Love Road Development Site

Dutchess County

Town of Poughkeepsie, New York

SITE MANAGEMENT PLAN

NYSDEC Site Number: C314113

Prepared for:

Herbert H. Redl

Commercial and Office Properties

80 Washington Street

City of Poughkeepsie, New York 12601

Prepared by:

The Chazen Companies

21 Fox Street

Poughkeepsie, New York 12601

845-454-3980

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

OCTOBER 2017

CERTIFICATION STATEMENT

I, Joseph M. Lanaro, certify that I am currently a NYS registered professional engineer 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) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

_____ P.E.

10/11/17 DATE

TABLE OF CONTENTS

Love Road Development Site

Dutchess County

Town of Poughkeepsie, New York

SITE MANAGEMENT PLAN

Table of Contents

TABLE OF CONTENTS (Continued)

List of Embedded Tables

List of Analytical Results Summary Tables

List of Figures

List of Appendices

List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Green House Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
IRM	Interim Remedial Measure
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract

SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-slab Depressurization System
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

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:

Site Identification:	BCP Site No. C314113, Love Road Development Site 20-50 Love Road, Town of Poughkeepsie, Dutchess County, New York

Institutional Controls:	An Environmental Easement that: 1. Allows restricted-residential, commercial, and industrial site uses, subject to local zoning. 2. Restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH or Dutchess County DOH. 3. Requires the remedial party or site owner to complete and submit to NYSDEC a periodic certification of the ICs and ECs. 4. Requires compliance with this SMP.
Engineering Controls:	A composite cover system in the defined area of the Site consisting of either buildings, pavement, sidewalks, or a 2-foot soil cover. Prior to building construction, the potential for soil vapor intrusion of petroleum-range compounds will be evaluated and may warrant future monitoring and/or mitigation to address exposures related to soil vapor intrusion. If mitigation is implemented, the associated operation and maintenance plan will be added to this SMP.

Inspections:	Frequency
1. Composite cover inspection	Annually
Monitoring:	
1. Groundwater Monitoring Wells 2009-MW-2, MW-5, MW-6, and MW-7	Semi-annual for two years; after which evaluate results for possible reduced sampling frequency.

Site Identification:	BCP Site No. C314113, Love Road Development Site 20-50 Love Road, Town of Poughkeepsie, Dutchess County, New York

Reporting:	
1. Groundwater Monitoring and Site Inspection	Semi-annual for two years; after which, evaluate results for possible reduced sampling frequency
2. Periodic Review Report	Annually

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

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Love Road Development Site located at 20-50 Love Road in the Town of Poughkeepsie, New York (hereinafter referred to as the "Site"). See **Figure 1a**. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP Site No. C314113), which is administered by New York State Department of Environmental Conservation (NYSDEC).

Herbert H. Redl entered into a Brownfield Cleanup Agreement (BCA) on December 2, 2004 with the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided as **Figure 1b**. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in **Appendix B**.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Dutchess County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. 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.

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 Index #W3-1026-04-10; Site #C314113 for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in **Appendix A** of this SMP.

This SMP was prepared by The Chazen Companies (Chazen), on behalf of Herbert H. Redl, and includes work summaries and referenced documents completed by others prior to Chazen's involvement since 2015 with this project. This SMP was prepared in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 3, 2010, and guidelines provided by the NYSDEC. The SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. 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.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6NYCRR Part 375, and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, 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 ECs 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 submitted to the NYSDEC within 45 days describing and documenting 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/Remedial Party 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 to the NYSDEC.

Table 1.3 on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix A**.

Table 1.3: Notifications*

Name	**Contact Information**
John B. Miller, NYSDEC Project Manager	518-402-9589, john.miller@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIALACTIONS

2.1 Site Location and Description

The site is located at 20-50 Love Road in the Town of Poughkeepsie, Dutchess County, New York and is identified as Section 6261, Block 01, and Lot 187898 on the Dutchess County Tax Map (see **Figure 1b**). The site is an approximately 4.59-acre area and is bounded by commercial plazas to the north and west, US Route 44 (Dutchess Turnpike) to the south, and the Dutchess Rail Trail to the east. The boundaries of the site are more fully described in the Metes and Bounds description provided in **Appendix B**. The owner of the site parcel at the time of issuance of this SMP is:

Herbert H. Redl
Commercial and Office Properties
80 Washington Street
Poughkeepsie, New York 12601
845-471-3388

2.2 Physical Setting

2.2.1 Land Use

The Site consists of overgrown vegetated areas and the remnants of former structures including driveways and building foundations. The Site is zoned for commercial use, has remained vacant and free of structures since the 1990s, and a public use easement is in place for the driveway and access to an adjoining rail trail.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include mostly commercial properties with some residential areas nearby. The properties immediately south of the Site include a highway and then commercial and residential properties; the properties immediately north of the Site include commercial properties; the properties immediately east of the Site include a rail trail and then commercial and residential properties; and the properties to the west of the Site include commercial properties.

2.2.2 Geology

Bedrock consists of interbedded shale and siltstone visible in several locations at the site. Bedrock topography varies significantly, such that more than 30 feet of overburden covers the center of the site, consisting of limited fill and native sand, silt, and clay

A topographic map with bedrock and surface contours is provided as **Figure 3**.

2.2.3 Hydrogeology

Groundwater flows generally to the west and is found at approximately 10 feet below ground surface in the shallow overburden and 30 feet below grade in bedrock.

. Groundwater monitoring well locations are shown on **Figures 2a and 2b**, and well construction details are provided in **Appendix C**.

2.3 Investigation and Remedial History

The Site was formerly occupied at different times by a lumber/building supply yard, a gasoline service station, a brick factory, and most recently by a petroleum bulk storage (PBS) facility which operated through the 1970s and 1980s. The PBS facility had six fuel oil above-ground storage tanks (ASTs) with the following capacities: one 2,500,000-gallon AST, two 25,000-gallon ASTs, and three 20,000-gallon ASTs. The PBS facility closed in the late 1980s, and the PBS registration notes that the ASTs were cleaned, removed, and listed as closed on the facility in the early 1990s.

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 – References. Investigative and remedial work prior to 2014 was completed by Fuss & O'Neill.

July 2006 Site Characterization and Remedial Investigation Summary Report (RI), prepared by Fuss & O'Neill

The initial RI at the Love Road Site occurred during June through August 2005 and included the advancement of 48 test pits, 29 soil borings, and two temporary groundwater monitoring wells. Three areas of concern (AOCs) were identified (**Figure 2**), which included a former PBS fuel unloading area near the northern site entrance (AOC-1), an area surrounding and including an existing remaining foundation from a former building adjacent to the southern site boundary (AOC-2), and the northeastern property corner (AOC-3) which was a former railside loading area. These areas were identified based on field evidence of petroleum impacted soil and analytical evidence of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), as well as select metals in soil that exceeded NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs). Groundwater impacted by petroleum-range VOCs was identified only at one location, within AOC-2.

During the RI, a 1,000-gallon underground storage tank (UST) was discovered near the southern site boundary within AOC-2 (**Figure 2**). It was surmised that this UST was associated with an historic gasoline service station that operated at the site. The UST was removed in November 2005 as an Interim Remedial Measure (IRM). A hole was noted in the bottom of the UST and petroleum impacts were observed at the base of the tank grave. Analytical soil samples taken from the tank grave limit confirmed the presence of petroleum-range VOCs and SVOCs exceeding UUSCOs. Impacted soil was left in place, to be addressed by the site remedy.

October 2010 Supplemental Remedial Investigation (SRI), prepared by Fuss & O'Neill

A Supplemental Remedial Investigation (SRI) was conducted between 2008 and 2009 to resolve environmental data gaps identified by the initial RI. The SRI also documented remaining conditions following a 2007 soil and UST removal IRM.

The July 2007 IRM was conducted to excavate an area of stained soil in AOC-1 where free product had been observed during the 2006 RI. Following NYSDEC approval, this soil was excavated and stockpiled on site. The excavation limit is depicted on **Figure 2**. Two 500-gallon USTs connected by a pipe, surmised to have been used as an oil-water separator, were discovered during the soil excavation and were removed and disposed. No

petroleum-range VOCs or SVOCs were detected in seven soil samples taken at the excavation limits, confirming a satisfactory soil removal effort. A total of 127.38 tons were removed and transported to Deep Green of New York in New Windsor, New York for thermal treatment and recycling on January 11, 2012.

The 2010 SRI included completion of a soil vapor investigation, installation and sampling of four monitoring wells, and completion of a fish and wildlife resources impact assessment (FWRIA). The SRI report provided the following conclusions:

- Soil vapor results were compared to the NYSDOH Soil Vapor Intrusion (SVI) guidance values for sub-slab soil vapor and did not identify concentrations that would require mitigation. One of the five soil vapor samples reported elevated petroleum range compounds which are not included in the NYSDOH SVI guidance matrixes and one sample was analyzed with detection limits exceeding SVI action criteria thresholds, warranting further SVI evaluation in this location if enclosed structures are proposed in the future.
- One overburden well, MW-1, was installed near the former 1,000-gallon UST in AOC-2, one bedrock well was installed west of AOC-2 (MW-2), and two bedrock wells were installed in and near AOC-1 (MW-3 and MW-4). The groundwater sample from the overburden well identified petroleum range VOCs and SVOCs greater than NYSDEC Standards, Criteria, and Guidance values (SCGs). Groundwater sampling results from the three bedrock wells met the SCGs.
- The results of the FWRIA determined that impacts present at the Site do not constitute actual or potential adverse impacts to fish and wildlife resources.

July 2012 Alternatives Analysis and Remedial Work Plan, prepared by Fuss & O'Neill

Three remedial alternatives were evaluated for the site, including no further action, remediation to UUSCOs, and remediation for RRUSCOs. Remediation for restricted-

residential use was selected based on its cost effectiveness in achieving compliance with the Remedial Action Objectives (RAOs) and SCGs in both the short and long term.

The proposed remedial strategies to protect site occupants and visitors from potential exposure to the contaminants of concern and to reduce the potential for off-site migration of contaminants included the following:

- Removal of approximately 650 cubic yards of source area soils in the vicinity of the former 1,000-gallon UST located within AOC-2.
- Placement of a composite cap system over shallow soil remaining on site that exceeds restricted-residential SCGs.
- Installation of a sub-surface depressurization system (SSDS) as part of any future buildings constructed within areas impacts by VOCs.
- Execution of an environmental easement which places standard BCA use restrictions on the property.

2015 Supplemental Sampling Investigation and 2017 Addendum to Alternatives Analysis and Remedial Work Plan, prepared by Chazen

Chazen completed a supplemental soil and groundwater sampling investigation in September 2015 to collect additional data to confirm the extent of cover remedies needed on the site. The investigation included installation of test pits to field screen soils for petroleum impacts and ten near-surface soil samples. One groundwater sample was also collected from exiting overburden well MW-1. The 2015 sampling locations were added to the 2012 SRI location map, **Figure 2**.

The ten near-surface soil results met the UUSCOs, significantly reducing the AOC-2 area requiring a protective cover system as part of the Site remedy. The 2017 Addendum to the Remedial Work Plan presented a reduced cover area subsequently approved by NYSDEC and NYSDOH on June 20, 2017.

The groundwater sample met the SCGs except for two compounds (isopropylbenzene and n-propylbenzene). The subsequent Remedial Work Plan Addendum included installation of MW-5, MW-6 and MW-7, around the AOC-2 excavation area in lieu of any future routine monitoring of wells MW-1 through MW-4.

2017 AOC-2 Soil Excavation and Soil Cover Remedy

In September 2017, 489.7 tons of petroleum-impacted soil were removed from the vicinity of the former 1,000-gallon UST area on and taken to Deep Green for disposal. The excavation limit is shown on **Figure 2b**. MW-1 was removed during excavation activities. Post-excavation soil sampling results confirmed UUSCOs were achieved. The excavation was backfilled with:

1. Soil meeting the requirements of 6 NYCRR Part 375-6.7(d), that was imported following NYSDEC approval of the Soil Import Form;
2. An existing soil pile that was field screened and sampled at the direction of NYSDEC; and,
3. Excavated material that was segregated based on the absence of gross petroleum impacts, confirmed by field screening.

In the area shown on **Figure 2a,** the ground was cleared and grubbed, orange construction fencing was placed as a demarcation barrier, and a two-foot thick layer of clean soil cover was placed over the existing grade (approximately 21 inches of fill with three inches of topsoil).

Monitoring wells MW-5, MW-6 and MW-7 were installed as part of this remedial work effort. A well construction details table is included in **Appendix C**.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated April 30, 2013 are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

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

Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

Soil Vapor

RAOs for Public Health Protection

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

2.5 Remaining Contamination

2.5.1 Soil

Figure 2a shows the locations of soils remaining on the Site that exceed UUSCOs for metals, VOCs, and SVOCs. The results of all soil samples collected that exceed the

SCOs are summarized in **Table 1**. With few exceptions as discussed below, soil contaminants remaining on Site meet the NYSDEC Part 375 RRUSCOs. Acetone is a chemical not associated with past Site uses, but was reported in several samples above the UUSCO and is considered a laboratory contamination artifact and not a Site contaminant.

