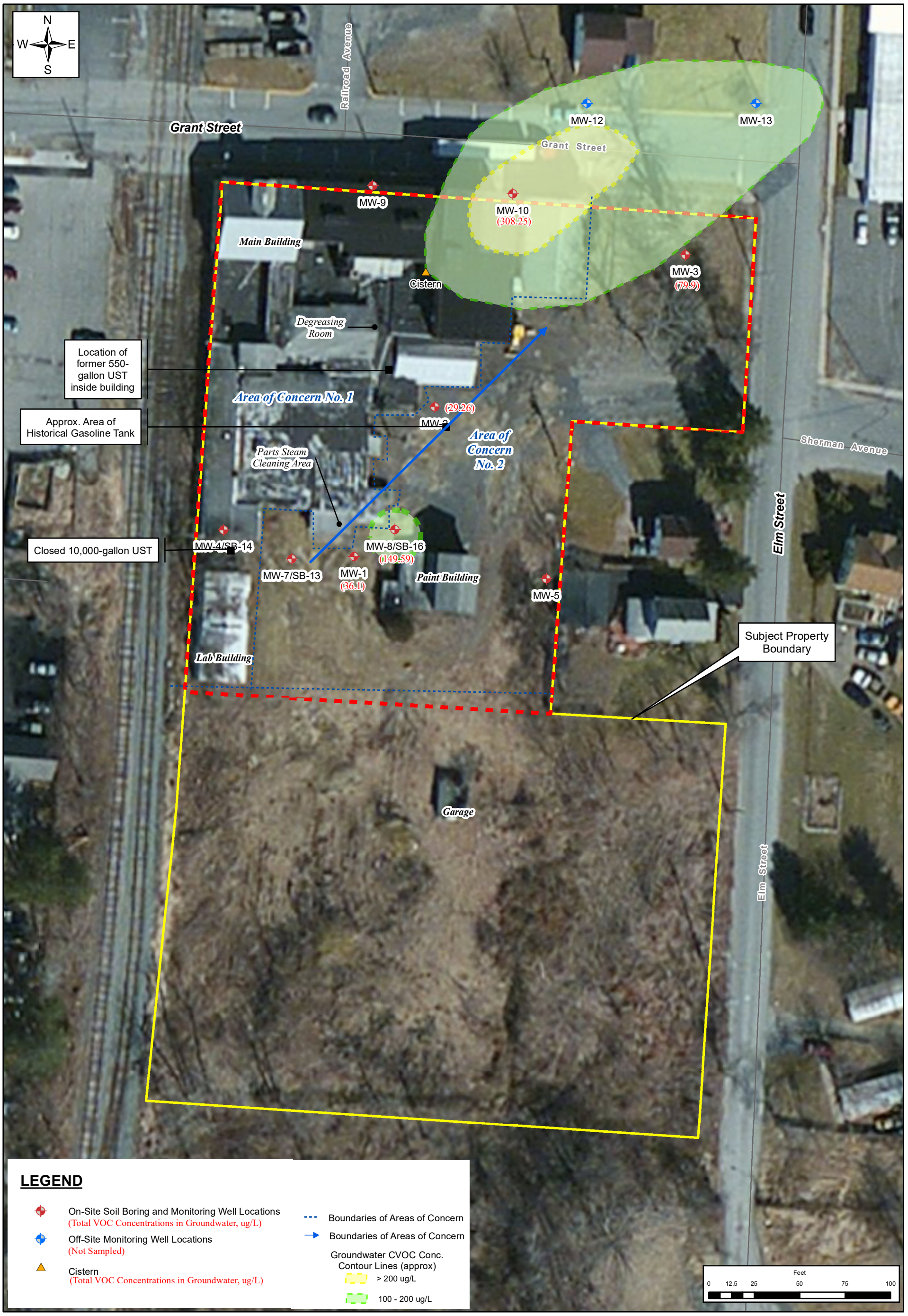
29 Grant Street

Town of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/SF
Date:	November 2015
Scale:	1:600
Project:	41115.00
Figure:	5C

Path: Z:\projects\41100-41199\41115.00 Hilzen BCP Walden NY\SMP\Figures\F5C_2014 GW Concentrations_June_2014_revised07312017.mxd



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Former Packaged Lighting Systems, Inc. Site

Figure 5D - CVOC Concentrations in Groundwater March 2016

29 Grant Street

Town of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/SF
Date:	July 2017
Scale:	1:600
Project:	41115.00
Figure:	5D

Path: Z:\projects\41100-41199\41115.00 Hilzen BCP Walden NY\RI\Figures\F5D_2016 GW Concentrations_March_2016_revised7282017.mxd



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Former Packaged Lighting Systems, Inc. Site

Figure 6 - Indoor Air Quality & Sub-slab Vapor Sample Locations

29 Grant Street
Town of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/STF
Date:	February 2015
Scale:	1 inch equals 50 feet
Project:	41115.00
Figure:	6

Document Path: X:\4\41100-41199\41115.00 Hilzen BCP Walden NY\RI\RI Report\Figures\GIS Maps\F4_IA & SS Sample Locations_Jul 2013_WithBCPBoundary.mxd



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Former Packaged Lighting Systems, Inc. Site

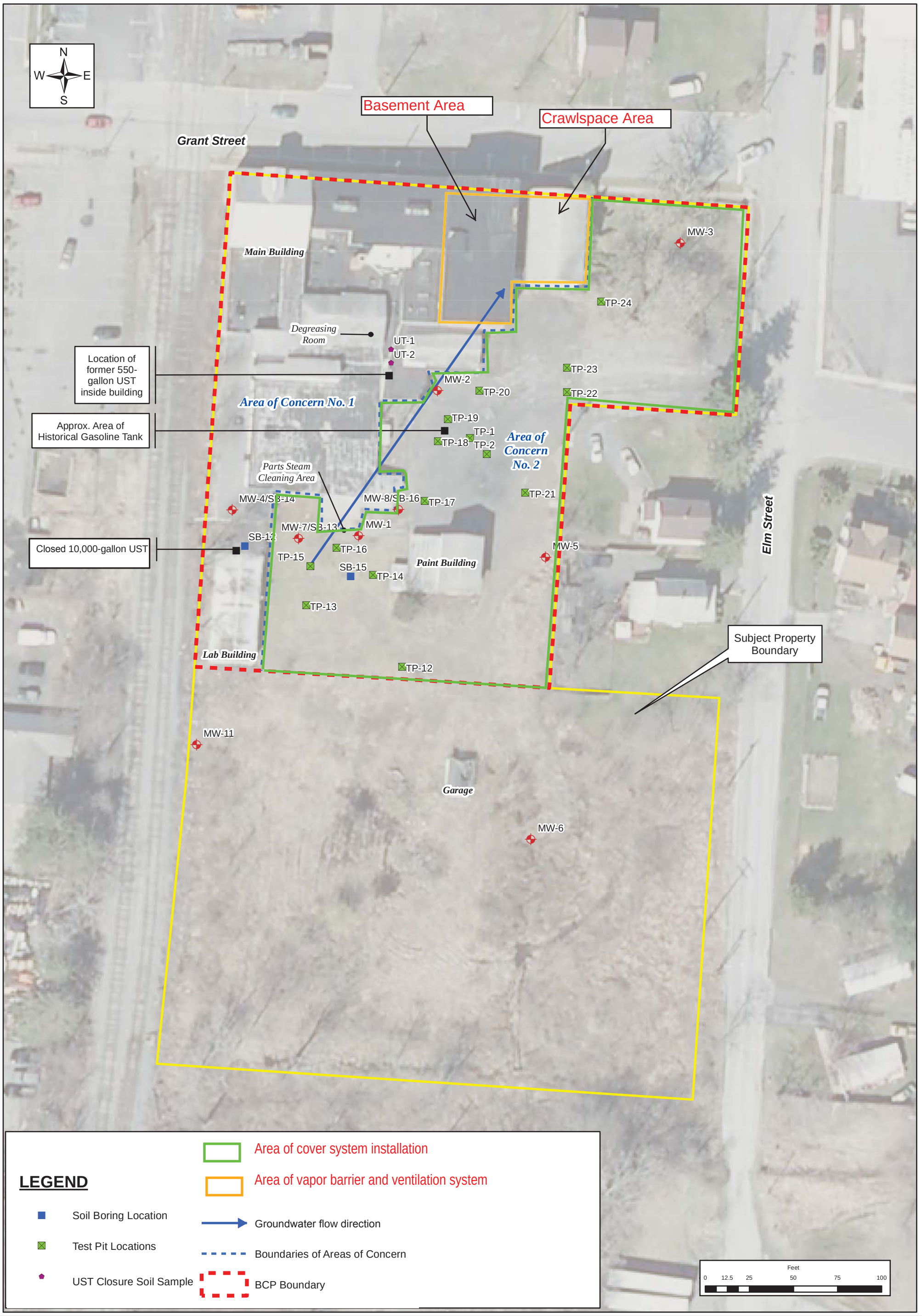
Figure 7 - IRM Injection Point Locations

29 Grant Street
Town of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010; Proposed Features Drawn by Chazen, 2011-2012.

Drawn:	STF
Date:	November 2015
Scale:	1 inch equals 50 feet
Project:	41115.00
Figure:	7

Document Path: X:\4\41100-41199\41115.00 Hilzen BCP Walden NY\RI\RI Report\Figures\GIS Maps\F8_IRM Injection Point Locations.mxd



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Former Packaged Lighting Systems, Inc. Site

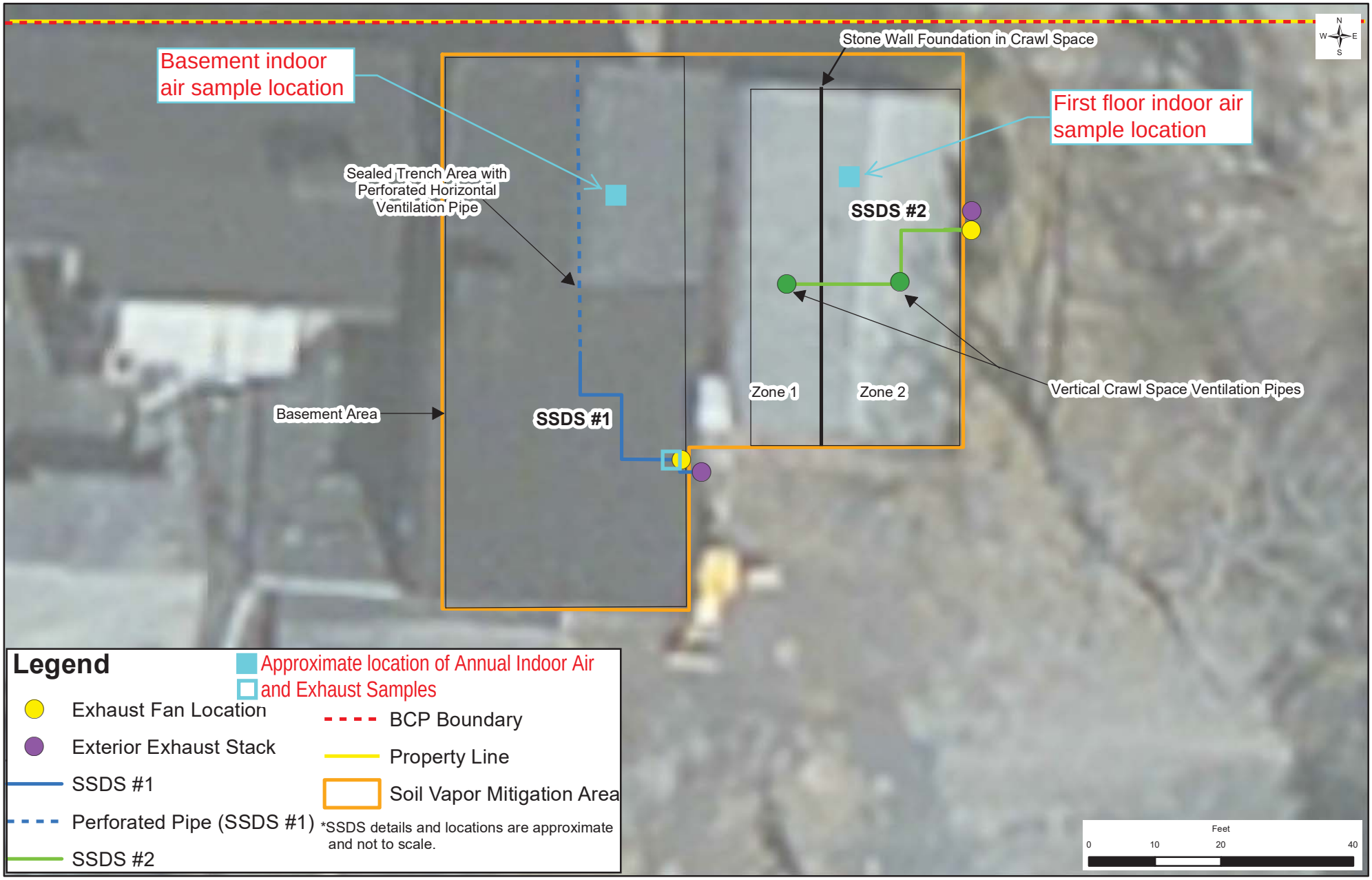
Figure 8 - Engineering Control Areas

29 Grant Street
Village of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010;Proposed Features Drawn by Chazen, 2011-2013.

Drawn:	RL/STF
Date:	May 2016
Scale:	1 inch equals 50 feet
Project:	41115.00
Figure:	8

Document Path: X:\4\41100-41199\41115.00 Hilzen BCP Walden NY\RI\RI Report\Figures\GIS Maps\F5A_Soil & MW Sample Locations_Jul 2013_withBCP.mxd



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Former Packaged Lighting Systems, Inc. Site

Figure 9 - Subsurface Depressurization System (SSDS) Layout Map

29 Grant Street
Town of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010; Proposed Features. Drawn by Chazen, 2011-2017.

Drawn:	AT
Date:	November 2017
Scale:	1 inch equals 20 feet
Project:	41115.00
Figure:	9

APPENDIX A – EXCAVATION WORK PLAN

A-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the Department. Currently, this notification will be made to:

John B. Miller, P.E.
Regional Hazardous Waste Remediation Engineer

NYSDEC- Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, NY 12233-7014

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control,
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work,
- A summary of the applicable components of this EWP,
- Site surface soils above the water table may be regraded or excavated as part of construction activities but will, to the extent feasible, be reused on the site. Saturated soils in contact with contaminated groundwater will not be relocated to the ground surface. If excavated, saturated soil will be reused at that excavation or disposed of off-site at a permitted facility.

- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120,
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the HASP provided in Appendix C of this document,
- Identification of disposal facilities for potential waste streams,
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

A-2 SOIL SCREENING METHODS

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

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

A-3 STOCKPILE METHODS

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

Stockpiles of potential contaminated soil will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles of potential contaminated soil will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC.

A-4 MATERIALS EXCAVATION AND LOAD OUT

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

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

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

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

To the extent that there is a realistic probability that truck tires will come in contact with contaminated soil, a truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

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

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

A-5 MATERIALS TRANSPORT OFF-SITE

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

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

The site is located in an industrial and developed area that regularly receives truck traffic. The site is situated north of an industrial manufacturing and warehouse facility and as such truck transport routes are anticipated to be along adjoining roadways commonly used for trucks. Therefore, no specific truck routes are warranted.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

A-6 MATERIALS DISPOSAL OFF-SITE

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

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal

quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

A-7 MATERIALS REUSE ON-SITE

The owner anticipates that some excavated site soil may be reused as fill material on the property during future site redevelopment, for the same excavation or excavations containing similar contaminants under the predetermined beneficial use determination (BUD) in 6 NYCRR 360.15(b)(8). Chemical criteria for on-site reuse of material are consist of Target Compound List of SVOCs, PCBs, and Target Analyte List (TAL) metals. The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Consistent with DER-10: soil that meets the Unrestricted Use SCOs can be reused without restrictions both on and off-site, soil that meets the Restricted-Residential Use SCOs can be reused on the site in the general area that they were excavated from. No saturated soil will be used in the unsaturated zone. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for re-use on-site will be placed below a demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

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

A-8 FLUIDS MANAGEMENT

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

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed in accordance with state and local law.

A-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities, the cover system will be restored in a manner that complies with the decision document. If the asphalt is replaced by a soil layer, then a demarcation layer, consisting of orange snow fencing material or equivalent material will be placed to provide a visual reference to the top of the 'Remaining Contamination Zone', the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this Site Management Plan. If the type of cover system changes from that which exists prior to the excavation (i.e., asphalt is replaced by a soil cover), this will constitute a modification of the cover element of the remedy and the upper surface of the 'Remaining Contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

A-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. The source area will be pre-approved by NYSDEC, with any required sampling or documentation.

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

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are those that meet Restricted-Residential Use SCOs. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

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

A-11 STORMWATER POLLUTION PREVENTION

Future development plans and activities will be based on actual planned projects, and any legally required Stormwater Pollution Prevention Plan (SWPPP) will be implemented. The SWPPP will conform to the requirements of NYSDEC Division of Water guidelines and NYS regulations.

A-12 CONTINGENCY PLAN

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

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

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be

reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5 of the SMP.

A-13 COMMUNITY AIR MONITORING PLAN

Community air monitoring will be performed in accordance with the Site Health and Safety Plan (Section 6.0 Air Monitoring) and the NYSDOH Generic CAMP, both in Appendix C of this SMP. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

A-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. While no odor issues have been identified in connection with the site, specific odor control methods to be used on a routine basis may include limiting exposed soil area, covering exposed soil, the application of odor control foam or other products applied directly to the exposed soil, or odor neutralizing. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

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

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by

sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

A-15 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

APPENDIX A – EXCAVATION WORK PLAN

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At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the Department. Currently, this notification will be made to:

John B. Miller, P.E.
Regional Hazardous Waste Remediation Engineer

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625 Broadway, 11th Floor
Albany, NY 12233-7014

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control,
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work,
- A summary of the applicable components of this EWP,
- Site surface soils above the water table may be regraded or excavated as part of construction activities but will, to the extent feasible, be reused on the site. Saturated soils in contact with contaminated groundwater will not be relocated to the ground surface. If excavated, saturated soil will be reused at that excavation or disposed of off-site at a permitted facility.

- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120,
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the HASP provided in Appendix C of this document,
- Identification of disposal facilities for potential waste streams,
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

A-2 SOIL SCREENING METHODS

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A-3 STOCKPILE METHODS

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Stockpiles of potential contaminated soil will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles of potential contaminated soil will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC.

A-4 MATERIALS EXCAVATION AND LOAD OUT

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

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

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

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

To the extent that there is a realistic probability that truck tires will come in contact with contaminated soil, a truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

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

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

A-5 MATERIALS TRANSPORT OFF-SITE

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

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

The site is located in an industrial and developed area that regularly receives truck traffic. The site is situated north of an industrial manufacturing and warehouse facility and as such truck transport routes are anticipated to be along adjoining roadways commonly used for trucks. Therefore, no specific truck routes are warranted.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

A-6 MATERIALS DISPOSAL OFF-SITE

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

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal

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Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

A-7 MATERIALS REUSE ON-SITE

The owner anticipates that some excavated site soil may be reused as fill material on the property during future site redevelopment, for the same excavation or excavations containing similar contaminants under the predetermined beneficial use determination (BUD) in 6 NYCRR 360.15(b)(8). Chemical criteria for on-site reuse of material are consist of Target Compound List of SVOCs, PCBs, and Target Analyte List (TAL) metals. The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Consistent with DER-10: soil that meets the Unrestricted Use SCOs can be reused without restrictions both on and off-site, soil that meets the Restricted-Residential Use SCOs can be reused on the site in the general area that they were excavated from. No saturated soil will be used in the unsaturated zone. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for re-use on-site will be placed below a demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

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

A-8 FLUIDS MANAGEMENT

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

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed in accordance with state and local law.

A-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities, the cover system will be restored in a manner that complies with the decision document. If the asphalt is replaced by a soil layer, then a demarcation layer, consisting of orange snow fencing material or equivalent material will be placed to provide a visual reference to the top of the 'Remaining Contamination Zone', the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this Site Management Plan. If the type of cover system changes from that which exists prior to the excavation (i.e., asphalt is replaced by a soil cover), this will constitute a modification of the cover element of the remedy and the upper surface of the 'Remaining Contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

A-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. The source area will be pre-approved by NYSDEC, with any required sampling or documentation.

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

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are those that meet Restricted-Residential Use SCOs. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

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

A-11 STORMWATER POLLUTION PREVENTION

Future development plans and activities will be based on actual planned projects, and any legally required Stormwater Pollution Prevention Plan (SWPPP) will be implemented. The SWPPP will conform to the requirements of NYSDEC Division of Water guidelines and NYS regulations.

A-12 CONTINGENCY PLAN

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

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

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be

reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5 of the SMP.

A-13 COMMUNITY AIR MONITORING PLAN

Community air monitoring will be performed in accordance with the Site Health and Safety Plan (Section 6.0 Air Monitoring) and the NYSDOH Generic CAMP, both in Appendix C of this SMP. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

A-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. While no odor issues have been identified in connection with the site, specific odor control methods to be used on a routine basis may include limiting exposed soil area, covering exposed soil, the application of odor control foam or other products applied directly to the exposed soil, or odor neutralizing. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

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

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by

sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

A-15 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

APPENDIX B – ENVIRONMENTAL EASEMENT AND METES AND BOUNDS

ORANGE COUNTY – STATE OF NEW YORK
ANN G. RABBITT, COUNTY CLERK
255 MAIN STREET
GOSHEN, NEW YORK 10924

COUNTY CLERK'S RECORDING PAGE
*****THIS PAGE IS PART OF THE DOCUMENT – DO NOT DETACH*****

BOOK/PAGE: 14163 / 1688
INSTRUMENT #: 20170001480

Receipt#: 2252856
Clerk: KP
Rec Date: 01/09/2017 09:28:48 AM
Doc Grp: D
Descrip: RT WY
Num Pgs: 10
Rec'd Frm: MARK E WRIGHT

Party1: GRANT STREET FACTORY INC
Party2: PEOPLE OF STATE OF NY
Town: MONTGOMERY-WALDEN
309-14-4

Recording:

Recording Fee	70.00
Cultural Ed	14.25
Records Management - Coun	1.00
Records Management - Stat	4.75
TP584	5.00
Sub Total:	95.00
Transfer Tax	
Transfer Tax - State	0.00
Sub Total:	0.00
Total:	95.00

**** NOTICE: THIS IS NOT A BILL ****

***** Transfer Tax *****
Transfer Tax #: 5020
Transfer Tax
Consideration: 0.00

Total: 0.00

Payment Type:
Check ___
Cash ___
Charge ___
No Fee ___

Comment: _____

Ann G. Rabbitt
Orange County Clerk

Record and Return To:

MARK E WRIGHT
PO BOX 422
FISHKILL, NY 12524

309-14-4

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

THIS INDENTURE made this 21st day of September, 2016 between Owner(s) Grant Street Factory, Inc., having an office at 29 Grant Street, Walden, New York 12586, County of Orange, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

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

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

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

WHEREAS, Grantor, is the owner of real property located at the address of 29 Grant Street in the Village of Walden, Town of Montgomery, County of Orange and State of New York, known and designated on the tax map of the County Clerk of Orange as tax map parcel numbers: Section 309 Block 14 Lot 4, being a portion of the property conveyed to Grantor by deed dated January 21, 2014 and recorded in the Orange County Clerk's Office in Liber and Page 13714/0186. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.53 +/- acres, and is hereinafter more fully described in the Land Title Survey dated November 13, 2014 prepared by Steven J. Alex, L.L.S., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

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

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

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C336079-08-11 as amended February 6, 2014, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

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

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

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

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

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

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

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

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

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

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

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

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

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

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

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

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

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

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

This property is subject to an Environmental Easement held

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

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

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

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

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

(i) are in-place;

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

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

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

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

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

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

(7) the information presented is accurate and complete.

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

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

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

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

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

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

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

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

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

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

Parties shall address correspondence to:

Site Number: C336079
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

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

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

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

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

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

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

Remainder of Page Intentionally Left Blank

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

Grant Street Factory, Inc.:

By: ⊗ _____

Print Name: SAMUEL CICHON

Title: President Date: 9/13/16

Grantor's Acknowledgment

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

On the 13 day of September in the year 20 16, before me, the undersigned, personally appeared samuel cichon, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

MARK E. WRIGHT
Notary Public, State of New York
Qualified in Dutchess County
Commission Expires July 31, 20 18

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

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the 21st day of September, in the year 2016, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

ALL that plot, piece or parcel of land situate and being in the Village of Walden, Town of Montgomery, County of Orange, State of New York, bounded and described as follows:

BEGINNING at a point marked by an iron pipe found at the intersection of the southerly line of Grant Street with the westerly side of Elm Street, said point being the northeasterly corner of the herein described Environmental Easement and being located N28°07'28"E 2.44 feet from another iron pipe found, and running; thence southerly along the westerly side of Elm Street S11°27'33"W 118.03 feet to an iron pipe found; thence along the northerly line of lands now or formerly of Diane Pacheco as described in Liber 12759 of Deeds at page 1125, N78°20'03"W 93.46 feet to a point being S79°05'09"E 1.28 feet from an iron pipe found, thence along the westerly line of said lands of Pacheco and also along the westerly line of lands now or formerly of Kevin Hemberg as described in Liber 12514 of Deeds at page 714, S12°10'00"W 159.88 feet to an iron rod found; thence through the lands of Grant Street Factory, Inc. as described in Liber 13714 of Deeds at page 0186, N79°05'00"W 200.5 feet to the southwesterly corner of the herein described Environmental Easement; thence along the westerly line of Grant Street Factory, Inc. and the herein described Environmental Easement, N12°10'00"E 280.54 feet to a point on the southerly side of Grant Street; thence along the southerly side of Grant Street, S78°20'03"E 292.01 feet, passing through an iron pipe found at 201.48 feet, to the point or place of beginning;

CONTAINING AN AREA OF 1.53 ACRES MORE OR LESS

APPENDIX C – HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN

Site Health & Safety Plan

Former Package Lighting Systems, Inc.

29 Grant Street
Village of Walden
Orange County, New York

October 2011
Revised July 2013

Chazen Project No. 41115.00



Prepared for:
The Estate of Hy Hilzen
25 Flag Hill Road
Chappaqua, New York 10514

Site Health & Safety Plan

Former Package Lighting Systems, Inc.

29 Grant Street
Village of Walden
Orange County, New York

October 11, 2011

Chazen Project No. 41115.00

Prepared by:

The Hudson Valley Office:
The Chazen Companies
21 Fox Street
Poughkeepsie, New York 12601
(845) 454-3980

Capital District
(518) 273-0055

North Country
(518) 812-0513

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1.0 INTRODUCTION AND OBJECTIVES

The Chazen Companies (Chazen) have prepared this Health and Safety Plan (HASP) for employees of Chazen for the Former Package Lighting Systems site located at 29 Grant Street in the Village of Walden, New York. This HASP is applicable to remedial investigation and interim remedial measure (IRM) activities, and has been prepared to specifically address potential hazards associated with the tasks identified in HASP Section 3.3.

The activities, equipment, and procedures described in this plan are designed to provide personal protection against potential environmental hazards which may be present on the work site. This plan includes a preliminary evaluation of site characteristics; establishes an emergency chain-of-command; details the use of basic safety equipment, personal protective equipment (PPE) and air monitoring devices, and describes equipment decontamination procedures.

The objectives of this HASP are to:

- Identify the physical, chemical, and biological hazards which may be present during the proposed site activities,
- Specify the protective measures necessary to control those hazards,
- Define emergency procedures,
- Specify training and medical qualification criteria for personnel.

This HASP must be read and understood by all Chazen personnel who enter the Former Package Lighting Systems, Inc. property.

We have generated a daily site sign in sheet (Appendix A) and HASP acknowledgement sheet (Appendix B) to be maintained by the Field Operations Leader and records appropriately filed in the project folder.

2.0 PROJECT PERSONNEL & EMERGENCY RESPONSE CONTACTS

The personnel and emergency response contacts associated with the proposed scope of work at the Former Package Lighting Systems site are presented below and are to be posted onsite during all field activities.

DIAL 911 FOR EMERGENCY IN ORANGE COUNTY

Title/Project Responsibility	Name	Main Office Phone	Mobile/Other Phone
Project Personnel			
Chazen Project Manager	Emily Pereira	(845) 486-1558	(914) 204-0583
Field Operations Leader	Will Olsen	(845) 486-1521	(845) 532-0602
Field Operations Leader	Eric Orlowski	(845) 486-1522	(518) 928-5823
Health & Safety Officer	Kimberly Cuppett	(845) 454-3980	(845) 249-5213
Emergency Personnel – DIAL 911 In Orange County			
Hospital St. Luke's Cornwall Hospital 70 DuBois Street Newburgh, New York (Hospital Route Map Attached On Next Page)		*Emergency-Dial 911	(845) 568-2311 non-emergency
Fire Department Coldenham Fire and Rescue		Dial 911	(845) 564-0438 non-emergency
Police Dept. Walden Village Police		Dial 911	(845) 778-5595 non-emergency
NYSDEC Spills Hotline		(800) 457-7362	
NYSDEC Regional Office		(845) 256-3000	
Poison Control Center		(800) 336-6997	
National Response Center		(800) 424-8802	

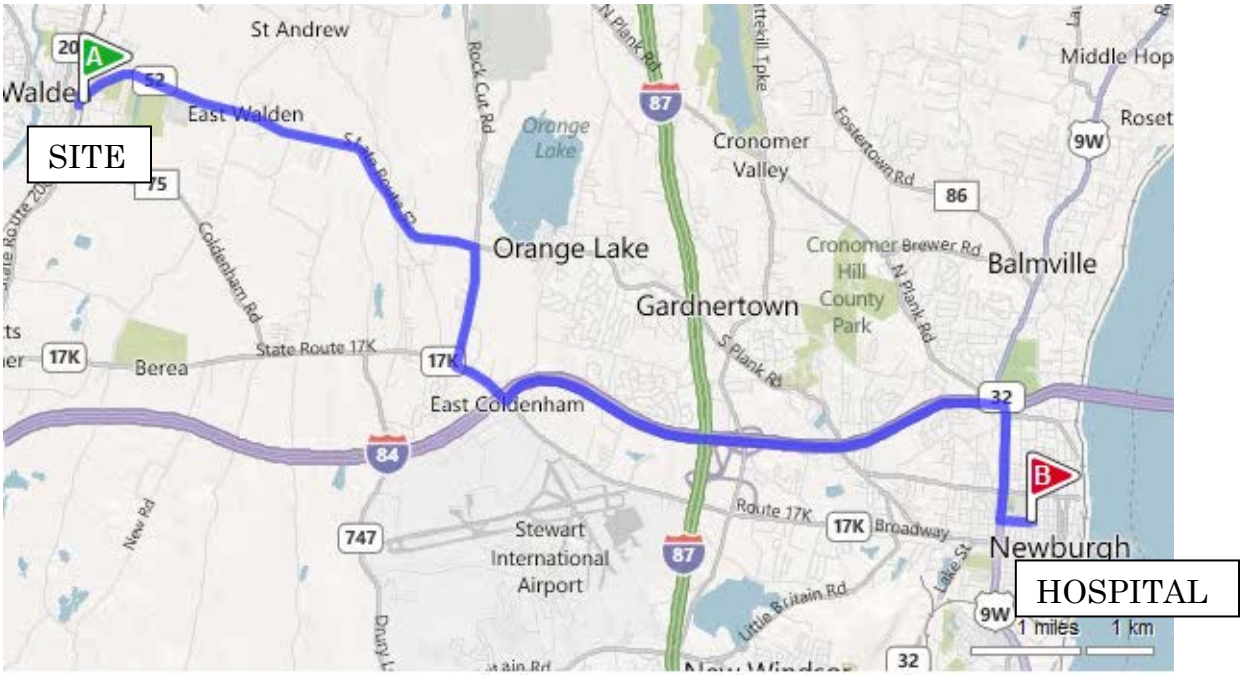
* Dialing 911 will connect all land lines and wireless calls to the Orange County Sheriffs Office Emergency Communications Center.

2.1 Hospital Route

St. Luke's Cornwall Hospital is located approximately 12.4 miles from the subject site. The estimated travel time from the site to St. Luke's Cornwall Hospital is approximately 20 minutes. Directions and a route plan map are provided below.

Directions To St. Luke's Cornwall Hospital

1.	Depart Grant St. toward Hepper St.	143 feet
2.	Turn right onto Hepper St.	0.1 miles
3.	Turn right onto Route 52/East Main St.	4.3 miles
4.	Turn right onto Rock Cut Road/CR 23.	1.1 miles
5.	Turn left onto Route 17K/Newburgh Cochecton Tpke.	0.6 miles
6.	Take ramp left for I-84 East.	4.7 miles
7.	At Exit 10, take ramp right for Rt-32/US-9W toward Highland/Newburgh.	0.2 miles
8.	Turn right onto US-9W/Rt-32/Route 9W.	1.1 miles
9.	Turn left onto Carter St.	0.3 miles
10.	Turn right onto DuBois St.	206 feet
11.	Arrive at 70 DuBois St, Newburgh, NY	
	Total estimated time = 20 minutes	~ 12.4 miles



3.0 SITE CHARACTERIZATION

3.1 Site Location & Description

This former commercial/industrial site is located at 29 Grant Street, in the Village of Walden, Orange County, New York. The site is situated along the southern side of Grant Street, approximately 500 feet east of the intersection of Grant Street and New York State Route 208. The site is bounded to the north by Grant Street, to the west by an active railroad line, to the east by two residences along Elm Street and to the south by a commercial/industrial facility (Ampac Paper). The site contains an abandoned, vacant commercial/industrial use building last occupied by Packaged Lighting Systems, Inc. The buildings on the property have been vacant since 2008.

3.2 Historic Site Uses

The subject property has four commercial buildings. The dates of construction for the site buildings range from the mid-1800s through the 1960s. The site has a history of industrial use dating back to the mid-1800s. From 1885 to 1894, the site was operated by the Rider Engine Company, a manufacturer of steam engines. From 1900 to 1939 the facility operated under the name Rider-Ericsson Engine Company, and continued manufacturing steam engines. From the 1920s until 1967, the facility was operated by Spence Engineering, a manufacturer of steam regulators and valve mechanisms. From 1968 until 2008 the facility was used by Packaged Lighting Systems, Inc., which designed unique lighting systems for New York City theaters.

A preliminary Phase II subsurface investigation of the facility was conducted in 2010 and identified chlorinated solvent impacts to groundwater in excess of New York State standards and also low-level metal impacts to soil that are likely related to historic filling. Based on the limited Phase II data, the source of the groundwater impacts appear to be localized and linked to the historic floor drain (FD) system because concentrations are highest near the FD, and drop sharply towards the east of the FD in the suspected down-gradient direction.

3.3 Proposed Project Scope/Site Activities

The investigative activities proposed at the former Package Lighting Systems site will include the following:

- Investigative delineation of the site through subsurface soil and groundwater sampling.
- Implementation of several IRMs to include:
    - the closure of two existing underground storage tanks (USTs)(one within the building),
    - the closure of a historical gasoline UST (if identified),
    - the closure of up to six floor drain/dry well systems with unknown discharge points, and
    - the remediation of associated impacted soil removal.

- Sub-slab vapor and indoor air quality sampling.
- A ground penetrating radar (GPR) survey.

4.0 SITE HAZARD EVALUATION AND CONTROL

The potential for exposure to chemical, physical, and mechanical hazards at Former Package Lighting Systems site is considered to be minimal. Hazards which may be encountered at the site are summarized in Table 1. Additional information pertaining to these hazards is provided in later sections of this HASP.