AOC-1 – Former Fuel Unloading Area

Remaining soils in this area meet the UUSCOs for VOCs, SVOCs, and metals with the following exceptions:

- Metals: nickel concentration slightly exceeds the UUSCO but is less than the RRSCOs at 8 to 9 feet below ground surface (bgs) in TP-24.

AOC-2 – Former UST and West of Former Buildings

Based on results of the site Remedial Investigations, petroleum contaminated soil remains in the lower AOC-2 area (west of building foundation), beneath the two-foot composite cover system and under the existing building foundation.

In the upper AOC-2 area (former 1,000-gallon UST area east of building foundation), substantial grossly-contaminated petroleum contaminated soil has been removed. Visual, olfactory, and PID evidence of petroleum impacts remain at depth and, beneath building foundations.

During the remedial action, the following demarcation layers were emplaced, below which remaining petroleum impacts can be expected to be encountered:

- Lower AOC-2 soil cover area, west of existing foundation wall: Orange construction fencing was laid on the ground surface and then covered by two-feet of clean soil.
- Upper AOC-2 area remedial excavation in former 1,000-gallon UST area, east of existing foundation wall: Orange construction fencing was laid horizontally within the excavation at a depth of approximately eight feet. The fencing was carried up the sides of the excavation to approximately five feet below grade. Since in portions of the excavation the approved fill extends as deep as 17 feet

below grade, the demarcation horizon serves as an alert that a transition to depth where petroleum impacts (evidenced by odor, staining, or VOCs detected by PID) remain beneath where excavation limits meet the backfill.

Figures 2a and 2b summarizes the results of soil samples remaining at the site after completion of the remedial action that meet the SCOs for unrestricted use of the site.

Other remaining AOC-2 soils west of the foundation wall meet the UUSCOs for VOCs, SVOCs, and metals with the following exceptions:

- Metals: One test pit reported manganese and arsenic concentrations greater than RRUSCOs at 9 feet bgs (TP-29). Five test pits (TP-16, TP-17, TP-28, TP-30, and TP-31) reported nickel concentrations greater than UUSCOs but less than RRUSCOs between 1 and 9.5 feet bgs. Concentrations of chromium (TP-31 at 5.5 feet) and zinc (TP-44 at 1 foot) were greater than UUSCOs, but less than RRSCOs.

AOC-3 – Former Railside Storage Area

Remaining soils in this area meet the UUSCOs for VOCs, SVOCs, and metals with the following exceptions:

- Metals: Lead, manganese, nickel, and/or zinc exceed the UUSCOs but meet the RRSCOs at depths ranging between 5.5 and 6.75 feet bgs at one or more of the four test pit location (TP-35, TP-37, TP-38, TP-39). Mercury exceeds the RRSCO at a depth of 5.5 feet bgs in TP-35.

Other Site Areas

Remaining soils not within the AOCs discussed above meet the UUSCOs for VOCs, SVOCs, and metals with the following exceptions:

- Metals: Copper, nickel, and/or zinc concentrations exceed the UUSCOs but meet the RRSCOs at depths ranging between 2 and 8.5 feet bgs at one or more of eight test pit locations (TP-05, TP-07, TP-12, TP-15, TP-32, and TP-47). Manganese exceeds the RRSCO at 2 feet bgs in TP-12.

Table 1 and **Figure 2a** summarize the results of soil samples collected that exceed the UUSCOs and the RRSCOs at the site after completion of remedial action. Remedial excavation endpoint sampling results from September 2017 are summarized in **Table 1b**.

2.5.2 Groundwater

Bedrock monitoring well 2009-MW-2, and overburden monitoring wells MW-5, MW-6, and MW-7 were developed and sampled between September 26 and 27, 2017. The results are summarized in **Table 2** and indicate limited VOC impacts remain within the overburden aquifer in the vicinity of monitoring wells MW-5, MW-6, and MW-7 (**Figure 2b**). One to three VOCs were reported in monitoring wells MW-5, MW-6, and MW-7 at concentrations greater than groundwater standards. Total VOCs were 102 ppb in MW-6 within the backfilled excavation; 28 ppb in upgradient well MW-5, and 9.1 ppb in MW-7, which is located adjacent to and downgradient from the excavation remedy. Remaining VOCs were either not detected or reported at low-level concentrations.

2.5.3 Soil Vapor

Soil vapor quality was evaluated in 2008 during the SRI. The SG-2 sample reported elevated concentrations of petroleum range compounds not included in NYSDOH SVI guidance matrixes. The SG-5 sample was analyzed using laboratory detection limits that were greater than the NYSDOH matrix values so there is the potential for criteria compound exceedances although few criteria parameters have been detected in soil or groundwater samples on this site. The SVI sampling locations are shown on **Figure 2**, and the analytical results are summarized in **Table 3**.

Soil vapor conditions are expected to have improved since 2008 and to have improved further within the AOC-2 area after the 2017 soil excavation remedy. Prior to construction of buildings at the site, the potential for soil vapor intrusion of petroleum-range compounds will be evaluated and may warrant future monitoring and/or mitigation to address exposures related to soil vapor intrusion.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in **Appendix G**) 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 IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to restricted residential, commercial, and industrial uses only. Adherence to these ICs on the site is required by the

Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on **Figure 1b**. These ICs are:

- The property may be used for: restricted residential; commercial, or industrial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Dutchess 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.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- 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 the Environmental Easement.
- The potential for vapor intrusion must be evaluated for any buildings developed at the site, and any potential impacts that are identified must be monitored or mitigated; and
- Vegetable gardens and farming on the site are prohibited;

3.3 Engineering Controls

3.3.1 Cover (or Cap)

Exposure to remaining contamination at the site is prevented by a cover system placed over a limited area of the site. This cover system is comprised of a minimum of 24 inches of clean soil, asphalt pavement, concrete-covered sidewalks, or concrete building slabs. **Figure 1b** presents the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in **Appendix G** 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 of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of 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 associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in **Appendices E and F**, respectively.

3.3.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when 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 6.4 of NYSDEC DER-10.

3.3.2.1 - Cover (or Cap)

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity. Should the eastern section of AOC-2 be redeveloped in ways that include additional soil removal, then the cover in that area may no longer be required.

3.3.2.2 - Monitoring Wells Associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC with consultation with NYSDOH, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the monitoring program will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in **Appendix F**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

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

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and

- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site –Wide Inspection

Site-wide inspections will be performed at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix D** – Site Management Forms. 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; and
- Confirm that site records are up to date.

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

- Whether ECs 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; and
- If site records are complete and up to date; and

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the overburden monitoring wells on a routine basis. Sampling locations, required analytical parameters and schedule are provided in **Table 4.3** – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 4.3 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters	Schedule
Monitoring Wells (2009-MW-2, MW-5. MW-6, MW-7)	NYSDEC CP-51 list VOCs (by EPA Method 8260)	Semi-annual for two years, then re-evaluate for possible reduced sampling frequency.

Detailed sample collection and analytical procedures and protocols are provided in **Appendix F** - Quality Assurance Project Plan.

4.3.1 Groundwater Sampling

Groundwater monitoring will be performed semi-annually for two years to assess the performance of the remedy. If evidence of impacts remain after two years and warrant continued monitoring, the frequency may be re-evaluated. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of three on-site overburden monitoring wells was installed to monitor upgradient and downgradient groundwater conditions relative to the area of the former 1,000-gallon UST and where source-area soil was removed as part of the Site remedy. Existing monitoring well 2009-MW-2 is included in the monitoring well network, and locations are shown on **Figures 2a and 2b**.

Table 4.3.1 summarizes the wells identification number, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, one upgradient well and two downgradient wells are sampled to evaluate the effectiveness of the remedial system.

Table 4.3.1 – Monitoring Well Construction Details

Monitoring Well ID	Well Location	Coordinates (longitude/ latitude)*	Well Diameter (inches)	Depth Below Ground Surface to nearest foot*			
				Casing	Surface	Screen Top	Screen Bottom
2009-MW-2	Downgradient	TBD	2	-3	0	Data pending	28
MW-5	Upgradient	TBD	1	-3	0	7	22
MW-6	Source Area	TBD	1	-3	0	7	27
MW-7	Downgradient	TBD	1	-3	0	7	22

*Well coordinates and elevation of well construction features (casing, ground surface, top and bottom of screen) will be gathered during the first semi-annual event of 2018.

Monitoring well construction logs are included in **Appendix C** of this document.

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, 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 any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

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

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.3.2 Soil Vapor Intrusion Sampling

Soil vapor intrusion sampling may be required depending on future development of the Site. If Site buildings are planned, the area will be re-assessed for potential vapor intrusion.

4.3.3 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in **Appendix D** - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Quality Assurance Project Plan provided as **Appendix F** of this document.

5.0 OPERATION AND MAINTENANCE PLAN

The site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems (SSDS) or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

In the event that a SSDS is installed at the site in the future, an addendum will be added to this SMP to address the operation and maintenance plan for the newly installed sub-slab depressurization system.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

Potential Vulnerabilities to Severe Weather Events

The Site is greater than 150 feet above sea level and is not located in a floodplain zone; therefore, it is not subject to flooding from rising sea level or elevated streamflow related to severe weather or climate change. A small pond located near the center of the Site could potentially flood; however, overflow from such an event would drain westward and away from Site ECs (the soil cap). The Site remedy is not vulnerable to high wind or electricity disruptions since it does not include any ECs that rely on structures or electricity to house or operate active remedial equipment.

The portion of the composite cover area consisting of two feet of soil with established vegetation may be susceptible to erosion during periods of severe rain events.

Since the condition of this capped area will be inspected regularly according to this SMP, any areas vulnerable to erosion will be reported and corrected.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

Green remediation principles, as outlined in the Decision Document, were applied during the Site remedy evaluation. Based on the limited monitoring required by this SMP, formal green remediation evaluations are not anticipated to be necessary. Green remediation principles will continue to be applied during site management and include but are not limited to:

- Concurrent site inspections and groundwater sampling events to limit transportation needs thus reducing direct greenhouse gas emissions, increasing energy efficiency, and minimizing use of non-renewable energy.
- Dedication of reusable groundwater sampling equipment to conserve material and reduce waste.

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;

- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in **Appendix D**. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of **Table 7.1** and summarized in the Periodic Review Report.

Table 7.1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Groundwater Monitoring	Semi-annually, within six weeks of receipt of analytical results
Site Inspection Report	Annually
Periodic Review Report	Annually, or as otherwise determined by the Department

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

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- 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 (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the Department beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. 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** -Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be 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 site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.

- 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, etc.), 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 in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:

  - The compliance of the remedy with the requirements of the site-specific Decision Document.

  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and

  - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.

  - The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*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 generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

- *No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and*

- *The assumptions made in the qualitative exposure assessment remain valid.* (to be included every five years)

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, [name], of [business address], am certifying as [Owner's/Remedial Party's Designated Site Representative] for the site."

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

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

7.3 Corrective Measures Work 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 Work 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 Work Plan until it has been approved by the NYSDEC.

7.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report is provided in **Appendix I**. The RSO report will document the

research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

NYSDEC Division of Environmental Remediation. "6NYCRR Part 375 Environmental Remediation Programs." 14 December 2006.

NYSDEC. "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1." June 1998, addended April 2000 addendum.

NYSDEC Department of Environmental Remediation. "DER-10 Technical Guidance for Site Investigation and Remediation." May 2010.

NYSDEC Division of Environmental Remediation. "Decision Document, Love Road Development Site, Brownfield Cleanup Program, Poughkeepsie, Dutchess County, Site No. C314113." 30 April 2013.

Fuss & O'Neill. "Site Characterization and Remedial Investigation Report, 2 Love Road Site, BCP Site No. C314113." July 2006

Fuss & O'Neill. "Supplemental Remedial Investigation Report, 2 Love Road Site, BCP Site No. C314113." January 2010, revised October 2010.

Fuss & O'Neill. "Re: Stockpile Soil Disposal." Received by Miller, John, NYSDEC, 23 January 2012.

Fuss & O'Neill. "Alternatives Analysis and Remedial Work Plan, 2 Love Road Site, BCP Site No. C314113." July 2012.

The Chazen Companies. "Re: Results of Supplemental Sampling." Received by Miller, P.E., John, NYSDEC, 30 November 2015.

The Chazen Companies. "Final Engineering and Construction Completion Report, Love Road Development Site." 11 October 2017.