Table 1
Potential Hazards at Former Package Lighting Systems, Inc. Site

Hazard Type	Hazard Anticipated	Associated Investigative Activities	Comments	Hazard Control Methods
Chemical	Chemicals of Potential Concern (COPC)	Soil and groundwater sampling to characterize the site. Closure of two USTs, suspect cistern and floor drain/dry well exploration and closure and soil removal	Considered minimal	PPE, Information on COPCs, Safety Training & Standard Safety Operations
Physical	Slip, trip & fall, heat and cold related illnesses, noise	Any site work	Construction equipment on-site	Safety Training & Standard Safety Operations, Job Awareness, Noise Source Distancing
Biological	Tick, insect bites, poisonous plants	Any outdoor site work	Considered moderate	Safety Training & Standard Safety Operations
Electrical	Working around utilities	Soil Excavation and work at southeastern property where overhead lines exist	Considered minimal	Utility Check Safety Training & Standard Safety Operations

4.1 Hazard Evaluation

4.1.1 Physical Hazards

Site work which occurs in the vicinity of excavating equipment and machinery presents a general safety hazard to personnel on the site. Uneven ground surfaces and the presence of debris on the site presents a concern for slip, trip, and fall incidents.

It is anticipated that site work will be performed during the Fall/Winter of 2011 and will continue into the Spring and possibly the Summer of 2012. Therefore, the potential for both heat-related and cold-related illnesses during site work exist.

Heat-related Illnesses include the following:

Heat Rash – Result of continuous exposure to hot humid air and chafing clothes. Heat rash is uncomfortable and decreases the ability to tolerate heat.

Heat Cramps – Result of the inadequate replacement of body electrolytes lost through perspiration. Signs include severe spasms and pain in the extremities and abdomen.

Heat Exhaustion – Result of the increase stress on the vital organs of the body in the effort to meet the body's cooling demands. Signs include shallow breathing, pale, cool, moist skin, profuse seating, dizziness and listlessness.

Heat Stroke – Result of overworked cooling system. Heat stroke is the most serious form of heat stress. Body surfaces must be cooled and medical help must be obtained immediately to prevent severe injury and/or death. Signs include red, hot, dry skin, absence of perspiration, nausea, dizziness, confusion, strong rapid pulse, coma and death.

Cold-related Illnesses include the following:

Frostbite – Result of continuous skin exposure to freezing conditions. Signs include loss of feeling in skin, firm or waxy feeling skin and white or grayish-yellow skin discoloration.

Trench Foot – Result of cold wet feet for extended periods of time. Signs include numbness, red or gray discoloration, swelling, burning pain, tingling, itchy, blisters, ulcers, and/or peeling skin.

Hypothermia – Result of abnormally low body temperature. Sign include severe shivering, loss of coordination, slurred speech, drowsiness, confusion, exhaustion and dizziness.

Physical hazards are anticipated to be a concern for all site activities.

4.1.2 Electrical Hazards

Excavation equipment will be used on the site and inside of the building to remove two petroleum storage tanks. There also may be limited soil excavation of highly concentrated soils. The presence of overhead and underground utilities poses a hazard if the lines are contacted by equipment.

4.1.3 Chemical Hazards

Based on Phase II investigation findings, the primary site contaminant is trichloroethylene. Other chemicals of potential concern (COPCs) which are known to be or are believed to be present in site soil and/or groundwater include semi-volatile organic compounds (SVOCs), chlorinated solvents, petroleum hydrocarbons, and heavy metals.

Table 2 lists the potential health hazards that may be encountered.

Table 2
COPCs for Former Package Lighting Systems & Established Airborne Exposure Limits

COPC	Time Weighted Average Airborne Limits			Short-Term Exposure Limit	IDLH	Primary Routes Of Exposure On Site
	OSHA PEL	NIOSH REL	ACGIH TLV			
Petroleum Constituents						
Benzene	1.0 ppm	0.1 ppm	0.5 ppm	5.0 ppm (1.0 NIOSH)	500 ppm Ca	Inhalation
Ethylbenzene	100 ppm	100 ppm	100 ppm	5.0 ppm (1.0 NIOSH)	500 ppm Ca	Inhalation
Toluene	200 ppm	100 ppm	50 ppm	125 ppm	800 ppm	Inhalation
Xylenes	100 ppm	100 ppm	100 ppm	150 ppm	500 ppm	Inhalation
1,2,4-TMB	--	25 ppm	25 ppm	150 ppm	900 ppm	Inhalation
1,3,5-TMB	--	25 ppm	25 ppm	--	--	Inhalation
Chlorinated Solvents						
Perchloroethylene & Trichloroethylene [1]	100 ppm	--	25 ppm	100 ppm (ceiling)	150 ppm Ca	Inhalation
Metals						
Arsenic	0.5 mg/m3	0.002 mg/m3 (ceiling)	0.01 mg/m3	--	5 mg/m3 Ca	Inhalation
Lead	0.05 mg/m3	--	0.05 mg/m3	--	100 mg/m3	Inhalation

SVOCs						
Napthalene[2]	10 ppm	10 ppm	10 ppm	300 ppm	--	Inhalation

1 Numerous VOCs; PCE and Trichlor permissible exposure limit information noted as a conservative example of VOCs. A conservative permissible exposure limit of 5 ppm for VOCs will be used in the field as measured continuously using a portable photoinization detector (PID)
2 Numerous SVOC; Naphthalene permissible exposure limit information noted as a conservative example of SVOCs.
Ca: NIOSH has identified the compounds as a potential occupational carcinogen
IDLH: Immediately Dangerous to Life & Health
OSHA PELs are legally enforceable. RELs and TLVs are published as recommended guidelines

COPCs present on the subject property are expected to vary based on location.

Given the nature of the proposed project activities, the potential for site personnel to encounter the site COPCs during performance of the activities outlined in the scope of work is considered to be minimal.

Symptoms of overexposure to the COPCs are summarized in Table 3.

Table 3
General Signs and Symptoms of Overexposure to COPCs

Compound	Signs & Symptoms of Overexposure
Petroleum Hydrocarbons	Irritation eyes, skin, nose, respiratory system; headache, nausea, staggered gait; fatigue, anorexia, lassitude (weakness, exhaustion); dermatitis
Chlorinated Solvents	Confusion, dizziness, drowsiness, euphoria, fatigue, headache, lethargy, light-headedness, pulmonary edema, renal and hepatic damage, respiratory depression, seizures, stupor, visual disturbances
SVOCs	Irritation eyes, skin, nose, respiratory system; headache, nausea, fatigue, anorexia, weakness
Metals	Weakness, insomnia, constipation, abdominal pain, anemia, tremor, weight loss, irritation to eyes and skin, cough, chest pain, breathing difficulty, tremor, irritability, headache

4.1.4 Biological Hazards

Site field work will most likely occur during the winter, spring, and summer months. Warmer weather presents the potential for biological hazards. Biological hazards include poison ivy, snakes, ticks, mosquitoes, and other pests.

4.1.4.1 Tick-Borne Disease

Ticks can carry a number of diseases. In the Northeastern United States primary tickborne diseases include:

- Lyme Disease
- Ehrlichiosis

Lyme Disease - The disease commonly occurs in New York State when deer ticks are active during spring, summer, and autumn, and is transmitted by the bite of infected ticks. Symptoms of Lyme disease include a rash or a peculiar red spot, in a bull's eye shape, which expands outward in a circular manner. The victim may develop a headache, weakness, fever, a stiff neck, swelling and pain in the joints, and eventually, arthritis.

Ehrlichiosis - The disease also commonly occurs in New York State in the spring, summer, and autumn and is transmitted by the bite of infected ticks. Symptoms of ehrlichiosis include muscle aches, joint aches, and flu-like symptoms, but there is typically no skin rash.

4.1.4.2 Other Biological Hazards

Poisonous plants, such as poison ivy and sumac, maybe present on the site and present a hazard for site personnel. Signs and symptoms of exposure to such poisonous plants include itching, burning, redness, rash, blistering and swelling.

Snakes that could be present on the site property present the potential for snake bites. Due to geographic location, venomous snakes are not expected to be present on the site, however, even bites from non-poisonous snakes can cause adverse health symptoms such as redness, swelling, and allergic reaction.

Site personnel may be exposed to mosquitoes during site work. While the presence of mosquitoes is not anticipated to be a significant health and safety concern, bites can cause adverse health symptoms such as redness, swelling, and allergic reaction.

Biological hazards are considered to be a concern for all site activities.

4.2 Hazard Control

4.2.1 Physical Hazards

All personnel should be aware of slip, trip, and fall hazards from scattered debris and/or irregular walking surfaces. Awareness and safe clearance should also be maintained when working in the proximity of excavation and construction equipment.

The following or any combination of the following actions can be taken to prevent heat stress:

- Replace body fluids (water and electrolytes) lost through perspiration. Solutions may include a 0.1% salt and water solution or commercial mixes such as Gatorade and Squench. A fluid/electrolyte replacement will be used as necessary to minimize fluid loss.

- Provide cooling devices to aid in the natural body ventilation. Cooling occurs through evaporation of perspiration and limited body contact with heat absorbing protective clothing. Fans and air conditioners can assist in evaporation.
- Provide hose-down mobile shower facilities, where feasible, to cool protective clothing and reduce body temperature.
- Conduct activities early in the morning or evening to avoid working during very hot weather.
- Provide shelter against heat and direct sunlight to protect personnel.

The following or any combination of the following actions can be taken to prevent cold weather injuries:

- Dress in loose-fitting layers; avoid cotton clothing as it absorbs water and drains body heat.
- Wear a hat that covers ears and choose mittens over gloves when dexterity is not required.
- Keep footwear and socks dry and wear waterproof, insultated boots.
- Keep moving but take occasional breaks and stay hydrated.
- Avoid drinking alcohol or caffeine.

4.2.2 Electrical Hazards

Overhead electric utilities exist at the southeastern portion of the property and municipal mains run through the basement of the main building. Other underground utilities may exist on the property.

Prior to any subsurface excavation required by site activities, underground utilities must be located using facility plans and the NYS Underground Facilities Protection Organization (UFPO) Program (1-800-962-7962). These protective measures will be taken to minimize the potential health and safety risks associated with subsurface excavation activities near underground utility lines.

If activities using heavy equipment are conducted in the vicinity of overhead power lines, the equipment will be positioned such that no part of its structure is within the minimum clearances published in OSHA regulation 29 CFR 1910.333(c)(3)(iii)(A) and NFPA 70E – Standard for Electrical Safety in the workplace, which are outlined in Table 4, below:

Table 4
Minimum Clearances For Overhead Line Conductors

Voltage (kV)	Minimum Required Clearance
<50	10 feet
50-72,500	10 feet plus 0.4 inches for each 1kV over 50 kV
>72,500	Refer to NFPA-70E

4.2.3 Chemical Hazards

To control dermal exposure during site investigation and IRMs activities, a minimum of Modified Level D PPE will be worn as described in Section 5.0 of this HASP.

Based on available information collected during a previous Phase II study, SVOCs, chlorinated solvents, metals, and petroleum hydrocarbons are present on site and therefore the potential for inhalation exposure to airborne dusts and vapors will be evaluated and controlled during site activities as a general safety precaution.

Air monitoring will be performed during site work to evaluate airborne concentrations of chemical contaminants to which site workers may be exposed. Air monitoring control measures are discussed in Section 6.0 of this HASP.

4.2.4 Biological Hazards

The best way to prevent tickborne diseases is to avoid tick bites. Preventative measures to reduce the potential for tick bites include, but are not limited to, the following:

- Wearing long pants and long sleeved shirts.
- Tucking shirts into pants. Tucking pants into socks or boots, or using tape to close the opening where they meet.
- Using an EPA-approved insect repellant or arachnicide (pesticide) which is effective for ticks, such as DEET (N,N-diethyl-m-toluamide) or pyrethrin. Be sure to heed all precautionary information, and be aware that some people are sensitive to these chemicals. For this reason chemicals should be applied to clothing; not to skin.
- Wearing light colored clothing so that a tick can be seen more easily.
- Changing clothes when you return from an area where ticks may be located.
- Showering to wash off any loose ticks.
- Throughout the work day, performing Tick Check and Removal Procedures as follows:

- Check clothing for ticks. If you find a tick, do a more thorough tick check.
- Inspect body parts that bend (back of knee, between fingers and toes, underarms), pressure points where clothing presses against skin (underwear elastic, belts, neck); other common areas (belly button, around or in ear, hairline, top of head).
- Once indoors, do a final tick check and change of clothing.
- If you are in a tick infested area or an area known to have disease carrying ticks, perform the checks on a more regular basis.
- Remove unattached ticks promptly.
- Attached ticks are removed using fine pointed tweezers.
- The mouth parts of the tick are grasped with the tweezers as close to the skin as possible.
- Apply firm steady pressure upward until the tick releases - do not jerk, twist, squash or squeeze the tick.
- Clean the wound and the tweezers with an antiseptic.

Do not use petroleum jelly or nail polish remover, or prick or burn the tick; these actions can cause infected secretions to enter the wound.

Preventative measures will be implemented to avoid contact with poisonous plants on the site property. These measures will include, but are not limited to, the following activities:

- Covering arms and hands if possible.
- Frequently washing exposed skin.
- Avoiding skin contact with objects or protective clothing that have touched the plants.
- Treating every surface that may have touched the plant as contaminated, and practice contamination avoidance.
- If skin contact is made, washing the area immediately with soap and water, and observed for signs of reddening.

To minimize the threat of snake bites, all personnel walking through vegetated areas must be aware of the potential for encountering snakes. If a snake bite occurs, first aid shall be performed. First aid procedures consist of washing the area around the wound to remove any unabsorbed venom and applying a clean dry dressing.

4.2.5 General Health and Safety Controls

4.2.5.1 Communications System

Telephone communicate will be available on-site and both on-site and off-site project personnel will be accessible for communication. If there is a lack of cell phone signal at the site, hand-held radios should be used for communication. As an added safety feature, personnel should locate the closest public payphone prior to work commencement. Personnel should also be trained in the use of standard hand signals for health and safety. Personnel in the work zone will use the following standard hand signals:

- Hand gripping throat ----- Can't breathe.
- Grip partner's wrist or both hands around waist ----- Leave area immediately.
- Hands on top of head ----- Need assistance.
- Thumbs up ----- OK, I am all right, I understand.
- Thumbs down ----- No, negative.

4.2.5.2 Basic Safety Equipment

Safety equipment will be kept on site for monitoring and responding to emergency situations. In addition to equipment previously mentioned, basic safety equipment will include, but is not limited to, the following:

- ABC type fire extinguishers.
- First aid kits.
- Air Monitoring Equipment.
- Reference books containing basic first-aid procedures and chemical information.

4.2.5.3 Safe Work Practices

All Chazen personnel and all subcontractors working on-site are expected to follow established safe work practices for their specialties (i.e. excavators, surveying, etc.). The need to exercise caution in the performance of specific work tasks is frequently made more acute due to:

- Weather conditions.
- Restricted mobility and reduced peripheral vision caused by protective gear.
- The need to maintain the integrity of the protective equipment.

Work at the Former Package Lighting Systems will be conducted in accordance with established protocols and guidelines for the safety and health of all involved. General safety practices employed at the site will include but are not limited to the following:

- No smoking, eating or drinking on site or before personnel decontamination. Ingestion of contaminants is the second most likely means of introducing toxic substances into the body. Breathing air contaminants is the primary route.

- In any unknown situation, always assume the worst conditions and plan responses accordingly.

- Personal protective equipment is never 100% effective, so all personnel must minimize contact with potentially contaminated material. Do not place equipment on potentially contaminated ground. Do not sit or kneel on potentially contaminated material. Avoid standing in or walking through puddles or stained soil.

- Avoid heat and other work stresses related to the wearing of protective equipment and clothing. Work breaks should be scheduled *(and actually taken)* to prevent stress-related accidents or fatigue.

- As often as possible, the handling of contaminated materials should be done remotely. Every effort should be made to identify the contents of containers found on-site before they are handled.

- Personnel must be observant of not only their own immediate surroundings, but also of others.

- Contact lenses are not permitted to be worn on site. If any contaminated substance enters the eye, the lenses impede proper flushing of the eye.

- Rigorous contingency planning and dissemination of plans to all personnel minimizes the impact of rapidly changing safety protocols in response to changing site conditions.

- Personnel must be aware that chemical contaminants may mimic or enhance symptoms of other illness or intoxication. Avoid working while feeling ill during field assignments.

- During test pitting investigations, the test pit will be backfilled to the ground surface. If this is not possible, then temporary fencing will be installed around the test pit at the end of each work day prior to leaving the site.

The site Health and Safety Officer or their designee will maintain project Health and Safety records in a safe and secure manner. The Health and Safety records will remain on site for the duration of the project so that any designated replacement can update and maintain the records. At the conclusion of field work, the records will be included with the overall project file.

5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Site workers will be provided with the appropriate PPE and will be trained on the use of this equipment. PPE will be selected to provide an appropriate level of protection against known and reasonably anticipated site hazards. Given the available data, the level of PPE selected for Former Package Lighting Systems is modified Level D which will include the items listed in Table 5.

Table 5
Site-Specific PPE Components

Area	PPE Item	Associated Tasks
Head	Hard Hat (OSHA approved)	Working around heavy equipment, overhead hazards
Feet	Work Boots (steel-toed)	Working with or around heavy equipment
Skin	Nitrile Gloves	Handling of contaminated equipment, soils, groundwater, or surfaces
Hearing	Ear Plugs/Hearing Protection	Working with or near loud equipment
Eyes	Safety Glasses	Handling of liquids (non-water), soils, working near heavy equipment

The level of PPE will be continually evaluated and will be modified as necessary, depending on site conditions. If necessary, the level of PPE will be upgraded to one of, or a combination of the following levels:

Level C protection consists of:

(a) Full-face air-purifying respirator

(b) Tyvek or Poly-tyvek coveralls

(c) Chemical-resistant gloves taped to coveralls

(d) Chemical-resistant boots taped to coveralls

The use of PPE above Level C is not anticipated for this site. If Level C protection becomes unprotective for site conditions, the site operations will halted so that project plans can be formulated to be protective of the site personnel. Plans to increase protection to Level B will be

made in conjunction with the Project Manager, Field Operations Leader, Health and Safety Officer, and other pertinent environmental staff.

Level B protection typically consists of:

(a) Level C protection for the body, plus

(b) Positive pressure Self-contained Breathing Apparatus (SCBA) or a tethered cascade breathing system.

It will be the responsibility of the Project Manager to ensure that all personnel and subcontractors are knowledgeable of the level of personal protection required in all work situations. Further, it is the obligation of the Project Manager to see that proper equipment is worn and work rules are observed. All subcontractors are responsible for supplying their personnel with the necessary equipment.

6.0 AIR MONITORING

6.1 Personal Air Monitoring

A preliminary evaluation of site characteristics at Former Package Lighting Systems has been conducted in accordance with 29 CFR 1910.120(c) and monitoring of the air necessary to appropriately protect employees has been assigned as specified below. Immediately after initial site entry, a more detailed evaluation of the site's specific characteristics will be preformed by the HSO in order to confirm correct assignment of air monitoring, engineering controls, and PPE during site work tasks.

Adequate outdoor ventilation is expected to minimize respiratory exposure to the COPCs while working outdoors. Indoor ventilation can be improved by opening assessable windows and doors. While the indoor petroleum storage tank is being evaluated and removed, the nearby overhead door should be fully opened to introduce fresh air.

Periodic monitoring of the air is necessary especially when working inside or when the possibility of an IDLH condition, flammable atmosphere, or elevated personal exposure condition could exist. In addition to periodic monitoring of site air conditions, monitoring will be conducted:

- anytime work begins on a different portion of the site,
- when contaminants other than those previously identified are discovered,
- when a different type of operation is initiated (for example, exploratory well drilling discovers free product), or
- when employee are working in areas with obvious liquid contamination (a spill or free product).

General dust conditions will be measured with a hand-held dust monitor, SVOCs will be measured with a hand-held photoionization detector (PID), and as extra precaution when working indoors combustible vapors and hydrogen sulfide will be measured using a 4-gas meter.

The following actions levels and required actions should be referenced when conducting personal air monitoring.

Table 6
Summary of Action Levels

Parameter	Averaging Period	Action Level	Action Required if Level Exceeded
Dust	15 minutes	100 ug/m3	Site continues to operate. Monitoring of dust generating activities and modifying of procedures including additional watering.
Dust	15 minutes	155 ug/m3	Temporary stop work. Project Manager and other project personnel will evaluate work practices and techniques to reduce dust will be identified and implemented. Work will resume within a short time period when revised procedures are implemented.
VOCs	15 minutes	2 ppm	Draeger® Tubes will be implemented to assess benzene contamination. If benzene is above 2 ppm, source will be immediately covered and an action plan will be developed.
VOCs	1 minute	> 15 ppm	Temporary stop work. Implement Draeger® Tubes to determine benzene levels. Project Manager and other project personnel will evaluate work practices and techniques to reduce exposure to VOCs.
Combustible Vapors	1 minute	> 10% LEL	Evacuate area. Project Manager and other project personnel will evaluate work practices and techniques to reduce potential explosive hazards.
Hydrogen Sulfide	1 minute	1 ppm	Evacuate area. Project Manager and other project personnel will evaluate work practices and techniques to reduce exposure to hydrogen sulfide.

6.2 Community Air Monitoring Plan (CAMP)

A CAMP is required for this project. CAMP specifications are detailed in the Remedial Investigation/Interim Remedial Measures Work Plan.

7.0 TRAINING & MEDICAL SURVEILLANCE

7.1 Personnel Safety Training

All workers and other personnel shall receive appropriate training prior to engaging in site activities. All Chazen personnel have received a minimum of 40 hours of comprehensive health and safety training in hazardous waste operations and emergency response (29 CFR 1910.120) and an annual 8 hour refresher course.

All workers must recognize and understand the potential hazards to health and safety that are associated with the investigation activities and must be thoroughly familiar with programs and procedures contained in the safety plan.

The objectives of Chazen's training program, for employees involved in hazardous site activities are:

- To make workers aware of the potential hazards they may encounter.
- To provide the knowledge and skills necessary to perform the work with minimal risk to the health and safety of the workers.
- To make workers aware of the purpose and limitations of safety equipment.
- To ensure that workers can safely avoid or escape from emergencies.

7.2 Medical Surveillance

All Chazen field personnel are currently considered for inclusion in a medical monitoring program in accordance with 29 CFR 1910.120.

Based on the proposed scope of work, the potential for exposure to site COPCs is considered to be negligible. Medical monitoring for common COPCs is performed as part of the existing Chazen medical monitoring program when exposure to site contaminants for established durations can be anticipated or are expected to occur. Any provisions for alterations to the existing medical surveillance program will be made by the Health & Safety Officer based on the site characterization and job hazard analysis.

8.0 WORKING ZONES

Although the following general working zones are not typically formally delineated under Level D apparel (the level of protective apparel anticipated to be needed to appropriately protect workers at Former Package Lighting Systems), they are described below and will be implemented partially or entirely at the discretion of the Project Manager and/or Health and Safety Officer. Decisions on working zones will be made according to site conditions and the determined necessity for formally defined working zones to be fully protective of people and the community.

8.1 Exclusion Zone

An Exclusion Zone will be established in areas where work activities will occur. The Exclusion Zone will be cordoned off while work is in progress. Entry to and exit from this area will be provided only to those persons directly involved in the work activities and only if the prescribed level of personal protection is worn.

The personnel working in the Exclusion Zone will be the Health and Safety Officer, work crews, and specialized personnel. All personnel within the Exclusion Zone must wear the level of protection required by the site safety plan. All personnel in the Exclusion Zone will be 40-hour health and safety trained.

8.2 Contamination Reduction Zone

If needed, the Contamination Reduction Zone (CRZ) will be established at the perimeter of the exclusion zone, where personal decontamination will take place. The CRZ is a transition zone between contaminated and uncontaminated areas of the site.

When personnel, equipment, or materials suspected to be contaminated are taken out of the exclusion zone, they will be properly contained, or decontaminated in the CRZ.

8.3 Support Zone

If a CRZ is established, then a Support Zone will also be created and is considered the area outside the CRZ. The Support Zone will be reserved for the support vehicle and for clean equipment storage. It is separated from the CRZ, and is considered a "Clean" area. Only uncontaminated or decontaminated personnel or materials may enter this zone from the CRZ.

The support vehicle serves as the communications center, clean storage area, and source of emergency assistance for field operations. Certain safety equipment (i.e. fire extinguisher, first aid kit, etc.) are stored in the support vehicle.

9.0 DECONTAMINATION

Standard operating procedures are in place to minimize workers' contact with site contaminants. However, procedures may be necessary to remove and/or minimize contaminants that have accumulated on equipment and personnel and will be established and amended to the HASP as necessary for safe project operation and protection of personnel and the surrounding community.

9.1 Personnel and Equipment Decontamination

All personnel and equipment leaving the work zone must be decontaminated. Decontamination procedures prior to leaving Level "D" areas will consist of brushing loose soil from clothing and equipment, and washing equipment and clothing with water and a mild detergent. Disposable gloves, scoops, paper towels and Tyvek suits will be discarded in trash receptacles provided within these areas. All wastes generated in Level "D" areas will be bagged and disposed of on site without any additional restrictions.

The decontamination for Level "C", if needed will involve a plastic liner to "catch" wash solutions and contaminated soil. When exiting the work zone, workers will enter the CRZ. Instruments, sample containers, and reusable equipment will be placed on a plastic covered table. These items will be cleaned with the appropriate cleaning solutions. The workers will then decontaminate their protective clothing. Disposable items will be discarded in trash receptacles which will be provided within the CRZ.

10.0 EMERGENCY/CONTINGENCY PLAN

10.1 Personnel Roles, Lines of Authority, and Communication

The Health & Safety Officer (HSO) is the primary authority for directing site operations under emergency conditions. During the HSO's absence, the Field Operations Leader will lead emergency operations. All Health and Safety related emergency communications both on and off site will be directed through the HSO.

10.2 Site Evacuation

A representative for local emergency agencies will be informed of the proposed schedule and activities prior to the initiation of on-site work that has been assigned to Level C or greater. The emergency response capabilities of the local authorities and agencies will be assessed prior to the initiation of work.

Prior to the evacuation of the off site area, the Exclusion Zone and the CRZ will be expanded, as practical to reduce the potential for community exposure. Monitoring of the expanded CRZ will be conducted to determine if evacuation is truly necessary.

When the HSO determines that conditions may actually warrant the evacuation of downwind residences and commercial operations, local agencies will be notified and assistance requested. Designated personnel will initiate evacuation of the immediate off site area without delay.

All work crews should be aware of surrounding conditions including the wind conditions while on site. When conditions warrant moving away from a work site, the field crew will relocate up wind. If site access is restricted, or limited in any way, the crew may be instructed by the HSO to evacuate the site rather than move upwind, especially if an upwind withdrawal moves the field crew away from an acceptable escape route.

If conditions warrant a site evacuation, the field crew will proceed upwind of the work site and will notify the HSO or their designated representative. If the decontamination area is upwind and more than 500 feet from the work site, the crew will pass through the CRZ to remove their outer suits. Following decontamination, the field crew will proceed to the support vehicle and an assessment of the situation will be made by the HSO, or their designated representative. As soon as it is practical, and as additional information about site conditions is received from the field crew, the situation will be communicated to the Health and Safety Supervisor, Health and Safety Manager, the Project Manager, and if applicable the appropriate local emergency response agencies.

10.3 Emergency Medical Treatment and First Aid

First aid will be available to any person injured. At least one person holding current certification in first aid will be present on-site. The closest medical facility is approximately 12.4 miles from the site and rapid medical attention can reasonably be anticipated.

A First Aid Kit will be on hand. The injured person may be transported to a trained medical center for further examination and treatment. The preferred transport method is a professional emergency transportation service; however, if this option is not readily available or would result in excessive delay, other transport is authorized.

Under no circumstances should an injured person transport themselves to a medical facility for treatment, no matter how minor the injury may appear.

If an injury occurs in the Exclusion Zone, provisions for decontamination of the victim will be made. However, if injuries are deemed life-threatening, then normal decontamination procedures may be delayed. In such cases arrangements will be made with the emergency response personnel to provide the necessary containment or decontamination in the transport vehicle or at the medical facility.

10.4 Spill Response

The proposed site activities involve the use, storage or generation of bulk quantities of petroleum, chemicals or hazardous wastes (i.e. drums, containers, etc.) which present a potential for spill hazards. In the event of a spill, the Chazen client will be notified and the NYSDEC Spills Hotline (1-800-457-7362) will be notified.

APPENDICES:

APPENDIX A: Daily Site Sign-In Sheet

APPENDIX B: HASP Acknowledgement

Appendix C: PersulfOx MSDS, Handling and Application Instructions

APPENDIX A: Daily Site Sign-In Sheet

DATE	NAME	Organization/Purpose	Time In	Time Out

APPENDIX B: HASP Acknowledgement

I, the undersigned, acknowledge I have read and understand the contents of the HASP for the Former Packaged Lighting Systems, Inc. Site:

DATE	NAME	ORGANIZATION	SIGNATURE

PersulfOx™

Material Safety Data Sheet (MSDS)

Last Revised: April 20, 2012

Section 1 – Supplier Information and Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Synonyms:	A mixture of Sodium Persulfate [$Na_2S_2O_8$], Sodium Metasilicate [Na_2SiO_3] and Amorphous Silicon Dioxide[SiO_2].
Chemical Family:	Inorganic Chemicals
Trade Name:	PersulfOx™
Product Use:	Used to remediate contaminated soil and groundwater (environmental remediation applications)

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical
7775-27-1	Sodium Persulfate
6834-92-0	Sodium Metasilicate, Anhydrous
7631-86-9	Silicon Dioxide, Amorphous

Section 3 – Physical Data

Form:	Solid, free-flowing powder
Color:	White
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA
Flammability/Flash Point:	Non-combustible
Vapor Pressure:	NA
Bulk Density:	NA
Viscosity:	NA
pH (10% solution):	≈ 8.5 – 9.9 @ 25 °C
Decomposition Temperature:	Decomposition will occur upon heating.

Section 4 – Reactivity Data

Stability:	Stable under normal conditions. Stability decreases in the presence of heat, moisture and/or contamination.
Conditions to Avoid/Incompatibility:	Acids, alkalis, halides (fluorides, chlorides, bromides and iodides), Combustible materials, most metals and heavy metals, oxidizable materials, other oxidizers, reducing agents, cleaners, and organic or carbon containing compounds, moisture, heat, flame. Contact with incompatible materials can result in a material decomposition or other uncontrolled reactions.
Hazardous Decomposition Products:	Oxygen that supports combustion and oxides of sulfur.
Polymerization	Will not occur

Section 5 – Regulations

UNITED STATES

SARA TITLE III (SUPERFUND ADMENDMENTS AND REAUTHORIZATION ACT)

Section 302 Extremely Hazardous Substances (40 CFR 335, Appendix A):	N/A
Section 311 Hazard Categories (40 CFR 370):	Fire Hazard, Immediate (Acute) Health Hazard
Section 312 Threshold Planning Quantity (40 CFR 370):	The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.: None
Section 313 Reportable Ingredients (40 CFR 372):	Not Listed

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA Designation & Reportable Quantities (RQ) (40 CFR 302.4):	Unlisted, RQ = 100 lbs., Ignitability

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:

Oxidizer. Store in a cool, clean, and well ventilated area away from all sources of ignition and out of the direct sunlight. Store in a dry location away from heat and in temperatures less than 40 °C.

Keep away from incompatible materials and keep lids tightly closed. Do not store in improperly labeled containers.

Protect from moisture. Do not store near combustible materials. Keep containers well sealed.

Store separately from reducing materials. Avoid contamination which may lead to decomposition.

Handling:

Avoid contact with eyes, skin and clothing. Use with adequate ventilation. Wear respiratory protection if ventilation is inadequate or not available. Use eye and skin protection. Use clean plastic or stainless steel scoops only.

Do not swallow. Avoid breathing vapors, mists or dust. Do not eat, drink or smoke in the work area. Wash hands thoroughly after handling.

Label containers and keep them tightly closed when not in use.

Personal Protective Equipment (PPE)

Engineering Controls:

General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Avoid creating dust or mists. Maintain adequate ventilation at all times. Do not use in confined areas. Keep levels below recommended exposure limits. To determine actual exposure limits, monitoring should be performed on a routine basis. General use of persulfates will generate thermal and pressure regimes which need to mitigated during application as a precautionary measure.

Respiratory Protection:

Use NIOSH(P100) approved respirator when airborne dust is expected.

Exposure Limit

0.1 mg/m^3 (TWA) - ACGIH

Hand Protection:

Wear chemical resistant gloves (neoprene, rubber, or PVC). Thoroughly wash the outside of gloves with soap and water prior to removal.

Section 6 – Protective Measures, Storage and Handling (cont)

Eye Protection:	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
Skin Protection:	Try to avoid skin contact with this product. Chemical resistant gloves (neoprene, PVC or rubber) and protective clothing should be worn during use.
Protection Against Fire & Explosion:	Product is non-explosive. In case of fire, evacuate all non-essential personnel, wear protective clothing and a self-contained breathing apparatus, stay upwind of fire, and use water to spray cool fire-exposed containers. Presence of water accelerates decomposition.

Section 7 – Hazards Identification

Potential Health Effects

Inhalation:	May be harmful and irritating.
Eye Contact:	Non-irritating (rabbit)
Skin Contact:	Non-irritating (rabbit)
Ingestion:	May be harmful if swallowed (vomiting and diarrhea).
Target Organs:	Eyes, skin, respiratory passages

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage:	Spilled material should be collected and put in approved DOT container and isolated for disposal. Isolated material should be monitored for signs of decomposition (fuming/smoking). If spilled material is wet, dissolve with large quantity of water and dispose as a hazardous waste. All disposals should be carried out according to regulatory agencies procedures.
Extinguishing Media:	Water; Do not use carbon dioxide or other gas filled fire extinguishers; they will have no effect on decomposing persulfates. Wear full protective clothing and self contained breathing apparatus.

First Aid

Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Seek medical attention if the effects persist.
Ingestion:	Rinse mouth with water, give two-four cups of water to dilute the chemical and seek medical attention immediately. Never give anything by mouth to an unconscious person. **Do Not** induce vomiting.
Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water. Seek medical attention if irritation occurs or persists.

Notes to Medical Doctor: This product has low oral toxicity and is not irritating to the eyes and skin. Flooding of exposed areas with water is suggested, but gastric lavage or emesis induction for ingestions must consider possible aggravation of esophageal injury and the expected absence of system effects. Treatment is controlled removal of exposure followed by symptomatic and supportive care.

Section 9 – Accidental Release Measures

Precautions:

Cleanup Methods: Spilled material should be collected and put in approved DOT container and isolated for disposal. Isolated material should be monitored for signs of decomposition (fuming/smoking). If spilled material is wet, dissolve with large quantity of water and dispose as a hazardous waste. All disposals should be carried out according to local regulatory agencies procedures.

Section 10 – Information on Toxicology

Toxicity Data

Oral LD_{50} (rat):	895 mg/kg
Dermal LD_{50} (rabbit):	> 10 g/kg
Inhalation LD_{50} (rat):	5.1 mg/kg

Section 11 – Information on Ecology

Ecotoxicological Information

Bluegill sunfish, 96-hour LC_{50} = 771 mg/L

Rainbow trout, 96-hour LC_{50} = 163 mg/L

Daphnia, 48-hour LC_{50} = 133 mg/L

Grass shrimp, 96-hour LC_{50} = 519 mg/L

Biotic Degradation: N/A.

Section 12 – Disposal Considerations

Waste Disposal Method: Dispose of in an approved waste facility operated by an authorized contactor in compliance with local, state and federal regulations.

Section 13 – Shipping/Transport Information

D.O.T. Shipping Name:	Oxidizing Solid, n.o.s. (a mixture of Sodium persulfate, sodium metasilicate and silicon dioxide)
UN Number:	UN 1479
Hazard Class:	5.1 (Oxidizer)
Labels:	5.1 (Oxidizer)
Packaging Group:	III

Section 14 – Other Information

HMIS® Rating	Health – 1 (Slight)	Physical Hazard – 1 (Slight)
	Flammability – 0 (None)	Lab PPE – goggles, gloves, apron, dust respirator

HMIS® is a registered trademark of the National Painting and Coating Association.

NFPA	Health – 1 (Slight)	Reactivity – 1 (Slight)
	Flammability – 0 (None)	Special - Oxidizer

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

PersulfOx™
CATALYZED PERSULFATE

Packaging, Storage, Health and Safety

PersulfOx® is a chemical oxidation technology developed by REGENESIS for the remediation of organic contaminants in soil and groundwater which employs a patented "catalyzed persulfate" technology. PersulfOx is mixed with water and applied to the contaminated matrix via mixing equipment or subsurface injection techniques. When adding the fine dry PersulfOx powder to the mix water, proper handling and dust precautions should be followed as listed under Health and Safety below (also review MSDS).

Packaging and Storage:

PersulfOx is a dry, white, and free flowing powder delivered in 30 lb. pails or 55.1 lb (25 kg) bags. It ships as a DOT 5.1 Class Oxidizer and should be handled according to rules and regulations governing oxidizers. Persulfox should be stored in a cool (<40^{o} C), clean, dry, and well-ventilated area and away from heat and moisture. It should not be stored with combustible or reducing materials.

Health and Safety:

PersulfOx is engineered for ease of handling in the field and is safely mixed without the risks and potential hazards associated with most other chemical oxidants such as alkaline activated sodium persulfate. However, PersulfOx is an oxidizer/catalyst powder mixture, therefore Level C proper protective equipment (PPE) is recommended for all personnel working with or in areas of potential contact with PersulfOx. In addition, PersulfOx is an alkaline product when in solution; if left to stand for a long periods, persulfate based products can become acidic. Under either alkaline or acidic conditions PersulfOx can be caustic and corrosive and degrade equipment surfaces.

Personal Protective Equipment (PPE)

- Eye protection – Wear well sealed goggles or a face shield (face shield recommended for full face protection)
- Head – Hard hat when required
- Respiratory – Use NIOSH(P100) approved respirator when airborne dust is expected
- Hands – Wear chemical resistant gloves (neoprene, rubber, PVC)
- Feet – Wear steel toe shoes with chemical resistant soles or neoprene boots
- Clothing – Wear long sleeve shirts and long pant legs. Consider using a Tyvek® body suit, Carhartt® coverall or splash gear
- Engineering Controls-ventilation is required if used indoors. Controls should be maintained to avoid creation of dusts and mists.

PersulfOx™
CATALYZED PERSULFATE

APPLICATION INSTRUCTIONS

Subsurface application of PersulfOx via pressure injection is commonly performed using either direct-push technology (DPT) or wells. PersulfOx is a dry white powder. It ships as a **DOT 5.1 Class Oxidizer** and should be handled according to regulations governing oxidizers. An MSDS is provided with each shipment.

Installation procedures. Prior to PersulfOx injection, Regenesis recommends test injection using clear water. This procedure is useful in determining if the target zone has hydraulic limitations that would limit the anticipated volume to be applied or exceed the anticipated application pressures to be used. For *in situ* oxidation projects, Regenesis recommends the test injection volume range up to 15% greater than the design volume for a single-point injection event.

Before application PersulfOx is mixed with water to create an injection solution. The common solution range for a PersulfOx injection fluid is 5% to 22.5% w/w; Regenesis suggests use of a 15% w/w solution. The solution should be made in appropriately sized tanks to match the project requirements. The solution is alkaline so use a plastic poly tank or other semi-resistant tank materials. When working in areas with cooler make-up water temperatures (<16°C or 65°F) be aware of lower chemical solubility; in all cases it is recommended that mechanical mixing be a regular part of the mixing process. We recommend slow addition of the dry PersulfOx powder to water then mixing during and after addition using power equipment such as drum-type vortex/cyclone mixers attached to the tank. Alternatives are power drills with paint-mixer attachments or trash pumps with a recirculating hose configuration. PersulfOx mixes easily in water within the common solution ranges. Once mixed PersulfOx will stay in solution for a few hours before some settling. It is always recommended that the solution be checked and re-mixed 4 to 5 times during a workday. When adding the PersulfOx to the mix water, follow proper handling and dust precautions (see H & S sheet and MSDS). The following table is a guideline for solution mixing % per bag of PersulfOx in water:

No. of Bags	Weight of Material (lbs.)	Desired Solution (%)	Volume of Water (gallons)	Final PersulfOx volume (gallons)
1	55	5	125	128
1	55	10	59	62
1	55	15	37	40
1	55	20	26	29
1	55	22.5	23	26

Volume of mix water (gallons/vertical foot of injection) can be calculated from the following equation:

$$\frac{\text{Persulfox lbs/ foot}}{(8.34\,\text{lbs/gal water})(\%\,\text{Persulfox solids})}\left[1-(\%\,\text{Persulfox solids})\right]$$

REGENESIS
Advanced Technologies for Groundwater Resources

PersulfOx™
CATALYZED PERSULFATE

Direct Push (DPT) applications. It is imperative that the DPT injection holes be properly grouted/sealed upon completion of the injection activities. The purpose of this effort is to seal off any potential pathways to the surface which may allow "day lighting" of injection materials. Whenever possible, the application should be performed by systematically working from the outside to the center of the injection array. This methodology of application will limit expansion of the plume (also applies to wells).

Well-applications. Regenesis recommends that wells should generally be constructed using at least 2-inch diameter Schedule 80 PVC with a screen slot size >0.2-inch. When possible use the required bentonite seal above the filter pack and then a cement grout (bentonite <10%) to the surface. Injection wells should be flushed with a clean-water chaser after application of PersulfOx. When wells are used for PersulfOx injection, the PersulfOx injection wells and all nearby groundwater monitoring wells should be tightly capped (or be equipped with pressure gauges) to reduce potential for short circuiting to the surface.

Surfacing. From time to time application related surfacing of oxidants or other high volume remedial reagents may occur. Regenesis has co-authored a document that addresses the specifics reagent surfacing before it occurs as well as proper management when it does occur. This document is entitled "Guidelines for Subsurface Injection of In Situ Remedial Reagents within the LARWQCB Region" (ISRR). This document can be found on the LARWQCB Website or on the Regenesis website www.regenesis.com

New York State Department of Health
Generic Community Air Monitoring Plan

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

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

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

P:\Bureau\Common\CommunityAirMonitoringPlan (CAMP)\GCAMPR1.DOC

APPENDIX D – MONITORING WELL BORING AND CONSTRUCTION LOGS

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-1**
Total Depth: 10 ft.

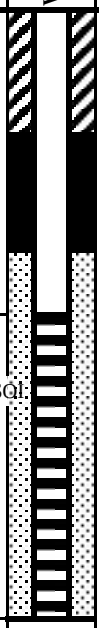
Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

Start Date: 7/23/2012
Finish Date: 7/23/2012
El. Datum: NAD 83
G.S. Elevation: ~353 ft.

Northing: -
Easting: -
Longitude: 74.184544 W
Latitude: 41.558512 N

Borehole Dia.: 2.25 in.
Depth to Water: 7.5 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
			1	28	0.0	0.0		2" dark brown topsoil
1	-1						SM	12" silty SAND, dark brown, some fragments of concrete, coal ash, slag, dry, NOSOI
2	-2						CL	14" silty CLAY, mottled brown and grey, dry to moist, NOSOI
3	-3							
4	-4							
5	-5							
			2	52	0.0	0.0	CL	24" SAA, moist to wet, NOSOI
6	-6						ML	20" SILT, brown, some clay, wet, NOSOI
							CL	8" clayey SILT, grey, trace fine to medium sub-rounded gravel, wet, NOSOI
7	-7							
8	-8							
9	-9							
10	-10							
11	-11							*End of boring at 10 feet bgs, refusal not encountered. Groundwater encountered at approximately 7.5 feet bgs.*
12	-12							
13	-13							
14	-14							
15	-15							
16	-16							
17	-17							
18	-18							
19	-19							
20	-20							



Well Diagram

Field Notes, Well Notes, Comments:

Well Type:
Monitoring
Well Finish:
Stick-up
Reference Pt.:
TOC - PVC
Reference Pt. El.:

Well installed to 10' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 10' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 10' bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
** : Soil Group Symbol not provided for materials outside of USCS groups
bgs = below ground surface
SAA = Same as Above

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-2**
Total Depth: 10 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

Start Date: 7/23/2012
Finish Date: 7/23/2012
El. Datum: NAD 83
G.S. Elevation: ~351 ft.

Northing: -
Easting: -
Longitude: 74.184379 W
Latitude: 41.558379 N

Borehole Dia.: 2.25 in.
Depth to Water: 7 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:	Well Diagram	Field Notes, Well Notes, Comments:
			1	28	0.0	0.0	SM	16" silty SAND, brown to black, some fragments of concrete, coal ash, slag, dry, NOSOI		Well Type: Monitoring Well Finish: Stick-up Reference Pt.: TOC - PVC Reference Pt. El.:
1	-1									
							CL	12" CLAY, mottled brown and grey, dry to moist, NOSOI		
2	-2									
3	-3									
4	-4									
5	-5									Well installed to 10' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 10' bgs. Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 10' bgs.
			2	44	0.0	0.0	CL	16" SAA, moist to wet, NOSOI		
6	-6						CL	20" clayey SILT, brown, trace fine to medium sub-rounded gravel, wet, NOSOI		
7	-7						SW	8" SAND, brown, fine to coarse, some fine to medium sub-rounded gravel, wet, NOSOI		
8	-8									
9	-9									
10	-10									
11	-11							*End of boring at 10 feet bgs, refusal not encountered. Groundwater encountered at approximately 7.0 feet bgs.*		
12	-12									
13	-13									
14	-14									
15	-15									
16	-16									
17	-17									
18	-18									
19	-19									
20	-20									

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
bgs = below ground surface
SAA = Same as Above
** : Soil Group Symbol not provided for materials outside of USCS groups

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-3**
Total Depth: 20 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

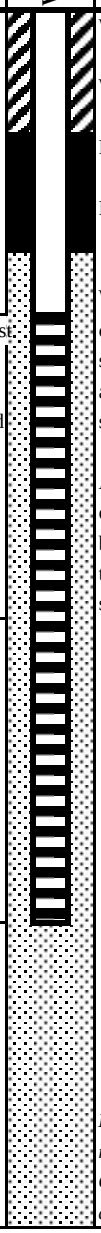
Start Date: 7/24/2012
Finish Date: 7/24/2012
El. Datum: NAD 83
G.S. Elevation: ~347 ft.

Northing: -
Easting: -
Longitude: 74.183883 W
Latitude: 41.558974 N

Borehole Dia.: 2.25 in.
Depth to Water: 6.5 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
1	-1							No recovery, sleeve jammed in sampler barrel and sampled soils dropped out while extracting sleeve.
2	-2							
3	-3							
4	-4							
5	-5							
			1	44	0.0	0.0	CL	6" silty CLAY, mottled brown and grey, few angular rock fragments, moist to wet, NOSOI
6	-6							
							SM	8" silty fine SAND, grey, wet, NOSOI
7	-7						SP	10" SAND, fine to coarse, brownish grey, little silt, little fine sub-rounded gravel, wet, NOSOI
8	-8						CL	12" silty CLAY, brown, little fine sub-rounded gravel, wet, NOSOI
							SW	8" gravelly SAND, brown, little silt, wet, NOSOI
9	-9							
10	-10							
			2	26	0.0	0.0	GP	26" fine to medium GRAVEL, brown, sub-angular to sub-rounded, little fine to coarse sand, little silt, wet, NOSOI
11	-11							
12	-12							
13	-13							
14	-14							
15	-15							
			3	30	0	0.0	GP	2" SAA, wet, NOSOI
16	-16							16" silty CLAY, grey, some fine to medium sub-rounded gravel and/or rock fragments, little fine to coarse sand, wet, NOSOI
17	-17							12" SAA, very stiff, moist to dry
18	-18							
19	-19							
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type:
Monitoring
Well Finish:
Stick-up
Reference Pt.:
TOC - PVC
Reference Pt. El.:

Well installed to 15' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 15' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 20' bgs.

End of boring at 20 feet bgs, refusal not encountered. Groundwater encountered at approximately 6.5 feet bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
** : Soil Group Symbol not provided for materials outside of USCS groups
bgs = below ground surface
SAA = Same as Above

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-5**
Total Depth: 10 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

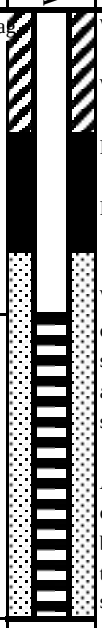
Start Date: 7/24/2012
Finish Date: 7/24/2012
El. Datum: NAD 83
G.S. Elevation: ~350 ft.

Northing: -
Easting: -
Longitude: 74.184150 W
Latitude: 41.558490 N

Borehole Dia.: 2.25 in.
Depth to Water: 7 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
1	-1		1	48	0.0	0.0	SM	14" silty SAND, brown to black, some fragments of concrete, coal ash, slag, dry, NOSOI
							CL	34" CLAY, mottled brown and grey, dry to moist, NOSOI
2	-2							
3	-3							
4	-4							
5	-5							
			2	44	0.0	0.0	CL	7" SAA, moist to wet, NOSOI
6	-6						CL	21" clayey SILT, brown, wet, NOSOI
							CL	16" silty CLAY, grey, some fine to medium sub-rounded gravel, little fine sand, stiff, moist, NOSOI
7	-7							
8	-8							
9	-9							
10	-10							
11	-11							*End of boring at 10 feet bgs, refusal not encountered. Groundwater encountered at approximately 7.0 feet bgs.*
12	-12							
13	-13							
14	-14							
15	-15							
16	-16							
17	-17							
18	-18							
19	-19							
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type:
Monitoring
Well Finish:
Stick-up
Reference Pt.:
TOC - PVC
Reference Pt. El.:

Well installed to 10' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 10' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 10' bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
bgs = below ground surface
SAA = Same as Above
** : Soil Group Symbol not provided for materials outside of USCS groups

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-6**
Total Depth: 13 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

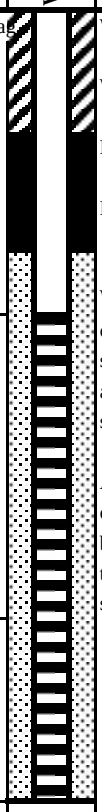
Start Date: 7/25/2012
Finish Date: 7/25/2012
El. Datum: NAD 83
G.S. Elevation: ~351 ft.

Northing: -
Easting: -
Longitude: 74.183982 W
Latitude: 41.558092 N

Borehole Dia.: 2.25 in.
Depth to Water: 7 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
1	-1		1	40	0.0	0.0	SM	11" silty SAND, brown to black, some fragments of concrete, coal ash, slag, dry, NOSOI
							CL	29" silty CLAY, mottled brown and grey, dry to moist, NOSOI
2	-2							
3	-3							
4	-4							
5	-5							
6	-6		2	42	0.0	0.0	CL	12" SAA, moist to wet, NOSOI
							CL	18" silty CLAY, light brown, wet, NOSOI
							CL	12" clayey SILT, grey, stiff, moist to wet
7	-7							fine sand, moist, stiff, NOSOI
8	-8							
9	-9							
10	-10							
11	-11		3	36	0.0	0.0	CL	12" SAA, wet, thixotropic
							SM	3" fine sandy SILT, brown, little clay, wet, NOSOI
							SW	21" gravelly fine SAND, brown, some silt, wet, NOSOI
12	-12							
13	-13							
14	-14							*End of boring at 13 feet bgs, due to refusal, probably on a boulder.* *Groundwater encountered at approximately 7.0 feet bgs.*
15	-15							
16	-16							
17	-17							
18	-18							
19	-19							
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type: Monitoring
Well Finish: Stick-up
Reference Pt.: TOC - PVC
Reference Pt. El.:

Well installed to 13' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 13' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 13' bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
bgs = below ground surface
SAA = Same as Above
** : Soil Group Symbol not provided for materials outside of USCS groups

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-9**
Total Depth: 18 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

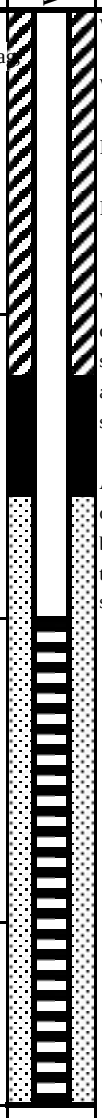
Start Date: 7/24/2012
Finish Date: 7/24/2012
El. Datum: NAD 83
G.S. Elevation: ~352 ft.

Northing: -
Easting: -
Longitude: 74.183982 W
Latitude: 41.558092 N

Borehole Dia.: 2.25 in.
Depth to Water: 7 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
			1	26	0.0	0.0		2" dark brown topsoil
1	-1						SM	11" silty SAND, brown to black, some fragments of concrete, coal ash, sla dry, NOSOI
2	-2						SM	4" sandy SILT, brown, some fine sub-rounded gravel, moist, NOSOI
3	-3							
4	-4							
5	-5							
			2	24	0.0	0.0	SM	24" SAA, moist, NOSOI
6	-6							
7	-7							
8	-8							
9	-9							
10	-10							
			3	18	0.0	0.8	SM	4" SAA, moist, no odor
11	-11						SM	10" gravelly fine to medium SAND, grey, some angular rock fragments, moist to wet, no odor
12	-12						CL	4" silty CLAY, grey, some fine to medium sub-angular gravel, little fine sand, moist to wet, no odor
13	-13							
14	-14							
15	-15							
			4	30	0	0.0	CL	8" SAA, wet, NOSOI
16	-16						SM	22" silty SAND, grey, some fine to medium sub-angular gravel, little clay, moist, NOSOI
17	-17							
18	-18							
								End of boring at 18 feet bgs, due to refusal, probably on a boulder.
19	-19							*Groundwater encountered at approximately 14.0 feet bgs.*
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type:
Monitoring
Well Finish:
Flush Mount
Reference Pt.:
TOC - PVC
Reference Pt. El.:

Well installed to 18' bgs, consisting of 1" diameter solid PVC riser 0 to 10' bgs and 1" diameter, 0.010" slot PVC screen 10 to 18' bgs.

Annular space fill consists of native soil backfill 0 to 6' bgs, 1/4" bentonite clay tablets 6 to 8' bgs and No. 2 silica well sand 8 to 18' bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
** : Soil Group Symbol not provided for materials outside of USCS groups
bgs = below ground surface
SAA = Same as Above

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-10**
Total Depth: 20 ft.

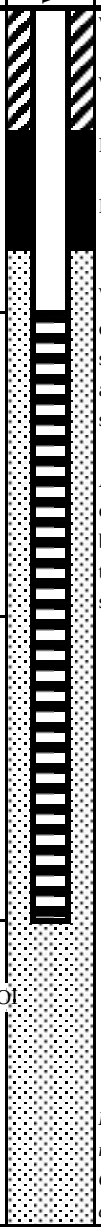
Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

Start Date: 7/24/2012
Finish Date: 7/24/2012
El. Datum: NAD 83
G.S. Elevation: ~350 ft.

Northing: -
Easting: -
Longitude: 74.184229 W
Latitude: 41.559078 N

Borehole Dia.: 2.25 in.
Depth to Water: 7.5 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
			1	18	0.0	0.0		3" dark brown topsoil
1	-1						SM	6" silty SAND, dark brown, some fine to medium sub-angular gravel, dry to moist, NOSOI
2	-2						SM	4" fine sandy SILT, orange-brown, some fine to medium sub-angular gravel, wet, NOSOI
3	-3						SM	5" silty SAND, dark brown, some fine to medium sub-angular gravel, dry to moist, NOSOI
4	-4							
5	-5							
			2	30	0.0	0.0	SM	2" SAA, dry to moist
6	-6						CL	28" silty CLAY, brown, some fine to medium sub-angular gravel, little fine to medium sand, moist to wet, NOSOI
7	-7							
8	-8							
9	-9							
10	-10							
			3	40	0.0	0.0	CL	32 " SAA, wet, NOSOI
11	-11						ML	8" SILT, grey, some fine to medium sub-angular gravel and/or rock fragments, little fine to medium sand, little clay, moist, stiff, NOSOI
12	-12							
13	-13							
14	-14							
15	-15							
			4	38	0	0.0	GM	6" gravelly SILT, borwn, little fine to medium sand, wet, NOSOI
16	-16						SP	24" fine SAND, brown, little fine sub-rounded gravel, wet, NOSOI
							SM	8" fine sandy SILT, grey, little fine sub-rounded gravel, moist, stiff, NOSOI
17	-17							
18	-18							
19	-19							
20	-20							



Field Notes, Well Notes, Comments:

Well Type: Monitoring
Well Finish: Flush Mount
Reference Pt.: TOC - PVC
Reference Pt. El.:

Well installed to 15' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 15' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 20' bgs.

End of boring at 20 feet bgs, refusal not encountered. Groundwater encountered at approximately 7.5 feet bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
** : Soil Group Symbol not provided for materials outside of USCS groups
bgs = below ground surface
SAA = Same as Above

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-11**
Total Depth: 10 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

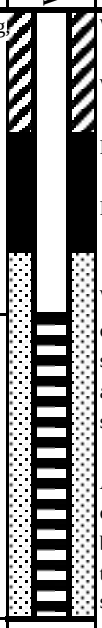
Start Date: 7/24/2012
Finish Date: 7/24/2012
El. Datum: NAD 83
G.S. Elevation: ~352 ft.

Northing: -
Easting: -
Longitude: 74.184892 W
Latitude: 41.558196 N

Borehole Dia.: 2.25 in.
Depth to Water: 6 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
1	-1		1	24	0.0	0.0	SM	6" silty SAND, brown to black, some fragments of concrete, coal ash, slag, dry, NOSOI
							CL	16" silty CLAY, mottled light brown and grey, dry to moist, NOSOI
2	-2						CL	2" silty CLAY, light brown, some fine sub-rounded garvel, moist, stiff, NOSOI
3	-3							
4	-4							
5	-5							
			2	30	0.0	0.0	CL	6" SAA, moist to wet, NOSOI
6	-6						CL	24" GRAVEL, light brown, some angular rock fragments, little silty sand, wet, NOSOI
7	-7							
8	-8							
9	-9							
10	-10							
11	-11							*End of boring at 10 feet bgs, refusal not encountered. Groundwater encountered at approximately 6.0 feet bgs.*
12	-12							
13	-13							
14	-14							
15	-15							
16	-16							
17	-17							
18	-18							
19	-19							
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type:
Monitoring
Well Finish:
Stick-up
Reference Pt.:
TOC - PVC
Reference Pt. El.:

Well installed to 10' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 10' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 10' bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
** : Soil Group Symbol not provided for materials outside of USCS groups
bgs = below ground surface
SAA = Same as Above

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **SB-13 / MW-7**
Total Depth: 15 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

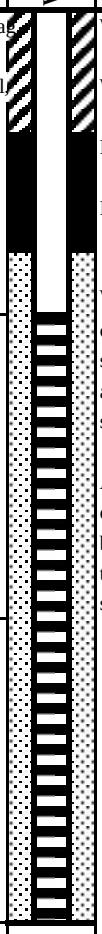
Start Date: 7/23/2012
Finish Date: 7/23/2012
El. Datum: NAD 83
G.S. Elevation: ~353 ft.

Northing: -
Easting: -
Longitude: 74.184669 W
Latitude: 41.558516 N

Borehole Dia.: 2.25 in.
Depth to Water: 6.5 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
1	-1		1	28	0.0	0.0	SM	16" silty SAND, brown to black, some fragments of concrete, coal ash, slag, dry, NOSOI
							CL	12" silty CLAY, mottled brown and grey, trace coarse sub-rounded gravel,
2	-2							dry, NOSOI
3	-3							
4	-4							
5	-5							
6	-6		2	54	0.0	0.0	CL	16" SAA, moist to wet, NOSOI
							SM	26" fine sandy SILT, mottled brown and grey, wet, NOSOI
7	-7						SM	12" fine sandy SILT, brown, wet, NOSOI
8	-8							
9	-9							
10	-10							
11	-11		3	48	0.0	0.0	SM	36" SAA, wet, NOSOI
							SW	12" gravelly SAND, brownish grey, wet, NOSOI
12	-12							
13	-13							
14	-14							
15	-15							
16	-16							*End of boring at 15 feet bgs, refusal not encountered. Groundwater encountered at approximately 6.5 feet bgs.*
17	-17							NOTE: While soils did not exhibit any obvious signs of impact, groundwater extracted from this well exhibited a slight sheen and an odor of petroleum (weathered fuel oil).
18	-18							
19	-19							
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type: Monitoring
Well Finish: Stick-up
Reference Pt.: TOC - PVC
Reference Pt. El.:

Well installed to 15' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 15' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 15' bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
bgs = below ground surface
SAA = Same as Above
** : Soil Group Symbol not provided for materials outside of USCS groups

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **SB-14 / MW-4**
Total Depth: 15 ft.

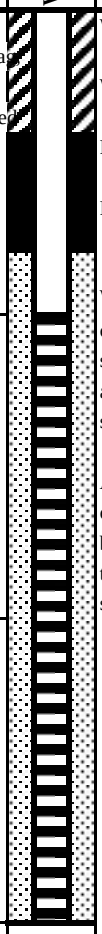
Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

Start Date: 7/23/2012
Finish Date: 7/23/2012
El. Datum: NAD 83
G.S. Elevation: ~354 ft.

Northing: -
Easting: -
Longitude: 74.184804 W
Latitude: 41.558560 N

Borehole Dia.: 2.25 in.
Depth to Water: 7.5 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
			1	39	0.0	0.0		4" concrete
1	-1						SM	14" silty SAND, brown to black, some fragments of concrete, coal ash, sla dry, NOSOI
2	-2						CL	21" silty CLAY, mottled brown and grey, little fine to medium sub-rounde gravel, dry, NOSOI
3	-3							
4	-4							
5	-5							
			2	40	0.0	0.0	CL	2" SAA, moist, NOSOI
6	-6						CL	18" clayey SILT, light brown, moist to wet, NOSOI
							SP	8" fine SAND, brown, wet, NOSOI
7	-7						SW	6" fine to coarse SAND, brown, wet, NOSOI
							SM	6" silty fine SAND, brown, wet, NOSOI
8	-8							
9	-9							
10	-10							
			3	12	0.0	0.0	SM	12" silty SAND, grey, some clay, some fine to medium sub-angular to
11	-11							sub-rounded gravel, wet, stiff, NOSOI
12	-12							
13	-13							
14	-14							
15	-15							
								End of boring at 15 feet bgs, refusal not encountered. Groundwater
16	-16							*encountered at approximately 7.5 feet bgs.*
17	-17							
18	-18							
19	-19							
20	-20							



Well Diagram

Field Notes, Well Notes, Comments:

Well Type: Monitoring
Well Finish: Stick-up
Reference Pt.: TOC - PVC
Reference Pt. El.:

Well installed to 15' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 15' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 15' bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
bgs = below ground surface
SAA = Same as Above
** : Soil Group Symbol not provided for materials outside of USCS groups

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **SB-16 / MW-8**
Total Depth: 10 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: Anthony Palomeque
Inspector: Eric Orlowski

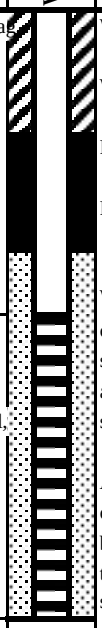
Start Date: 7/23/2012
Finish Date: 7/23/2012
El. Datum: NAD 83
G.S. Elevation: ~352 ft.

Northing: -
Easting: -
Longitude: 74.184425 W
Latitude: 41.558597 N

Borehole Dia.: 2.25 in.
Depth to Water: 6.5 ft.
Depth to Rock: NE ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
0			1	26	0.0	0.0	SM	14" silty SAND, brown to black, some fragments of concrete, coal ash, slag, dry, NOSOI
1	-1						CL	12" silty CLAY, mottled brown and grey, moist, NOSOI
2	-2							
3	-3							
4	-4							
5	-5							
			2	48	0.0	0.0	CL	20" SAA, moist to wet, NOSOI
6	-6						CL	24" clayey SILT, brown, trace fine to medium sub-rounded gravel, wet, NOSOI
7	-7						SP	4" fine to coarse SAND, brown, some fine to medium sub-rounded gravel, wet, NOSOI
8	-8							
9	-9							
10	-10							
11	-11							*End of boring at 10 feet bgs, refusal not encountered. Groundwater encountered at approximately 6.5 feet bgs.*
12	-12							
13	-13							
14	-14							
15	-15							
16	-16							
17	-17							
18	-18							
19	-19							
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type: Monitoring
Well Finish: Stick-up
Reference Pt.: TOC - PVC
Reference Pt. El.:

Well installed to 10' bgs, consisting of 1" diameter solid PVC riser 0 to 5' bgs and 1" diameter, 0.010" slot PVC screen 5 to 10' bgs.

Annular space fill consists of native soil backfill 0 to 2' bgs, 1/4" bentonite clay tablets 2 to 4' bgs and No. 2 silica well sand 4 to 10' bgs.

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
bgs = below ground surface
SAA = Same as Above
** : Soil Group Symbol not provided for materials outside of USCS groups

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-12**
Total Depth: 15 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: John Theiling
Inspector: Will Olsen

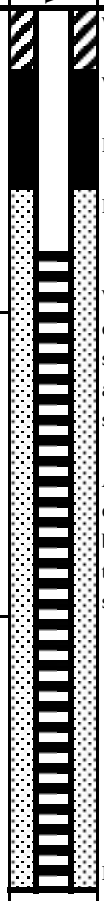
Start Date: 5/15/2013
Finish Date: 5/15/2013
El. Datum: NAD 83
G.S. Elevation: ~344 ft.

Northing: -
Easting: -
Longitude: 74.184066 W
Latitude: 41.559213 N

Borehole Dia.: 2.25 in.
Depth to Water: 8 ft.
Depth to Rock: >15 ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
			1	3			OL/OH	dark brown organic soil
1	-1			3				SILT, brown, with coal ash
2	-2							
				9	725		ML	clayey SILT, brownish-grey, mottled, moist
3	-3							
4	-4							
5	-5							
			2	6	182		ML	SAA
6	-6							
7	-7							
				27	341		GM	mostly SAND and GRAVEL, some silt and clay, dense, bottom 14" wet
8	-8							
9	-9							
10	-10							
			3	7	110		SW	mostly c SAND and f subrounded GRAVEL, some f-m Sand, clean, loose, grey, wet
11	-11							
12	-12							
				25	269		ML	mostly SILT, little f gravel, hard, dry, top 4" brown then change to grey
13	-13							
14	-14							
15	-15							
								End of boring at 15 feet bgs, refusal not encountered. Groundwater encountered at approximately 8.0 feet bgs.
16	-16							
17	-17							
18	-18							
19	-19							
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type:
Monitoring
Well Finish:
Flush
Reference Pt.:
TOC - PVC
Reference Pt. El.:

Well installed to 14' bgs, consisting of 1" diameter solid PVC riser 0 to 4' bgs and 1" diameter, 0.020" slot PVC screen 4 to 14' bgs.

Annular space fill consists of native soil backfill 0 to 1.0 bgs, 3/8" bentonite clay tablets 1-3' bgs and No. 2 silica well sand 3 to 14' bgs.

Hard driving 14.5-15 feet

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
** : Soil Group Symbol not provided for materials outside of USCS groups
bgs = below ground surface
SAA = Same as Above

TEST BORING LOG

THE Chazen COMPANIES

21 Fox Street
Poughkeepsie, NY
12601

PROJECT: Former Packaged Lighting Services, Inc. Site
LOCATION: 29 Grant Street, Village of Walden, New York
CLIENT: Estate of Hy Hilzen
PROJECT NO.: 41115.00

Test Boring No.: **MW-13**
Total Depth: 15 ft.

Contractor: Miller Environmental Group
Drill Rig: Geoprobe 7720 DT
Driller: John Theiling
Inspector: Will Olsen

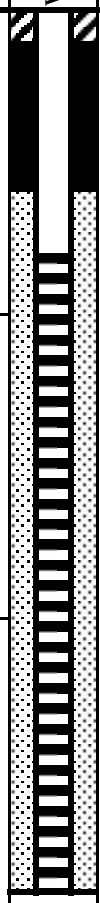
Start Date: 5/15/2013
Finish Date: 5/15/2013
El. Datum: NAD 83
G.S. Elevation: ~343 ft.

Northing: -
Easting: -
Longitude: 74.183737 W
Latitude: 41.559222 N

Borehole Dia.: 2.25 in.
Depth to Water: 6 ft.
Depth to Rock: >15 ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Recovery (Inches)	PID (ppm)	FID (ppm)	Group Symbol	Stratum and Field Descriptions:
0			1	6			OL/OH	brown soil with f gravel
1	-1							
				2				brick
2	-2							
3	-3			8	4.5		ML	clayey SILT, brownish-grey, mottled, moist, NOSOI
4	-4							
5	-5							
6	-6		2		16.0		ML	clayey SILT, brownish-grey, mottled, changing to grey silty CLAY, wet, NOSOI
7	-7							
8	-8				8		SM	f SAND, some silt and clay, little shale gravel, wet, NOSOI
9	-9							
10	-10							
11	-11		3		12		CL	silty CLAY, trace f-c gravel, grey, wet, NOSOI
12	-12							
					14		SW	f-c SAND, some f-c gravel, little silt and clay, brown, dense, wet
13	-13							
14	-14							
15	-15				1		ML	SILT, grey, in tip
16	-16							*End of boring at 15 feet bgs, refusal not encountered. Groundwater encountered at approximately 6.0 feet bgs.*
17	-17							
18	-18							
19	-19							
20	-20							

Well Diagram



Field Notes, Well Notes, Comments:

Well Type: Monitoring
Well Finish: Flush
Reference Pt.: TOC - PVC
Reference Pt. El.:

Well installed to 14' bgs, consisting of 1" diameter solid PVC riser 0 to 4' bgs and 1" diameter, 0.020" slot PVC screen 4 to 14' bgs.

Annular space fill consists of native soil backfill 0 to 0.5 bgs, 3/8" bentonite clay tablets 0.5-3' bgs and No. 2 silica well sand 3 to 14' bgs.

Hard driving 14.5-15 feet

STANDARD NOTES: 1. Refer to the "Interpretation of Subsurface Logs" for additional symbology and abbreviation definitions.
2. Samples classified in accordance with ASTM D-2488 unless otherwise noted.
3. Test Boring Log Page 1: 0 - 20 feet Each subsequent page: Additional 25 feet.