ANALYICAL RESULTS SUMMARY TABLES

Table 1
Alternatives Analysis/Remedial Work Plan - Summary of Detected Constituents in Soil
2 Love Road, Poughkeepsie, NY
July 2012

				Site ID	TP-01	TP-02	TP-02	TP-03	TP-04	TP-05	TP-06	TP-07	TP-07	TP-08	TP-09	TP-09
				Sample #	TP-01-01_1.5	TP-02-01_0-1	TP-02-02_1-3	TP-03-01_0-1	TP-04-01_1-3	TP-05-01_0-4	TP-06-01_2-4	TP-07-01_0-4	TP-07-02_4-6	TP-08-01_0-2	TP-09-01_4-4.5	TP-09-02_1.5
				Date	6/16/2005	6/16/2005	6/16/2005	6/17/2005	6/16/2005	6/16/2005	6/16/2005	6/16/2005	6/16/2005	6/16/2005	6/16/2005	6/16/2005
				Depth	1.5	0.5	2	0.5	2	2	3	2	5	1	4.25	1.5
CONSTITUENT	**UU-SCO**	**PPH-C**	**PPH-RR**		Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs (ug/kg)																
Acetone	50	500000	100000		<24U	<25J	<21U	<120U	<23J	<23U	48	<23J	<25J	<21U	<25J	<23U
Benzene	60	44000	4800		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1U	<5.6U
Benzene, 1,2,4-trimethyl	3600	190000	52000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7J	<6.2U	<5.4U	<6.1U	<5.6U
Benzene, 1,3,5-trimethyl-	8400	190000	52000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1U	<5.6U
Benzene, 1-methylethyl-	NE	NE	NE		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1J	<5.6U
Ethylbenzene	1000	390000	41000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1U	<5.6U
M/P-xylenes	260	500000	100000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1U	<5.6U
Methyl ethyl Ketone	120	500000	100000		<12U	<12U	<10U	<60U	<11U	<12U	<12J	<11U	<12U	<11U	<12U	<11U
n-Butylbenzene	12000	500000	100000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	13	<5.6U
n-Propylbenzene	3900	500000	100000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1J	<5.6U
o-Xylene	260	500000	100000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1U	<5.6U
p-Cymene	NE	NE	NE		<5.9U	<6.2U	<5.2U	<30J	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1U	<5.6U
sec-Butylbenzene	11000	500000	100000		<5.9U	<6.2U	<5.2U	<30J	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	15	<5.6U
tert-Butylbenzene	5900	500000	100000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7U	<6.2U	<5.4U	<6.1J	<5.6U
Toluene	700	500000	100000		<5.9U	<6.2U	<5.2U	<30U	<5.7U	<5.8U	<6.0U	<5.7J	<6.2U	<5.4U	<6.1J	<5.6U
SVOCs (ug/kg)																
Acenaphthene	20000	500000	100000		<390U	<410U	<340U	<390U	<380U	<390U	<390U	<380U	<410U	<350U	<400J	430
Fluoranthene	100000	500000	100000		<390U	<410U	<340U	<390U	<380U	<390U	<390U	<380U	<410U	<350J	<400U	<370J
Fluorene	30000	500000	100000		<390U	<410U	<340U	<390U	<380U	<390U	<390U	<380U	<410U	<350U	<400J	610
2-Methylnaphthalene	NE	NE	NE		<390U	<410U	<340U	<390U	<380U	<390U	<390U	<380U	<410U	<350U	<400J	800
Naphthalene	12000	500000	100000		<5.9U ?	<6.2U ?	<5.2U ?	<30U ?	<5.7U ?	<5.8U ?	<6.0U ?	11 ?	<6.2U ?	<5.4U ?	<6.1U ?	<5.6U ?
Phenanthrene	100000	500000	100000		<390U	<410U	<340U	<390U	<380U	<390U	<390U	<380U	<410U	<350U	<400J	1400
Pyrene	100000	500000	100000		<390U	<410U	<340U	<390J	<380U	<390U	<390U	<380U	<410U	<350J	<400J	<370J
Metals (mg/kg)																
Aluminum	NE	NE	NE		15800	12200	14100	15500	17200	17100	17000	15000	16800	20300	17800	16500
Arsenic	13	16	16		8.1	5.3	6	8.6	7	7.9	**[13]**	5.3	7.7	9.2	12.3	10
Barium	350	400	400		89.3	38.1	43.6	77	91.7	109	67	79.6	102	81.1	76.7	87.7
Beryllium	7.2	590	72		<0.58U	<0.62U	<0.51U	<0.59U	<0.55U	<0.58U	<0.58U	<0.54U	<0.62U	0.67	<0.59U	<0.54U
Cadmium	2.5	9.3	4.3		<0.58U	<0.62U	<0.51U	<0.59U	<0.55U	<0.58U	<0.58U	<0.54U	<0.62U	<0.52U	<0.59U	0.77
Calcium	NE	NE	NE		3760	27200	11100	1870	1550	2420	1060	1650	2860	1600	1440	11000
Chromium*	1 (Hexavalent) / 30 (Trivalent)	400 / 1500	110 / 180		**[20.2]**	**[15.4]**	**[16.3]**	**[18.5]**	**[20.9]**	**[21.4]**	**[20.7]**	**[17.3]**	**[21.5]**	**[26.3]**	**[21.5]**	**[26.1]**
Cobalt	NE	NE	NE		13.2	12.1	12.6	13.4	13.4	14.8	18.6	12.8	14.3	17.6	17.9	13.6
Copper	50	270	270		36.3	29.6	28.5	30.1	30.5	34.3	25.4	23.6	32.7	31.6	29.2	34.2
Iron	NE	NE	NE		34200	27900	35000	31100	34000	35400	41000	26400	34300	34400	27000	31100
Lead	63	1000	400		39.5	12.4	17	13.5	14.7	16.5	18.8	15	17.3	25.8	21.6	**[79.5]**
Magnesium	NE	NE	NE		7710	9400	8310	5900	6980	6450	5030	5580	7330	8780	6050	8670
Manganese	1600	10000	2000		983	619	1010	496	775	638	1010	642	727	1010	443	983
Mercury	0.18	2.8	0.81		<0.04U	<0.04U	<0.03U	<0.04U	<0.04U	<0.04U	<0.04U	<0.03U	<0.04U	0.05	0.07	0.14
Nickel	30	310	310		28.9	25	28.2	28.7	29.4	**[31.5]**	25.3	24.4	**[32.5]**	**[37.5]**	29.6	28.6
Potassium	NE	NE	NE		1380	1310	1050	1780	1690	1770	1160	1230	1610	1330	1250	1310
Selenium	3.9	1500	180		1.5	0.81	1.3	1.2	1.6	1.1	1.5	1.2	1	0.9	1.1	1.3
Sodium	NE	NE	NE		150	74.6	63.4	91.9	89.2	156	67.9	66.9	83.4	<52.5U	93.4	77.5
Vanadium	NE	NE	NE		21.4	14.2	15.7	18.9	22.4	23.4	25.2	19.5	22.2	25.1	23	**23**
Zinc	109	10000	10000		89.4	67.7	84.7	80.9	81.4	87.8	61.9	71	91.4	78.6	98.7	**[133]**

Notes:
1. Units: ug = micrograms; mg = milligrams; kg = kilograms
2. < =constituent not detected at the specified laboratory reporting limit
3. NE = Not Established
4. **[2040]** indicates an exceedance of applicable Unrestricted Use Soil Cleanup Objectives
5. ***[2040]*** indicates an exceedance of applicable Restricted Residential Use Soil Cleanup Objectives
6. ***[2040]*** indicates an exceedance of applicable Commercial Use Soil Cleanup Objectives
7. **UU-SCO** = Unrestricted Use - Soil Cleanup Objective
8. **PPH-C** = Protection of Public Health - Commercial
9. **PPH - RR** = Protection of Public Health - Restricted Residential
10. U = indicates the compound was analyzed but not detected
11. J = estimated value
12. ? = Highest value reported for both methods utilized
13. * Samples analyzed for total chromium but compared to the worst case hexavalent chromium standard

Table 1
Alternatives Analysis/Remedial Work Plan - Summary of Detected Constituents in Soil
2 Love Road, Poughkeepsie, NY
July 2012

				Site ID	TP-10	TP-12	TP-13	TP-14	TP-15	TP-16A	TP-16A	TP-16B	TP-17	TP-17	TP-18	TP-19
				Sample #	TP-10-01_3-5	TP-12-01_1-3	TP-13-01_2-4	TP-14-01_4-5	TP-15-01_3-5	TP-16A-01_1-4	TP-16A-02_4	TP-16B-01_5-10	TP-17-01_7-10	TP-17-02_3-5	TP-18-01_4-5	TP-19-01_0-2
				Date	6/16/2005	6/16/2005	6/16/2005	6/17/2005	6/17/2005	6/17/2005	6/17/2005	6/17/2005	6/17/2005	6/17/2005	6/17/2005	6/17/2005
				Depth	4	2	3	4.5	4	2.5	4	7.5	8.5	4	4.5	1
CONSTITUENT	**UU-SCO**	**PPH-C**	**PPH-RR**		Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs (ug/kg)																
Acetone	50	500000	100000		<23U	<21U	<23U	<24U	42	<25J	<130J	**[66]**	**[84]**	<3000J	<23U	<22U
Benzene	60	44000	4800		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	<6.3U	<33U	<6.3U	<12J	<760U	<5.8U	<5.6U
Benzene, 1,2,4-trimethyl	3600	190000	52000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	59	33	<6.3J	150	2700	<5.8U	<5.6U
Benzene, 1,3,5-trimethyl-	8400	190000	52000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	<6.3J	<33U	<6.3U	200	1300	<5.8U	<5.6U
Benzene, 1-methylethyl-	NE	NE	NE		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	<6.3J	160	<6.3J	62	<760J	<5.8U	<5.6U
Ethylbenzene	1000	390000	41000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	<6.3J	<33J	<6.3U	38	840	<5.8U	<5.6U
M/P-xylenes	260	500000	100000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	<6.3U	<33U	<6.3U	150	<760J	<5.8U	<5.6U
Methyl ethyl Ketone	120	500000	100000		<12U	<10U	<11U	<12U	<13J	<13U	<66U	<13J	48	<1500U	<12U	<11U
n-Butylbenzene	12000	500000	100000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	13	540	19	81	<760J	<5.8U	<5.6U
n-Propylbenzene	3900	500000	100000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	11	300	<6.3J	99	<760J	<5.8U	<5.6U
o-Xylene	260	500000	100000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	<6.3J	<33U	<6.3U	26	<760J	<5.8U	<5.6U
p-Cymene	NE	NE	NE		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	10	110	<6.3J	160	<760J	<5.8U	<5.6U
sec-Butylbenzene	11000	500000	100000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	15	530	58	46	<760J	<5.8U	<5.6U
tert-Butylbenzene	5900	500000	100000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	<6.3J	<33U	<6.3J	15	<760U	<5.8U	<5.6U
Toluene	700	500000	100000		<5.8U	<5.2U	<5.6U	<5.9U	<6.3U	<6.3U	<33U	<6.3J	<12J	<760U	<5.8U	<5.6U
SVOCs (ug/kg)																
Acenaphthene	20000	500000	100000		<380U	<340U	<370U	<390U	<420U	<8400J	<440J	<420U	<410U	<400U	<390U	<1100U
Fluoranthene	100000	500000	100000		<380J	<340U	<370U	<390J	<420U	<8400J	<440J	<420U	<410U	<400U	<390U	<1100U
Fluorene	30000	500000	100000		<380U	<340U	<370U	<390U	<420U	<8400J	570	<420U	<410U	<400U	<390U	<1100U
2-Methylnaphthalene	NE	NE	NE		<380U	<340U	<370U	<390U	<420U	50000	1700	<420U	950	1800	<390U	<1100U
Naphthalene	12000	500000	100000		<5.8U ?	<5.2U ?	<5.6U ?	<5.9U ?	<6.3U ?	8700 ?	<33U ?	<6.3U ?	740 ?	1300 ?	<5.8U ?	<5.6U ?
Phenanthrene	100000	500000	100000		<380U	<340U	<370U	<390J	<420U	9200	1200	<420J	<410U	<400U	<390U	<1100U
Pyrene	100000	500000	100000		<380J	<340U	<370U	<390J	<420U	<8400J	<440J	<420J	<410U	<400U	<390U	<1100U
Metals (mg/kg)																
Aluminum	NE	NE	NE		16800	21200	15100	16000	21300	16100	17400	16300	17100	21400	16400	17900
Arsenic	13	16	16		5.6	11.2	6	7.1	8.3	5.4	7.5	8.7	8.4	9.9	7.7	7.5
Barium	350	400	400		80.1	86.4	81.2	63.5	113	71.6	91.2	102	119	116	66.5	68.6
Beryllium	7.2	590	72		<0.57U	0.66	<0.55U	<0.58U	<0.62U	<0.61U	<0.66U	<0.61U	<0.62U	<0.60U	<0.56U	<0.55U
Cadmium	2.5	9.3	4.3		<0.57U	<0.52U	<0.55U	<0.58U	<0.62U	<0.61U	<0.66U	<0.61U	<0.62U	<0.60U	<0.56U	<0.55U
Calcium	NE	NE	NE		2190	1840	1510	10300	2020	3320	2200	2500	8300	1250	5330	4710
Chromium*	1 (Hexavalent) / 30 (Trivalent)	400 / 1500	110 / 180		**[19.3]**	**[29.5]**	**[17.9]**	**[17.2]**	**[25.6]**	**[18.8]**	**[20.9]**	**[20]**	**[21.4]**	**[24.7]**	**[20.5]**	**[20]**
Cobalt	NE	NE	NE		12.4	25.5	14.5	11.8	16.5	13.4	17.8	14.3	15.3	17.1	14.5	12.9
Copper	50	270	270		27.7	**[73.1]**	25.6	30.5	36.8	26.6	32.6	33.4	30.9	32.4	29.3	32.7
Iron	NE	NE	NE		29700	41500	30700	29100	38300	30100	34800	33700	33800	35600	32100	29400
Lead	63	1000	400		52.1	24.5	17.6	40.2	17	40.1	16.8	18.1	19.5	20.3	12.1	27.1
Magnesium	NE	NE	NE		6280	17000	7090	11600	6810	6920	6230	5990	7020	6800	6770	8840
Manganese	1600	10000	2000		831	***[2100]***	989	1050	764	925	889	691	1020	892	1010	1480
Mercury	0.18	2.8	0.81		0.09	0.04	<0.04U	0.04	0.05	<0.04U	<0.04U	<0.04U	<0.04U	0.06	0.04	0.05
Nickel	30	310	310		26.7	**[43.5]**	25.7	25.7	**[35.9]**	26.9	**[34.8]**	29.7	**[32.9]**	**[34.1]**	28.3	27.6
Potassium	NE	NE	NE		1070	1510	1060	993	1540	1140	1020	910	1400	2020	1640	1380
Selenium	3.9	1500	180		1.5	1.9	2.2	1	1.5	0.73	1.4	1.5	1.8	1.7	0.98	1.5
Sodium	NE	NE	NE		<56.5U	<52.2U	70.5	120	169	97.7	174	126	79.8	83.5	141	58.5
Vanadium	NE	NE	NE		21.4	25.6	19.6	20.6	25.7	23.1	20.1	19.2	21.6	27.8	22.5	25.3
Zinc	109	10000	10000		**[140]**	104	72.8	103	86.1	86	88.1	83	86.2	85.9	76.2	93.7