DRILLING INFORMATION
Method: Direct Push

	Casing	Sample	Core
Type:			
Diam.:			
Weight:			
Fall:			

ADDITIONAL NOTES:
NE : Not Encountered
EOB : End of Boring
NOSOI : No Obvious Signs of Impacts
** : Soil Group Symbol not provided for materials outside of USCS groups
bgs = below ground surface
SAA = Same as Above

APPENDIX E – GROUNDWATER MONITORING WELL SAMPLING LOG FORM

THE Chazen COMPANIES

Chazen Environmental Services, Inc
Field Data Sheet

SAMPLE INFORMATION:

Sample ID: _____ **Sample Date:** _____ **Sample Time:** _____

Well ID: _____ **Sample Matrix:** *GW SW DW Soil Other:* _____

Project Name: _____ Project and Task#: _____

Sample Location/Task: _____ Proj. Manager: _____

WELL INFORMATION:

Well Condition: _____

_____

Lock Type: _____ Key #: _____

PURGE DATA:

Measuring Point: _____

Depth to Bottom: _____

Water Level: _____

Height of Water Column: _____

Purge Method: _____

Start Date: _____

Start Time: _____

Stop Time: _____

Calculated Volume:

A = Water Column

(Bottom Depth-Depth to Water)

B = Gallons/Foot

C = # of Volumes To Be Purged

A x B x C = Gallons To Be Purged

Gallons to be purged: _____

Pipe Width	Gal/ Foot
1.5”	0.092
2.0”	0.163
3.0”	0.367
4.0”	0.653
6.0”	1.469
8.0’	2.611

Actual Volume:

Purge Rate (gpm): _____

Elapsed Time (min): _____

Well Volumes Purged (#): ___

Purge Volume (gal): _____

Well went dry?: • No • Yes

Condition: • No Odor • Odor

• Clear • Sl.Turbid • Turbid

FIELD RESULTS:

Water Level	Sample Depth	Temperature	pH	Conductivity	Turbidity	Other: _____
_____	Start	_____	_____	_____	_____	_____
_____	Volume 1	_____	_____	_____	_____	_____
_____	Volume 2	_____	_____	_____	_____	_____
_____	Volume 3	_____	_____	_____	_____	_____
_____	Volume 4	_____	_____	_____	_____	_____
_____	Sample	_____	_____	_____	_____	_____

SAMPLE INFORMATION:

Sample Method: _____ Sample Type: • Composite • Grab

i.e. Peristaltic, Submersible, Dedicated or Disp. Bailer, Waterra, etc.. Sample Depth: _____

Weather: _____ Sample Technician(s): _____

Notes: _____

_____

LAB REQUESTS:

Laboratory Name:	Analysis/Method:	Turn Around Time:
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

QA/QC

• Duplicate • Field Blank • Equip. Blank • Trip Blank

SAMPLE TRANSPORT:

Transported Via: _____ Date: _____

APPENDIX F – SITE-WIDE INSPECTION FORM

THE Chazen COMPANIES®

ANNUAL SITE INSPECTION FORM
Former Packaged Lighting Site BCP Site C336079
Town of Montgomery, Village of Walden, Orange County

Performed by: _____ Date: _____ Time: _____

Part 1 - Engineering Controls - Sub-Slab Depressurization System (SSDS) (circle noted condition)

1A - Has site use changed or redevelopment occurred since last site inspection?				yes	no
1B - If building use has expanded, has SVI been conducted in new areas?	yes; results indicate SSDS is or is not (circle one) warranted		no	if no, explain why:	
1C - If answer to 1A is Yes, has SSDS been expanded?	NA	yes, describe below		no, explain why below	
1D - Describe SSDS function: explain if not normal:	normal	decreased function		non-functioning	

1E - Is there any damage or defect to the foundation that reduces or has the potential to reduce the effectiveness of the SSDS? (circle one)

No Yes If yes, describe needed repairs:

If yes, owner to notify DEC within 48 hours. Attached documentation of notification.

1F - Describe fan conditions:(circle and note SSDS #1 or #2)	normal	decreased function	non-functioning	
Excess wear:	none	minimal (no change to system function)	non-functioning	
Visual damage:	none	minimal (no change to system function)	non-functioning	
Listen for smooth fan operation:	normal	inconsistent (describe)	non-functioning	

1G - Do the u-tube manometers show a differential (fluid level on left side of tube level is lower than right side)	SSDS #1	yes	no
	SSDS #2	yes	no

1H - Is system functioning as designed to continue to be protective of human health and the environment?

Yes No **If no**, describe needed modifications:

If no, owner to notify DEC within 48 hours. Attach documentation of notification.

Part 2 - Engineering Controls - Cover System (circle noted condition)

2A - Has site use changed or redevelopment occurred since last site inspection? yes no

2B - If yes, describe and note if cover system modifications needed:

2C - If yes, has site cover been modified accordingly: yes no if no, explain why:

2D -Describe Cover Conditions: asphalt: intact damaged not present

explain if not intact:

building slab: intact damaged not present

explain if not intact:

2E - Is system functioning as designed to continue to be protective of human health and the environment?

Yes No

If no, describe needed modifications:

If no, owner to notify DEC within 48 hours. Attach documentation of notification.

2F - Is Site Cover intact (per Track 4)? Yes No

If No, explain:

Part 3 - Institutional Controls (circle one)

3A - Site usage: Restricted-Residential Commercial Industrial
Other:_____ (inconsistent with Environmental Easement, must be reported to DEC)

3B - Has the site been used for vegetable gardens or farming ? (circle one)	No	Yes, Explain inconsistency with Environmental Easement
3C - Is site water source from a municipal source? (circle one)	Yes	No Explain inconsistency with Environmental Easement
3D - Is site groundwater being used for any purpose? (circle one)	No	Yes, Explain inconsistency with Environmental Easement, or groundwater treatment system implemented
3E - Has contaminated surface material been disturbed? (circle one)	No	Yes, explain activities and whether they were performed consistent with the Site Management Plan
3F - Has contaminated subsurface material been disturbed? (circle one)	No	Yes, explain activities and whether they were performed consistent with the Site Management Plan
3G - Have new buildings been constructed or additional areas of existing buildings been occupied? (circle one)	No	Yes, explain how potential impacts were monitored or mitigated (e.g., SSDS)

Part 4 - General Site Conditions

4A - Describe changes since last inspection

4B - Describe condition of monitoring wells and note changes or NYSDEC-approved closures since last inspection by entering data in table below.

Well ID (show on site map)	Intact	Damaged	Closed	Replaced	Explanation
On-Site Wells					
MW-1 (south of Main Building)					
MW-2 (east of Main Building)					
MW-3 (northeast corner of site)					
MW-4 (inside Main Building-southwest corner)					
MW-5 (east of Paint Building)					
MW-7 (south of Main Building)					
MW-8 (southeast of Main Building)					
Off-Site Wells					
MW-6 (southeast of Site)					
MW-9 (north of Main Building)					
MW-10 (north-northeast of Main Building)					
MW-11 (south of Lab Building)					
MW-12 (north of site, across Grant Street)					
MW-13 (north-northeast of site, across Grant Street)					

Part 5 - Compliance with Excavation Work Plan and Operations & Maintenance Plan

5A - Describe site construction activities that have been conducted since last inspection (see SMP for soil management criteria)

5B - Describe soil excavation and disposition (on site/off site). Map excavation areas and on site placement.

Part 6 - Monitoring Program

6A - Groundwater sampling event status (MW-1, MW-3, MW-8, and MW-10 sampled semi-annually for first two years, and evaluate data for potential sampling reduction for NYSDEC approval)

1st Event	for Year 2017	was completed on (date):	8/2/17
1st Event	for Year 2018	was completed on (date):	_____
2nd Event	for Year 2018	was completed on (date):	_____
1st Event	for Year 2019	was completed on (date):	_____
Update form for Subsequent events	For Year _____	was completed on (date):	_____

6B - Attach sampling reports for semi-annual sampling events.

6C- DEC determination that monitoring can be reduced (circle one): not yet requested | requested (date)/pending _____ | granted (date): _____

Part 7 - Confirm that site records are up to date			
No	Yes		7A - Are SSDS monthly monitoring records up to date?
No	Yes		7B - Are SSDS annual fan maintenance records up to date?
No	Yes		7C - Are there any changes that need to be documented in site records (e.g., change of ownership, site usage)
No	Yes	NA	7D - Has DEC received 15-day advanced notice of any proposed ground intrusive activities?
No	Yes	NA	7E - Has DEC received notification within 48 hours of any damage or defect to the foundation that reduces or has the potential to reduce the effectiveness of the SSDS?
No	Yes (Attached)		7F - Has site owner or remedial party submitted a written statement to NYSDEC certifying that (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP?

APPENDIX G – QUALITY ASSURANCE PROJECT PLAN

Quality Assurance Program Plan

Former Packaged Lighting Systems, Inc.
Brownfield Cleanup Program
NYSDEC Site No. C336079

Village of Walden

October 2011

Prepared for:

Estate of Hy Hilzen
c/o Dr. Michael Daniels
25 Flag Hill Road
Chappaqua, New York 10514

New York State Department of Environmental Conservation –
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

Prepared by:

Prepared by:

Hudson Valley Office:
The Chazen Companies
21 Fox Street

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1.0 PROGRAM DESCRIPTION

This Quality Assurance Program Plan (QAPP) describes protocols and procedures necessary to ensure that specific tasks and actions undertaken by The Chazen Companies (Chazen) are planned and executed in a manner consistent with the Quality Assurance (QA) objectives. This QAPP also details responsibilities for compliance with these requirements.

The QAPP provides guidance and specifications for:

- Organizational structure within The Chazen Companies
- A method for determining Data Quality Objectives
- All routine calibration and sampling procedures conducted by The Chazen Companies
- Chain of Custody requirements and Analytical Procedures
- Data Reduction, Validation, and Reporting
- Internal Quality Control and Internal Auditing
- Specific Routines to Assess Data Quality
- Preventative Maintenance
- Performance Reporting

This document will support all work performed by Chazen in the areas of soil and groundwater Remedial Investigations, Interim Remedial Measures and Alternatives Analyses, environmental site audits, Remedial Design (RD) and long-term environmental monitoring.

The format for this QAPP is based on “Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final”, 1988 (EPA/540/G-89/004), “Data Quality Objectives for Remedial Response Activities (Development Process)”, 1987 (EPA/540/G-87/003), and on “NYSDEC Technical and Administrative Guidance Memos” (TAGMs) including TAGM 4007 titled “Phase II Investigation Generic Work Plan”. Other TAGMs are referenced throughout the QAPP. The QAPP will also reference all portions of the Work Plan relevant to the particular site.

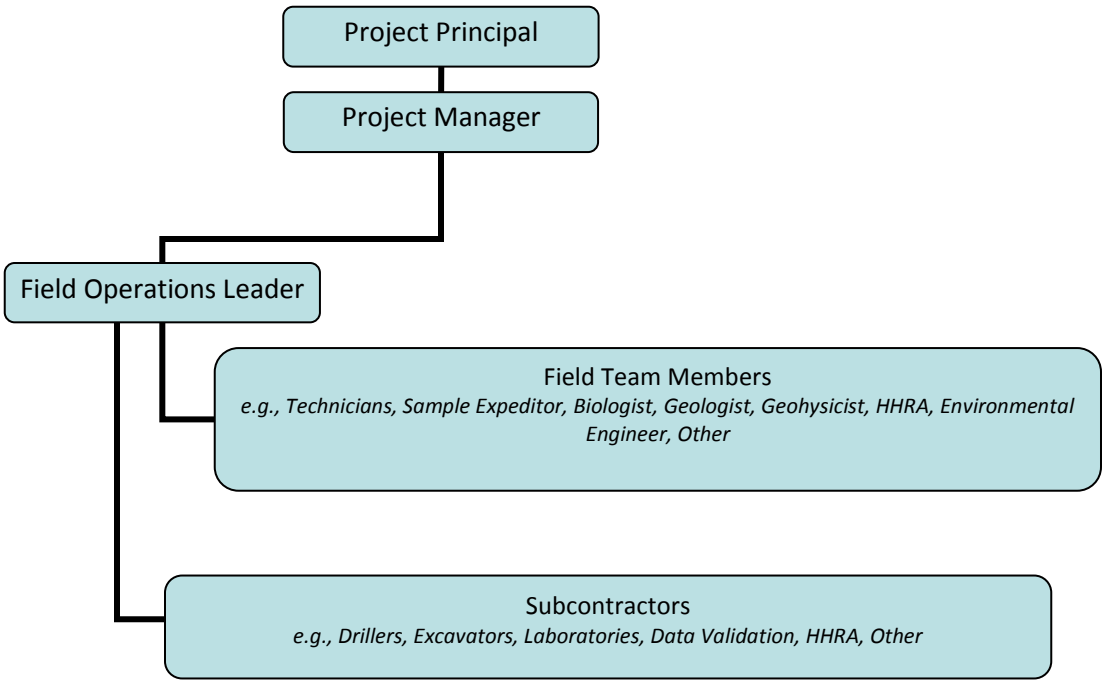
The QAPP is divided into 14 sections as described in the document “Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final”, 1988 (EPA/540/G-89/004).

2.0 PROGRAM ORGANIZATION

2.1 Company Organization

The Chazen Companies assigns a specialized team of experts to each project. These individuals act together to meet the needs of the project. Each project is assigned a Project Principal and Project Manager who oversee the components of the project. A typical organization chart is shown below.

Organization Plan



2.2 Specific Responsibilities

Principals: Principals of The Chazen Companies are responsible for establishing a contract for the services to be performed, for committing the corporate resources necessary to conduct the program work activities, and for supplying corporate-level input for problem resolution.

Project Manager: The Project Manager is responsible for the management and quality of the project. The Project Manger is named in the Site Investigation Work Plan and may be the Director of Environmental Services or his/her designee (e.g. Assistant Project Manager). The Project Manager will be responsible for establishing protocols to be used during the investigation and remedial activities, and

establishing sampling methods. He will provide oversight and technical guidance during field activities and report preparation, maintain quality and consistency, and monitor the overall work progression.

The duties and responsibilities of the Project Manager include:

- General supervision of project execution to ensure that the project objectives are met on schedule and on budget.
- Assisting in project activities.
- Financial management.
- Identifying project staff, equipment, and other resource requirements.
- Conducting project progress meetings with the client and the technical reviewers.
- Final review of project deliverables prior to issue.
- Implementation of subcontracting, as required.

Field Operations Leader: The Field Operations Leader named in the Work Plan is usually a member of the Senior Environmental staff at The Chazen Companies and is responsible for the coordination and execution of the field activities, data reduction, and interpretation. Assigned responsibilities include:

- Organization of personnel, equipment, and materials to meet the objectives of the field tasks.
- Direction of field activities in accordance with the Work Plan and project QAPP.
- Coordination of subcontractor activities including verification and adequacy of subcontractor QA/QC programs.
- Assisting in project activities.
- On-going Quality Control (QC) during performance of work.
- Field and laboratory data reduction and interpretation.
- Execution of corrective actions for identified QA/QC problems.
- Supervision of field team.
- Supervision of deliverable preparation.

Technical Reviewer/Quality Assurance Manager: The Technical Reviewer(s) named in the Work Plan is (are) generally peer reviewers, the Director of The Chazen Companies or the managing Principal. Technical reviewers review field data and methodology and act as Quality Assurance Managers. The Technical Reviewer(s) will be responsible for the overview of tasks and procedures, which affect the quality of work performed during the investigation. The Technical Reviewer/Quality Assurance Manager is responsible for:

- Verification of the Quality Assurance Program through evaluation and overview of program tasks.
- Identification of problems affecting quality and recommending corrective actions.
- Reporting to the Project Manager on the status and adequacy of the overall QA program.
- Consultation on data analysis and interpretation.
- Technical review of the project.

Field Team Member: Field Team Members involved in the field investigation, geophysical survey, location and elevation survey, or other field activities are responsible for the on-site execution of planned field activities. Field team members named in the Work Plan are assigned responsibilities which may include:

- Completion of all field activities in accordance with the Work Plan.
- Field supervision of subcontractor activities.
- Monitoring of, and adherence to, health and safety requirements in accordance with the HASP during field activities.

2.3 Personnel Qualifications and Training

The Project Manager and the Quality Assurance Manager review the assignment of technical staff and the project management plan with regard to the appropriate qualifications in the technical areas relevant to the Project and any associated QC techniques. Training, if required, is specified and implemented prior to project start-up.

Site-specific training is provided to all members of the field team and includes:

- General briefings covering the QA program and Project plans;
- Detailed briefings on specific methods required by the Work Plan and QAPP;
- Specific briefings on individual QA and QC procedures and activities.

All employees of Chazen involved with hazardous waste investigations are required to attend an OSHA-approved 40-hour health and safety course prior to working on hazardous waste sites. In addition, these employees are required to annually attend an 8-hour refresher health and safety course and to participate in a medical surveillance program.

2.4 Analytical Laboratory and Other Support Services

The subcontractors for analytical services will be determined prior to the initiation of the field investigations. Data validation, if required, will be performed by The Chazen Companies or by a qualified firm.

The responsibility for implementing the laboratory QA Program resides with the laboratory subcontractor's Laboratory Analytical Task Manager. The Laboratory Analytical Task Manager is responsible for the following:

- Following the Project QC Plan.
- Supporting the Chazen Project Manager and Quality Assurance Manager.
- Maintaining sufficient instruments, space resources, and personnel to perform the analyses as necessary.
- Handling/receiving samples in a manner consistent with New York State and Federal guidance as outlined in the Work Plan/QAPP.
- Implementing corrective action to account for analytical problems or QC deficiencies.
- Maintaining appropriate instrument controls/calibration.
- Reviewing all sampling and analyses, instrument blanks, sample blanks, and other QA/QC information to ensure that it meets the desired quality standards.
- Providing QA/QC checks at the proper frequency and maintaining an awareness of the laboratory condition to detect conditions which might jeopardize controls of the various analytical systems (e.g. improper calibration, improper sample storage conditions, and equipment maintenance intervals).

- Providing in-house QC audit documentation for sample storage, labeling, preservation, transportation, and disposal in accordance with Analytical Services Protocol (ASP).

Consistent with New York State Department of Health's (NYSDOH) discontinuance of the Contract Laboratory Protocol (CLP) accreditation process, dated January 28, 2009, the selected laboratory is not required to be CLP-accredited.

3.0 QUALITY ASSURANCE OBJECTIVES

Quality Assurance (QA) is a management system that ensures that all information, data, and decisions generated during a site investigation or feasibility study is technically sound and properly documented. Quality Control (QC) is the functional mechanism through which the quality assurance objectives are achieved. The overall objective of the QA/QC program is to establish procedures such that data obtained from the field and laboratory analyses are of adequate quality to satisfy the project objectives.

3.1 Data Quality Objectives

Data quality objectives (DQOs) are stated qualitatively and quantitatively, where applicable, in the Work Plan for a site investigation or feasibility study. DQOs specify the required quality of data necessary to support decisions related to the program including site screening, characterization, assessment of health risk, and ultimately, to the remedial actions that may take place on a site.

The basis of DQOs is that the quality of data is dependent upon the intended use of the collected data. DQOs are established based upon site-specific conditions and project objectives and are applicable to all data collection activities.

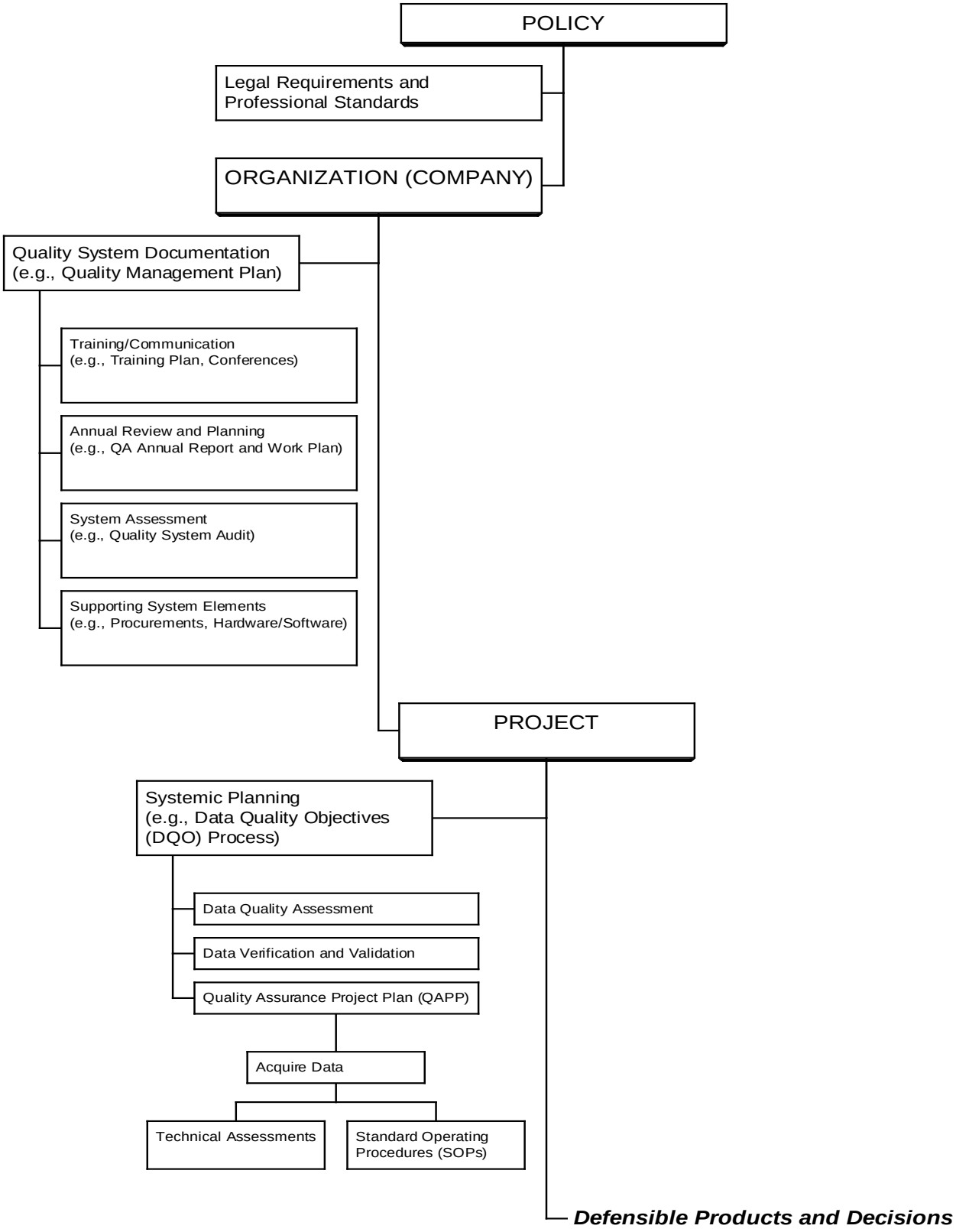
Data quality objectives are developed through an iterative process by which all the DQO elements are continually reviewed and re-evaluated to meet the overall project objectives. This process can be summarized as follows:

Stage 1: Defines the types of decisions which will be made during site remediation by identifying data users, evaluating available data, developing a conceptual model, and specifying goals for the project. Stage 1 results in a specific identification as to why new data are needed.

Stage 2: Identifies the data necessary to meet the objectives established in Stage 1. It also stipulates criteria for determining data adequacy. During Stage 2, sampling approaches and analytical options are evaluated to determine timely or cost-effective approaches.

Stage 3: Is the final design of the data collection program. The design of the data collection program results in the specification of the methods by which acceptable data will be obtained to make decisions.

QUALITY SYSTEM COMPONENTS AND TOOLS



3.2 Data Quality Characteristics

Data quality characteristics will be addressed as they pertain to a proposed investigation. Based on the DQOs selected, data will be assessed and evaluated for:

- Precision
- Accuracy
- Representativeness
- Completeness
- Comparability
- Reporting Limits

The manners in which these characteristics will be assessed and evaluated are described in the following sections.

3.2.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. The duplicate results for each precision check event will be compared to determine the range of the measurements as an indication of the precision associated with the measurement. In addition, the laboratory will analyze matrix spike/matrix spike duplicate samples to monitor the precision of the analytical methods.

Precision will be determined by calculating the relative percent differences (RPD) between the duplicate samples. The RPD for each sample will be calculated using the following equation:

$$\%RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100\%$$

where,

RPD Relative Percent Difference
D_1 First Sample Value
D_2 Second Sample Value (duplicate)

The RPD data will be used to evaluate the long term precision of the analytical/measurement methods. The laboratory will also calculate RPD values on the results of the matrix spike/matrix spike duplicate samples. These RPD values will be compared to RPD values provided in the current NYSDEC ASP protocols.

Procedures to be employed to maximize the precision of the data to be collected include:

- written methods and procedures documented in the project QAPP;
- multiple techniques will not be used to generate or collect the same data;
- all sampling and analytical personnel will be trained and required to follow the Work Plan and QAPP procedures;

- the Field Operations Leader will provide oversight during this investigation to monitor the adherence of project staff to these plans.

3.2.2 Accuracy

Accuracy measures the bias in a measurement system and is a determination of the closeness of the measurement to the true value. Sources of error include the physical sampling process, decontamination procedures, sample preservation and handling, homogeneity of the sample matrix, and sample preparation and analysis techniques used by the laboratory. Accuracy will be measured using blank and spike samples. The levels detected in the blanks and the difference between the reported and known concentrations for spikes will be used to assess the accuracy of the results.

The results of sample spiking will be used to calculate the Percent Recovery (%R), which will be used as the quality control Parameter for accuracy evaluation. Percent Recovery is calculated by the following equation:

$$\%R = \frac{ObservedValue}{TheoreticalValue} \times 100\%$$

Surrogate standard determinations will be performed on all samples and blanks. All samples and blanks will be fortified with surrogate spiking compounds before purging or extraction as specified in current USEPA SW-846 protocols.

Procedures employed to maximize the accuracy of the data to be collected include:

- written methods and procedures documented in the project FSP;
- all sampling and analytical personnel will be trained and required to follow the procedures specified in these plans, use of standard methods and known procedures to generate accurate data;
- adherence to strict decontamination procedures of sampling equipment;
- frequent calibration against known standards of field and laboratory equipment.

Calculations performed with analytical data are also checked for accuracy and precision by the Project Manager, Field Operations Leader or their designees, and reviewed by the QAM.

3.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent an analytical result from the matrix being sampled. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program.

Procedures employed to maximize the representativeness of the data to be collected include:

- written methods and procedures documented in the project FSP;
- avoiding use of multiple techniques to generate or collect the same data;
- all sampling and analytical personnel to be trained and required to follow the procedures specified in the project plans;
- Field Operations Leader to provide oversight during the investigation to monitor the adherence of project team members to these plans.

In addition, the sampling locations and number of samples to be collected (as specified in a Work Plan) will be selected to provide data representative of the media and potential contaminants of concern at locations where releases would be expected to be detected if present.

3.2.4 Completeness

Completeness is defined as the percentage of data collected judged to be valid and useful to the objectives of the project. Completeness is the amount of valid data obtained from a measurement system expressed as a percentage of the number of valid measurements that should have been (i.e., were planned to be) collected according to the Work Plan. The completeness objective will be 100% valid data for samples collected or analyzed. If this objective cannot be met due to unforeseeable problems, the problems will be addressed in the data usability report. Any data deficiencies will be evaluated in terms of their impact on project goals, and corrective action will be taken, if needed.

Procedures employed to maximize the usefulness and completeness of project data include:

- real-time field screening to focus on potential contaminant source regions;
- soils and groundwater samples for laboratory analysis for confirmation purposes;
- sample handling and shipping procedures which protect samples from breakage;
- communication with the laboratory to ensure their awareness of sample holding times;
- the availability of backup instruments or equipment for field measurements;
- collection of minimum-recommended sample volumes, which frequently include sufficient volume for re-analysis if a problem occurs in the laboratory;
- monitoring of field activities by the Field Operations Leader so as to allow for potential re-sampling or other measures to ensure that the required samples are collected.

3.2.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Methods will be employed during this investigation to ensure that the data generated can be compared to other relevant data sets of similar quality. The analytical results of QA/QC samples and internal laboratory QA/QC samples will be reported along with the results of field sample analyses. Standard sample analysis and reporting methods will follow NYSDEC ASP protocols.

3.2.6 Reporting Limits

Formulae for determining the reporting limits specific to each parameter analyzed are provided by the laboratory.

3.3 Quality Assurance Reports

The Quality Assurance Manager will prepare status reports to summarize QA/QC issues related to the collected data. The objective of the status report is to verify that the work being performed on the project adheres to all of the project plans, and that the collected data meet the previously described goals for precision, accuracy, and completeness.

3.4 Problem Resolution

The successful execution of a field investigation requires that a system be in place for reporting and responding to unexpected events as well as correcting problems or mistakes when they occur. The system described below includes internal systems for decreasing the risk of such occurrences and the procedures for reporting such events.

Procedures designed to minimize the possibility of problems throughout this project include:

- The use of standard methods
- Development of written project plans
- Team member supervision and training
- Project meetings
- Clear definition of the project objectives and team member responsibilities

To ensure that the approach to data collection is applied in a uniform manner, all project team members will be trained in the methodologies and procedures detailed in all project documents including the Work Plan, Field Sampling Plan (FSP), QAPP, and Health and Safety Plan (HASP). Copies of these plans will be available to all team members for individual use and reference. In addition, the Project Manager and Field Operations Leader will review these plans with the project team prior to the start of field activities.

Training in the use of the procedures required in the plans will be provided to all designated team members as determined necessary by the Quality Assurance Manager. The Project Manager and/or Field Operations Leader will hold regular project meetings with team members to communicate changes in procedures or scope; to discuss and assign upcoming tasks; to address potential problem areas in tasks yet to be conducted; and to communicate ways that past problems encountered in the project were remedied. These meetings will be scheduled by the Project Manager or Quality Assurance Manager, as necessary, during this investigation.

Should an event occur that cannot be readily resolved or appears to have gone unnoticed, the Project Manager will be notified. The project Quality Assurance Manager and the site owner may also be notified. The notification will include a completed Problem Resolution Form (PRF) (shown below).

PROBLEM RESOLUTION FORM NO._____

Originator:_____ Date:_____

Contract/Task Involved:_____

Description of Event:_____

_____

Sequence of Response Actions (Date, Person, Action Taken):_____

_____

Description of Final Response:_____

_____

Final Response Approved By:_____

Project Manager:_____ Date:_____

The PRF will be available for use by all project team members. The user of the form will provide a mechanism for reporting and responding to specific events which require a more formal quality control review to ensure proper resolution of the problem.

The Project Manager and/or Quality Assurance Manager will be responsible for ensuring that each issue identified in a PRF is resolved. The Project Manager, after a review of the issue with the Field Operations Leader and Quality Assurance Manager, will work with the Field Operations Leader to assign responsibility for remedying the problem and for establishing procedures, if necessary, to ensure that the problem is not repeated. The steps of the problem resolution process are:

1. Identify and describe the event or problem
2. Investigate and determine the cause
3. Determine a response action to remedy the situation
4. Implement the response action
5. Monitor the effectiveness of the action to verify that the situation has been remedied

The PRF form is designed to document and track the resolution of the event from its initial reporting to the final solution. The form is completed by the person reporting the problem and includes a description of the event, possible cause(s), and recommended solution(s). The form will then be used to document the sequence of events resulting in an effective resolution. Final approval of the response action as described on the PRF will be documented by the signature of the Project Manager and Quality Assurance Manager.

Completed PRFs and copies will be maintained in the field office and in CHAZEN's project file for future reference. Copies of PRFs (if utilized) will also be forwarded to the client and to any affected regulatory agency, if warranted.

The analytical laboratory will also use a system for on-the-spot and formal problem resolution procedures. The specific laboratory procedures will be consistent with the requirements of USEPA-SW-846 and are defined in the laboratory's Quality Assurance Program Plan.

3.5 Data Quality Requirements

Site specific data requirements are presented in the Work Plan, FSP, or associated documents for a particular project or investigation. There are five general analytical levels of data quality. These levels are described as follows:

Level I: Field screening utilizing portable instruments. These data may include pH, temperature, and specific conductance measurements of water samples, and ambient air and soil screening measurements with photoionization, flame-ionization, O_2, lower explosive limit (LEL), or other meters.

Level II: Field analyses utilizing more sophisticated portable analytical instruments. These instruments may be set up in a mobile laboratory on site. There is a wide range in the quality of data that can be generated. Data quality depends on the use of suitable calibration standards, reference materials, sample preparation equipment, as well as the training of the operator. Results from Level II data are available in real-time or within several hours of sample collection.

Level III: These data include analytical laboratory data utilizing USEPA-approved procedures. All analyses are performed in an off-site analytical laboratory following SW-846 protocols. Level III is characterized by rigorous QA/QC protocols and documentation.

Level IV: Analytical laboratory analysis supported by a rigorous QA program and documentation. These data are typically used for definitive site characterization, risk assessment, engineering alternative selection and design, and litigation activities. Level IV methods may include pre-approved non-standard methods for specific constituents or detection limits. All analyses are performed in an off-site analytical laboratory.

Level V: These data include physical property and engineering material analysis by approved standard or non-standard methods including analysis of non-standard sample matrices (e.g. wastes, biota). All analyses are performed in an off-site laboratory. The following table presents a summary of analytical levels appropriate to data uses.

Summary of Analytical Levels Appropriate to Data Uses

Data Uses	*Analytical Level*	*Type of Analysis*	*Limitations*	*Data Quality*
Site Characterization. Monitoring during implementation.	Level I	Total organic and inorganic vapor detection using portable instruments, Field test kits	Instruments respond to naturally occurring compounds	If instruments are calibrated and data are interpreted correctly, can provide indication of contamination
Site Characterization. Evaluation of alternatives. Engineering design. Monitoring during implementation.	Level II	Variety of organics by GC; Inorganics by AA; XRF Tentative ID; Analyte-specific; Detection limits vary from low ppm to low ppb	Tentative ID Techniques and instruments mostly limited to volatiles, metals	Dependent on QA/QC steps employed. Data typically reported in concentration ranges.
Risk assessment. PRP determination. Site characterization. Evaluation of alternatives. Engineering design. Monitoring during implementation.	Level III	Organics and inorganics using EPA Procedures can be analyte specific RCRA Characteristics tests	Tentative ID in some cases Can provide data of same quality as Levels IV, NS	Less rigorous QA/QC
Risk assessment. PRP determination. Evaluation of alternatives. Engineering design.	Level IV	HSL organics and inorganics by GC/MS; AA; ICP Low ppb detection limits	Tentative identification of non-HSL parameters. Some time may be required for validation of packages	Goal is data of known quality. Rigorous QA/QC.
Risk assessment. PRP determination.	Level V	Non-conventional parameters. Method specific detection limits. Modification of existing methods. Appendix 8 parameters	May require Method Development or Modification. Mechanism to obtain services requires special lead time.	Method specific

Reference: EPA Document No. 540 G-87 003, 1987, "Data Quality Objectives for Remedial Response Activities"

4.0 ENVIRONMENTAL SAMPLING / TESTING PROCEDURES

An essential aspect of any field investigation is assurance that sample collection is conducted in a manner that will provide high-quality, representative data. This section of the QAPP provides a description of sampling techniques, procedures, and equipment used during field sampling programs. These techniques and procedures conform to guidelines outlined in the EPA document "A Compendium of Superfund Field Operations Methods", and with NYSDEC Technical and Administrative Guidance Memorandum (TAGM) Nos. 4007, 4008, 4015, 4019, 4032, and 4051 and others, where applicable.

4.1 Site Specific Sampling and Testing Rationale

The Work Plan provides the sampling rationale for every investigation, including the rationale for the following tasks:

- sampling of environmental media,
- determination of constituents to be measured in each environmental media,
- sampling locations,
- sample depths and types,
- number and frequency of samples to be collected.

The specific details of a field investigation such as sampling locations, target depths, analytical methods, and a reference map are detailed in the project Work Plan.

4.2 Documentation

During the implementation of any investigation, field activities will be documented in field log books. The field log book is a controlled document, which records all major on-site activities during the investigation. The log book is a bound notebook with pages that cannot be removed without cutting or tearing pages. Each page of the log book will be numbered consecutively and signed at the bottom of the page with the signature or initials of the person who completed the page. All entries will be made in ink and errors crossed-out with a single line and initialed and dated.

Field data for all tasks completed during this field program, as well as general observations, pertinent conversations, and unexpected occurrences will be documented in field log books. At a minimum, the following information will be recorded:

- Names of personnel on-site (including all subcontractors);
- Date and time of arrival and departure;
- Daily objectives;
- Site name, location, and project number;
- Field observations;
- Weather conditions;
- Site sketch with description of sampling points;
- Health and Safety monitoring data;
- Field calibration, decontamination procedures, and performance frequency;
- Well bailing or pumping procedure and equipment;
- Well specifics including static water level, depth, and volume of water removed;

- Type and quantity of monitoring well construction materials used;
- Surveying data;
- Sample identification numbers;
- Sample point names and descriptions;
- Sample collection procedures and equipment;
- Sample preservation used;
- References to maps or sketches of the sampling site;
- Results of any field measurements, such as pH, water temperature, specific conductivity, and field screening results;
- Notes on conversations with site personnel, observers, or subcontractors;
- Problems encountered and the manner of their resolution;
- General observations that may support the data; and
- Summary of daily activities completed.

4.3 Pre-Sample Planning

The quality of sample collection is maintained by specifying the technique used for both the medium/matrix to be sampled and the analytes of interest. For example, groundwater samples intended for SVOC analyses are collected in amber glass containers; groundwater samples for VOC analyses are collected in Teflon-capped glass vials with "zero" headspace to minimize diffusive and evaporative losses; and groundwater samples for inorganic analyses are collected in polyethylene bottles. Sample containers provided by the analytical subcontractor are prepared in a manner consistent with USEPA protocol.

Acquisition of environmental samples also requires specialized techniques to preserve sample integrity and to ensure that a representative portion of the source is collected. Media-specific sample collection techniques and sample preservation are specified in the following sections. Field programs are designed and implemented using the EPA's "Compendium of Superfund Methods", NYSDEC Sampling and Analysis Protocols, and NYSDEC TAGMs 4007, 4008, 4015, 4019, 4031, 4032, 4046, 4048, and 4051 as primary references.

4.3.1 Sample Labels and Records

Sample labels will be prepared using a pre-determined labeling system. Each sample may require several containers depending on the intended analysis to be performed. At the time the sample is collected, a sample data record sheet and field logbook entries will be completed. The sample documentation may include:

- A plan of the site with the sample location and sample numbers indicated
- A description of the sample site
- Physical descriptors of the sample site, if appropriate (e.g., stream width, groundwater depth, etc.)
- Photographs of the sample site showing the sampling equipment and/or unusual conditions (orientation of photograph must be shown on sketch map, and photo number recorded in field notebook)
- Chain of Custody documentation (see Section 5)

Identification of samples collected during the field investigation will be accomplished using alphanumeric Sample Identification codes indicating sample type, sample identification, depth of sample (if applicable), and designation of duplicate samples. An explanation of the Sample Identification codes system for soil, groundwater, and sediment samples is shown below:

Sample Identification Code System

Digits	*Identification*	*Description*	*Code/Example*	
1, 2	Site Code	Two letter code to identify the site	DS	Dutchess Steel
3, 4	Sample Type	Two letter code to identify sample media	SB	Test Boring Soil Sample
			SS	Surface Soil
			BW	Screened-auger Groundwater Sample
			MW	Monitoring Well Groundwater Sample
			SW	Surface Water
			SD	Sediment Sample
			TB	Trip Blank
			EB	Sampler Blank
			SV	Sub-Slab Vapor Sample
			TP	Test Pit Soil
			PW	Test Pit Water
			WT	Waste Sample
			DL	Drum Liquid
			DS	Drum Solids or Sludge
			IA	Indoor Air Sample
			OA	Outdoor Air Sample
			GP	Geoprobe® Soil Sample
			CD	Septic System/Sump Sludge Sample
			CL	Septic System/Sump Catch Basin Liquid Sample
			CB	Catch Basin/Storm Drain Sediment Sample
5, 6, 7	Sample Locator	Three numbers to identify sample site name or location	MWX22	Monitoring Well Groundwater Sample from Well 22
8, 9, 10	Depth of Sample Below Reference Surface		SB-XX0	SB samples collected from 0 to 2 feet below ground surface (bgs)
			SB-XX1	SB sample depth is assumed to be the top of a 2-foot, split-spoon sample
			X25	MW sample depth is assumed to be the bottom of the well screen measured in feet bgs
			128	All samples obtained from the ground surface or from drums or containers will be designated XXX
11, 12			XX	Duplicates will periodically be sent to the lab with the XX designation to preserve duplicate anonymity, according to Section 9.2.
			XF	Sample collected for field analysis or future reference

			XD	Duplicate sample
			MS	Matrix spike
			MD	Matrix spike duplicate
			XS	Laboratory split sample

4.3.2 Sample Container Requirements and Sample Preservation

Sample integrity will be maintained by using special containers and preservation methods keyed to both the medium/matrix to be sampled and the analytes. Sample containers and preservation methods specified in NYSDEC protocols are summarized in the table below. Any changes to these protocols required by a Specific project will be detailed in a site-specific Work Plan.

4.3.3 Preparation of Sample Containers

Sample containers will be provided by the laboratory and are prepared according to USEPA protocols. The bottles will be equivalent to I-Chem series 300. QC records for the bottles used will be maintained by the laboratory. The preparatory procedures used by the vendor providing the laboratory with sample containers are detailed below.

4.3.3.1 Volatile Organic Analyte (VOA) Containers

(40-mL glass vials and 2-oz or 4-oz glass jars)

1. Wash vials, septa, and closures in hot tap water with laboratory grade non-phosphate detergent.
2. Rinse three times with tap water.
3. Rinse three times with ASTM Type II water.
4. Oven dry vials, septa, and closures.
5. Remove vials, septa, and closures from oven.
6. Place septa in closures, Teflon side down, and place on vials. The attendant must wear gloves and the vials cannot be removed from the preparation room until sealed.

4.3.3.2 Semi-Volatile Organic Analyte (SVOA) Containers

(1-liter amber glass bottles and 4-ounce glass jars)

1. Wash containers, closures, and Teflon® liners in hot tap water with laboratory grade non-phosphate detergent.
2. Rinse three times with tap water.
3. Rinse with 1:1 nitric acid.
4. Rinse three times with American Society for Testing and Materials (ASTM) Type II water.
5. Rinse with pesticide-grade methylene chloride.
6. Oven dry.
7. Remove containers, closures, and Teflon® liners from oven.
8. Place Teflon liners in closures and place closures on containers. The attendant must wear gloves and the containers cannot be removed from the preparation room until sealed.

4.3.3.3 Metals Containers

(1-liter, 500, 250, 120 and 60-milliliter (mL) clear and 1-liter amber polyethylene bottles)

1. Wash bottles, closures, and Teflon® liners with hot tap water and laboratory grade non-phosphate detergent.
2. Rinse three times with tap water.
3. Rinse with 1:1 nitric acid.
4. Rinse three times with ASTM Type II water.
5. Air dry in contaminant-free environment.
6. Place liners in closures and place closures on bottles. The attendant must wear gloves and the bottles cannot be removed from the preparation room until sealed.

4.3.3.4 Sample Preservation

Samples are preserved according to the protocol established for the selected analytical method. Unless the proper sample container preparation and sample preservation measures are taken in the field, sample composition can be altered by contamination, degradation, biological transformation, chemical interactions, and other factors during the time between sample collection and analysis.

Steps to maintain the in-situ characteristics required for analysis may include storage of samples at 4°C, pH adjustment, and chemical fixation. Specific sample and container preservation requirements are detailed in Table 3 above. Where pH adjustment is performed, the pH will be checked in the field with pH paper to ensure the required pH level is achieved. If pre-preserved sample containers are provided by the laboratory, extra preservation material should be available in the field in case it is needed to achieve the target pH.

Table 3 - Summary of Required Containers, Preservation Requirements and Holding Times

Parameter	*Matrix*	*Required Container*	*Minimum Volume* *Required for Analysis*	*Preservation Technique*	*Holding Time (2)*
Volatile Organics (3)	Water	Glass vials with Teflon faced septa and screw cap. (Two 40 ml vials per sample)	50 ml	Cool (4°C) Preserved with acid (HCl to pH<2)	7 days
	Soil	2-2oz or 1-4oz wide-mouth glass jar with Teflon-lined cover.	10 grams	Cool (4°C)	7 days
Semi-Volatiles, Pesticides, PCBs (3), or Total Petroleum Hydrocarbons	Water	1-L Amber glass jar with Teflon lined screw cap.	1,000 ml (1 Liter)	Cool (4°C)	Extraction within 5 days of sampling. Analysis within 40 days of extraction
	Soil	8-oz wide mouth glass jar with Teflon-lined cover	50 grams	Cool (4°C)	Extraction within 5 days of sampling. Analysis within 40 days of extraction
Metals (Total and Dissolved) (1) (4)	Water	Polyethylene bottle (one 1 L bottle)	100 ml	(Dissolved metals only - field filtered using 0.45 micron filter) Cool (4°C) Preserved with acid (HNO_3 to pH<2)	180 days
	Soil	8-oz wide mouth glass jar with Teflon-lined cover	10 grams	Cool (4°C)	180 days
Total Petroleum Hydrocarbons Fingerprint Analysis	Water	Glass jar with Teflon lined screw cap (one 1 L bottle)	1,000 ml (1 Liter)	Cool (4°C)	28 days
	Soil	8-oz wide mouth glass jar with Teflon-lined cover	50 grams	Cool (4°C)	28 days
Total Cyanide	Water	Polyethylene bottle (one 1 L bottle)	100 ml	Cool (4°C) Preserved with base (NaOH to pH>12)	180 days
	Soil	8-oz wide mouth glass jar with Teflon-lined cover	10 grams	Cool (4°C)	12 days
Mercury (Total and Dissolved)	Water	Polyethylene bottle (one 1 L bottle)	100 ml	(Dissolved metals only - field filtered using 0.45 micron filter) Cool (4°C) Preserved with acid (HNO_3 to pH<2)	26 days
	Soil	8-oz wide mouth glass jar with Teflon-lined cover	10 grams	Cool (4°C)	26 days
Biochemical Oxygen Demand	Water	Polyethylene bottle (one 1 L bottle)	100 ml	Cool (4°C)	24 hours
Bicarbonate	Water	Polyethylene bottle (one 1 L bottle)	100 ml	Cool (4°C)	14 days
Carbonate	Water	Polyethylene bottle (one 1 L bottle)	100 ml	Cool (4°C)	14 days
Chemical Oxygen Demand	Water	Polyethylene bottle (one 1 L bottle)	100 ml	Cool (4°C) Preserved with acid (H_2SO_4 to pH<2)	26 days
Chloride	Water	Polyethylene bottle (one 1 L bottle)	100 ml	None Required	26 days
Sulfate	Water	Polyethylene bottle (one 1 L bottle)	100 ml	Cool (4°C)	28 days
Total Dissolved Solids (TDS)	Water	Polyethylene bottle (one 1 L bottle)	100 ml	Cool (4°C)	7 days
Total Suspended Solids (TSS)	Water	Polyethylene bottle (one 1 L bottle)	100 ml	Cool (4°C)	5 days

Reference: EPA Document No. 540 P-87 001, 1987, "A Compendium of Superfund Field Operations Methods"
NOTES: (1) Metals analysis will be conducted on unfiltered samples. If filtered samples are analyzed, unfiltered samples must also be collected and analyzed. If turbidity presents a problem, the samples will be handled according to NYSDEC "Guidelines for Handling Excessively Turbid Samples" following approval by the Division of Hazardous Waste Remediation (DHWR). (2) Holding times are calculated from VTSR (Verified Time at Sample Receipt). Samples must be received by the lab within 48 hours of collection. (3) TCL = Target Compound List. (4) TAL = Target Analyte List.

4.4 Decontamination Procedures

Standardized procedures for decontamination have been established to reduce the likelihood of cross-contamination between samples and sampling locations. Equipment to be decontaminated includes: backhoes, drilling equipment, and sampling equipment.

All decontamination procedures will comply with the personal protection requirements detailed in the site Health & Safety Plan (HASP). Personal protection levels will depend on the nature of the contamination and the specific decontamination method. Specific decontamination methods for exploratory and sampling equipment are described in the following sections.

4.4.1 Heavy Equipment

Heavy equipment such as drill rigs and backhoes may need to be steam cleaned with a portable high pressure steam cleaner upon arrival at the site and prior to demobilization. During the course of investigation activities, it is only necessary to decontaminate equipment that comes in contact with soils and/or groundwater (i.e., drill rods, bits, backhoe bucket, etc.).

Prior to initiation of drilling activities at the site, a temporary steam cleaning area will be established, if necessary, for the decontamination of the drill rig and associated tools and augers. When selecting the steam cleaning location, the following items will be considered:

- Free from traffic;
- Away from any proposed test boring or monitoring well locations;
- Readily accessible to the investigation area; and
- Free of known surficial contamination.

The decontamination area will consist of a controlled area or structure to contain all wash water and eliminate the possibility of drilling equipment coming in contact with the underlying surficial soils and/or pavement during steam cleaning. Site-specific decontamination area construction requirements may be detailed in the Work Plan.

All equipment will be placed on clean pallets or racks prior to and after steam cleaning. Potable water will be used for the steam cleaning activities. The equipment to be steam cleaned includes: drill rods, augers, bits, tools, and split-spoon samplers. Decontamination wastewater and soils will be initially drummed into 55 gallon steel containers or other appropriate holding vessels pending laboratory analyses.

4.4.2 Drilling Equipment

Drilling equipment that is exposed to soil and/or groundwater will be steam cleaned between sampling locations. The purpose of this decontamination is to ensure that potential contaminants are not transferred between sampling locations.

4.4.3 Sampling Equipment

Contaminated tools and sampling equipment will be placed in a plastic pail, tub, or other container with a Liquinox® (or equivalent) soap and water solution. The tools will be brushed off, rinsed, and

transferred to a second soap and water solution bath. Tools will be rinsed with potable water and finally rinsed with de-ionized water. Tools such as wrenches, split-spoons, etc., may be decontaminated between exploration locations with a high-pressure steam cleaner instead of washing. Sampling equipment such as reusable bailers or submersible pumps will be wrapped in aluminum foil after cleaning to prevent contamination before their next use. Control and disposal of decontamination fluids are discussed in Section 4.4.4

4.4.4 Control and Disposal of Decontamination Materials

In general, The Chazen Companies is responsible for collecting, controlling, and staging hazardous material generated during field investigations. Disposal arrangements will be made for the client, if required, for particular work assignments. Specific procedures for handling contaminated environmental materials and contaminated personal protective equipment will be presented in the Work Plan and/or the HASP.

Contaminated soil and water will be handled according to NYSDEC TAGM 4032 and TAGM 405 (draft) unless otherwise specified in the Work Plan. These documents describe alternatives for disposal of these materials and requirements for handling.

4.4.4.1 Soil Disposal

NYSDEC TAGM 4032 on disposal of drill cuttings distinguishes between soils from inactive hazardous waste sites (IHWS) and soils from investigations near or adjacent to inactive hazardous waste sites. On-site soils from IHWS are presumed to be hazardous while soils from areas off-site are presumed to be non-hazardous, pending results of waste characterization analyses.

Alternatives for on-site disposal of non-hazardous soils include:

- Backfill inside borehole;
- Collect and dispose on-site;
- Temporarily store on-site prior to off-site disposal;
- Transport from off-site areas to site (without need to manifest or contract with licensed hauler).

Hazardous soils can be sent off site for disposal to a properly permitted treatment, storage, or disposal facility, and non-hazardous soils can be sent to a solid waste management facility. Representative samples of materials will be analyzed for proper classification, treatment, and disposal. Materials will be transported by a licensed hauler and accompanied by the proper manifests.

Disposal alternatives are subject to precautions listed in the TAGM 4032 including the general requirement that the soils “be handled and disposed of in a manner that does not pose a threat to health and the environment”. Specific handling and disposal requirements for drill cuttings will be identified by the Field Operations Leader based on field screening and analytical results of drill cutting samples, if applicable.

4.4.4.2 Groundwater Disposal

The control of contaminated groundwater is important to prevent impacts to surficial soils. Five alternatives for the disposal of groundwater generated during remedial investigations at hazardous or petroleum impacted sites are generally recognized and are provided below:

- Transportation off-site to an authorized Resource Conservation and Recovery Act (RCRA) treatment facility;
- Discharge to a sanitary sewer for treatment at a publicly-owned treatment works (POTW);
- On-site treatment and discharge to a storm sewer, receiving stream, or to the ground;
- Transport by truck to a POTW;
- On-site disposal by allowing water to infiltrate into the ground.

In order to determine the proper disposal option for groundwater generated during monitoring well development and purging, the water will be containerized pending the receipt of laboratory analysis. The preferred method of disposal of non-impacted groundwater is to the ground surface away from the well, or if allowed, to a storm sewer or a surface water body. Disposal of impacted or non-impacted water to a POTW or other disposal facility will require authorization from the receiving facility. Overall, handling and disposal of collected groundwater will be identified by the Field Operations Leader and approved by the DEC project manager based on field screening and analytical results of water samples.

4.4.5 Sample Handling/Shipping Areas

Sample containers will be wiped clean at the sample site, taken to the decontamination area to be further cleaned, as necessary, and transferred to a clean carrier. The sample identities will be checked off against the COC record. The samples will then be stored at approximately 4° C in a secure area prior to shipment.

Sample handling areas will be cleaned/wiped down daily. For final cleanup, all equipment will be disassembled and decontaminated. Equipment that cannot be satisfactorily decontaminated will be disposed of.

4.4.6 Monitoring Equipment

When monitoring equipment is used under conditions where contamination is possible, the equipment will be protected from contaminant sources by draping, masking, or otherwise covering as much of the instrument as possible with plastic without hindering the operation of the unit.

Any contaminated equipment will be taken from the source area and the protective coverings removed and disposed of in appropriate containers. Any direct or obvious contamination will be brushed or wiped with a disposable paper wipe. The units will then be dried, checked, and calibrated for subsequent operations.

4.5 Air Monitoring

The air monitoring program is designed to provide the necessary information to ensure the safety of on-site personnel and to evaluate potential increases to air contaminant levels and dispersion patterns

during site activities. Air monitoring will be conducted during field activities as detailed in the site-specific HASP and/or Work Plan.

4.5.1 Site Safety Air Monitoring

The required level of personal protection equipment specified in the site-specific HASP will be verified by the results of air quality screening performed on-site during field activities. The screening will be performed using a photoionization detector (PID), which detects and measures concentration levels of total VOCs relative to a reference standard on a real-time basis. The PID lamp sensitivity will be specified in the site-specific HASP based on any information regarding identification of potential contaminants. Most sites will require a PID with a lamp of 10.2 or 11.7 electron volts (eV).

The HASP outlines the air monitoring procedures to be followed during the field investigation. Air monitoring equipment used on site may include a PID, chemical indicator tubes (e.g., Draeger® tubes), percent oxygen/lower explosive limit meter, respirable dust monitor, or a radiation detector.

4.6 Field Screening

Headspace vapor monitoring will be performed as a screening tool for determining the relative concentrations of VOCs in soil samples. A photoionization-detector (PID) will be used. The PID will be calibrated daily in accordance with manufacturer's specifications. Headspace readings will be collected using the static headspace analysis method detailed below:

- Approximately 2 oz. of soil will be collected from each open split-spoon and placed in a dedicated laboratory-cleaned glass jar. Alternatively, soil may be placed in a resealable plastic bag which will be immediately sealed. The mouth of the jar will then be immediately covered with aluminum foil prior to sealing the jar lid to minimize the loss of VOCs. Headspace samples will be collected for each split spoon sample.
- The jar will be shaken to break up the compacted soil or material, and will be placed in a specified location (e.g., field vehicle), out of direct sunlight, for a period of no less than 15 minutes to equilibrate prior to field monitoring.
- Where ambient temperatures are below 0^{o}C, headspace development should be within a heated vehicle or building. Ambient temperature during headspace analysis will be recorded and reported.
- The jar lid will be removed from the jar. Headspace will be monitored within the jar by piercing the aluminum foil with the PID probe. Care will be taken to prevent unnecessary mixing of jar headspace and outside air. Monitoring with the PID will continue for at least 1 minute or until a stable reading is shown. The highest PID concentration observed will be recorded along with the sample interval in the field notebook, and on the Soil Boring Log.

4.7 Test Pitting

Test pits are designed to explore and characterize shallow subsurface soils. Test pits allow observation of large sections of the subsurface and facilitate the collection of soil samples for field screening and laboratory analysis. The locations of test pits will be determined in advance and will be detailed in the Work Plan with the provision that site personnel may modify plans in response to site conditions.

Test pits are generally excavated using a hydraulic backhoe, excavator, or other mechanical equipment with dimensions and capabilities sufficient to complete test pits described in the Work Plan. The depths of test pits and collected soil samples will be determined using a weighted tape measure referenced to the ground surface. During test pitting, samples may be collected from the test pit for geologic characterization, field screening, and laboratory analyses. Samples from the test pits are generally collected from the backhoe bucket.

Field personnel may also enter the test pit to collect samples directly from the sidewalls or bottom of the excavation if the depth is less than four feet. Occupational Health and Safety Administration (OSHA) regulations prohibit entry into test pits greater than four feet deep without adequate shoring or benching of sidewalls. Before entry into any test pit, air monitoring will be conducted in accordance to the site HASP.

Soil samples collected from test pits may be screened with a photoionization detector. If a sample is required, it will be taken from the middle of the backhoe bucket and placed in appropriate containers according to soil sampling procedures outlined in Section 4.3.

Samples may also be placed in an airtight jar or a plastic zip-lock bag and field screened for headspace VOC concentrations as outlined in Section 4.6.1.

Excavated materials may be temporarily stockpiled on plastic sheeting. If hazardous conditions are encountered, the material will be stockpiled to one side, preferably downwind, and away from the edge of the pit to reduce pressure on the pit walls. Materials with different permeabilities (i.e., sand, silt, clay) will normally be segregated during stockpiling to allow for proper replacement during backfilling. Heavily contaminated soils will also be segregated and stockpiled pending laboratory analysis and possible alternative disposal.

In the event that it is necessary to excavate below the water table, groundwater will either be left in the excavation or containerized in a frac tank and evaluated for proper disposal. If drums or other obviously contaminated objects are uncovered, the excavation will be stabilized and further excavation terminated. The field geologist will contact the Project Manager and/or NYSDEC for further directions.

Upon completion of the excavation, the test pit will be backfilled to the ground surface. Prior to backfilling, each test pit may be photographed. During backfilling, materials will be compacted by tamping with the backhoe bucket. The surface will then be graded to the level of the ground surface. At locations where heavily contaminated materials are encountered, clean soil may be utilized for backfill.

The contractor operating the excavator will decontaminate the bucket of the backhoe between excavations using the procedures outlined in Section 4.4.1.

All pertinent information will be documented in a field notebook. A test pit log will also be prepared for each test pit. The test pit log may include a sketch of the test pit, geologic description, and a written summary. Information that may be noted in the log or field notebook includes the following:

- Site name and location;
- Date of excavation;
- Total depth and dimensions of excavation;

- Sample designations and methods of acquisition;
- Soil description;
- Air monitoring levels;
- Field screening results;
- Groundwater seeps or levels; List of photographs taken;
- Date and type of backfill;
- Other pertinent information (waste materials encountered, staining, odor, etc.).

4.7.1 Procedure for Obtaining Soil Samples using a Backhoe

In order to obtain relatively vertical samples from known depths, the backhoe technique is employed. Soil can be excavated and placed in a pile. Upon retrieval of subsurface soil from the backhoe bucket, the contents are examined. The use of the backhoe sampling method allows for direct observation of the stratigraphy.

1. Choose a location from which to obtain a soil sample. Solid covering such as concrete or asphalt must be removed using the backhoe. The operator can then proceed with the excavating.
2. Examine the contents of the backhoe bucket and log, noting the depth from which the sample came.
3. If an individual sample is to be saved for further observation or analyses, place it in a capped glass jar.
4. If the sample desired is a composite sample, place the individual sample in a clean bucket, on a clean piece of plastic or in a plastic zip-lock bag. Add additional samples to the bucket or plastic. After thoroughly mixing all individual samples together, obtain a composite sample and place in a capped glass jar.
5. Clean the bucket with soapy water prior to obtaining the next sample. If samples are to be analyzed for contaminants, properly decontaminate (steam clean) the bucket.
6. Repeat procedure at next location.

4.8 Borings and Environmental Wells

4.8.1 Drilling Methods

Soil borings may be drilled to facilitate collection of subsurface soil samples for geologic classification, chemical analyses, and physical testing. Drill rigs are utilized to advance the borings. The rigs are typically mounted on trucks, all-terrain vehicles, or skids. There are a variety of drilling methods that may be utilized including hollow-stem auger (HSA), drive and wash, and mud rotary. Each of these methods enables the collection of soil or groundwater samples. Drilling methods also facilitate the installation of monitoring wells to provide hydrogeologic data.

A geologist will observe drilling operations summarizing boring information in a field notebook, taking photographs when appropriate, and collecting samples in accordance with the Field Sampling Plan. A boring log will be prepared that includes: characterization of subsurface materials and geologic conditions, air monitoring readings, field screening readings, pertinent drilling information, and relevant observations (i.e., staining, odor, sheen, etc.). An example of a typical boring and monitor well log is presented below.

Typical Boring Log

THE Chazen COMPANIES

PROJECT:		Test Boring No.:	MW-6
LOCATION:			
CLIENT:			
PROJECT NO.:		Total Depth:	ft.
Contractor:	Start Date:	Northing:	Borehole Dia.: in.
Drill Rig:	Finish Date:	Easting:	Depth to Water: ft.
Driller:	El. Datum:	Longitude:	Depth to Rock: ft.
Inspector:	G.S. Elevation:	Latitude:	Depth of Well: ft.

Depth (Feet)	Elevation (Feet)	Casing Data	Sample No.	Sample Data	Recovery (inches)	PID (ppm)	Group Symbol	Stratum and Field Descriptions:	Well Diagram	Field Notes, Well Notes, Comments:
			S1	9	5	0		0-3" Asphalt		
1	-1			8				3-6" Gravel road base		
				5				6"-11" Fill - Black, ash, wood, dry, no odor		
2	-2			5						
			S2	8	5	0		2'-2'5" Fill - Black ash, wood, gravel, tip of spoon wet, no odor		
3	-3			2 4						
				8						
4	-4			7						
			S3	6	3	0		4'-4'3" Black, silty CLAY, saturated, no odor		
5	-5			3						
				1						
6	-6			1						Bentonite:
			S4	3	12	0		6'-6'3" Same as above		Sand:
7	-7			8				6'3"-7' Reddish brown, silty CLAY, gravel, saturated, no odor		
				4						
8	-8			3						
			S5	4	12	0		8'-9' Dark brown and reddish brown, plastic CLAY, saturated,		
9	-9			1				no odor		
				1						
10	-10			2						
			S6	2	12	0		10'-11' Dark brown, silty CLAY, moist to wet, no odor		
11	-11			3						
				2						
12	-12			4						
								Boring terminated at 12 feet below ground surface		
14	-14									

ADDITIONAL NOTES:

Drilling methods used during an investigation will be determined in advance and will be detailed in the Work Plan with the provision that the drilling procedure may be modified in response to conditions encountered during drilling. A more detailed discussion of the various drilling methods, sampling procedures, and well installation procedures is provided below.

4.8.1.1 Hollow-Stem Augers

The Hollow Stem Auger (HSA) method utilizes coupled lengths of continuous-flight, hollow steel augers to advance through overburden materials. With this method, drill cuttings rise upward on the flights as the string of augers is rotated.

Typically, $4^1/_4$-inch or $6^1/_4$-inch inner diameter (ID) augers are used for hazardous waste investigations. These produce nominal 8-inch and 10-inch boreholes, respectively.

A center plug equipped with cutting teeth is attached to drilling rods and placed inside the augers to facilitate cutting and to prevent subsurface materials from entering the augers.

When the augers are advanced to the appropriate depth, the center plug is removed to allow for the collection of soil or in situ samples.

The advantage of the HSA method is that limited fluid use is required. In addition, 2-inch ID monitoring wells can be easily installed inside the augers. The limitations of HSA drilling include the inability to advance through very dense materials like rock, cobbles, rubble, etc., or drilling through loose saturated sands and silts which tend to flow around the plug and seize the tooling. Drilling depths are usually limited to the first dense rock layer encountered or by the torque of the machine.

4.8.1.2 Direct Push

Soil probing or "direct push" machines such as the Geoprobe® push tools and sensors into the ground without the use of rotation to remove soil and to make a path for the tool. A Geoprobe® relies on a relatively small amount of static (vehicle) weight combined with a hydraulic hammer as the energy for advancement of a tool string. Probing tools do not remove cuttings from the probe hole but depend on compression of soil or rearrangement of soil particles to permit advancement of the tool string.

Probing tools are advanced as far as possible using only the static weight of the carrier vehicle. Greater depth is achieved using the combined effect of the vehicle weight and hydraulic hammer. Hammering is often required when probing near the ground surface to penetrate hard-packed surface soil and other hard surfaces. The probe is then allowed to penetrate using only static force until refusal is again encountered, at which time the hammer is reapplied. The hammer is applied as required when probing through sands, gravels, high friction clays, tills, fill materials, and surface frost.

A Geoprobe® can be used to drive tools to obtain continuous soil cores or discrete soil samples; obtain groundwater samples or soil gas samples; install permanent sampling implants and air sparging points; set small diameter permanent monitoring wells; or drive a conductivity sensor probe to map subsurface lithology. Soil probing equipment is typically used for site investigations to depths of 30 to 60 feet.

The advantage of using a Geoprobe® versus conventional drilling techniques, are:

- Minimal cuttings are generated. This reduces handling, containing, storing, sampling, analyzing, and disposing of potentially hazardous and contaminated cuttings. This also reduces disposal costs and potential exposure of site workers, facility employees, residents, and surroundings to hazardous contaminants.

- Only a small diameter hole is created. Grouting is less expensive because a small volume of grouting material is required.

- Less obtrusive equipment required. Small, light, probing equipment is used for sample collection which allows the operator to reach many locations not accessible to larger and heavier conventional drilling equipment.

- Minimal physical and chemical disturbance of the sample materials occurs.

- Typical penetration rates are from 5 to 25 feet per minute, although probing time is highly dependent upon soil conditions.

- Sampling time is shorter; therefore, more sample locations can be sampled per day, depending upon soil conditions.

- The unit can sample all subsurface media including soil, groundwater, and soil gas; log soil conductivity and contaminants; grout probe holes; and inject remediation materials.

4.8.1.3 Deep Drilling

Deep drilling, if needed, will be conducted using a method that prevents borehole collapse when advancing through the unconsolidated formation. A HSA rig will be used in deep overburden drilling if necessary in most cases. This will allow for the advancement of a split spoon sampler in advance of the auger flights which will prevent collapse of the borehole. In the event that HSA is not successful in advancing the borings due to difficult drilling conditions, an example of typical drilling tooling that may be used is Odex, although this task may be conducted by using a different method if the selected driller demonstrates an alternate method is capable of meeting the project's deep drilling and sampling requirement.

An Odex drill bit is designed to fit through typical dimension solid steel well casing. A drive shoe is welded to the bottom of the casing string to provide a ledge for the air hammer to pull the casing downward as the boring advances. This prevents the borehole from collapsing around the hammer which could result in loss of tooling and the well attempt. The cutting head of the drill bit extends beneath the casing and expands during rotation and application of high pressure air, enabling it to drill a borehole that is slightly wider than the outside diameter of the steel well casing. The drill bit pulverizes the material below the casing and uses compressed air to blow the rock and/or soil cuttings back to the top of the borehole. Drill cuttings are collected and placed in 55-gallon drums on the site pending laboratory characterization. The drill bit can be retracted and pulled out of the casing to allow for soil sample collection through the casing using either split-spoon or macro-core sampler.

Diagrams depicting typical Odex tooling in drilling and retract modes are shown below.

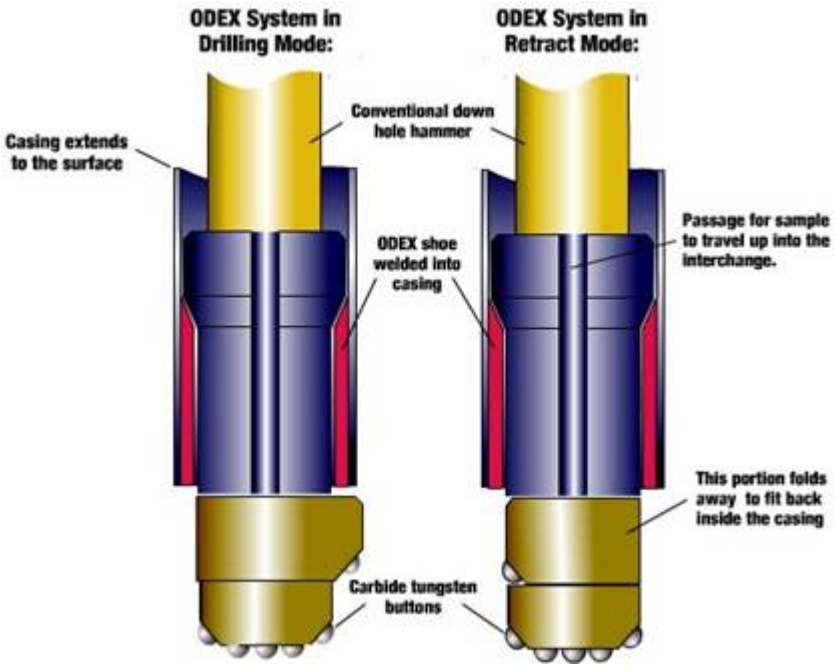


Image provided by Midnight Sun Drilling Ltd

4.8.2 Subsurface Soil Sampling

4.8.2.1 Hand/Bucket Auger

A hand or bucket auger may be used for collecting shallow subsurface soil samples, usually no deeper than 3 to 4 feet below ground surface, although the achievable depth will be limited by soil type and conditions at the site. A hand or bucket auger may be used for collecting surface soil samples. The following procedure is used when collected soil samples with a hand auger:

1. Using a decontaminated stainless steel auger connected to an extension rod and handle, begin turning the auger clockwise until the auger is full. Remove the auger, empty the soil, and continue auguring until the desired depth is reached.

2. Using a decontaminated or second auger obtain soil from the specified depth interval (24-36", 36-48", etc.). The auger used to advance the hole is not suitable for sample collection, as it may be contaminated by the material above it.

3. When sampling at depths deeper than 12 inches, discard ½-inch of material at the top of the auger due to cave in.

4. Transfer soil to a stainless steel mixing bowl. Immediately transfer soil for VOC analysis into sample jar using a stainless steel spoon (unless State requirements specify methanol preservation of samples for VOC analysis).

5. Once a sufficient volume of soil is collected in the mixing bowl, thoroughly homogenize the sample and remove any vegetative material and stones.

6. Transfer the material to the labeled sample containers and place them in sample cooler on ice.

7. Either decontaminate the sampling equipment or place it in a plastic bag for later decontamination.

4.8.2.2 Split-Spoon Sampling

Split-spoon samplers are used to collect soil samples from the bottom of a borehole. The sampler consists of a thick-walled, steel tube that is split lengthwise. It has a cutting shoe attached at the lower end and a check valve at the upper end.