Notes:

1. Units: ug = micrograms; mg = milligrams; kg = kilograms
2. < =constituent not detected at the specified laboratory reporting limit
3. NE = Not Established
4. **[2040]** indicates an exceedance of applicable Unrestricted Use Soil Cleanup Objectives
5. ***[2040]*** indicates an exceedance of applicable Restricted Residential Use Soil Cleanup Objectives
6. ***[2040]*** indicates an exceedance of applicable Commercial Use Soil Cleanup Objectives
7. **UU-SCO** = Unrestricted Use - Soil Cleanup Objective
8. **PPH-C** = Protection of Public Health - Commercial
9. **PPH - RR** = Protection of Public Health - Restricted Residential
10. U = indicates the compound was analyzed but not detected
11. J = estimated value
12. ? = Highest value reported for both methods utilized
13. * Samples analyzed for total chromium but compared to the worst case hexavalent chromium standard

Table 1
Alternatives Analysis/Remedial Work Plan - Summary of Detected Constituents in Soil
2 Love Road, Poughkeepsie, NY
July 2012

				Site ID	TP-19	TP-20	TP-21	TP-21	TP-22	TP-24	TP-25	TP-28	TP-28	TP-29	TP-29	TP-30
				Sample #	TP-19-02_0-2	TP-20-01_3.5-4.5	TP-21-01_6-6.5	TP-21-02_3-4	TP-22-01_8.5-9	TP-24-01_8-9	TP-25-01_5.5-6.5	TP-28-01_1-4	TP-28-02_9.5	TP-29-01_9	TP-29-02_0-1	TP-30-01_9.5
				Date	6/17/2005	6/17/2005	6/17/2005	6/17/2005	6/17/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005
				Depth	1	4	6.25	3.5	8.75	8.5	6	2.5	9.5	9	0.5	9.5
CONSTITUENT	**UU-SCO**	**PPH-C**	**PPH-RR**		Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs (ug/kg)																
Acetone	50	500000	100000		<22U	<23J	<24U	<25U	<110U	**[100]**	<26U	<25U	<23U	<25J	**[110]**	<26J
Benzene	60	44000	4800		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	38	<6.1U	<5.9U	<6.6U
Benzene, 1,2,4-trimethyl	3600	190000	52000		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	100	<6.1U	<5.9U	<6.6U
Benzene, 1,3,5-trimethyl-	8400	190000	52000		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	250	<6.1U	<5.9U	<6.6U
Benzene, 1-methylethyl-	NE	NE	NE		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	61	<6.1U	<5.9U	<6.6U
Ethylbenzene	1000	390000	41000		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	80	<6.1U	<5.9U	<6.6U
M/P-xylenes	260	500000	100000		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	160	<6.1U	<5.9U	<6.6U
Methyl ethyl Ketone	120	500000	100000		<11U	<12U	<12U	<12U	<56U	14	<13U	<12U	<11U	<12U	14	<13U
n-Butylbenzene	12000	500000	100000		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	27	<6.1U	<5.9U	<6.6U
n-Propylbenzene	3900	500000	100000		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	89	<6.1U	<5.9U	<6.6U
o-Xylene	260	500000	100000		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	6.3	<6.1U	<5.9U	<6.6U
p-Cymene	NE	NE	NE		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	37	<6.1U	<5.9U	<6.6U
sec-Butylbenzene	11000	500000	100000		<5.6U	<5.8U	<6.0U	<6.2U	<28J	<6.5U	<6.5U	<6.1U	18	<6.1U	<5.9U	<6.6U
tert-Butylbenzene	5900	500000	100000		<5.6U	<5.8U	<6.0U	<6.2U	<28J	<6.5U	<6.5U	<6.1U	<5.6J	<6.1U	<5.9U	<6.6U
Toluene	700	500000	100000		<5.6U	<5.8U	<6.0U	<6.2U	<28U	<6.5U	<6.5U	<6.1U	6.4	<6.1J	<5.9J	<6.6J
SVOCs (ug/kg)																
Acenaphthene	20000	500000	100000		<1100U	<380U	<390U	<410U	<370U	<430U	<430J	<410U	<370U	<400U	<390U	<430U
Fluoranthene	100000	500000	100000		<1100U	<380U	<390U	<410U	<370U	<430U	<430U	<410U	<370U	<400U	<390U	<430U
Fluorene	30000	500000	100000		<1100U	<380U	<390U	<410U	<370J	<430U	<430J	<410U	<370U	<400U	<390U	<430U
2-Methylnaphthalene	NE	NE	NE		<1100U	<380U	<390U	<410U	<370U	<430U	<430J	<410U	<370U	<400U	<390U	<430U
Naphthalene	12000	500000	100000		<5.6U ?	<5.8U ?	<6.0U ?	<6.2U ?	<28U ?	<6.5JB ?	<6.5J ?	<6.1JB ?	110 ?	<6.1JB ?	<5.9JB ?	<6.6JB ?
Phenanthrene	100000	500000	100000		<1100U	<380U	<390U	<410U	<370J	<430U	<430J	<410U	<370U	<400U	<390U	<430U
Pyrene	100000	500000	100000		<1100U	<380U	<390U	<410U	<370J	<430U	<430U	<410U	<370U	<400U	<390U	<430U
Metals (mg/kg)																
Aluminum	NE	NE	NE		17100	17100	20800	23200	12500	20500	17200	20100	11100	11400	17900	20200
Arsenic	13	16	16		7.7	8.3	9.9	7.2	7	9.3	7.5	11.6	5.6	***[18.8]***	5.9	10.9
Barium	350	400	400		73.7	70.4	140	134	61.2	107	76	127	45.4	127	93.2	113
Beryllium	7.2	590	72		<0.54U	<0.57U	0.59	<0.62U	<0.55U	<0.62U	<0.64U	<0.59U	<0.54U	<0.60U	<0.56U	<0.66U
Cadmium	2.5	9.3	4.3		<0.54U	<0.57U	<0.59U	<0.62U	<0.55U	<0.62U	<0.64U	<0.59U	<0.54U	<0.60U	<0.56U	<0.66U
Calcium	NE	NE	NE		10400	935	3440	2800	1920	1570	1460	2580	13300	6840	1140	7430
Chromium*	1 (Hexavalent) / 30 (Trivalent)	400 / 1500	110 / 180		**[18.9]**	**[19.4]**	**[22.8]**	**[24.5]**	**[15.9]**	**[22]**	**[19.7]**	**[23.4]**	**[13.5]**	**[13.9]**	**[20]**	**[25.1]**
Cobalt	NE	NE	NE		11.8	13.8	16.5	14.9	11.8	17.3	14	19.8	10.2	13.4	13.4	17
Copper	50	270	270		30.3	29.2	26.1	21.3	32.9	30.4	36.9	38.5	28.2	34.3	18.8	37.5
Iron	NE	NE	NE		29100	31500	33400	29900	25800	34600	30000	41800	25900	28000	27300	37600
Lead	63	1000	400		30.3	15.8	27.2	17.2	14.5	17	14.8	19.4	10.2	13.3	18.9	16.9
Magnesium	NE	NE	NE		11000	5550	6250	5710	5880	5680	6830	6890	5870	5780	4630	8570
Manganese	1600	10000	2000		1500	758	717	1200	791	855	1080	1480	730	***[2410]***	1590	733
Mercury	0.18	2.8	0.81		0.05	<0.04U	0.04	0.05	<0.04U	0.06	0.04	0.05	<0.04U	<0.04U	0.04	<0.04U
Nickel	30	310	310		26.3	23.7	28.8	27.7	25.6	**[30.8]**	29.9	**[37.1]**	22.9	28.4	22.6	**[36.4]**
Potassium	NE	NE	NE		1380	1410	1680	1760	1380	1480	1740	2020	1240	1300	1250	2750
Selenium	3.9	1500	180		2.1	1.3	1.7	2.6	1	2.1	1.5	1.6	1.1	1.1	1.6	0.94
Sodium	NE	NE	NE		69.5	61.1	126	125	55.6	70.4	<64.3U	119	204	119	73.5	106
Vanadium	NE	NE	NE		25.9	22.4	28.5	30.4	16.8	23.8	21.4	26.4	13.2	14.5	24.8	25.1
Zinc	109	10000	10000		94.7	65	96.7	74	95	75.4	88.4	93.4	71.1	78.9	76.2	96.2

Notes:

1. Units: ug = micrograms; mg = milligrams; kg = kilograms
2. < =constituent not detected at the specified laboratory reporting limit
3. NE = Not Established
4. **[2040]** indicates an exceedance of applicable Unrestricted Use Soil Cleanup Objectives
5. ***[2040]*** indicates an exceedance of applicable Restricted Residential Use Soil Cleanup Objectives
6. ***[2040]*** indicates an exceedance of applicable Commercial Use Soil Cleanup Objectives
7. **UU-SCO** = Unrestricted Use - Soil Cleanup Objective
8. **PPH-C** = Protection of Public Health - Commercial
9. **PPH - RR** = Protection of Public Health - Restricted Residential
10. U = indicates the compound was analyzed but not detected
11. J = estimated value
12. ? = Highest value reported for both methods utilized
13. * Samples analyzed for total chromium but compared to the worst case hexavalent chromium standard

Table 1
Alternatives Analysis/Remedial Work Plan - Summary of Detected Constituents in Soil
2 Love Road, Poughkeepsie, NY
July 2012