When needed, the split-spoon sampler is attached to drill rods with a threaded adapter. The split-spoon sampler is driven into the ground in accordance with the standard penetration test (ASTM D1586). The standard penetration test (SPT) consists of driving a $1^3/_8$-inch ID, 2-foot split-spoon 24 inches into the soil using a 140-pound hammer falling 30 inches. The number of blows required to drive the split-spoon each 6 inches is recorded to obtain the SPT-N value, which is defined as the total blows for the penetration from 6 to 18 inches. Often, larger split-spoons are used in order to provide sufficient soil volume when collecting samples for chemical analyses. The size of the split-spoon and the sampling interval are detailed in the FSP.

After the sampler has been retrieved, a field geologist will perform field screening, soil characterization, and sample collection according to the following procedures:

1. The split-spoon will be screened for VOCs immediately upon opening with a total VOC analyzer such as a PID. The instrument will be passed over the sample while slightly disturbing the soil with a sampling trowel or spoon.
2. The soil from the split spoon will be characterized in the field using Modified Burmeister Soil Classification System or the Unified Soil Classification. Physical characteristics such as color, grain size, soil type, texture, consistency, and moisture will be recorded in a field notebook or boring log form.
3. Representative soils will be placed into the appropriate jars for physical and chemical testing. The type and frequency of tests that will be performed are discussed in the FSP. Samples that may be submitted for laboratory analysis will be placed immediately into laboratory-supplied jars with a pre-cleaned stainless steel trowel or spoon. The samples will be labeled with the date and time of sampling, sample identification and site location, then packed for shipment to the laboratory in a cooler with ice. An 8-ounce jar and/or 40-ml vial will also be filled (if specified in the Work Plan) for soil jar headspace tests as detailed in Section 4.6.1.
4. The split-spoon and sampling utensils will be decontaminated between each sample according to the procedures outlined in Section 4.4.3.

4.8.2.3 Geoprobe® Sampling

Macro-Core Soil Samples

The MacroCore® Soil Sampler is a solid barrel, direct push device for collecting continuous core samples of unconsolidated materials at depth. The standard MacroCore® Sampler has an assembled length of approximately 52 inches (1,321 mm) with an outside diameter (OD) of 2.2 inches (56 mm). Collected samples measure up to 1,300 ml in volume in the form of a 1.5-inch by 45-inch (38-mm by 1,143-mm) core contained inside a removable liner. The MacroCore® Sampler may be used in an open-tube or closed-point configuration. It has a removable/replaceable, thin-walled liner tube inserted inside for the purpose of containing and storing soil samples. The standard MacroCore® liner is 1.75-inches OD by 46-inches long (44-mm by 1,169-mm). Liner materials include stainless steel, Teflon®, PVC, and PETG.

To obtain a soil sample, an assembled MacroCore® Soil Sampler is driven one sampling interval into the subsurface and then retrieved using a Geoprobe® soil probing machine. The collected soil core is removed from the sampler inside a liner.

The MacroCore® Soil Sampler is most commonly used as an open-tube sampler. In this configuration, coring starts at the ground surface with a sampler that is open at the leading end. The sampler is driven into the subsurface and then pulled from the ground to retrieve the soil core. In stable soils, an open-tube sampler is advanced back down the same hole to collect the next core.

In unstable soils, which tend to collapse into the core hole, the MacroCore® Sampler can be equipped with a piston rod point assembly. The point fits firmly into the cutting shoe and is held in place by a piston rod and stop-pin. The MacroCore® Piston Rod System prevents collapsed soil from entering the sampler as it is advanced to the bottom of an existing hole, thus ensuring collection of a representative sample.

Loose soils may fall from the bottom of the sampler as it is retrieved from depth. Better recovery is obtained when the core catcher is used with saturated sands and other non-cohesive soils. A core catcher should not be used with tight soils as it may actually inhibit sample recovery.

Large Bore Soil Sampler

The Large Bore (LB) Soil Sampler is a solid-barrel, piston-sealed, direct push device for collecting discrete interval samples of unconsolidated materials at depth. The assembled Large Bore Sampler is approximately 30-inches long with an OD of 1.5-inches. Collected samples measure up to 283-ml in volume in the form of a 1.0-inch by 22-inch core contained inside a removable liner. It has a 1.15-inch OD by 24-inch long removable/replaceable, thin-walled tube liner inserted inside for the purpose of containing and storing soil samples. Liner materials include brass, stainless steel, Teflon®, and clear plastic (cellulose acetate butyrate).

The Large Bore Sampler is used primarily as a discrete interval sampler; that is, for the recovery of a sample at a prescribed depth. In certain circumstances, it is also used for continuous coring.

To obtain a sample, the assembled Large Bore Sampler is connected to the leading end of a Geoprobe® rod and driven into the subsurface using a Geoprobe® Soil Probing Machine. Additional probe rods are connected in succession to advance the sampler to depth. The sampler remains sealed (closed) by a

piston tip as it is being driven. The piston is held in place by a reverse-threaded stop-pin at the trailing end of the sampler. When the sampler tip has reached the top of the desired sampling interval, a series of extension rods, sufficient to reach depth, are coupled together and lowered down the inside diameter of the probe rods. The extension rods are then rotated clockwise using a handle. The male threads on the leading end of the extension rods engage the female threads on the top end of the stop-pin, and the pin is removed. After the extension rods and stop-pin have been removed, the tools string is advanced an additional 24 inches. The piston is displaced inside the sampler body by the soil as the sample is cut. To recover the sample, the sampler is retrieved from the hole and the liner containing the soil sample is removed.

4.8.3 Monitoring Well Installation

This section outlines the general procedures for monitoring well installation and typical materials utilized. The number, location, and construction details of monitoring wells will depend on the project objectives and will be discussed in the Work Plan.

4.8.3.1 Well Construction Materials

Well construction materials consist of well screen, riser pipe, sand pack, bentonite seal, cement grout, and protective casing. Specific monitoring well details may be outlined in the Work Plan. Typical well construction specifications are described below.

Well Screen and Riser Pipe

The most common materials used in the construction of monitoring wells are polyvinyl chloride (PVC) and stainless steel. Generally, PVC is used because it is less expensive and non-corrosive. However, PVC may deteriorate as a result of certain compounds. In such cases, stainless steel may be preferred. Riser pipe and well screen is typically 2-inch or 4-inch ID and has flush joint threads.

When PVC is used, wells constructed in unconsolidated materials less than 100 feet deep are constructed with Schedule 40 PVC.

Well screens are used in the construction of monitoring wells to limit sediment from entering the well. Generally, screens are machine slotted at slot sizes of 0.01 inches (10-slot) for fine materials or 0.02 inches (20-slot) for coarse materials such as coarse sand and gravel. The screen slot size should be selected to retain 90 percent of the filter pack material or native aquifer material.

Sand Pack

The sand pack consists of uniformly graded sand. A grade of sand is selected such that it will not to pass the well screen slot size and will exclude the fines from the formation. At least a 2-inch layer of sand will be placed at the bottom of the hole prior to the well installation. Sand will be placed around the well screen to a level of 2 feet above the top of the screen, site conditions permitting. In situations that require a well to straddle a shallow water table, it may be necessary to place less sand above the top of the screen to allow enough space for an adequate bentonite seal.

Bentonite Seal

The bentonite seal may consist of pure Wyoming sodium bentonite chips, pellets, or slurry. A bentonite seal expands by absorbing water, and due to its low permeability, serves to isolate the screened interval

from the rest of the borehole. The bentonite seal should be at least 2 feet thick and be placed directly above the sand pack. It may be necessary to install less bentonite for shallow water table wells. Bentonite seals that are placed above the water table should be hydrated with potable water. NYSDEC guidelines (TAGM 4008) specify that bentonite seals must be placed via tremie method. For deeper installations it is often more practical to tremie a bentonite slurry. In such cases, the bentonite slurry may be placed up to the ground surface in place of cement or cement-bentonite grout.

Cement-Bentonite Grout

Grout will be placed from the top of the bentonite seal to the ground surface via the tremie method. Generally, the grout consists of a cement-bentonite mixture. Cement is Portland Type 1, in conformance to ASTM specifications C150. The bentonite is powdered Wyoming sodium bentonite. Cement-bentonite grout typically consists of 94 pounds of cement mixed with 3 to 5 pounds of powdered bentonite and 7 gallons of water or a media approximating this mixture. The purpose of the grout seal is to replace material removed from the borehole during drilling and prevent collapse and subsidence around the well. Pure bentonite slurry may also be used in place of the cement-bentonite grout.

Protective Casings

Protective casings are placed around wells to prevent damage, provide security, and to provide a seal to prevent surface runoff from entering the well. They usually consist of a 4- or 6-inch diameter steel casing with a 2-3 foot stick up above the ground or a manhole road box installed flush to the ground surface (flush-mounted casing). The casings should be watertight and equipped with a locking cover. All protective casings should be labeled with the well identification. A concrete surface seal should be constructed around the protective casing at the ground surface to provide a seal and to divert surface runoff away from the well. All details of well installation will be recorded by the geologist.

4.8.4 Bedrock Monitor Well Installation

Monitor wells will be installed following National Water Well Association protocol and good engineering practices. The on-site geologist will be present during all drilling and monitor well installations to ensure that work progresses in a timely fashion. Continuous sampling of the unconsolidated sediments will be completed using split spoons. These samples will be examined to define the stratigraphy.

The on-site geologist shall log the borehole and provide an interpretation of cores, unconsolidated sediment samples, and drill cuttings. The on-site geologist shall also maintain a log of each boring including:

- Reference point for all depth measurements.
- The depth at which each change of formation occurs.
- Identification and classification of formation materials using Unified Soil Classification system for unconsolidated sediment samples.
- The number, interval, and time of sample collection.
- Identification of the bedrock type, rock quality density (RQD), fracture frequency and weathered zone by the examination of rock cores.
- Description of drilling progress.
- The number and time of each core run.
- Estimated water level, yield, and recovery rate.
- Field-screening PID readings in parts/million of each sample as logged at the time of drilling.

The bedrock monitor well will be installed using the air rotary method. A 4- to 6-inch steel casing will be sealed at least 1-foot into bedrock. The boring will be completed as an open rock well. The well will also be sealed with cement at the ground surface.

4.8.5 Well Development

Monitoring wells will be developed in order to restore the natural permeability of the formation adjacent to the borehole; to permit water to flow through the screen easily. Well development removes fine sediment from the formation so, during sampling, water will not be turbid or contain suspended materials that can interfere with chemical analysis.

Shallow wells are generally developed with a bailer, a foot-valve pump, or a submersible pump. Pumping is usually a more efficient method for deeper wells. The selection of the well development methods and equipment will be determined on site by the field personnel based on drilling, well construction, and site-specific geologic information.

Well development will occur after a minimum of 24 hours following construction or after recovery is complete, whichever is later (NYSDEC TAGM 4007). All equipment that is introduced into the well will be decontaminated according to the procedures discussed in Section 4.4. The general procedures for well development are summarized below:

1. Measure the water level in the well with a water level indicator. The depth to the bottom of the well is measured with a weighted measuring tape.
2. A bailer or other pumping device is lowered to the bottom of the well. The well is surged by the bailer or the pump to agitate and loosen fines in the well screen and sand pack.
3. Groundwater is bailed or pumped from the well. If a pump is used, the pump intake will be periodically placed at different depths throughout the well and within the screen interval during development.
4. Readings of pH, temperature, specific conductance, and turbidity will be collected after each well volume removed or at other intervals depending upon well output and other factors pertinent to sampling.
5. Well development will continue until the field measurements stabilize. Ideally, the well should be developed to 50 Nephelometric Turbidity Units (NTU), if possible, according to NYSDEC TAGM 4007. The goal of 50 NTUs may not be practical in formations which contain a lot of silt and clay in which case the well will be developed until the turbidity readings appear to have stabilized.
6. The development tools will be removed from the well and the water level and well bottom will be measured following development.
7. The well will be covered and locked.
8. Purged water will be containerized pending subsequent sampling and handled according to the procedures outlined in Section 4.4.4.
9. All pertinent field data will be recorded on a Field Data Sheet (see Section 4.10).

4.9 Groundwater Sampling

Groundwater samples are collected from monitoring wells for laboratory analysis. The specific number and location of samples, rationale, and parameters to be tested are discussed in the Work Plan. The equipment and general procedures normally utilized for groundwater sampling are presented below.

4.9.1 Groundwater Sampling Equipment

Monitoring wells will be purged using one of the following pieces of equipment:

- Lubricant-free stainless steel submersible pump with polyethylene or Teflon discharge tubing.
- Peristaltic pump equipped with dedicated polyethylene tubing with or without a foot valve.
- Dedicated Teflon bailer connected to new solid-braid nylon rope.
- Inertial lift pump with dedicated polyethylene valve and tubing.

Project-specific purging methods are outlined in the Work Plan. The selection of a purging method is determined based on the following information:

1) Well depth
2) Static water level
3) Hydraulic conductivity
4) Well diameter
5) Well location

4.9.2 Procedures for Collecting Groundwater Samples

4.9.2.1 Pre-Sampling Activities

Before sampling, the following pre-sampling activities will occur:

- The well will be inspected for integrity and proper identification.
- A sheet of polyethylene will be laid out for placement of monitoring and sampling equipment.
- If site conditions are unknown, conditions warrant, or project requirements call for VOC monitoring, VOCs will be measured at the rim of the opened well with a PID and recorded in the field logbook.
- After removing the well cap, the water level will be allowed to equilibrate for a minimum of 5 minutes. The static water level in the well will be measured with a water level indicator to the nearest 0.01 feet referenced to a permanent mark on the PVC riser. The probe of the meter will be decontaminated according to the procedures detailed in Section 4.4.
- The volume of water in the well will calculated by the following equation:

$$V = (\pi) r^2 l (7.48)$$

where,
V = volume, in gallons
π = 3.14
r = inside radius of well, in feet
l = height of water in well, in feet
7.48 = conversion factor for cubic feet to gallons

- If desired, the depth of any non-aqueous phase liquids (NAPLs) will be measured using an interface probe and recorded. If LNAPLs or DNAPLs are detected, the well will not be sampled. A sample of the LNAPLs or DNAPLs present may be obtained using a bailer, if appropriate.

4.9.2.2 Sampling Procedures

Low Flow Sampling:

- Install Pump: Slowly lower the pump, safety cable and tubing into the well to the depth specified for that well. The pump intake should be in the middle or slightly above the middle of the screened interval. Too close to the bottom increases the possibility that solids that have collected in the well over time will be collected in the sample. Too close to the top increases the possibility that water stored in the casing will be included in the sample. Record the depth to which the pump is lowered.

- Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.

- Purge Well: Start pumping the well at 100 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every 5 minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should be reduced, if needed, to the minimum capabilities of the pump to ensure stabilization of the water level. Care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

- Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (temperature, specific conductance, and pH) approximately every 5 minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows:

  ±0.1 for pH

  ±3% for temperature

  ±3% for specific conductance (conductivity)

  The pump must not be removed from the well between purging and sampling.

- Sample collection should be directly from the dedicated or disposable tubing, not from the flow-through cell discharge hose.

- Remove pump and tubing: After collecting the samples, the tubing must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.

- Close and lock the well.

Sample Collection

All laboratory samples will be placed in containers according to the procedures outlined in Section 4.3.3 of this document. Drums containing purge water will be handled in accordance with Section 4.4.4.

4.10 Sediment and Shallow Soil Sample Collection

Shallow soil samples and sediment samples provide information related to the presence of contamination caused by surface releases. These samples are typically collected utilizing one of the following tools:

- Split-spoon sampler
- Hand augur
- Sampling trowel

Depending on the objectives of the sampling program, either grab samples or composite samples may be collected. Samples can be composited over various depths from one location, or laterally from several locations of the same depth. Composite samples are homogenized in a stainless steel bowl using a stainless steel mixing spoon or trowel. Grab samples to be analyzed for VOCs are collected directly from the sampling implement and are not mixed. Soil samples are placed in the appropriate laboratory jars based on the proposed analytical methods, labeled, and packed for shipment to the laboratory in a cooler with ice.

All sampling equipment will be decontaminated between sample locations according to the procedures outlined in Section 4.4.

A detailed log for each sample will be recorded in a field notebook. This record will include: time and date of sample collection, depth, location, sampler's name, sampling procedures, soil types collected, and all other pertinent observations.

The various methods for obtaining shallow soil and sediment samples are described below. Site-specific sampling objectives and procedures are described in the Work Plan.

Split-Spoon Sampling: Split-spoon samples are collected in accordance with the procedures outlined in Section 4.8.2.2.

Hand Auger Sample Collection: A hand auger is twisted into the ground by hand. The auger is generally advanced in one-half to one-foot intervals to the target depth. Samples are collected by removing the device from the hole and emptying the sample from the bucket auger into a stainless steel bowl. The sample is then homogenized according to the procedure described above. Hand augers generally have a maximum depth range of about five feet, depending on soil type and density, frequency of cobbles, depth to water, and other natural or manmade conditions.

Sampling Trowel: The use of sampling trowels will follow the same procedures as described for hand augers. However, samples are collected by hand with a stainless steel shovel, trowel, or similar instrument. The maximum depth is generally about one to two feet.

4.11 Surface Water Sampling

The procedures for surface water sampling are dependent on the depth of water, flow rate, and analytical parameters of interest. Site-specific sampling locations and methods are presented in the FSP. In general, samples are collected according to the following procedures:

- A clean sample bottle is lowered into the surface water body. Care will be taken to avoid floating debris. Samples from streams are collected with the opening of the sampling vessel facing upstream.
- If a sample collection vessel is required due to depth or flow rate, the vessel will be filled as described above. The appropriate sample container can be filled from the sampling vessel.
- Depending on the parameters being sampled, collect measurements of pH, specific conductance, and temperature from the surface water body. Details of required surface water measurements will be shown in the FSP.
- All pertinent information will be recorded in a field notebook and on a Field Data Sheet.
- The sampling location will be staked and labeled for subsequent field survey, if required by the Work Plan.

4.12 Water Level Measurements

Groundwater level measurements are taken to calculate groundwater elevations so that groundwater contour maps can be constructed. Groundwater contour maps are used to assess flow directions and hydraulic gradients.

Water levels are measured with a water level indicator to the nearest hundredth (0.01) foot. Measurements collected from monitoring wells are taken from the top of well casing. The measurement point is notched or marked indelibly on the casing.

Water levels are measured according to the following procedures:

- Check the well for proper identification.
- Inspect the integrity of the protective casing and surface seal.
- If previous data warrant, or unknown conditions exist, then monitor the ambient air in the breathing zone and at the well head while unlocking and removing the well cover.
- Using a pre-cleaned water level indicator, measure the water level to the nearest hundredth (0.01) foot from the reference mark at the top of the well riser pipe.
- Record the water level measurements in a field notebook and/or on a field data sheet along with the date and time of measurement.
- Decontaminate the water level probe between locations by rinsing it with methanol and deionized water.
- Replace the well cover and lock.

4.13. Ground Penetrating Radar

Ground penetrating radar (GPR) uses high frequency radio waves to investigate shallow geologic features (e.g. depth to the water table or depth to bedrock) and for the detection of buried objects. GPR can provide subsurface information ranging in depth from several tens of feet to inches and is useful for locating subsurface objects, utilities, and geologic interfaces.

Ground penetrating radar operates by transmitting pulses of microwave-range (0.1- to 100-cm wavelength) electromagnetic energy into the ground through an antenna (a.k.a. transducer). Some of the energy is scattered where materials with different dielectric permitivity interface. The rest of the energy passes through the interface and on to the next interface where it may be reflected or pass through to deeper interfaces. The reflected signals are received by a control unit which registers the reflections against two-way travel time in nanoseconds. The control unit typically contains an output

display on which the signals are plotted in profile (radargram).

The GPR antenna is pulled slowly along the ground surface radiating energy downward into the subsurface. Reflected energy is gathered at a receiving antenna and variations in the return signal are continuously recorded. These variations are caused by wave reflections from surfaces of materials having different electrical properties. These surfaces may be geologic features (e.g., soil interfaces, changes in moisture content, voids or fractures in bedrock) or indications of human activity (e.g., buried drums, utilities, tanks).

The depth of penetration is highly site-specific and is dependent on the soil types and properties. In general, dry, sandy soils provide better data, while moist, clayey or conductive soils provide poorer results.

4.13.1 Equipment/Instrumentation

The GPR system consists of a control unit, antenna, and a graphic recording device. The antenna transmits electromagnetic pulses of short duration into the ground. Pulses are reflected back to the antenna from the various interfaces within the subsurface. The receiver sends the signal to the control unit for processing and display.

Several manufacturers produce commercially-available GPR systems. For this reason, a detailed description of instrument operation is not practical. The operator should refer to the instrument setup and operations manual to prepare the instrument for a survey. The instrumentation should be selected based on the desired target and actual field conditions. The selection of a transducer frequency will need to balance the desired depth of penetration with resolution.

4.13.2 Field Procedures

The general field procedures for conducting GPR surveys are outlined below:

- Where possible, the instrument is calibrated by burying a metal object at known depth. The instrument is then adjusted so that the readings are consistent with the true depth.

- A grid of parallel lines is established across the investigation area. The size of the grid is dependent upon the project objectives and is detailed in the FSP.

- Data are collected by slowly pulling the antenna along the survey lines. The beginning and end points of each traverse should be surveyed from a known location, which can be recovered at a future date.

4.13.3 Data Analysis

Most modern GPR systems utilize portable digital processors operating on battery (DC) power. Digital processing allows the operator to utilize filtering, stacking, and gain controls as well as manipulate them in the field. Data is typically stored in an unfiltered (raw) form that can be reviewed and processed after the survey is complete.

GPR data are evaluated qualitatively in the field as the survey progresses. Data is displayed on the GPR system and observed in profile as it is collected. Estimates of depth are automatically made by utilizing a

velocity conversion factor. The velocity conversion factor is a user-entered estimate of the radar wave propagation rate through the subsurface. It is used to determine distance (depth) from the GPR antenna.

4.13.4 Data Evaluation

The propagation velocity of the EM pulse depends upon the relative dielectric permittivity of the material (e_r) through which the pulse travels. The relative dielectric permittivity is a measure of the degree to which a medium can resist the flow of the EM pulse: the higher the relative permittivity, the lower the resistance to flow, and vice versa. For most earth materials and rocks, the relative dielectric permittivity does not exceed 10 and is always greater than unity, the value for a vacuum. The table below gives typical permittivity values for commonly encountered materials.

Approximate Electromagnetic Properties of Various Materials

Material	*Relative Dielectric Permittivity*	*Pulse Velocity (ns/ft)*
Air	1	1
Freshwater	81	9
Seawater	81	9
Sand (dry)	4 – 6	2.1 – 2.4
Sand (saturated)	30	5.5
Silt (saturated)	10	3.1
Clay (saturated)	8 – 12	2.8 – 3.3
Average “dirt”	16	4
Dry sandy coastal land	10	3.1
Marshy forested flat land	12	3.5
Rich agricultural land	15	3.9
Pastoral land, hilly, forested	13	3.6
Freshwater ice	4	2
Permafrost	4 – 8	2.0 – 2.9
Granite (dry)	5	2.2
Limestone	7 – 9	2.6
Concrete	6.4	2.5
Asphalt	3 – 5	1.7 – 2.5

The dielectric permittivity is related to the propagation velocity by the formula:

$$e_r = \left(\frac{c}{V_m} \right)^2$$

where, “c” is the propagation velocity in free space (3×10^8 meters per second or approximately 1 foot per nanosecond) and Vm is the propagation velocity through a material. It follows that

$$\left(e_r\right)^{1/2} = \frac{c}{V_m} \qquad \text{or} \qquad \frac{1}{V_m} = \frac{\left(e_r\right)^2}{c}$$

Since c is approximately equal to 1 ft/ns, then

$$1/V_m \approx (e_r)^{1/2} \qquad \text{(Formula 1)}$$

Where units are in ns/ft (one-way travel time).

Formula 1 gives a method for estimating the propagation velocity for a medium (and therefore the depth to a reflecting horizon) if the soil conditions are known. If they are unknown or their properties cannot be estimated accurately enough, a reflector of known depth can often be used to calibrate the GPR recordings to site conditions.

Approximate Depth Ranges for Various Antenna Frequencies

Frequency (MHz)	Minimum Target Size (m)	Approximate depth range (m)*
100	0.1-1	2-15
250	0.05-0.5	1-10
500	0.04	1-5
800	0.02	0.4-2

4.14 Soil Vapor Sampling

Soil vapor sampling will be conducted in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion, Final October 2006.

Soil vapor samples are collected outside, and not beneath the foundation or slab of a building, to determine whether there is soil vapor contamination, to characterize the nature and extent of soil contamination, and to identify possible sources of contamination. The results are often used to evaluate the potential for current and future human exposures and to determine the effectiveness of measures implemented to remediate contaminated subsurface vapors.

4.14.1 Investigation Considerations

Existing environmental data and site background information are used to select the sample locations. When evaluating sites that are proposed for development, where soils are suspected or known to be contaminated, the soil vapor samples should be collected from:

- Known or suspected VOC source material
- In a grid pattern across the area
- From multiple depths from suspected subsurface sources, former source, or a depth comparable to the expected depth of foundation footings.

Soil vapor intrusion investigations often involve more than one round of sampling.

4.14.2 Sample Probe Installation

Samples at depths less than 5 feet below the ground surface (bgs) are prone to negative bias from infiltration of outdoor air and should only be collected when deeper samples are not feasible.

Soil vapor probe installation can be permanent, semi-permanent, or temporary. Permanent probes are preferred for data consistency. Soil probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be used when constructing and installing soil probes:

- Direct-push technology is the preferred method of installing sample probes. When necessary, an auger could be used.
- Porous backfill material (i.e. coarse sand, glass beads) should be used to create a sampling zone of 1 to 2 feet in length.
- Implants/probes should be fitted with VOC-inert tubing (i.e. polyethylene, stainless steel, or Teflon®) of the appropriate size (typically $^1/_8$-inch to $^1/_4$-inch diameter) that is of laboratory or food grade quality.
- The probes should be sealed above the sampling zone with bentonite slurry for a minimum distance of 3 feet to prevent outdoor air infiltration. The hole should be filled with clean material.
- For multiple probe depths, the borehole should be grouted with bentonite between probes to create discrete sampling zones.
- For permanent installations, a protective casing should be set around the top of the probe tubing and grouted in place to the top of the bentonite to minimize infiltration of outdoor air, as well as to prevent accidental damage to the probe.

4.14.3 Soil Vapor Sample Collection

Soil vapor samples should be collected in the same manner at all locations to minimize discrepancy and should include the following:

- Samples should be collected a minimum of 24 hours after the installation of permanent probes, and shortly after the installation of temporary probes.
- One to three implant volumes (volume of sample probe and tube) must be purged prior to sample collection.
- Flow rates for purging and collecting must NOT exceed 0.2 liters/minute to minimize outdoor air infiltration.
- Use conventional sampling methods, in an appropriate container that meets the requirements of the sampling and analytical methods and has been certified to be clean by the laboratory.
- Sample size is dependent on the volume needed for laboratory minimum reporting limits.
- Tracer gas (i.e. helium, butane, or sulfur hexafluoride) must be used to verify that outdoor air infiltration is not occurring. Once verified, continued use of the tracer gas may not be necessary. Two approaches can be selected when using a tracer gas:
    - Include the tracer gas in the list of laboratory analytes.
    - Use a portable field monitoring device to analyze the sample for the tracer gas.

4.15 Sub-slab Vapor Sampling

Sub-slab vapor samples are collected to characterize the nature and extent of soil vapor contamination immediately beneath a building with a basement foundation and/or a slab-on grade. The sample results are used when evaluating current and potential for future human exposures, and site specific attenuation factors (i.e., the ratio of indoor air to sub-slab vapor concentrations). Sub-slab vapor samples are collected after soil vapor characterization and/or other environmental sampling (soil and groundwater characterization). Sub-slab samples are typically collected concurrently with indoor and outdoor samples. However, outside of the heating season, sub-slab vapor samples may be collected independently depending on the sampling objective.

Sub-slab vapor samples and, unless there is an immediate need for sampling, indoor air samples are typically collected during the heating season because soil vapor intrusion is more likely to occur when a building's heating system is in operation and air is being drawn into the building.

4.15.1 Investigation Considerations

Existing environmental data, site background information, and building construction details should be considered when selecting buildings and locations within buildings for sub-slab vapor sampling. At a minimum, these general guidelines should be followed:

- Buildings located above or directly adjacent to known or suspected areas of subsurface VOC contamination should be sampled;
- Buildings in which positive responses with field equipment were obtained should be sampled; and
- Buildings with known or suspected areas of subsurface VOC contamination that are used or occupied by sensitive population groups (i.e. daycares, schools, etc) should be given special consideration for sampling.

Investigations of sub-slab and/or indoor air contamination should proceed outward from known or suspected sources, as necessary, on an aerial basis until potential and human exposures have been adequately addressed. Samples should be collected in a central location away from the foundation footings, and from the soil or aggregate immediately below the basement or slab and the number of samples will depend on the number of slabs.

4.15.2 Sub-slab Vapor Probe Installation and Sampling

Prior to the installation of the sub-slab vapor probes, the building floor will be inspected within 25 feet of the proposed sampling area and the location of any penetrations such as cracks, floor drains, utility perforations, or sumps will be noted and recorded. The probes will be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal and may be adjusted from the proposed locations based on any floor inspection findings. Sub-slab vapor probe installation can be either permanent, semi-permanent, or temporary. Sub-slab probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies and as described in section 4.14.2 above, Sample Probe Installation)

Sub-slab samples should be collected in the following manner:

- The probes will be purged of 1 to 3 volumes (i.e., the volume of the sample probe and tube) prior to collecting the samples;
- Environmental Protection Agency Method TO-15 will be followed when collecting and analyzing samples;
- The samples will be collected in a 6-liter Summa® canister over a minimum 8-hour sampling period in order to achieve a detection limit of 0.25 micrograms per cubic meter (ug/m^3);
- The flow rates for both purging and collecting will not exceed 0.2 liters per minute; and
- The Summa® canisters will be certified as clean by the laboratory;
- If possible, samples will be collected over the same period of time as concurrent indoor and outdoor air samples.

The heating systems in each building, if functional, will have been in operation for at least 24-hours prior to and during the sample collection period at a normal indoor temperature typically between 65^0 and 75^0F. Additionally, a pre-sampling building inspection should be preformed prior to each sampling event to identify and minimize conditions that may interfere with proposed testing.

4.16 Indoor Air Sampling

Indoor air samples are collected to characterize exposures to air within a building. Like sub-slab vapor sampling, indoor air sampling results are used when evaluating current and the potential for future human exposures, and site-specific attenuation factors. Indoor air samples are collected concurrently with sub-slab vapor and outdoor air samples. Some site-specific situations may warrant indoor air samples without concurrent sub-slab vapor and outdoor air samples. Additionally, Indoor and outdoor air samples may be collected without sub-slab vapor samples when confirming the effectiveness of a mitigation system.

4.16.1 Investigation Considerations

Similar to soil vapor and sub-slab vapor sampling, existing environmental data, site background information, and building construction details should be considered when selecting buildings and locations within buildings for sub-slab vapor sampling. At a minimum, these general guidelines should be followed:

- Where sub-slab vapor samples were collected without indoor air samples, buildings in which elevated concentrations of contaminants were measured in sub-slab vapor samples should be sampled
- Buildings located above or directly adjacent to known or suspected areas of subsurface VOC contamination should be sampled
- Buildings in which positive responses with field equipment were obtained should be samples; and

- Buildings with known or suspected areas of subsurface VOC contamination that are used or occupied by sensitive population groups (i.e. daycares, schools, etc) should be given special consideration for sampling.

To characterize contaminant concentration trends and potential exposures, indoor air samples should be collected from:

- The crawlspace area
- Basement (where vapor infiltration is suspected or in a central location) at a height approximately three feet above the floor
- The lowest level living space (in centrally-located, high activity-use areas) at a height of approximately three feet above the floor
- Or if in a commercial setting, from multiple tenant spaces at a height of approximately three feet above the floor

Investigations of indoor air contamination should proceed outward from known or suspected sources, as necessary, on an aerial basis until potential and human exposures have been adequately addressed.

4.16.2 Indoor Air Sampling

During colder months, the heating systems in each building will have been in operation for at least 24-hours, if operable, prior to and during the sample collection period at a normal indoor temperature typically between 65^0 and 75^0F. If possible, a pre-sampling inspection should be preformed.

In general, indoor air samples should be collected in the following manner:

- Sampling duration should reflect the exposure scenario without compromising the detection limit or sample flow collection rate (e.g. an 8 hour sample from a workplace with a single shift versus a 24 hour sample from a workplace with multiple shifts). Samples should be collected for at least one hour. If the goal is to represent an average concentration over a longer period of time, then longer duration sampling periods may be appropriate.

- Personnel should avoid lingering in the immediate area of the sampling device while the samples are being collected

- Sample flow rates must conform to the specifications in the sample collection method, and if possible, be consistent with the flow rates for concurrent outdoor and sub-slab samples;

- Samples must be collected using conventional sampling methods, in an appropriate container which meets the objective of the samples and one that is certified clean by the laboratory.

At sites with tetrachloroethene contamination, passive air monitors that are specifically analyzed for tetrachloroethene (i.e. perc badges) are commonly used to collect indoor and outdoor air samples.

4.17 Outdoor Air

Outdoor air samples are collected to characterize site-specific background outdoor air conditions. Outdoor air sampling results are primarily use when evaluating the extent to which outdoor sources may be influencing indoor air quality. They may also be used in the evaluation of soil vapor results.

Typically, outdoor air samples are collected at each location where an indoor air sample is collected (e.g. near each tenant space sampled). Outdoor samples should be collected in a representative upwind location, away from wind obstructions, and at a height of 3 to 5 feet. A representative sample is one that is not biased towards obvious sources of VOC.

4.17.2 Outdoor Air Sampling

Outdoor air samples must be collected simultaneously with indoor air samples, and may also be collected concurrently with soil vapor samples. Outdoor samples must be collected in the same manner as indoor air samples (see Section 4.16.2 above).

4.18 Vapor Intrusion Assessment Documentation/Considerations

The following should be considered during a soil vapor sampling event and may influence the interpretation of the results:

- If sampling near a building, uses of VOC-containing products during normal operations of the facility should be identified.
- Outdoor sketches, including site, streets, nearby facilities, and outdoor ambient air sample locations (if appropriate) should be drawn.
- Weather conditions should be noted for 24-48 hours prior to sampling events.
- Pertinent observations (odors, field screening readings) should be recorded.
- Use of HVAC systems during sampling (sub-slab and indoor air);
- A floor sketch of each building that includes the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), and any other pertinent information;

A sample log sheet should be maintained to include:

- Sample ID
- Sample date and time
- Sampler ID
- Sampling Methods/devices
- Purge volume
- Volume of vapor sample
- For canisters, the vacuum reading before and after sample collection
- Apparent moisture content of sampling zone
- Chain of Custody procedures used to track sample

4.19 Vapor Intrusion QA/QC Precautions and Laboratory Analytical Methods

On the day of sample collection activities, the person collecting the samples should avoid the following: fueling vehicles, use of permanent markers, wearing freshly dry-cleaned clothing, wearing perfumes, and any other activity where the use of VOCs could contaminate the samples. Proposed analytical procedures are identified in the Work Plan. TO-15 for VOCs, and NYSDOH Method 311-9 for tetrachloroethene are the preferred laboratory analytical methods.