				Site ID	TP-30	TP-31	TP-32	TP-32	TP-33	TP-33	TP-35	TP-35	TP-36	TP-37	TP-38	TP-39
				Sample #	TP-30-02_3-4	TP-31-01_4-7	TP-32-01_3-5	TP-32-02_11	TP-33-01_0-1	TP-33-02_8	TP-35-01_0-1	TP-35-02_4-7	TP-36-01_5-7	TP-37-01_4-5	TP-38-01_4-7	TP-39-01_6-7.5
				Date	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005	6/20/2005
				Depth	3.5	5.5	4	11	0.5	8	0.5	5.5	6	4.5	5.5	6.75
CONSTITUENT	**UU-SCO**	**PPH-C**	**PPH-RR**		Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs (ug/kg)																
Acetone	50	500000	100000		<23J	**[83]**	<26U	<29J	<24U	<25J	<22U	**[51]**	**[97]**	**[69]**	**[120]**	<31J
Benzene	60	44000	4800		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7U	<6.2J	<7.7U
Benzene, 1,2,4-trimethyl	3600	190000	52000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	7.9	<6.2U	<7.7J
Benzene, 1,3,5-trimethyl-	8400	190000	52000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7J	<6.2U	<7.7U
Benzene, 1-methylethyl-	NE	NE	NE		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7J	<6.2U	<7.7U
Ethylbenzene	1000	390000	41000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7U	<6.2U	<7.7U
M/P-xylenes	260	500000	100000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7J	<6.2U	<7.7U
Methyl ethyl Ketone	120	500000	100000		<12U	<13J	<13U	<15U	<12U	<13U	<11U	<12J	13J	<11J	12J	<15U
n-Butylbenzene	12000	500000	100000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7U	<6.2U	<7.7U
n-Propylbenzene	3900	500000	100000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7U	<6.2U	<7.7U
o-Xylene	260	500000	100000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7J	<6.2U	<7.7U
p-Cymene	NE	NE	NE		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7U	<6.2U	<7.7U
sec-Butylbenzene	11000	500000	100000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7J	<6.2U	<7.7U
tert-Butylbenzene	5900	500000	100000		<5.9U	<6.4U	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7U	<6.2U	<7.7U
Toluene	700	500000	100000		<5.9J	<6.4J	<6.4U	<7.3U	<6.0U	<6.3U	<5.5U	<6.2U	<6.6U	<5.7J	<6.2J	<7.7U
SVOCs (ug/kg)																
Acenaphthene	20000	500000	100000		<390U	<420U	<420U	<480U	<390U	<420U	<360U	<410U	<430U	<380J	<410J	<1500U
Fluoranthene	100000	500000	100000		<390U	<420J	<420U	<480U	<390U	<420U	<360J	520	<430J	<380J	410	<1500J
Fluorene	30000	500000	100000		<390U	<420U	<420U	<480U	<390U	<420U	<360U	<410J	<430U	<380J	<410J	<1500U
2-Methylnaphthalene	NE	NE	NE		<390U	<420U	<420U	<480U	<390U	<420U	<360J	<410J	<430U	<380J	<410J	<1500U
Naphthalene	12000	500000	100000		<5.9JB ?	<6.4U ?	<6.4U ?	<7.3U ?	<6.0U ?	<6.3U ?	<5.5U ?	<6.2U ?	<6.6U ?	180 ?	<6.2U ?	8.0 ?
Phenanthrene	100000	500000	100000		<390U	<420U	<420U	<480U	<390U	<420U	<360J	<410J	<430U	<380J	<410J	<1500J
Pyrene	100000	500000	100000		<390U	<420J	<420U	<480U	<390U	<420U	<360J	480	<430J	<380J	<410J	<1500J
Metals (mg/kg)																
Aluminum	NE	NE	NE		16900	24400	23000	12700	17000	11100	12900	14000	21100	17400	12900	21800
Arsenic	13	16	16		6.3	7.3	10.3	9.8	6.9	7.2	8.4	6.1	8.8	9.9	9	9.4
Barium	350	400	400		88.1	172	162	83	96.4	51.6	75.7	50.7	128	52.2	72.5	88
Beryllium	7.2	590	72		<0.57U	0.75	0.72	<0.71U	<0.58U	<0.60U	<0.53U	<0.60U	0.76	<0.55U	<0.62U	<0.75U
Cadmium	2.5	9.3	4.3		<0.57U	<0.61U	<0.62U	<0.71U	<0.58U	<0.60U	0.94	<0.60U	<0.64U	0.71	0.82	1.2
Calcium	NE	NE	NE		1090	23800	3470	19700	2360	2780	35000	8120	2640	2020	3130	5140
Chromium*	1 (Hexavalent) / 30 (Trivalent)	400 / 1500	110 / 180		**[21]**	**[30.6]**	**[28.5]**	**[15.7]**	**[18.1]**	**[13.6]**	**[16]**	**[22.7]**	**[22.6]**	**[21.1]**	**[17]**	**[29.8]**
Cobalt	NE	NE	NE		15.3	15.9	17.3	12.3	13.4	14.1	11.1	12.4	11.6	18.5	12	18.1
Copper	50	270	270		27.5	36.9	42.1	33.9	21.5	32.7	32.4	33.7	31.4	49.3	37.9	49.9
Iron	NE	NE	NE		28000	39500	41100	27500	26400	25800	26300	27500	32400	37200	41000	38700
Lead	63	1000	400		15.2	14.7	18.3	13.4	26	12.8	32	54.9	15.3	**[64.5]**	46.5	**[118]**
Magnesium	NE	NE	NE		6170	9100	8730	7350	4590	4990	24200	9820	5220	9150	5280	13700
Manganese	1600	10000	2000		536	1100	798	935	910	744	1460	318	795	720	**[1810]**	724
Mercury	0.18	2.8	0.81		<0.04U	<0.04U	<0.04U	<0.04U	0.05	<0.04U	<0.04U	***[1.4]***	0.08	0.05	0.04	0.1
Nickel	30	310	310		29.2	**[37.4]**	**[38.7]**	25.6	21.9	24.8	23.5	27.8	26.9	**[37]**	27.7	**[40.8]**
Potassium	NE	NE	NE		1690	2740	2920	1710	893	813	1460	1410	1560	1360	1550	1350
Selenium	3.9	1500	180		1.2	1.5	1.3	1.2	1.3	1	0.75	<0.60U	1.6	1.5	2.5	1.3
Sodium	NE	NE	NE		120	166	128	71.6	76.4	<59.9U	300	90	123	77.2	134	111
Vanadium	NE	NE	NE		21.3	31.3	31.8	15.7	22.1	12.8	17.9	17.6	26.6	21.1	20.4	34.9
Zinc	109	10000	10000		77.1	91.5	98.4	79.1	81.4	79.6	87.6	92.6	88.8	**[120]**	93.6	**[182]**

Notes:

1. Units: ug = micrograms; mg = milligrams; kg = kilograms
2. < =constituent not detected at the specified laboratory reporting limit
3. NE = Not Established
4. **[2040]** indicates an exceedance of applicable Unrestricted Use Soil Cleanup Objectives
5. ***[2040]*** indicates an exceedance of applicable Restricted Residential Use Soil Cleanup Objectives
6. ***[2040]*** indicates an exceedance of applicable Commercial Use Soil Cleanup Objectives
7. **UU-SCO** = Unrestricted Use - Soil Cleanup Objective
8. **PPH-C** = Protection of Public Health - Commercial
9. **PPH - RR** = Protection of Public Health - Restricted Residential
10. U = indicates the compound was analyzed but not detected
11. J = estimated value
12. ? = Highest value reported for both methods utilized
13. * Samples analyzed for total chromium but compared to the worst case hexavalent chromium standard

Table 1
Alternatives Analysis/Remedial Work Plan - Summary of Detected Constituents in Soil
2 Love Road, Poughkeepsie, NY
July 2012

				Site ID	TP-41	TP-42	TP-44	TP-44	TP-46	TP-47	TP-47	TP-48
				Sample #	TP-41-01_3-6	TP-42-01_4-6	TP-44-01_10.5	TP-44-02_0-2	TP-46-01_10	TP-47-02_8-9	TP-47-03_8-9	TP-48-01_6-7
				Date	6/21/2005	6/21/2005	6/21/2005	6/21/2005	6/21/2005	6/21/2005	6/21/2005	6/21/2005
				Depth	4.5	5	10.5	1	10	8.5	8.5	6.5
CONSTITUENT	**UU-SCO**	**PPH-C**	**PPH-RR**		Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary
VOCs (ug/kg)												
Acetone	50	500000	100000		<23J	<25J	<25J	**[66]**	<110J	<23J	<23J	<23J
Benzene	60	44000	4800		<5.7U	<6.2U	<6.2U	<5.5U	<28U	<5.7U	<5.7U	<5.7U
Benzene, 1,2,4-trimethyl	3600	190000	52000		<5.7U	<6.2U	<6.2U	<5.5U	250	<5.7U	<5.7U	<5.7U
Benzene, 1,3,5-trimethyl-	8400	190000	52000		<5.7U	<6.2U	<6.2U	<5.5U	33	<5.7U	<5.7U	<5.7U
Benzene, 1-methylethyl-	NE	NE	NE		<5.7U	<6.2U	<6.2U	<5.5U	<28J	<5.7U	<5.7U	<5.7U
Ethylbenzene	1000	390000	41000		<5.7U	<6.2U	<6.2U	<5.5U	<28U	<5.7U	<5.7U	<5.7U
M/P-xylenes	260	500000	100000		<5.7U	<6.2U	<6.2U	<5.5U	<28U	<5.7U	<5.7U	<5.7U
Methyl ethyl Ketone	120	500000	100000		<11U	<12U	<12U	<11J	<57U	<11U	<11U	<11U
n-Butylbenzene	12000	500000	100000		<5.7U	<6.2U	<6.2U	<5.5U	130	<5.7U	<5.7U	<5.7U
n-Propylbenzene	3900	500000	100000		<5.7U	<6.2U	<6.2U	<5.5U	43	<5.7U	<5.7U	<5.7U
o-Xylene	260	500000	100000		<5.7U	<6.2U	<6.2U	<5.5U	<28U	<5.7U	<5.7U	<5.7U
p-Cymene	NE	NE	NE		<5.7U	<6.2U	<6.2U	<5.5U	83	<5.7U	<5.7U	<5.7U
sec-Butylbenzene	11000	500000	100000		<5.7U	<6.2U	<6.2U	<5.5U	110	<5.7U	<5.7U	<5.7U
tert-Butylbenzene	5900	500000	100000		<5.7U	<6.2U	<6.2U	<5.5U	<28U	<5.7U	<5.7U	<5.7U
Toluene	700	500000	100000		<5.7U	<6.2U	<6.2U	<5.5U	<28U	<5.7U	<5.7U	<5.7U
SVOCs (ug/kg)												
Acenaphthene	20000	500000	100000		<370U	<410U	<410U	<360U	<380J	<380U	<380U	<370U
Fluoranthene	100000	500000	100000		<370U	<410U	<410U	<360J	<380U	<380U	<380U	<370U
Fluorene	30000	500000	100000		<370U	<410U	<410U	<360U	<380J	<380U	<380U	<370U
2-Methylnaphthalene	NE	NE	NE		<370U	<410U	<410U	560	510	<380U	<380U	<370U
Naphthalene	12000	500000	100000		<5.7U ?	<6.2U ?	<6.2U ?	<5.5U ?	750 ?	<5.7U ?	<5.7U ?	<5.7U ?
Phenanthrene	100000	500000	100000		<370U	<410U	<410U	360J	<380J	<380U	<380U	<370U
Pyrene	100000	500000	100000		<370U	<410U	<410U	<360J	<380U	<380U	<380U	<370U
Metals (mg/kg)												
Aluminum	NE	NE	NE		14100	18800	16800	10500	15500	16300	15400	15600
Arsenic	13	16	16		7.9	7.4	6.2	9.5	6.3	7.3	7.4	8.4
Barium	350	400	400		83	76.1	74.2	64.6	98.9	79.5	79.3	81.4
Beryllium	7.2	590	72		<0.57U	<0.59U	<0.61U	<0.52U	<0.54U	<0.54U	<0.57U	<0.55U
Cadmium	2.5	9.3	4.3		<0.57U	<0.59U	<0.61U	0.59	<0.54U	<0.54U	<0.57U	0.58
Calcium	NE	NE	NE		30600	1170	1330	8140	12100	2590	2450	12500
Chromium*	1 (Hexavalent) / 30 (Trivalent)	400 / 1500	110 / 180		**[18.8]**	**[23.4]**	**[19.8]**	**[13.7]**	**[19.7]**	**[20.5]**	**[19.5]**	**[20]**
Cobalt	NE	NE	NE		13	11.8	13.3	9.5	13.9	14.4	14.4	16
Copper	50	270	270		34.7	30.3	37.1	29.3	32.3	37.8	38.2	39.7
Iron	NE	NE	NE		29600	33200	31400	27500	31000	32800	32200	32100
Lead	63	1000	400		12.8	15.3	15.1	60.9	14	16.4	15.7	15
Magnesium	NE	NE	NE		7620	6390	6960	6610	6380	7270	6720	7030
Manganese	1600	10000	2000		825	378	693	631	550	876	844	909
Mercury	0.18	2.8	0.81		<0.04U	<0.04U	0.04	0.07	<0.04U	<0.04U	<0.04U	0.04
Nickel	30	310	310		27.7	27.3	28.6	23.2	28.6	**[32.6]**	**[31.1]**	**[33.9]**
Potassium	NE	NE	NE		2010	1870	1990	1060	1890	1840	1880	1920
Selenium	3.9	1500	180		1.3	1.8	1.3	1.1	0.94	1.2	1.3	1.4
Sodium	NE	NE	NE		115	120	<61.2U	142	80.8	109	111	75.1
Vanadium	NE	NE	NE		19.8	27.5	21.8	17.6	20.2	22.2	21.1	21.2
Zinc	109	10000	10000		82.1	76.8	85.4	**[143]**	90	94.4	89.8	94.6

Notes:

1. Units: ug = micrograms; mg = milligrams; kg = kilograms
2. < =constituent not detected at the specified laboratory reporting limit
3. NE = Not Established
4. **[2040]** indicates an exceedance of applicable Unrestricted Use Soil Cleanup Objectives
5. ***[2040]*** indicates an exceedance of applicable Restricted Residential Use Soil Cleanup Objectives
6. ***[2040]*** indicates an exceedance of applicable Commercial Use Soil Cleanup Objectives
7. **UU-SCO** = Unrestricted Use - Soil Cleanup Objective
8. **PPH-C** = Protection of Public Health - Commercial
9. **PPH - RR** = Protection of Public Health - Restricted Residential
10. U = indicates the compound was analyzed but not detected
11. J = estimated value
12. ? = Highest value reported for both methods utilized
13. * Samples analyzed for total chromium but compared to the worst case hexavalent chromium standard

Table 1b

Excavation Endpoint Sampling Results Summary

Love Road BCP Site

Sample ID (Endpoint-Location-Depth in feet) Laboratory ID Sampling Date Sample Matrix	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives or CP-51 Soil Cleanup Levels	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Restricted Residential	EP-01-16 17I0269-01 9/7/2017 Soil		EP-02-16 17I0269-02 9/7/2017 Soil		EP-03-17 17I0269-04 9/8/2017 Soil		EP-04-16 17I0269-05 9/8/2017 Soil		EP-05-17 17I0269-06 9/8/2017 Soil		EP-06-17 17I0269-07 9/8/2017 Soil		FD-01* 17I0269-08 9/8/2017 Soil	
Compound/Method			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, CP-51 List, by 8260	ppm	ppm	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
1,2,4-Trimethylbenzene	3.6	52	0.0022	U	0.20	U	0.019		0.0022	U	0.72	D	0.20	U	0.027	
1,3,5-Trimethylbenzene	8.4	52	0.0022	U	0.20	U	0.023		0.0022	U	0.21	U	0.20	U	0.036	
Benzene	0.06	4.8	0.0022	U	0.20	U	0.0022	U	0.0022	U	0.21	U	0.20	U	0.0022	U
Ethyl Benzene	1	41	0.0022	J	0.20	U	0.034		0.0022	U	0.21	U	0.20	U	0.036	
Isopropylbenzene	2.3	~	0.0055		0.20	U	0.032		0.0032	J	0.24	JD	0.20	U	0.020	
Methyl tert-butyl ether (MTBE)	0.93	100	0.0022	U	0.20	U	0.0022	U	0.0022	U	0.21	U	0.20	U	0.0022	U
Naphthalene	12	100	0.0022	U	1.6	D	0.0067	J	0.0022	U	0.21	U	0.20	U	0.0096	
n-Butylbenzene	12	100	0.0051		0.35	JD	0.022		0.0067		0.22	JD	0.20	U	0.018	
n-Propylbenzene	3.9	100	0.0027	J	0.20	U	0.048		0.0022	U	0.21	U	0.20	U	0.033	
o-Xylene	~	~	0.0022	U	0.20	U	0.0022	U	0.0022	U	0.21	U	0.20	U	0.0022	U
p- & m- Xylenes	~	~	0.0045	J	0.41	U	0.0088		0.0044	U	0.41	U	0.39	U	0.0092	
p-Isopropyltoluene	10.0	~	0.0022	U	0.20	U	0.0047		0.0022	U	0.21	U	0.20	U	0.0058	
sec-Butylbenzene	11	100	0.0066		0.25	JD	0.020		0.0060		0.21	U	0.20	U	0.010	
tert-Butylbenzene	5.9	100	0.0022	U	0.20	U	0.0022	U	0.0022	U	0.21	U	0.20	U	0.0022	U
Toluene	0.7	100	0.0022	U	0.20	U	0.0022	U	0.0022	U	0.21	U	0.20	U	0.0022	U
Xylenes, Total	0.26	100	0.0067	U	0.61	U	0.0088	J	0.0066	U	0.62	U	0.59	U	0.0092	J

NOTES:

Detected compounds met Unrestricted Soil Cleanup Objectives (SCOs) or CP-51 Soil Cleanup Levels.

* Sample FD-01 is field duplicate of sample EP-03-17.

Q is the Qualifier Column with definitions as follows:

D=result is from an analysis that required a dilution

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated

~=this indicates that no regulatory limit has been established for this analyte

Table 2

Remaining Groundwater Exceedences

Love Road BCP Site

Sample/Well Location ID		2009-MW-2		MW-5		MW-6		MW-7		Quality Control Samples					
										FD-01		FB-01		TB-01	
Laboratory ID		17I1106-01		17I1106-02		17I1106-04		17I1106-03		17I1106-05		17I1106-06		17I1106-07	
Sampling Date		9/26/2017		9/26/2017		9/26/2017		9/26/2017		9/26/2017		9/26/2017		9/26/2017	
Matrix	NYSDEC TOGS Standards and Guidance Values - GA	Groundwater		Groundwater		Groundwater		Groundwater		Groundwater		D.I.		D.I.	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, CP-51 list	ug/L	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
1,2,4-Trimethylbenzene	5	0.20	U	0.20	U	0.97		0.20	U	0.40	U	0.20	U	0.20	U
1,3,5-Trimethylbenzene	5	0.20	U	0.20	U	0.77		0.20	U	0.40	U	0.20	U	0.20	U
Benzene	1	0.20	U	0.58		0.52		0.20	U	0.50	JD	0.20	U	0.20	U
Ethyl Benzene	5	0.20	U	0.82		**19**		1.2		0.70	JD	0.20	U	0.20	U
Isopropylbenzene	5	0.20	U	**15**		**31**		0.20	U	**11**	D	0.20	U	0.20	U
Methyl tert-butyl ether (MTBE)	10	0.20	U	0.20	U	0.20	U	0.22	J	0.40	U	0.20	U	0.20	U
Naphthalene	10	1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U
n-Butylbenzene	5	0.20	U	0.20	U	3.2		0.20	U	0.40	U	0.20	U	0.20	U
n-Propylbenzene	5	0.20	U	0.65		**39**		0.20	U	0.54	JD	0.20	U	0.20	U
o-Xylene	5	0.20	U	0.20	U	0.34	J	2.3		0.40	U	0.20	U	0.20	U
p- & m- Xylenes	5	0.50	U	0.97	J	1.4		5.0		1.00	U	0.50	U	0.50	U
p-Isopropyltoluene	5	0.20	U	0.20	U	0.44	J	0.20	U	0.40	U	0.20	U	0.20	U
sec-Butylbenzene	5	0.20	U	**6.4**		4.0		0.20	U	4.4	D	0.20	U	0.20	U
tert-Butylbenzene	5	0.20	U	4.0		0.59		0.40	J	3.1	D	0.20	U	0.20	U
Toluene	5	0.20	U	0.20	U	0.27	J	0.20	U	0.40	U	0.20	U	0.20	U
Xylenes, Total	5	0.60	U	0.97	J	1.7		**7.3**		1.20	U	0.60	U	0.60	U

NOTES:

Results that exceed the TOGS groundwater standard are in bold font and highlighted yellow.

Q is the Qualifier Column with definitions as follows:

D=result is from an analysis that required a dilution

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated

Quality Control Samples:

FD-01 Field duplicate of MW-5.

FB-01 Field blank collected at MW-5 location.

TB-01 Trip blank

D.I. - Deionized Water

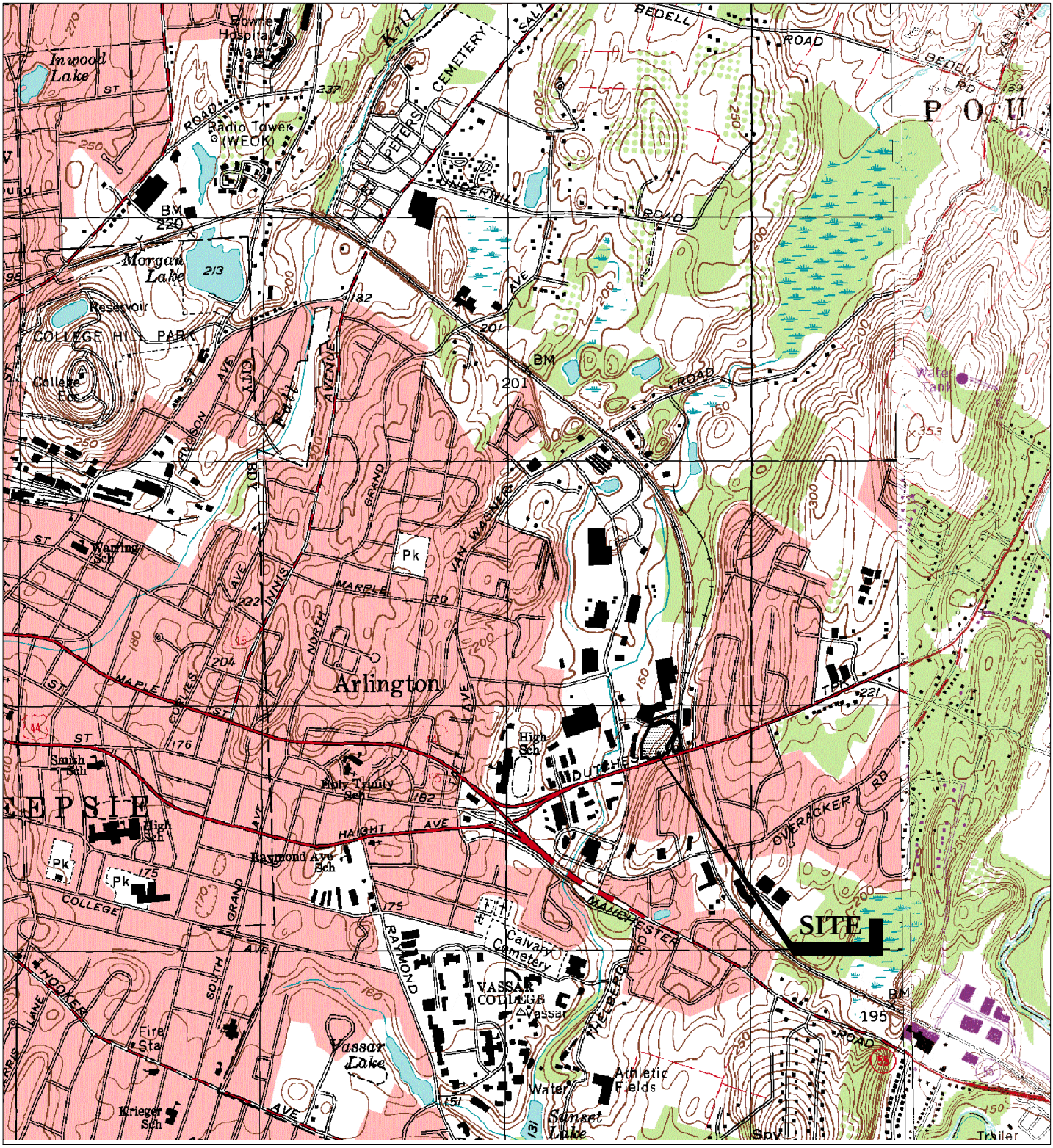
TABLE 3 - 2008 Soil Vapor Sampling Results

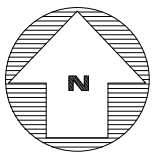
Alternatives Analysis/Remedial Work Plan - Supplemental Remedial Investigation
Summary of Soil Vapor Results
2 Love Road, Poughkeepsie, NY
July 2012