5.0 DOCUMENTATION / CHAIN OF CUSTODY PROCEDURES

5.1 Chain of Custody

Chain-of-Custody (COC) procedures are followed to insure that sample integrity is maintained throughout the sampling and analysis process and that all samples collected are accounted for at all times. The COC process begins when the sample is collected and carries on throughout the analytical laboratory operations. The field team member responsible for the collection of the samples acts as the initial sample custodian.

A sample is considered "in custody" of an individual if it is either in direct view of, or directly controlled by, that individual. Chain-of-Custody transfer is accomplished when the samples or sealed sample containers are directly transferred from one individual to the next. At the time of transfer, the first individual witnesses the signature of the receiver on the COC record. The objective of the COC program is to ensure that:

- Samples are protected from loss or damage.
- The correct samples are analyzed.
- All samples are uniquely identified.
- Samples are traceable to their records.
- Documentation of sample handling procedures including: sample location, sample number, number of sample containers, and the COC process.
- A signed COC record is included for each sample shipment, documenting contents of the shipment. The COC record indicates the following information:
  - Site name
  - Sample Identification Numbers
  - Date and time of collection
  - Sample type (e.g., groundwater, soil, etc.)
  - Number and type of containers per sampling location
  - Parameters requested for analysis for each container
  - Signature of person(s) involved in the chain-of-possession
  - Description of sample bottles and their condition
  - Problems associated with sample collection (i.e., breakage, no preservatives), if any.

The COC records are printed on triplicate forms. One copy is retained by The Chazen Companies when the samples are taken into custody by either a shipping agency or the lab. A second copy is kept by the analytical lab. The third copy is returned to Chazen with completed lab results.

5.1.1 Sample Tracking

In order to track the samples sent to the laboratory, a permanent log of each shipment is maintained in a log book. A copy of all COC records is also maintained in a project file. All pertinent COC information is recorded in the log book, as well as follow-up correspondence with the laboratory, via telephone or mail, indicating receipt of the samples, breakage, turnaround time, or any problems with the shipment. As analytical data are received, the database is updated to reflect the new information. Turnaround

times are compared to protocols to ensure quality control. Missing data or invalid samples are addressed by the Field Operations Leader or the Project Manager.

5.1.2 Laboratory Operations

Specific laboratory Standard Operating Procedures used during the investigation are provided by the selected analytical laboratory. These procedures include sample tracking, methods for collection and handling of laboratory blanks, laboratory duplicates, matrix spikes, laboratory control samples, and surrogates. Maximum/minimum holding times and data reporting procedures are also defined by the laboratory.

5.2 Analytical Sample Shipping

Sample containers are packed in coolers. Bottles are packed tightly in materials such as Styrofoam, vermiculite, and/or "bubble pack" to minimize motion. Ice placed in zip-lock bags and can be added to the cooler to cool the samples to around 4° C. All paperwork is sealed in a separate zip-lock bag and placed in the cooler which is then taped shut. The samples are shipped to the laboratory together with the COC documents.

The standard procedure followed for shipping environmental samples to the analytical laboratory is:

1) Samples are shipped by courier or equivalent overnight delivery service.
2) Samples are shipped to the laboratory within 24 to 48 hours of acquisition.
3) Prior to leaving for the field, the Analytical Lab is notified of the number, type, collection date, and shipment dates for samples. If the number, type, or date of shipment changes due to site constraints or program changes, the Lab is informed of the change. Notification to the Lab also occurs when sample shipments will arrive on Saturdays. This communication is critical to allow the laboratory enough time to prepare for the samples' arrival.
4) If prompt shipping and laboratory receipt of the samples is not possible, (i.e., Sunday arrival), members of the Field Team are responsible for proper storage of the samples until adequate transportation arrangements can be made.
5) Field Operations Leader or his/her designee ensures that samples collected by the client are entered into the project sample log.

6.0 CALIBRATION PROCEDURES

This section details the calibration and operating procedures for the field and laboratory analytical instruments that will be used during this investigation.

6.1 Field Instruments

Field instrumentation is calibrated according to the manufacturer's instructions to ensure that accurate field data are collected. Each piece of equipment is calibrated daily prior to use or as specified by the manufacturer. More frequent calibration may be performed when accuracy of the equipment becomes suspect or under extreme field conditions. Calibration information is recorded in the same field notebook in which the field instrument readings will be recorded. The recorded calibration includes:

- Name of instrument
- Instrument serial number
- Date of calibration
- Observations and results of calibration
- Calibration gas used, if applicable
- Buffer solutions used, if applicable
- Specific calibration procedures and operating instructions are detailed below.

6.1.1 pH Meters

pH is the measure of the acidity or alkalinity of a solution. It is defined as the negative logarithm of the hydrogen ion activity. Hydrogen ion activity is related to the hydrogen ion concentrations, which in relatively weak solutions are nearly equal. For practical purposes, pH is the measure of the hydrogen ion concentration.

The operation of a pH meter relies on the same principal as many other ion-specific electrodes. Measurement relies on establishment of a potential difference in the response to hydrogen ion concentration across a membrane in the electrode. The membrane is conductive to ionic concentrations, which in combination with a reference electrode (which can be combined into a single "combination" electrode), can generate a potential difference proportional to the hydrogen ion concentration.

Variation in temperature will effect the association of hydrogen and hydroxide ions, which without proper compensation will affect the pH. pH meters have several controls to compensate for the variations between electrodes and the different responses to changes in temperature.

It is very important to obtain a pH measurement as soon as possible after sample collection, since temperature changes, precipitation/dissolution reactions, and sorption of carbon dioxide from the air all affect the pH of a solution.

Because of the great variety of pH meters available, operators should refer to the manufacturer's instruction manual for specific calibration, operation, and troubleshooting procedures for their instrument. The following general procedure is used for measuring pH in the field with a pH meter:

- The pH meter is calibrated at each sample site.
- The instrument and batteries are checked prior to the initiation of the field effort. pH electrodes are kept moist at all times.
- Buffer solutions used for calibration are checked since buffer solutions will degrade upon exposure to the atmosphere.
- Generally, 4.00 and 7.00 pH buffers are selected for calibration.
- All electrolyte solutions within the electrode(s) are filled to their proper levels and no air bubbles are present within the electrode(s).
- The electrodes are immersed in a pH-7 buffer solution.
- The temperature compensator is adjusted to the proper temperature (on models with automatic temperature adjustments, immerse the temperature probe into the buffer solution). Alternatively, the buffer solution may be immersed in the sample and allowed to reach temperature equilibrium before equipment calibration. It is best to maintain buffer solution at or near expected sample temperature before calibration.
- The pH meter is adjusted to read 7.0.
- The electrodes are removed from the buffer and rinsed well with deionized water. The electrodes are immersed in pH-4 (or pH-10 buffer solution) and the slope control is adjusted to read the appropriate pH. To check the calibration, three successive readings are taken, one minute apart, to see that readings are within ±0.1 pH unit.
- The electrodes are immersed in the unknown sample, slowly stirring the probe until the pH stabilizes. Stabilization may take several seconds to minutes. If the pH continues to drift, the sample temperature may not be stable, a chemical reaction (e.g., degassing) may be taking place in the sample, or the meter or electrode may be malfunctioning. This must be clearly noted in the logbook.
- The pH and temperature of the sample are read and recorded. pH is recorded to the nearest 0.1 pH unit.
- The electrodes are rinsed with deionized water.

6.1.2 Specific Conductance Meters

Conductivity is a numerical expression of the ability of a water sample to carry an electric current. This value depends on the total concentration of ionized substances dissolved in the water and the temperature at which the measurement is made. It is important to obtain a specific conductance measurement soon after sample collection since temperature changes, precipitation reactions, and sorption of carbon dioxide from the air affect the specific conductance.

Specific conductance can be used to identify the direction and extent of the migration of contaminants in groundwater and surface water. It can also be used as a measure of subsurface biodegradation or to indicate alternate sources of groundwater contamination.

A conductance cell and a Wheatstone Bridge (for the measurement of potential difference) may be used for measurement of electrical resistance. The ratio of current applied to voltage across the cell may also be used as a measure of conductance. Depending on ionic strength of the aqueous solution to be tested, a potential difference is developed across the cell which can be converted directly or indirectly (depending on instrument type) to a measurement of specific conductance.

Because many conductivity meters are available, operators should refer to the manufacturer's instruction manual for specific calibration, operation, and troubleshooting procedures. The following general procedure is used for obtaining specific conductance measurements:

- The conductivity meter is calibrated at the start of each sampling day or more frequently if deemed necessary.
- Batteries are checked before going into the field.
- The instrument is calibrated using a potassium chloride standard solution by completely immersing the electrode into the solution. The temperature of the calibration solution is checked and the temperature dial is adjusted on the meter (if not self-compensating). Calibration measurements and time are recorded in the field logbook.
- The umho value of the solution is checked in terms of the temperature. The Cell Constants dial is adjusted until the display reads the appropriate value.
- The electrode is rinsed with one or more portions of the sample to be tested.
- The electrode is immersed in the sample and the temperature and the conductivity are measured.
- The results are noted in the field logbook.
- If the specific conductance measurements become erratic, or inspection shows that any platinum black has flaked off the electrode, replatinization of the electrode is necessary. See the manufacturer's instructions for details.

6.1.3 Photoionization Detector

For monitoring total ambient air quality during field activities and for conducting static headspace testing, Chazenuses a MiniRae PID. This instrument measures total VOC concentrations. The operating and calibrating procedures for this instrument follow.

A MiniRAE 2000 PID can be used to detect a variety of trace gases, particularly VOCs. The MiniRAE 2000 uses the principle of photoionization to detect and measure the VOC concentrations in the atmosphere or from a sample.

The MiniRAE 2000 operates using an electrodeless discharge ultraviolet (UV) lamp as the high-energy photon source. As organic vapors pass by the lamp, they are photo-ionized and the ejected electrons are detected as a current. The PID sensor with a standard 10.6 eV lamp detects a broad range of organic vapors. In principle, any compound with ionization energy lower than that of the lamp photons can be measured.

The following procedure is used for operating and calibrating the MiniRAE 2000:

- Press and hold the MODE key for one second and release to turn on the MiniRAE 2000. The audio buzzer will beep once and the air pump will turn on. The display will show "ON"
- To turn off the MiniRAE 2000, press and hold the MODE key for 5 seconds. The monitor will beep once per second during the power-down and the message "OFF" will flash and the screen will go blank.
- After the monitor is turned on, it runs through the start up menu and then a "READY…" message is displayed. At this point the user can either 1) step through the operation menu or 2) take a measurement.

- In the first menu of the programming mode, the user can calibrate the MiniRAE 2000. The calibration is a two-point process using "fresh air" and the calibration gas (Isobutylene)
- Calibration Process
  - Press and hold down both the [N/-] and MODE keys for three seconds to enter the programming mode; the first menu item is "Calibrate/select Gas"
  - The Fresh Air calibration determines the zero point of the sensor calibration curve. If a fresh air source from a cylinder or tedlar bag is not available, any clean ambient air without detectable contaminant or a charcoal filter can be used.
  - The first menu shows "Fresh Air Cal?"; make sure the instrument is connected to the fresh air source; press the [Y/+] key, the display will show "zero in progress", flowed by "wait.." and a countdown timer; after a pause, the display will show the message "zeroed…reading= x.x. ppm…"; press any key or wait about 20 seconds, the monitor will return back to the submenu.
  - For the second point of the sensor calibration, a cylinder of span gas (Isobutylene) fitted with a 500 cc/min. flow limiting regulator is attached to the instrument.
  - Press the [Y/+] key at the "Span Cal?" to stat the calibration. The display shows the gas name and the span value of the corresponding gas; the display will show "Apply gas now" at which point the valve will be turned to open the gas supply.
  - The display with ask you to wait 30 seconds. When the count down timer reaches 0, the display will show the calibrated value. Turn off the flow to gas and disconnect the span gas. Press any key
- To record measurements
  - Press the [Y/+] key to start a measurement in survey mode
  - Instantaneous readings in ppm are updated every second
  - To stop measurements press the MODE key and the display shows STOP. Press [N/-] to continue measurement

The meter is calibrated once per day or more frequently, if necessary. The MiniRAE 2000 is used to monitor the breathing zone for health and safety precautions or to screen samples by placing the probe near suspected sources of contaminants.

6.1.4 Airborne Particulate Matter Meters

For monitoring airborne particulate matter (i.e., dust) during field activities, Chazen uses a MIE, Inc. Personal Data-logging Real-time Aerosol Monitor (*personal*DataRAM). This instrument provides direct and continuous data measurements and is a high sensitivity nephelometric monitor optimized for the measurement of the respirable fraction of airborne dust emitted from ground intrusive work or work that has the potential to produce dust. The following procedures are used for calibrating and operating the *personal*DataRAM:

- Calibration/Zeroing Process
  - Conduct zeroing in a particle-free environment such as a *personal*DataRAM Z-Pouch, a clean room, a duct or area directly downstream of a HEPA filter, or the MINIRAM Z-Bag. The following instructions are for the Z-Pouch.
  - Wipe the outside surfaces of the instrument to remove as much dust as possible, then in a reasonably clean area, open the zipper of the Z-Pouch and place the unit inside.
  - Open the small nipple of the Z-Pouch and insert the fitting of the hand-pump/in-line filter unit into the nipple. Start pumping the hand-pump until the Z-Pouch begins to bulge slightly.

- While continuing to pump, press ENTER and keep pumping slowly while ZEROING is displayed for 1.1 minutes followed by CALIBRATION: OK. If screen shows BACKGROUND HIGH or MALFUNCTION, consult instruction manual.
- To set up a run and scroll logging/operating parameters, press NEXT when screen shows READY: NEXT.
- After completing zeroing process, remove the *personal*DataRAM from the Z-Pouch, close the zipper and flatten the Z-Pouch while plugging its nipple to prevent dust contamination in the Z-Pouch.

- Operating Process
  - To enable the logging function, press ENTER when screen shows LOGGING DISABLED.
  - LOG INTRVL 600s indicates that logging is enabled (in this example for 10-minute log period). Press ENTER.
  - At ALARM: OFF press ENTER to toggle through alarm modes.
  - Press NEXT to move through the calibration factor screen and battery charge screen.
  - Press NEXT at CONNECT TO PC, then again to return to ready mode (this will enable data to be downloaded).
  - Press ENTER at LOG INTRVL with TAG # displayed. Concentration screen will be displayed after three seconds. Pressing NEXT will successively scroll to show various run values.
  - Press EXIT to terminate the current run, then ENTER to return to Ready mode.

6.2 Laboratory Equipment Calibration

The Laboratory's Project Manager will be responsible for the operation and calibration of laboratory analytical instruments in accordance with the schedules and procedures specified by the NYSDEC ASP (Analytical Services Protocol, Revised September 1993).

The laboratory calibration procedures are addressed in the QA documents for the laboratory subcontractor.

7.0 ANALYTICAL PROCEDURES

Laboratory analyses will be scheduled based on historic information regarding potentially hazardous material disposal, previous site information, review of data objectives, and NYSDEC criteria. Specific parameters will be outlined in the Work Plan.

7.1 Analytical Laboratory

All sample analyses will be performed by a laboratory certified by the New York State Department of Health (NYSDOH). In order to provide legally defensible data, selected analytical procedures to be used will be in accordance with the most recent NYSDEC ASP. Laboratory analytical parameters will be based on previous site information, as well as data quality objectives and applicable NYSDEC criteria. The sampling program and related analytical methods are documented in the FSP. All samples will be received by the laboratory within 48 hours of collection.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Independent third party data validation will be utilized. Data will be validated using the NYSDEC ASP Revision 12/91 and the USEPA Region II Functional Guidelines. The details supporting an independent validator's selection, describing how the individual is independent from the project, will be set forth in the Work Plan or other supplementary documentation.

8.1 Data Reduction

Data reduction is the conversion of raw data into a useful form from which conclusions can be made and presented. Raw data may consist of field data, which are real-time measurements, and technical data, which includes field and laboratory analytical data. Raw field data (e.g. PID readings) will be compared to laboratory analytical results which will be compared to site-specific criteria.

8.2 Data Validation

Data validation is the process of reviewing data and accepting it or rejecting it on the basis of sound criteria.

Records of all data will be maintained, even those judged to be "outlying" or spurious values.

The principle criteria that will be used to validate the integrity of the data during collection and reporting should be modeled from the following EPA guidance documents:

- "National Functional Guidelines for Organics Review", (USEPA, June, 1991)
- "Laboratory Data Validation, Functional Guidelines for Evaluating Inorganic Analyses", (USEPA, October, 1989)
- "NYSDEC ASP Revision 12/91"

8.2.1 Field Data Validation

Field data will be validated at the time of collection by following standard procedures and QC checks and after the data is reduced to review data sets for anomalous values. The objectives of field data validation are as follows:

- Adherence to approved site-specific plans.
- Standard operating procedures are followed.
- Sufficient sample volume is obtained, sample integrity is maintained, all required analyses are conducted, and all applicable field QC samples are provided with each sample set.
- Complete chain-of-custody documentation is maintained throughout the duration of the field effort.
- Maximize data consistency between field personnel by random checks of sampling and field conditions by supervisory personnel.

8.2.2 Laboratory Data Validation

Laboratory data verification will be performed by qualified individuals appointed by the analytical laboratory. Data verification will involve routine audits of the data collection and flow procedures and

monitoring GC sample results. Results from the analysis of project and blind audit QC samples will be calculated and evaluated as reported. Immediate corrective action will be taken if these results indicate data quality problems.

An individual independent from the project (i.e., third party data validator) will conduct a data validation of the laboratory data and prepare a Data Usability Summary Report (DUSR). Independent validation will be according to criteria such as:

- Holding times
- Instrument tuning and performance
- Calibration
- Blanks
- Surrogate recoveries
- Matrix spike and matrix spike duplicate recoveries

8.3 Reporting

When required for a project, Category B Deliverables will be supplied for laboratory analysis. Validated field and laboratory data will be presented in a final report in the form of tables and/or figures. Figures may include planimetric maps, cross sections, and contour maps. All supporting data, such as raw field and laboratory analytical data, will be presented as an appendix to the final report. Electronic files may be provided in lieu of hardcopies.

9.0 INTERNAL QUALITY CONTROL PROCEDURES

Quality control (QC) checks will be performed to ensure the collection of representative and valid data. QC checks provide the mechanisms by which the quality assurance objectives are monitored.

9.1 Field Quality Control

Field quality control measures will be conducted in accordance with the NYSDEC RCRA Quality Assurance Project Plan Guidance dated March 29, 1991. The field QC checks that will be used are listed and described as follows.

9.1.1 Documentation

All activities must be properly documented including: sampling procedures, decontamination activities, chain-of-custody procedures, equipment calibration, and justification for all actions taken contrary to the approved QAPP, Work Plan, and FSP.

9.1.2 Blank and Duplicate Samples

Three types of blanks can used during sampling: trip blanks, field blanks and equipment blanks. These are discussed below.

Trip Blanks: Trip blanks are for assessing the potential for contaminating aqueous samples with VOCs during sample shipment. The trip blank consists of a VOC sample container shipped to the site with the other VOC sample containers either filled with reagent water at the lab or filled on-site with reagent water. Trip blanks will be used so as to maintain a 1:20 ratio of blanks to samples or with each shipment, whichever is greater. Non-aqueous samples do not require trip blanks.

Field Duplicates (Replicates): When required, field duplicates of soil, sediment, and groundwater samples will be submitted for analysis of all site-specific parameters at a rate one every 20 samples collected for analyses. These duplicates are intended to assess the homogeneity of the sampled media and the precision of the sampling protocol. True duplicates of soil, sediment, and solid waste samples; however, are not possible because chemicals are typically not uniformly distributed.

Equipment Blanks: Equipment blanks for the bailer, sampling pump, and/or tubing assembly are collected during monitoring well sampling at a rate of one per day on one piece of equipment per equipment type. VOCs, SVOCs, or inorganics present within the bailer, pump apparatus, or discharge tubing are assessed by collecting a sample of reagent water passed through the sampling apparatus after washing with the decontamination solution followed by at least one rinse with reagent water.

Equipment blanks, sometimes called rinsate blanks, are collected during each field event at a rate of one per day on one piece of equipment per equipment type. VOC, SVOC, or inorganics present within or on the sampling apparatus where intimate contact with the sample occurs (i.e., split-spoon, trowel) are assessed by rinsing the sampling apparatus with ASTM Type II water following decontamination. Rinsate blanks are collected directly into the appropriate water container.

Matrix Spike/Matrix Spike Duplicates (MS/MSD): For some projects, the NYSDEC ASP requires the laboratory to analyze MS/MSDs for organic analyses at a frequency of five percent. To meet this requirement, the Field Operations Leader will select samples for MS/MSD analyses and will provide additional sample volume to the laboratory.

9.1.3 Completeness

Completeness of scheduled sample collection is controlled in the field by comparing a pre-sampling inventory with samples actually collected each day. Daily checking of field data sheets and comparison of transport and COC logs provides further control of documentation and completeness.

9.1.4 Field Analytical Quality Control

QC checks are performed on field measurement systems that emulate laboratory measurement systems (e.g., portable field GC).

9.2 Laboratory Analytical Quality Control

Data from QC samples (e.g., blanks, spiked samples) will be used as a measure of performance and as an indicator of potential sources of cross-contamination. In some cases, quality control data and records will be submitted to the data validator. Laboratory analytical quality control will be in accordance with the requirements outlined in the NYSDEC RCRA Quality Assurance Project Plan.

10.0 PERFORMANCE AND SYSTEM AUDITS

10.1 Systems Audit

System audits are performed to ensure that the QA/QC procedures are being followed. These audits include a careful evaluation of both field and laboratory control procedures.

Organization and Personnel: The project organization is reviewed for compliance with the proposed organization and for clarity of assigned responsibility. Personnel assigned to the project will be placed so that responsibility, skill, and training of the personnel are properly matched.

Facilities and Equipment: The audit will address whether field equipment and analytical instruments are meeting requirements specified by the project objectives stated in the Work Plan. Equipment and facilities provided for personnel health and safety may also be evaluated. Calibration and documentation procedures for instruments will also be verified.

Analytical Methodology: A review of analytical methodology with regard to the data requirements for the project will be performed. An on-site observation of analyst technique, data reduction, and record keeping may be performed if determined necessary. Periodic review of precision and accuracy of data will be performed.

Sampling and Sample Handling Procedure: An audit of scheduled samples versus samples collected versus samples received for analysis may be performed. Field documentation may be reviewed. If deemed necessary, a site visit will be made to document that designated control procedures are practiced during sampling activities.

Data Handling: During a system audit, the QAM will review data handling procedures with the TLs. Accuracy, consistency, documentation, and appropriate selection of methodologies will be discussed:

10.1.1 Field Systems Audit

Field systems audits are performed by QA personnel to compare field practices with standard procedures. These audits focus on such things as:

- Compliance with Work Plan
- Proper working order of field equipment
- Documentation procedures
- Field team efficiency
- Level of QA conducted by field members
- Proper sample packaging and shipping

10.1.2 Laboratory Systems Audit

Laboratory systems audit are conducted to ensure that measurement systems are properly maintained and used. Laboratory records and procedures may be reviewed for completeness, accuracy, precision, and adherence to prescribed methods.

10.1.3 Field Performance Audits

Field performance audits are conducted by QA personnel on an ongoing basis during a project as field data are generated, reduced, and analyzed. Field performance audits include review of numerical manipulations and review of blank and replicate samples.

10.1.4 Laboratory Performance Audits

Laboratory performance audits may be conducted and may include:

- Verification of written procedures, and analyst's understanding
- Verification and documentation of procedures and documents
- Periodic unannounced inspections, if warranted
- Review of a portion of all analytical data and calculations

11.0 PREVENTATIVE MAINTENANCE

11.1 Analytical Instrumentation

Preventative maintenance of analytical instrumentation is outlined in the QA documents of the subcontract analytical laboratory.

11.2 Field Instrumentation and Equipment

Preventative maintenance of field instrumentation and equipment includes the following measures:

- The field operations leader shall ensure that all scheduled maintenance occurs as obligated.
- Critical spare parts will be kept in stock.
- Equipment will be cleaned on a daily basis after use.
- Field crews will report on the condition and performance of the equipment after each sampling event.

12.0 DATA MEASUREMENT ASSESSMENT PROCEDURES

The purpose of a data quality assessment is to document that data generated under the program are accurate and consistent with project objectives. The quality of data is assessed based on the precision, accuracy, representativeness, comparability, and completeness of the data that are generated. Data quality assessments are conducted in three phases.

Phase 1: Prior to data collection, sampling, and analysis procedures are evaluated in regard to their ability to generate the appropriate, technically acceptable information required to achieve project objectives.

Phase II: During data collection, results will be assessed so that selected procedures are efficient and effective and that the data generated provide sufficient information to achieve project objectives. In general, evaluation of data are based on performance audits, results of duplicate and spiked sample analyses, and review of completeness objectives.

Documentation may include:

- Number and identity of duplicate samples collected
- Number and identity of duplicate, spike, and field blank samples analyzed
- Identification of statistical techniques, if used
- Use of historical data
- Identification of analytical method
- Data validation results

Procedures for assessing precision and accuracy for analytical data are outlined in Section 3.2. Precision is generally expressed as the relative percent difference (RPD) among duplicate analyses. Accuracy is generally expressed as percent recovery. Precision and accuracy of instrumental analysis is further addressed in the NYSDEC ASP and the Laboratory QAPP. It is the laboratory's responsibility to attempt to identify the source of substandard recoveries and take corrective action or document the cause as required by the NYSDEC ASP.

Phase III: Following completion of data collection activities, an assessment of the adequacy of the database generated in regard to completing project objectives is undertaken by the Project Manager and/or the Technical Reviewer. Recommendations for improved QC are developed, if appropriate. If data gaps are identified, additional raw data collection may be recommended to fully support the project findings and recommendations.

13.0 CORRECTIVE ACTIONS

Corrective actions are QA/QC problem-solving measures taken to rectify a laboratory or field measurement system that is out of control. Corrective action is required when potential or existing conditions are identified which may adversely affect the data quality. The need for corrective action may be identified by system or performance audits or by standard QC procedures. The corrective action system will include the following procedures:

The Project Manager is immediately notified of any potential problem with the data quality, and will then evaluate the need for changes in affected procedures and conduct appropriate corrective actions. Potential data quality problems may include:

- Loss of a sample or damaged sample containers.
- Analytical results that are substantially different from those expected.
- Laboratory QC samples that do not attain target performance objectives.
- Events that may require changes in specifications and sampling procedures.

Corrective action related to questionable analytical results or damaged sample containers may include re-sampling and re-analysis, if appropriate. Modification of procedures may be necessary to remedy problems related to unexpected conditions encountered in the field.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The Project Manager submits periodic QA reports for appraisal by management, appropriate to their level of responsibility. Reports to management include:

- Periodic assessment of measurement data accuracy, precision, and completeness.
- Results of performance and system audits.
- Significant QA/QC problems and recommended solutions.
- Resolutions of previously stated problems.

14.1 Field Quality Assurance Reports

Periodic status reports describing the progress of the project are submitted periodically to management. These reports include: copies of field notes or daily field progress reports, compiled field data sets, and corrective action documentation. The Project Manager is notified immediately of situations requiring corrective action measures.

14.2 Laboratory Quality Assurance Reports

A project QA report that summarizes QA activities and QC data is issued to the QA Manager and Project Manager. Any laboratory QA situations requiring immediate corrective action is reported to the Project Manager.

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APPENDIX H – SUB-SLAB DEPRESSURIZATION/VENTILATION SYSTEMS OPERATION, MAINTENANCE, AND MONITORING PLAN

THIS PLAN TO BE RETAINED AT THE SITE

Sub-Slab Depressurization/Ventilation Systems Operation, Maintenance, and Monitoring Plan

Former Packaged Lighting Site
NYSDEC BCP Site No. C336079
29 Grant Street
Village of Walden
Orange County, New York

November 2017

Chazen Project No. 41115.01

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Quick Reference Guide

SSDS #1 – Basement of Main Building

Ventilation fan

Air pressure indicator (u-tube manometer). A differential fluid level indicates normal system operation (fluid on left is lower). An equalized fluid level indicates system is off or otherwise not operating properly.

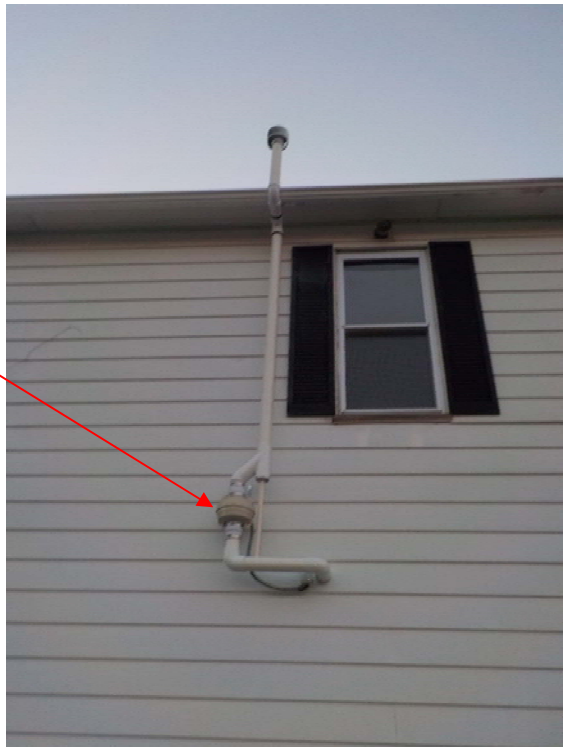


Close up of air pressure indicator (u-tube manometer) showing system is running as indicated by a lower fluid level on the left side.

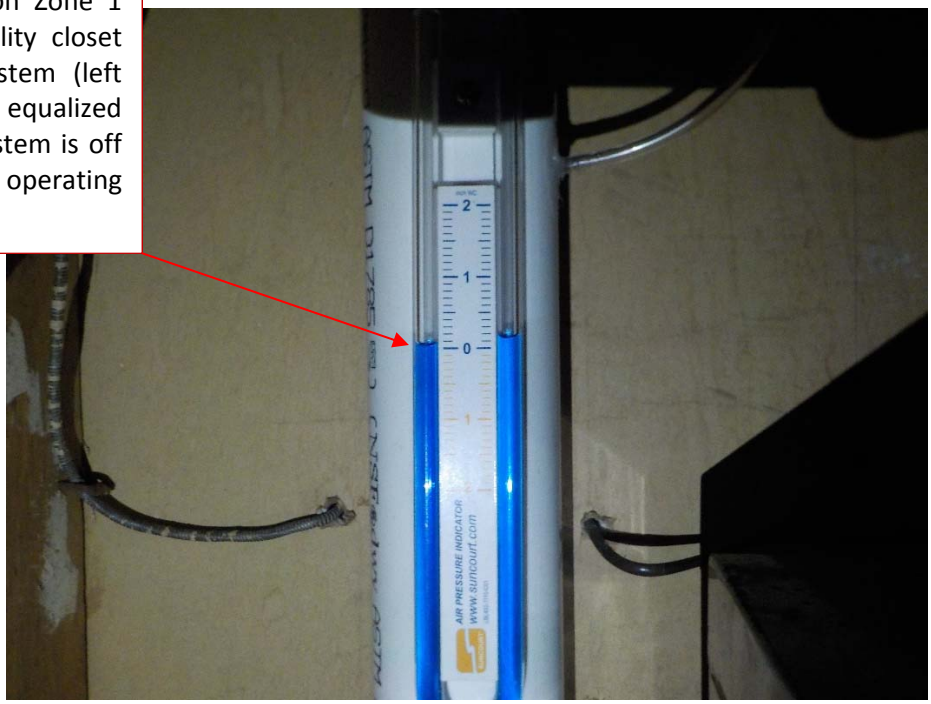


SSDS #2 – Office Building Crawl Space

Ventilation fan mounted on east exterior wall



Air pressure indicator (u-tube manometer) located on Zone 1 ventilation pipe in utility closet showing operating system (left fluid level is lower). An equalized fluid level indicates system is off or otherwise not operating properly.



Troubleshooting Guide for the Sub-Slab Depressurization Systems (SSDSs)

Problem	**Troubleshooting Guide**
Ventilation fan is not running:	The most probable cause of a system shutdown is an interruption to the electrical service. In the event of a system shutdown, the air-pressure indicator (u-tube manometer) will show an equalized fluid level. Inspect fan service switches (if equipped) and circuit breakers to ensure power is being supplied to unit. If the circuit breaker is tripped, reset breaker and verify system operation. If circuit breaker continues to trip, have system evaluated by a qualified electrician.
The ventilation fan sounds like it is running normally, but the air pressure indicator shows an equalized fluid level (i.e., no suction):	Inspect the SSDS lines for signs of breakage, blockage, or leakage. Have a qualified electrician inspect the fan unit for proper operation. Replace as necessary.

1.0 Introduction

This Operation, Maintenance and Monitoring (OM&M) Plan describes the measures necessary to operate, monitor, and maintain the mechanical components of the sub-slab depressurization/ventilation systems (SSDS) for this site.

This OM&M Plan:

- Includes the steps necessary to allow individuals unfamiliar with the site to operate and maintain the SSDSs; and,
- Will be updated as needed to reflect changes in site conditions or the manner in which the SSDS is operated and maintained.

A copy of this OM&M Plan will be kept at the site.

2.0 Engineering Control System Operation and Maintenance

In response to elevated sub-slab air concentrations of chlorinated volatile organic compounds (CVOCs) in the Site's subsurface, two SSDS systems were designed and installed to mitigate potential soil vapor intrusion in to building spaces planned for occupancy. The systems began operating in early November 2017. One system (SSDS #1) was installed in the basement of the main Site building, using an existing trench in the concrete floor. The second system (SSDS #2) was installed beneath the eastern office building's the first floor to ventilate two crawl space zones. System layout details are shown on Figure 1. Each system uses a Suncourt in-line ventilation fan. The product data sheet for these fans are provided in Appendix A.

The SSDSs are planned for continual operation as part of the engineering controls required for the Site under the Brownfields Cleanup Program. Operation of these systems may only be terminated following approval by New York State Department of Environmental Conservation and Department of Health (NYSDEC and NYSDOH).

2.1 System Operation: Routine Operation Procedures

The SSDSs each contain one Suncourt ventilation fan. The fan product data sheet is included as Appendix A. Operation of the fan units requires ensuring that a continuous power source is applied to the fan motor. The operator must also ensure that SSDS piping does not leak and that there are no blockages.

Each SSDS includes an air pressure indicator (u-tube manometer) installed on the suction pipe to visually confirm system operation. Normal system operation is indicated by a differential fluid level within the u-tube. An equalized fluid indicates the system is off, or otherwise is not operating properly.

Air Pressure Indicator Photograph Showing System is Off



Should irregularities be detected in the line pressures, or the system becomes non-functional, a troubleshooting guide is provided prior to Section 1.0 to assist in diagnosing and restarting the system. Repairs and adjustments should be performed by a qualified service technician.

2.2 System Operation: Routine Equipment Maintenance

This system requires minimal routine maintenance. The fan manufacturer recommends the impeller be inspected once a year for excessive dust and dirt build up, and cleaned as necessary. The unit must be disconnected from power during inspections or cleanings

2.3 System Operation: Non-Routine Equipment Maintenance

Should a non-routine condition occur, the site owner/operator will ensure that the system continues operate appropriately. Examples of non-routine maintenance activities include restarting the systems after power disruptions or inspecting the systems if the fans are running but no suction is indicated by the installed u-tube manometers.