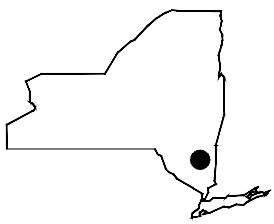
	Sample Location:	SG-1	SG-2	SG-3	SG-4	SG-5
	Sample Number:	980080612-01	980080612-02	980080612-03	980080612-04	980080612-05
	Sample Date:	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008
Volatile Organic Compounds ($\mu g/m^3$)	**NYSDOH Soil Vapor/ Indoor Air Matrix*** **					
Acetone	NE	36	ND<240	27	55	ND<4.8
Benzene	NE	3.4	1000	7.6	0.4	90
Benzyl Chloride	NE	ND<0.52*	ND<260*	ND<0.26	ND<0.26	ND<5.2*
Bromodichloromethane	NE	ND<0.66	ND<330	ND<0.33	ND<0.33	ND<6.6
Bromoform	NE	ND>1.1	ND<510	ND<0.51	ND<0.51	ND<11.
Bromomethane	NE	ND<0.38	ND<190	ND<0.19	ND<0.19	ND<3.8
1,3-Butadiene	NE	ND<0.22	ND<110	ND<0.11	ND<0.11	ND<2.2
2-Butanone (MEK)	NE	9.3	ND<230	5.4	26	14
Carbon Disulfide	NE	13	3300	0.83	2.7	5
Carbon Tetrachloride	1	ND<0.62	ND<310	0.53	0.49	ND<6.2
Chlorobenzene	NE	ND<0.46	ND<230	ND<0.23	ND<0.23	ND<4.6
Chlorodibromomethane	NE	ND<0.86	ND<430	ND<0.43	ND<0.43	ND<8.6
Chloroethane	NE	ND<0.26	ND<130	ND<0.13	ND<0.13	ND<2.6
Chloroform	NE	ND<0.48	ND<240	ND<0.24	ND<0.24	ND<4.8
Chloromethane	NE	1.1	ND<100	1.3	0.94	ND<2.0
Cyclohexane	NE	71	41000	47	ND<0.17	290
1,2-Dibromoethane	NE	ND<0.76	ND<380	ND<0.38	ND<0.38	ND<7.6
1,2-Dichlorobenzene	NE	ND<0.60	ND<300	ND<0.30	ND<0.30	ND<6.0
1,3-Dichlorobenzene	NE	ND<0.60	ND<300	ND<0.30	ND<0.30	ND<6.0
1,4-Dichlorobenzene	NE	ND<0.60	ND<300	ND<0.30	ND<0.30	ND<6.0
Dichlorodifluoromethane	NE	2.7	ND<250	2.7	2.7	ND<5.0
1,1-Dichloroethane	NE	ND<0.40	ND<200	1.4	0.52	ND<4.0
1,2-Dichloroethane	NE	ND<0.40	240	ND<0.20	ND<0.20	ND<4.0
1,1-Dichloroethylene	2	ND<0.40	ND<200	ND<0.20	ND<0.20	ND<4.0
cis-1,2-Dichloroethylene	2	ND<0.40	ND<200	0.31	ND<0.20	ND<4.0
t-1,2-Dichloroethylene	NE	ND<0.40	ND<200	ND<0.20	ND<0.20	ND<4.0
1,2-Dichloropropane	NE	ND<0.46	ND<230	ND<0.23	ND<0.23	ND<4.6
cis-1,3-Dichloropropene	NE	ND<0.44	ND<220	ND<0.22	ND<0.22	ND<4.4
trans-1,3-Dichloropropene	NE	ND<0.44	ND<220	ND<0.22	ND<0.22	ND<4.4
1,2-Dichlorotetrafluoroethane (114)	NE	ND<0.70	ND<350	ND<0.35	ND<0.35	ND<7.0
Ethanol	NE	6.1	ND<190	3.5	14	ND<3.8
Ethyl Acetate	NE	ND<0.44	ND<370	ND<0.37	ND<0.37	ND<7.3
Ethylbenzene	NE	21	7500	49	0.22	220
4-Ethyl Toluene	NE	19	3300	25	0.25	250
n-Heptane	NE	110	63000	47	0.97	320
Hexachlorobutadiene	NE	ND<2.2**	ND<1100**	ND<1.1	ND<1.1	ND<22**
Hexane	NE	93	43000	51	1	300
2-Hexanone	NE	ND<0.40	ND<200	ND<0.20	5.9	ND<4.0
Isopropanol	NE	2.4	410	1.6	5	5.7
Methyl tert-Butyl Ether (MTBE)	NE	ND<0.36	ND<180	ND<0.18	ND<0.18	ND<3.6
Methylene Chloride	NE	17	6100	4.6	0.78	ND<7.0
4-Methyl-2-Pentanone (MIBK)	NE	ND<0.40	ND<200	ND<0.20	2.7	ND<4.0
Propene	NE	22	ND<180	5.6	6.1	ND<3.5
Styrene	NE	ND<0.42	ND<210	ND<0.21	ND<0.21	ND<4.2
1,1,2,2-Tetrachloroethane	NE	ND<0.68	ND<340	ND<0.34	ND<0.34	ND<6.8
Tetrachloroethylene	2	ND<0.68	ND<340	ND<0.34	ND<0.34	ND<6.8
Tetrahydrofuran	NE	ND<0.30	ND<150	ND<0.15	19	ND<3.0
Toluene	NE	4.4	580	4.3	0.85	20
1,2,4-Trichlorobenzene	NE	2.5*	ND<370*	ND<0.37	ND<0.37	ND<7.4*
1,1,1-Trichloroethane	2	ND<0.54	ND<270	ND<0.27	ND<0.27	ND<5.4
1,1,2-Trichloroethane	NE	ND<0.54	ND<270	ND<0.27	ND<0.27	ND<5.4
Trichloroethylene	1	ND<0.54	ND<270	ND<0.27	ND<0.27	ND<5.4
Trichlorofluoromethane	NE	15	ND<280	1.7	1.4	ND<5.6
1,1,2-Trichloro-1,2,2-Trifluoroethane	NE	ND<0.76	ND<380	0.59	0.65	ND<7.6
1,2,4-Trimethylbenzene	NE	77	10000	84	0.47	780
1,3,5-Trimethylbenzene	NE	5.9	260	27	ND<0.25	58
Vinyl Acetate	NE	ND<1.5	ND<710	ND<0.71	ND<0.71	ND<15
Vinyl Chloride	1	ND<0.26	ND<130	1.5	ND<0.13	ND<2.6
m/p-Xylene	NE	23	7500	53	0.63	330
o-Xylene	NE	2.4	610	5.2	0.23	44

Notes:
$\mu g/m^3$ = micrograms per cubic meter
ND<(xx) = Not detected at or above the Reporting Limit (xx)
NE = Not Established
* = Laboratory fortified blank recovery is outside of control limits. Any reported value for this compound in this batch is expected to be biased on the high side.
** = Laboratory fortified blank recovery is outside of control limits. Any reported value for this compound in this batch is expected to be biased on the low side.
*** = Compounds compared to Sample Matrix 1 have the potential to require mitigation if the sample concentration is greater than 5 $\mu g/m^3$.
Compounds compared to Sample Matrix 2 have the potential to require mitigation if the sample concentration is greater than 100 $\mu g/m^3$.

FIGURES







MAP REFERENCE

THIS MAP WAS PREPARED FROM THE FOLLOWING 7.5 MINUTE USGS MAPS:
Poughkeepsie Quadrangle 1964, Photorevised 1980
Poughkeepsie Quadrangle 1963, Photorevised 1980

SCALE:	
HORZ.:1" = 2000'	
VERT.: N/A	
DATUM:	
HORZ.:N/A	
VERT.: N/A	
0 1000 2000	
GRAPHIC SCALE	

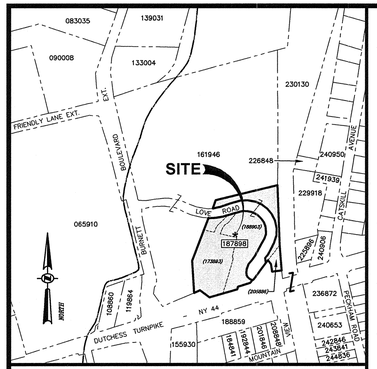
FUSS&O'NEILL
80 WASHINGTON STREET, SUITE 301
POUGHKEEPSIE, NY 12601
845.452.6801
www.fando.com

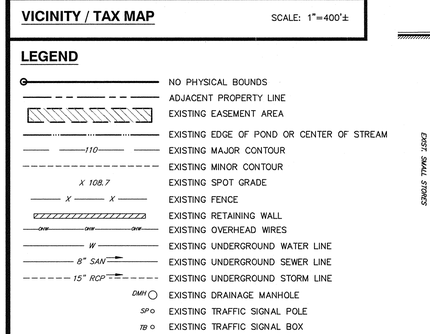
HERBERT REDL
AA/REMEDIAL WORK PLAN
USGS LOCATION MAP
2 LOVE ROAD
TOWN OF POUGHKEEPSIE NEW YORK

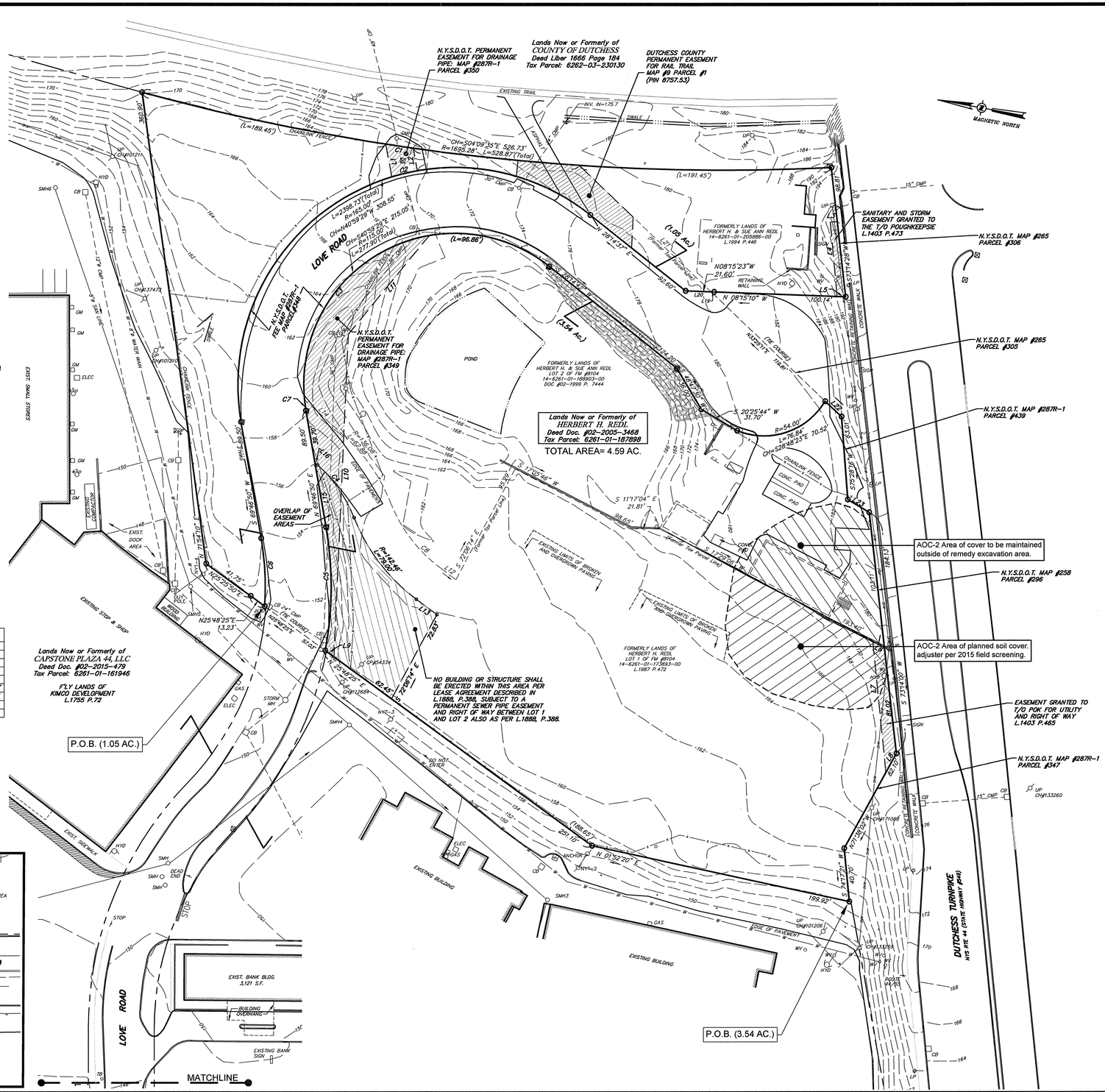
PROJ. No.:	20040761.A8N
DATE:	JULY 2012

FIGURE 1

UCS: WRLD | MS VIEW: 2000 | LMAN: PLOT | CTB: F&O STANDARD







VICINITY / TAX MAP

SCALE: 1"=400'±

LEGEND

	NO PHYSICAL BOUNDS
	ADJACENT PROPERTY LINE
▨	EXISTING EASEMENT AREA
	EXISTING EDGE OF POND OR CENTER OF STREAM
110	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
X 108.7	EXISTING SPOT GRADE
X X	EXISTING FENCE
▨	EXISTING RETAINING WALL
OHW OHW OHW	EXISTING OVERHEAD WIRES
W	EXISTING UNDERGROUND WATER LINE
8" SAN	EXISTING UNDERGROUND SEWER LINE
15" RCP	EXISTING UNDERGROUND STORM LINE
DMH ○	EXISTING DRAINAGE MANHOLE
SP ○	EXISTING TRAFFIC SIGNAL POLE
TB ○	EXISTING TRAFFIC SIGNAL BOX
ELEC ☐	EXISTING ELECTRICAL STRUCTURE
LP ☼	EXISTING LIGHT POLE
GV ○	EXISTING GAS VALVE
GM ☐	EXISTING GAS METER
GAS ☐	EXISTING GAS STRUCTURE
HYD ○	EXISTING HYDRANT
WV ○	EXISTING WATER VALVE
WSO ○	EXISTING WATER SHUT OFF
SIGN ○	EXISTING SIGN

LINE TABLE

LINE	BEARING	LENGTH
L1	N 69°09'49" E	25.14'
L2	S 69°19'23" W	17.30'
L3	S 15°33'07" E	5.27'
L4	N 74°26'53" E	56.71'
L5	N 08°15'10" W	6.54'
L6	S 17°29'06" W	9.86'
L7	N 73°53'14" E	99.77'
L8	N 71°38'02" W	16.14'
L9	N 25°48'25" E	8.25'
L10	N 82°12'32" E	245.08'
L11	S 61°00'23" E	97.10'
L12	S 26°23'06" W	14.99'
L13	N 26°23'06" E	19.47'
L14	S 31°41'02" W	40.79'
L15	N 69°46'50" E	49.80'
L16	N 31°41'02" E	3.04'
L19	N 08°15'23" W	2.00'
L20	N 08°15'23" W	19.60'
L21	N 33°25'11" E	138.90'
L22	S 32°48'41" W	17.03'
L23	S 20°44'14" W	19.03'

CURVE TABLE

CURVE	RADIUS	LENGTH	CHORD
C1	1695.28'	21.12'	
C2	165.00'	19.97'	
C3	115.00'	172.51'	
C4	106.08'	49.02'	
C5	265.00'	94.34'	N79°58'43"E 93.84'
C6	215.00'	51.81'	S76°41'04"W 51.69'
C7	115.00'	8.53'	
C8	112.46'	62.37'	

RECORD DESCRIPTION TAX PARCEL 6261-01-187898:

(transposed from Deed Doc. #02-2005-3468)

(1) ALL that tract or parcel of land situate in the Town of Poughkeepsie. Dutchess County, New York, on the north side of the highway leading from Poughkeepsie to Pleasant Valley, formerly known as the Dutchess Turnpike:

BEGINNING at a point in the north line of said highway at or opposite an elm tree standing on or near the north line of said highway about two hundred twenty-two (222) feet westerly along said highway from the west line of the land and right of way of the Central New England Railway Company, and running thence easterly along the north line of said highway two hundred twenty-two {222) feet more or less to the west line of the lands and right of way of the Central New England Railway Company two hundred twelve feet (212) to a point in said line; thence southwesterly in a straight line to the place of beginning: together with all the right, title and interest of party of the first part in and to the highway in front of said premises to the center line thereof. Being a triangular parcel of land bounded on the east by lands of the Central New England Railway Company, on the south by the highway and northwesterly by other lands of the party of the first part.