Some diagnostic measures may require that the PVC piping, fans, or exhaust stacks be physically examined. The PVC piping in SSDS #1 extends horizontally below the concrete basement floor level, emerges vertically then passes through a basement window near grade, then extends vertically to a three-story high roofline. The PVC piping in SSDS #2 extends vertically from two crawl space zones, then manifolds together along the first floor ceiling, passes through the exterior wall, and then extends vertically to a two-story roofline. Should a significant vacuum pressure change indicate pipe damage that is not visible from the ground of floor levels, a more intensive inspection may be needed. A man lift or ladder will be required to access the higher sections of piping.

3.0 Engineering Control System Performance Monitoring

3.1 Monitoring Schedule

Inspection and sampling events will occur per the schedule in Table 1. Inspection and sampling frequencies are subject to change with the approval of the NYSDEC and NYSDOH. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS has been reported or an emergency

occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the SSDS are specified later in this Plan.

Table 1 Monitoring Schedule for the SSDS

Action	Frequency
Routine inspection and system readings (extraction well pressure)	Monthly system checks to verify system is operating
Air Quality Sampling (grab sub-slab sample collected from SSDS #1 discharge piping for analysis of TO-15 list VOCs)	Annually, as per Site Management Plan, concurrent with indoor air quality sampling with one indoor sample proximal to each venting system unit, plus one outdoor air reference sample

3.2 General Equipment Monitoring

A visual inspection of the complete systems will be conducted monthly. SSDS components to be monitored include, but are not limited to, the following:

- General system piping.
- Ventilation Fans
- Air pressure indicators (u-tube manometers)

A complete list of components to be checked is provided in the Inspection Form, presented in Appendix B. If any equipment readings are not within their typical range, any equipment is observed to be malfunctioning, or the system is not performing within specifications, maintenance and repair as per the Operation and Maintenance Plan are required immediately, and the SSDS restarted.

3.3 Sampling Event Protocol

The SSDS #1 system will undergo periodic air discharge sampling consistent with the monitoring schedule offered in Table 1. Grab samples will be collected using a stainless steel SUMMA canister connected directly to the discharge line while the system is running.

4.0 Maintenance and Performance Monitoring Reporting Requirements

Maintenance reports and any other information generated during regular operations will be kept on-file at the Site.

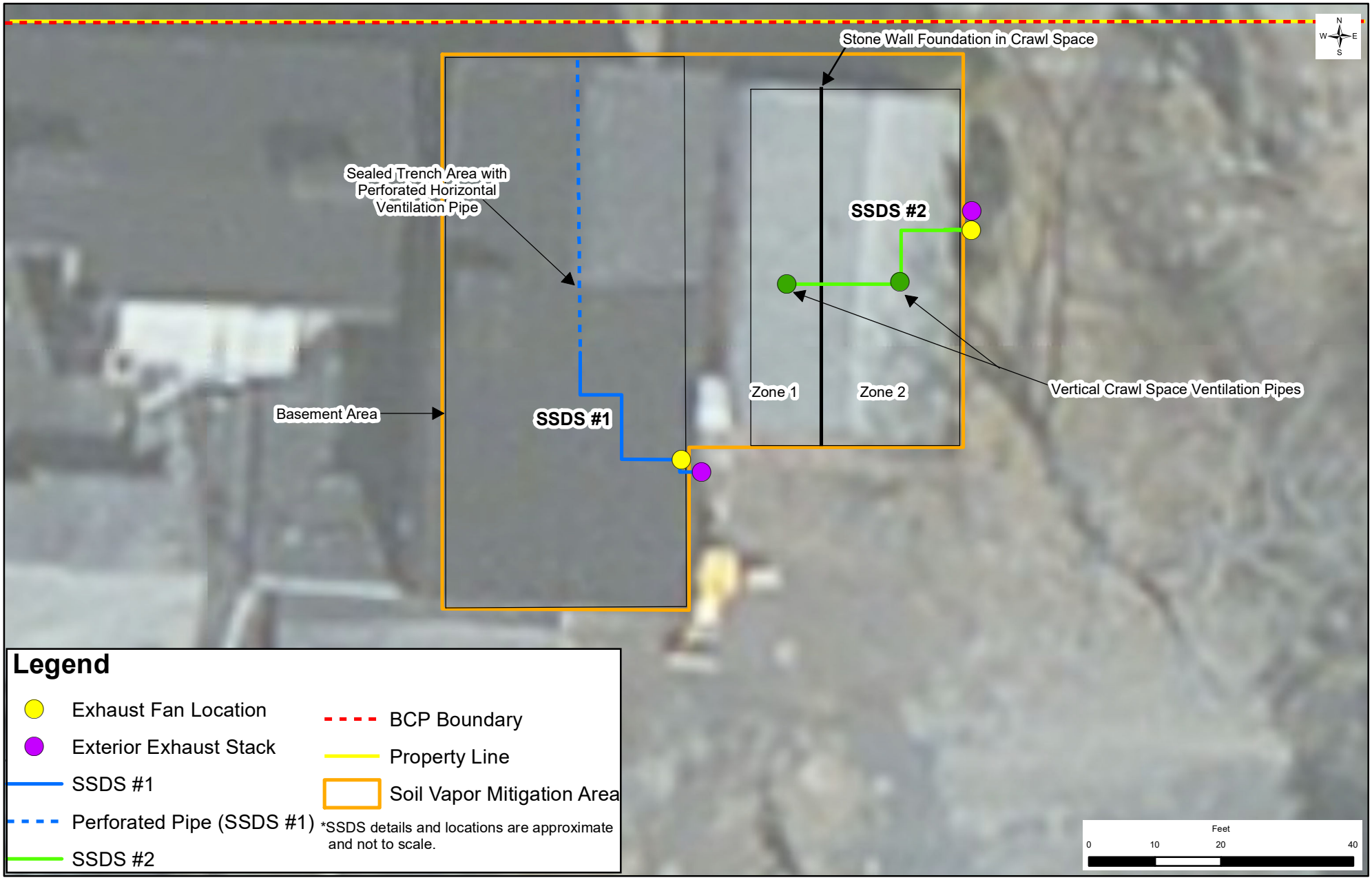
Table 2 Maintenance Schedule for the SSDS

Action	Frequency
Inspect fan impeller for dust and dirt, clean as necessary	Annually

4.1 Routine Maintenance Reports

Checklists or forms (see Appendix B) will be completed during each monthly routine monitoring event. Information documented on the forms will include date, inspector's initials, verification of system operation, air pressure indicator measurements, any system troubleshooting, and performed maintenance. Completed forms will be attached to the Annual Indoor Air Quality Monitoring Report as required by the Site Management Plan.

Figures



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Former Packaged Lighting Systems, Inc. Site

Figure 1 - Subsurface Depressurization System (SSDS) Layout Map

29 Grant Street
Town of Walden, Orange County, New York

Source: NYS Department of Homeland Security and Emergency Services 2010 Orthoimagery; Existing Sample Locations and Site Features from Going Phase II, 2010; Proposed Features. Drawn by Chazen, 2011-2017.

Drawn:	AT
Date:	November 2017
Scale:	1 inch equals 20 feet
Project:	41115.00
Figure:	1

Appendix A:

Suncourt Ventilation Fan Product Data Sheets

Suncourt® Radon Fan Mitigation Kit

Product Data Sheet (http://assets.4500studios.com/clients/suncourt/attachments/RDK0403-DS-0516.pdf)



Centrax Radon Mitigation Fan Kit RDK04-3

Model #

RDK04-3

Model Name

Suncourt® Radon Fan Mitigation Kit

CFM

200

Electrical Rating

77 W

Safety Rating

ETL® Listed

Warranty Period

5 year

Diameter

4" inlet/outlet overall diameter is 10"

Assembled in the USA

N

Installation Instructions | Spec Drawings | Performance | Packaging Metrics | Videos | FAQs

SUNCOURT® INSTALLATION INSTRUCTIONS RADON FAN MODEL: RDKO4, RDK04-3, RDN04 & RDN04-3

READ THESE INSTRUCTIONS BEFORE PLANNING YOUR INSTALLATION

Centrax® Radon Mitigation Kit Instructions

PLEASE READ AND SAVE THESE INSTRUCTIONS:

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED.

CAUTION: BEFORE CARRYING OUT ANY MAINTENANCE OR SERVICING, ENSURE THE UNIT IS DISCONNECTED FROM THE MAIN POWER SUPPLY.

DO NOT USE TO EXHAUST HAZARDOUS OR EXPLOSIVE
MATERIALS AND VAPORS OR DUST.

NEVER EXPOSE THIS FAN TO TEMPERATURES EXCEEDING 140°F (60°C).

WARNING - TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

1. Do not use fan in hazardous environments where the fan electrical system could provide ignition to combustible or flammable materials.
2. Do not use fan to exhaust explosive or corrosive gases.
3. Check voltage at the fan to insure it corresponds with product nameplate.

4. Normal operation of this device may affect the supply of fresh air needed for safe operation of fuel burning equipment. Follow safety standards, codes, and heating equipment manufacturer's procedures guide lines.
5. There are no user serviceable parts located inside the fan unit. Do NOT attempt to open (this will void manufacturer's warranty). Return unit to the factory with original purchase receipt for service after obtaining a Return Goods Authorization (RGA).
6. All wiring must be in accordance with local and national electrical codes. When installed outside, power must be supplied from a GFCI (Ground Fault Circuit Interrupter).
7. Operate unit only in the manner intended. If you have questions, contact the manufacturer.
8. Before servicing or cleaning unit, switch power off at service panel and lock service panel to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag to the service panel.
9. Installation work and electrical wiring must be done by a qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
10. This unit has an unguarded impeller. Do not use in locations where the impeller is readily accessible to people or animals.

FAN SPECIFICATIONS

Electric Motor • External Rotor • Ball Bearing • Class B • Thermally Protected • Conforms To ANSI-UL 705 & CSA 22.2 • ETL Listed • Housing Material FRABS • UV Protected • Flame Rating UL 94V0 • Housing Color White

MOUNTING HARDWARE INCLUDED



TF104	Qty. 4	Qty. 4	Qty. 4	Qty. 4	Qty. 4	Qty. 4	Qty. 2	Qty. 2
Model	#8 x 1" Self Tapping Screw	#6 x 1/2" Machine Screw	Hex Nut	#6 Lock Washer	Rubber Washer	Flat Washer	Mounting Bracket	White Couplers



Qty. 6 | #6 Screws For Securing Duct Connection



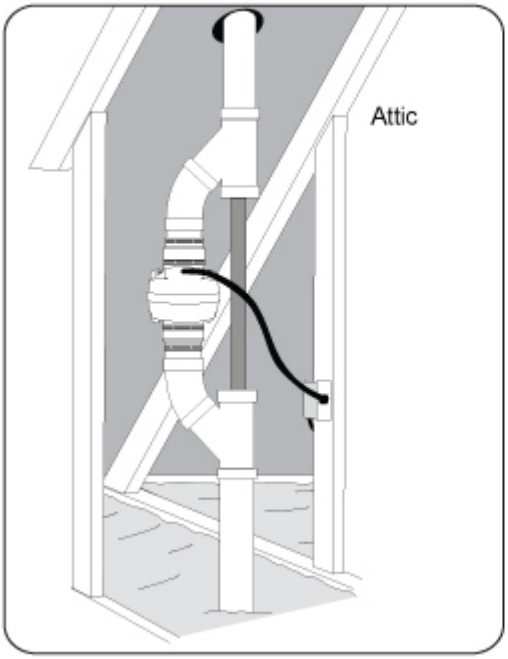
Qty. 1 | Air Pressure Indicator (Model RDK04 & RDK04-3 Only)

INSTALLATION

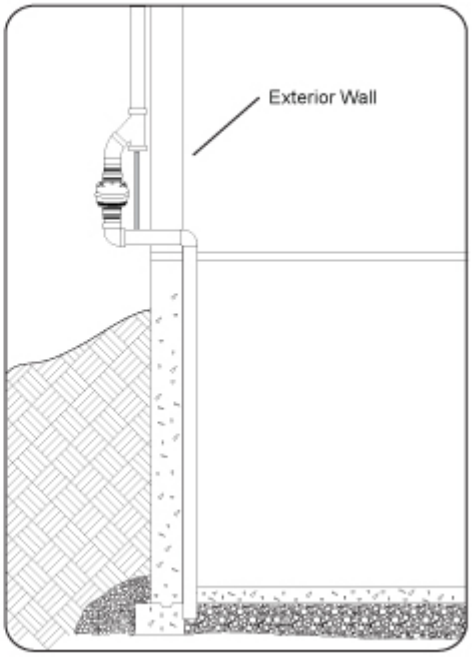
Retain original packaging.

The fan can be mounted indoors or outdoors. (It is suggested that EPA recommendations be followed in choosing the fan location.) The fan may be mounted directly to the system piping or fastened to a supporting structure by means of mounting brackets provided.

Indoor Installation

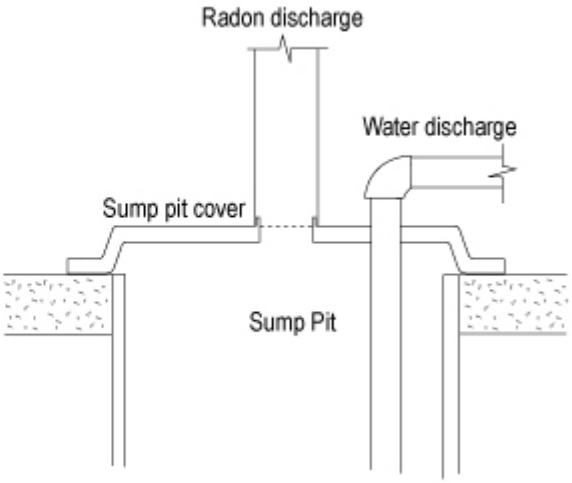


Outdoor Installation



OPTIONAL SUMP PIT INSTALLATION

In homes with a sump pit, a sump pit cover, or dome, can be mounted and sealed over the sump pit opening. Fittings in the sump pit cover are used to attach the pipes for water and radon gas discharge. All gaps in the cover should be sealed air tight.



MOUNTING

Mount the fan vertically with the outlet up. Insure the unit is plumb and level. When mounting directly to the system piping ensure that the fan does not contact any building surface to avoid vibration noise. Use the flexible couplers provided to secure the fan to the piping.

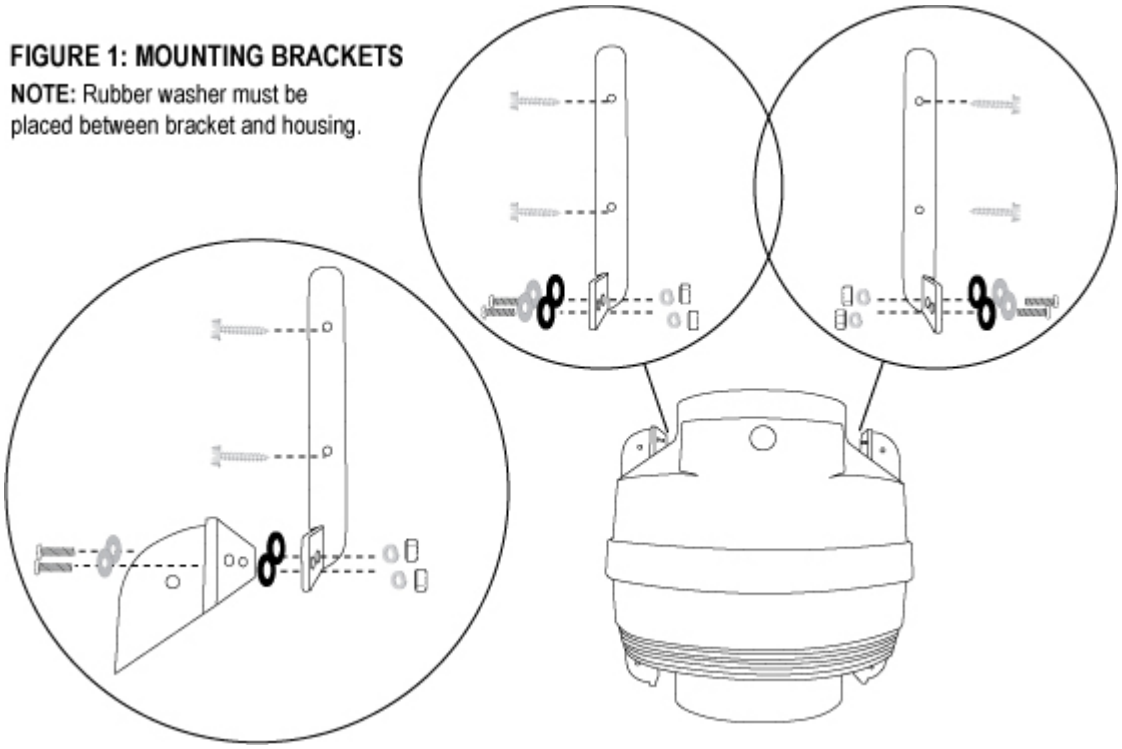
MOUNTING BRACKET

The fan may be further secured with the mounting brackets provided.

The flexible couplings will provide means of disconnect for cleaning the impeller and also to isolate vibration.

FIGURE 1: MOUNTING BRACKETS

NOTE: Rubber washer must be placed between bracket and housing.



ELECTRICAL WIRING

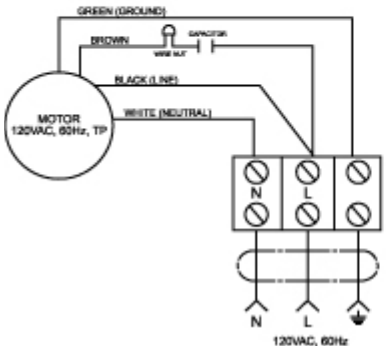
The fans operate on standard 120VAC 60Hz. All wiring must be performed in accordance with the National Electrical Code and state and local building codes. A qualified electrician should perform all electrical work. Outdoor installations require the use of UL Listed watertight conduit and power supplied from a GFCI (Ground Fault Circuit Interrupter).

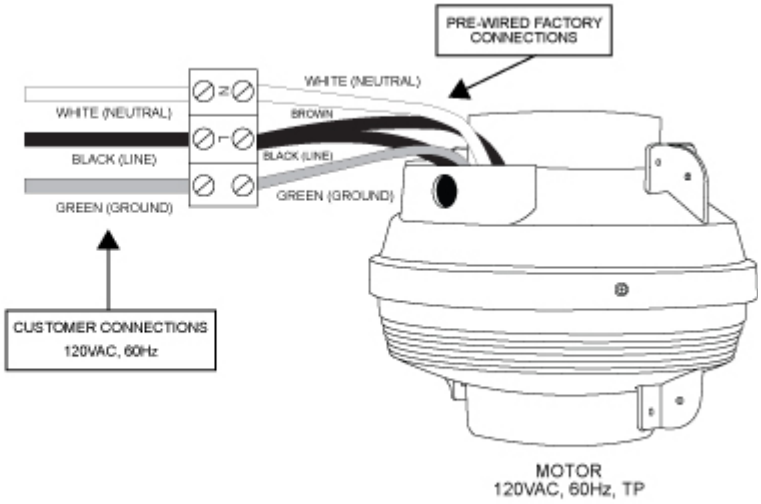
ELECTRICAL CONNECTION

Connect wiring with terminal block provided, observing proper connections.

Fan Wire	Connection
Green	Ground (G)
Black	AC Line
White	AC Neutral

WIRING SCHEMATIC





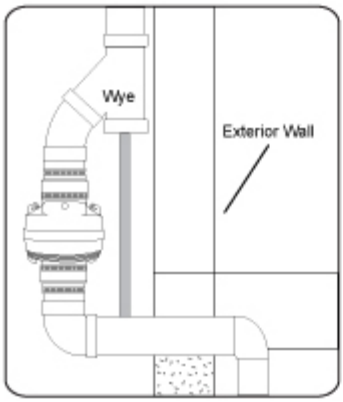
(This is what it looks like)

CONDENSATION & DRAINAGE

Condensation can form in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation. The fan MUST be mounted vertically plumb and level, with the outlet pointing up for proper drainage through the fan. Avoid mounting the fans in any orientation that will allow water to accumulate inside the fan housing. The fans are NOT suitable for underground burial.

A condensate bypass should be installed in the outlet ducting as shown below. This is particularly true in cold climate installations, which require long lengths of outlet ducting or when the outlet ducting is likely to produce large amounts of condensation because of high soil moisture or outlet duct material. Schedule 20 piping and other thin-walled plastic ducting or aluminum downspout piping will normally produce much more condensation than Schedule 40 piping.

The condensation produced in the outlet stack is collected in the Wye fitting and drained through the bypass tube. The bypass tubing may be insulated to prevent freezing.

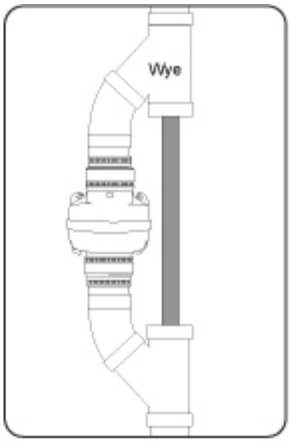


The bypass is constructed with a 45 degree Wye fitting at the bottom of the outlet stack. The bottom of the Wye is capped and fitted with a tube that connects to the inlet piping.

Condensate bypass parts list

(1) 3" or 4" 45DEG PVC Wye
(1) 3" or 4" 45DEG PVC Strt Elbow
(1) 3" or 4" x 1-1/2" PVC Bushing
(1) 1-1/2" x 1" PVC Flush Bushing
(1) 1" x 5' PVC
(1) 1" x 3/8" x 3' pipe wrap
(1) 3" or 4" 90DEG PVC Elbow

(3" or 4" depending on your installation)



The bypass is constructed using (2) 45 degree Wye fittings mounted above and below the fan. The Wye's divert the fan and allow the condensation to bypass the fan via a 1" drain tube.

Condensate bypass parts list

(2) 3" or 4" 45DEG PVC Wye
(2) 3" or 4" 45DEG PVC Strt Elbow
(2) 3" or 4" x 1-1/2" PVC Bushing
(2) 1-1/2" x 1" PVC Flush Bushing
(1) 1" x 5' PVC
(1) 1" x 3/8" x 3' pipe wrap

(3" or 4" depending on your installation)

Failure to install a proper condensate collection system voids the product warranty.

MAINTENANCE

Inspect the product at least once every 12 months for excessive dust and dirt build up on the impeller (more often in dusty environments). Clean as necessary. The unit must be disconnected from power during inspection and/or cleaning.

"SYSTEM ON" INDICATOR

Install a "system on" indicator to confirm status. A pressure indicator, manometer, or vacuum alarm is recommended for this purpose. The Suncourt Air Pressure Indicator is included with models RDK04 and RDK04-3.

SLAB COVERAGE

The Suncourt® Radon Fan provides coverage up to 2000 sq. ft. per slab penetration depending on type of sub slab material. If one slab penetration does not sufficiently mitigate the Radon then additional slab penetration points can be added as required.

Detailed Radon information is available on the EPA's website at: http://www.epa.gov/radon/ (http://www.epa.gov/radon/)

FIVE YEAR LIMITED WARRANTY

Subject to the following limitations, Suncourt® Inc. (manufacturer) warrants that the fan will, for 5 (five) years from date of original purchase, remain free from appearance of defects in workmanship or materials. This warranty is subject to the following limitations: (a) manufacturer's liability is limited to the replacement or repair of the unit, as decided by the manufacturer; (b) a defective unit must be returned, prepaid, with proof of purchase, to Suncourt; and (c) this warranty does not apply to defects resulting from the alteration, abuse, accidental damage, unauthorized repair, or misuse of the unit. This warranty is given in lieu of all other warranties, guarantees, and conditions on manufacturer's part, and the manufacturer shall have no tortious or other liability in respect to this fan. There is no implied warranty of merchantability and fitness for a particular purpose.

Suncourt shall not be liable for any direct, indirect, special, incidental or consequential damages arising from, or relating to, the fan or the performance of it. Suncourt's maximum liability shall not exceed the amount of the purchase price of the fan. The sole remedy under this warranty shall be the repair or replacement of the product.

WARRANTY RETURN

Call Suncourt at 1.800.999.3267 for a Return Goods Authorization (RGA) number. Please have date of original purchase available.

Mark the RGA number clearly on the return shipping box. We do not accept returns without a valid RGA number.

Package the unit using the original packaging including the styrofoam inserts to avoid damage in shipping.

Pressure Indicator Instructions

INSTALLATION INSTRUCTIONS FOR THE AIR PRESSURE INDICATOR

READ AND SAVE THESE INSTRUCTIONS (FOR GENERAL VENTILATION PURPOSE ONLY)

Mounting your Air Pressure Indicator:
Install the Air Pressure Indicator on any clean and dry vertical section of the suction side of the vent pipe in an indoor location where the Air Pressure Indicator can be easily read.
1. Using the adhesive tape on the back, mount to the vent pipe, keeping the Air Pressure Indicator vertical so that the fluid does not run out.
2. Remove the sealing caps from the tube and allow the liquid to settle. You may need to tap the Air Pressure Indicator lightly with your finger to settle the liquid.
3. Slide the tube up-down until the liquid level is at the Zero level in both columns. Use screw provided to hold tube in place. Screw goes into the hole above the numbered section. (See photo #1) This is how the indicator will look if the fan is not operating.
4. Using a 3/16" drill bit, drill a hole in the vent pipe 1" to 2" below the top of the Air Pressure Indicator.
5. Connect one end of the tubing to the top of either opening of the Air Pressure Indicator and insert the other end into the 3/16" hole. Use a little silicon sealant to make sure the hose

connections are airtight.
6. Complete the information on the installation label and apply to the vent pipe near the installation.
7. See photo #2 to see how the liquid should appear when the fan is running. The liquid will be higher on the side the 3/16” tubing was inserted into. The markings are not calibrated. You may get a different reading than what is pictured.

Please Note: Do not ingest the liquid. Contact with your eyes or skin may cause irritation. Liquid will stain if spilled.

Installation

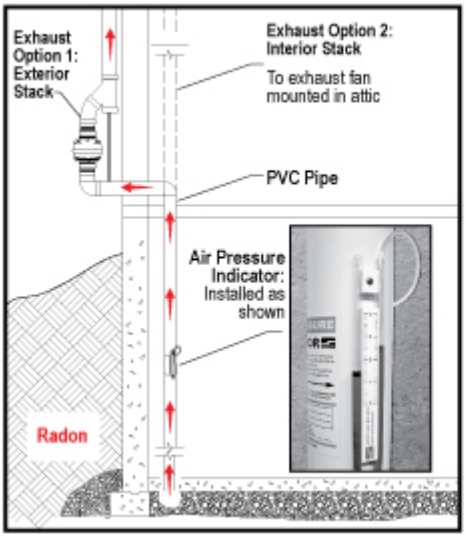


Photo #1 Fan not running



Photo #2 Fan running



Warranty

Subject to the following limitations, Suncourt® Inc. (manufacturer) warrants that the Air Pressure Indicator will, for 5 (five) years from date of original purchase, remain free from appearance of defects in workmanship or materials. This warranty is subject to the following limitations: (a) manufacturer’s liability is limited to the replacement or repair of the unit, as decided by the manufacturer; (b) a defective unit must be returned, prepaid, with proof of purchase, to Suncourt; and (c) this warranty does not apply to defects resulting from the alteration, abuse, accidental damage, unauthorized repair, or misuse of the unit. This warranty is given in lieu of all other warranties, guarantees, and conditions on manufacturer’s part, and the manufacturer shall have no tortious or other liability in respect to this Air Pressure Indicator. There is no implied warranty of merchantability and fitness for a particular purpose. Suncourt shall not be liable for any direct, indirect, special, incidental or consequential damages arising from, or relating to, the Air Pressure Indicator or the performance of it. Suncourt’s maximum liability shall not exceed the amount of the purchase price of the Air Pressure Indicator. The sole remedy under this warranty shall be the repair or replacement of the product. Ship unit to Suncourt Inc. only after obtaining a Return Goods Authorization (RGA) number. Returns without this RGA number will not be accepted.

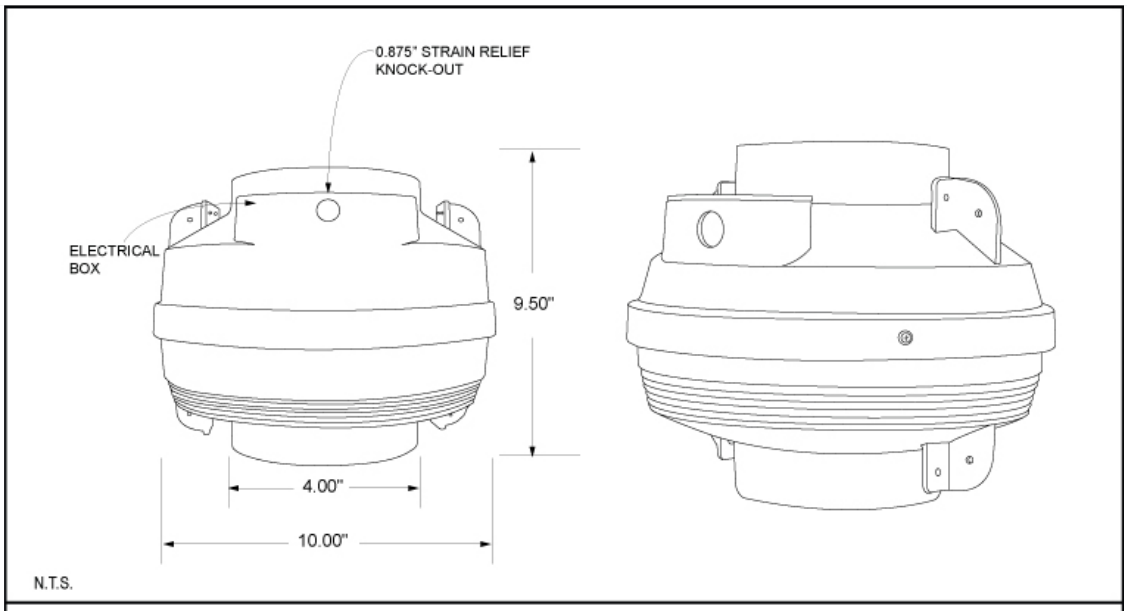
Actual product appearance may differ from illustrations. Suncourt reserves the right to modify any or all of its products’ features, designs, components and specifications without notice.

SUNCOURT INC.
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1.800.999.FANS (3267)
www.suncourt.com

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USA & Canada 800-999-FANS (3267)
Suncourt Inc. 500 West Second Avenue
P.O. Box 40, Durant, IA 52747

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N.T.S.

4" Centrax® In-Line Centrifugal Fan™

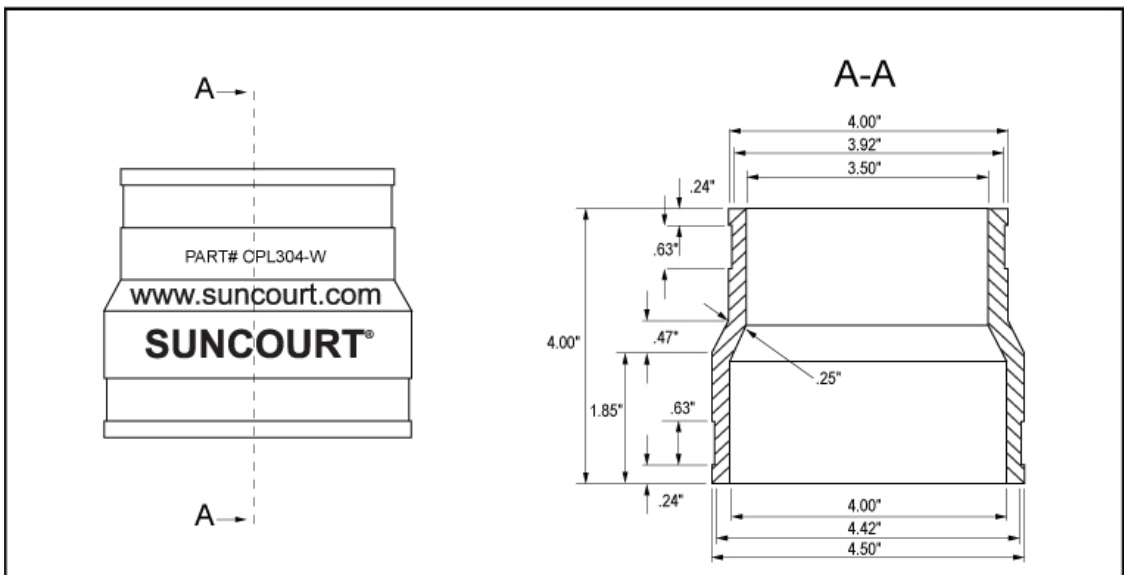
Model: TF104(-W)

Mounting Hardware:
(4) #8 x 1" Self tapping screws
(4) #6 X 1/2" Machine screws
(4) Hex nuts, (4) #6 Lock washers
(4) Rubber washers
(2) Fan mounting brackets, (2) Cable ties
(6) #6 Screws for securing duct connection

Output/Input Diameter: 4" (po) • Unit weight: 5.45 lbs. • CFM: 200 • Amps: 0.65
• Watts: 77 • Volts: 120 • Hz: 60 • ETL® Listed • Class F external rotor motor
• Thermally protected auto reset • Ball bearing balanced ABS backward inclined impeller
• 5 year limited warranty

SUNCOURT INC.
P.O. Box 40
Durant, IA 52747-0040
1.800.999.FANS (3267)
www.suncourt.com

TF104-SS-0716



N.T.S.

SUNCOURT® RUBBER COUPLERS

MODEL CPL304-W

3" to 4" white couplers available in the Suncourt Radon Mitigation In-Line Fan Kit or sold separately in a (2-pack).

DIAMETER: SIZED TO CONNECT SUNCOURT TF104(-W) TO 4"
SCHEDULE C PVC
UNIT WEIGHT: 0.65 LBS
ONE YEAR LIMITED WARRANTY

SUNCOURT INC.
P.O. Box 40
Durant, IA 52747-0040
1.800.999.FANS (3267)
www.suncourt.com

CPL304W-SS-0716

PRODUCT DATA SHEET



Model: RDK04-03
4" Centrax® In-Line Centrifugal Fan
Includes: (2) 4" to 3" White Rubber Couplers
(1) Air Pressure Indicator
ETL® Listed
5 Year Limited Warranty
4" Inlet/Outlet Diameter / Overall Diameter 10"
Made In China
Primary UOM: EA
Shipping Multiple: 1

Performance

CFM	Watts	Amps	Volts	Hz	dBA	Sones
200	77	0.65	120	60	60	4

Hazardous Material Info

Not Applicable

Customs Tariff Classification

HS Code	Country of Origin	NAFTA Preference Criterion	NAFTA Producer Index
8414596060	China		N

Packaging Metrics

	UPC/SCC	Width (in)	Height (in)	Depth (in)	Weight (lbs)
Unit	066028034052	10.50	16.25	10.50	9.00
Master Case	40066028034050	10.50	16.25	10.50	9.00

Appendix B:

SSDS Inspection Form

SSDS Inspection Log Sheet
Former Packaged Lighting Site
29 Grant Street, Walden, NY

Date	Inspector (initials)	SSDS #1 - Main Bldg. Basement		SSDS #2 - Office Building	
		System Operation Normal? (Yes/No)	Air pressure indicator fluid level difference (inches)	System Operation Normal? (Yes/No)	Air pressure indicator fluid level difference (inches)
	NOTES				
	NOTES				
	NOTES				
	NOTES				
	NOTES				
	NOTES				
	NOTES				
	NOTES				
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