BEING the same premises conveyed by Adirondack Bottled Gas Corporation of New York to National Propane, L.P. by deed dated June 25, 1996 and recorded in the Dutchess County Clerk's Office on July 2. 1996 in Liber 1981 of Deeds at page 401.

(2) ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Poughkeepsie, County of Dutchess, State of New York, described as follows:

Grid No. 14-6261-01-173893-00

(3) ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York, known as Lot #2 on Map No. 8104 on file in the Dutchess County Clerk's Office Sept. 4, 1987.

TOGETHER with all right, title and interest, if any, of the party of the first part in and to any streets and roads abutting the above described premises to the center lines thereof; TOGETHER with the appurtenances and all the estate and rights of the party of the first part in and to said premises; TO HAVE AND TO HOLD the premises herein granted unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

SURVEY DESCRIPTION TAX PARCEL 6261-01-187898:

ALL that certain plot, piece or parcel of land on the southerly and westerly side of Love Road, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York and being more particularly bounded and described as follows;

BEGINNING at a point on the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549) at the southwesterly corner of the herein described parcel and the southeasterly corner of lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479, said point also being the southwesterly corner of Lot 1 as shown on a certain map entitled "Subdivision Map and Survey Map of the lands of Donald P. Love & H. Paul Richards" filed in the office of the Dutchess County Clerk September 4, 1987 as filed map #8104, and running;

Thence northerly along the division line between the herein described parcel on the east and said lands of Capstone Plaza 44, LLC on the west, N 01°52'20" E 199.92 feet, and N 25°48'25" E 251.10 feet to the southerly side of Love Road; thence along the southerly side of Love Road, along a non-tangent curve to the left having a radius of 265.00 feet, an arc length of 94.34 feet and a chord bearing N 79°58'43" E 93.84 feet, N 69°46'50" E 89.50 feet, along a tangent curve to the right having a radius of 115.00 feet, an arc length of 277.90 feet and a chord bearing S 40°59'29" E 215.05 feet, S 28°14'42" W 124.20 feet, S 48°47'30" W 36.00 feet, S 20°25'44" W 31.70 feet, along a non-tangent curve to the left having a radius of 54.00 feet an arc length of 76.84 feet and a chord bearing S 28°48'23" E 70.52 feet to the northerly side of said Dutchess Turnpike NYS Route 44 (State Highway #549); thence westerly, along the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549), S 32°48'41" W 17.03 feet, S 75°28'16" W 63.01 feet, S 20°44'14" W 19.03 feet, S 73°14'00" W 184.13 feet, N 71°38'02" W 82.10 feet and S 74°17'21" W 40.70 feet to the point or place of BEGINNING.

CONTAINING 3.54 Acres of Land more or less

Also ALL that certain plot, piece or parcel of land on the northerly and easterly side of Love Road, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York and being more particularly bounded and described as follows;

BEGINNING at a point on the northerly side of Love Road, said point being distant 57.03 feet northerly as measured on a course of N 25°48'25" E from the northwesterly corner of the aforementioned parcel on the southerly and westerly side of Love Road, and running;
Thence northerly along the division line between the herein described parcel on the east and lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479 on the west, N 25°48'25" E 13.23 feet and N 25°25'50" E 41.75 feet to the northwesterly corner of the herein described parcel, said point also being the northwesterly corner of Lot 2 as shown on a certain map entitled "Subdivision Map and Survey Map of the lands of Donald P. Love & H. Paul Richards" filed in the office of the Dutchess County Clerk September 4, 1987 as filed map #8104; thence easterly along the division line between the herein described parcel on the south and lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479 on the north, N 71°54'10" E 360.90 feet to the westerly line of Lands now or formerly of County of Dutchess as described in Liber 1666 of deeds at page 184; thence along a non-tangent curve to the left having a radius of 1,695.28 feet, an arc length of 528.87 feet and a chord bearing S 04°09'35" E 526.73 feet to the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549) at the southeasterly corner of the herein described parcel; thence along the northerly side of said Turnpike in part, and along the northeasterly side of Love Road in part, S 73°14'28" W 98.81 feet, N 08°15'10" W 100.14 feet, N 08°15'23" W 21.60 feet; thence continuing along the northeasterly side of Love Road, N 28°14'37" E 92.60 feet, along a non-tangent curve to the left having a radius of 165.00 feet, an arc length of 398.73 feet and a chord bearing N 40°59'29" W 308.55 feet, S 69°46'50" W 89.50 feet and along a tangent curve to the right having a radius of 215.00 feet, an arc length of 51.81 feet and a chord bearing S 76°41'04" W 51.69 feet to the point or place of BEGINNING.

CONTAINING 1.05 Acres of Land more or less

The above described parcels having a combined, total area of 4.59 Acres more or less.

SURVEY 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.

TOPOGRAPHY SHOWN HEREON WAS COMPILED FROM A FIELD SURVEY COMPLETED DECEMBER 11, 1999 AND APRIL 18, 2001. DATUM: USGS (1929 NGVD), 2 FOOT CONTOUR INTERVAL.

SURVEYED FROM RECORD DESCRIPTION AND AS IN POSSESSION.

SUB-SURFACE STRUCTURES NOT VISIBLE OR READILY APPARENT ARE NOT SHOWN AND THEIR LOCATIONS AND EXTENTS ARE NOT CERTIFIED.

SUBJECT TO COVENANTS, EASEMENTS, RESTRICTIONS, CONDITIONS AND AGREEMENTS OF RECORD.

SURVEY SUBJECT TO ANY RIGHT, TITLE OR INTEREST THE PUBLIC MAY HAVE FOR HIGHWAY USE.

MAP REFERENCE:

1. FILED MAP #8104 ENTITLED "SURVEY MAP OF THE LANDS OF DONALD LOVE AND H. PAUL RICHARDS", PREPARED BY RAYMOND J. KIHLMIRE, L.S., FILED IN THE DUTCHESS COUNTY CLERKS OFFICE ON SEPTEMBER 04, 1987.

TAX PARCEL NUMBER:	DEED REFERENCES:
TOWN OF POUGHKEEPSIE, DUTCHESS COUNTY, NY	
134689-6261-01-187898	HERBERT H. REDL - DOC.# 02-2005-3468
(Formerly: 134689-6261-01-173893-00	*HERBERT H. REDL - DEED LIBER 1987 PAGE 472)*
(Formerly: 134689-6261-01-188903-00	*HERBERT H. AND SUE ANN REDL- DOC#02-1999 PAGE 7444)*
(Formerly: 134689-6261-01-205886-00	*HERBERT H. AND SUE ANN REDL - DEED LIBER 1994 PAGE 446)*

ENVIRONMENTAL EASEMENT NOTE NYSDEC CONTRACT NO. C314113:

THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO TITLE 36 OF ARTICLE 71 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW.THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THIS EASEMENT ARE SET FORTH IN THE SITE MANAGEMENT PLAN (SMP). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP CAN BE OBTAINED FROM NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR AT "derweb@dec.ny.gov.".

40 0 40
SCALE IN FEET
1"=40'

10M 0 10M
SCALE IN METERS

0 1 2 3
ORIGINAL SCALE IN INCHES

IT IS A VIOLATION OF NEW YORK STATE EDUCATION LAW FOR ANY PERSON TO ALTER THIS DRAWING OR DOCUMENT IN ANY WAY, UNLESS HE OR SHE IS ACTING UNDER THE DIRECTION OF A LICENSED DESIGN PROFESSIONAL (PROFESSIONAL ENGINEER, LAND SURVEYOR, ARCHITECT OR LANDSCAPE ARCHITECT). IF THIS DRAWING OR DOCUMENT IS ALTERED, THE ALTERING DESIGN PROFESSIONAL SHALL AFFIX TO THE DRAWING OR DOCUMENT HIS OR HER SEAL, THE NOTATION "ALTERED BY" FOLLOWED BY HIS OR HER SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

I HEREBY CERTIFY THAT THIS SURVEY MAP IS BASED ON AN ACTUAL FIELD SURVEY COMPLETED JULY 17, 2017 AND THAT THIS SURVEY MAP WAS MADE BY ME OR UNDER MY DIRECTION, AND CONFORMS WITH THE MINIMUM STANDARD OF PRACTICE ADOPTED BY THE NEW YORK STATE ASSOCIATION OF PROFESSIONAL LAND SURVEYORS.

STEVEN JAY ALEX
050016
STEVEN J. ALEX, L.S. #50016

CHAZEN ENGINEERING, LAND SURVEYING & LANDSCAPE ARCHITECTURE, CO., D.P.C.

THE Chazen COMPANIES®
Proud to be Employee Owned
Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

Office Locations:

☒ Hudson Valley Office:
21 Fox Street
Poughkeepsie, New York 12601
Phone: (845) 454-3980

☐ North Country Office:
375 Bay Road
Queensbury, New York 12804
Phone: (518) 812-0513

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

☐ Central NY Office:
721 East Genesee Street
Syracuse, New York 13210
Phone: (315) 251-1013

Tennessee Office:
1705 Division Street
Nashville, Tennessee 37203
Phone: (615) 953-4909

rev.	date	description

LOVE ROAD BCP

MAP OF ENVIRONMENTAL EASEMENT SURVEY PREPARED FOR HERB REDL PROPERTIES

TOWN OF POUGHKEEPSIE, DUTCHESS COUNTY, NEW YORK

designed CJS	checked
date 07/26/17	scale 1"=40'
project no. 81434.00	
sheet no. SV1	

Drawing Name: Z:\projects\81400-81499\81434.00 Herb Redl_Love Rd BCP\DWG\05_SVY_81434-00_ENV-ESMT.dwg
Xref's Attached: XTB_81434-00_H24x36; XBASE-SVY_81434-00
Date Printed: Jul 26, 2017, 1:54pm

AREAS OF CONCERN

AOC–01 – FORMER FUEL UNLOADING AREA

AOC–02 – FORMER UST AREA

AOC–03 – FORMER RAILROAD STORAGE AREA

LEGEND

- PROPERTY LINE/BCP BOUNDARY
- TEST PIT – ONE OR MORE VOLATILE OR SEMI–VOLATILE ORGANIC COMPOUNDS DETECTED BELOW THE UNRESTRICTED USE CRITERIA (2005)
- TEST PIT – NO VOLATILE OR SEMI–VOLATILE ORGANIC COMPOUNDS DETECTED (2005)
- SOIL PROBE (NO SAMPLES COLLECTED) (2005)
- TEMPORARY MONITORING WELL AND SOIL BORING (2005)
- TANK GRAVE SAMPLE (2005)
- SOIL EXCAVATION CONFIRMATION SAMPLE (2007)
- SUPPLEMENTAL REMEDIAL INVESTIGATION BEDROCK MONITORING WELL (2009)
- SUPPLEMENTAL REMEDIAL INVESTIGATION SOIL GAS SAMPLE (2008)
- SUPPLEMENTAL REMEDIAL INVESTIGATION OVERBURDEN MONITORING WELL (2009)
- SUPPLEMENTAL REMEDIAL INVESTIGATION SEDIMENT SAMPLE (2008)
- SOIL SAMPLE WITH VOLATILE OR SEMI–VOLATILE ORGANIC COMPOUNDS EXCEEDING THE UNRESTRICTED USE CRITERIA
- SOIL SAMPLE WITH METALS EXCEEDING THE UNRESTRICTED USE CRITERIA
- SOIL SAMPLE WITH METALS EXCEEDING THE RESTRICTED RESIDENTIAL USE CRITERIA
- SOIL SAMPLE WITH METALS EXCEEDING THE COMMERCIAL USE CRITERIA
- OVERBURDEN MONITORING WELL WITH VOLATILE ORGANIC COMPOUNDS EXCEEDING TOGS 1.1.1
- TEST PIT WITH NO SAMPLES COLLECTED BUT ASSUMED UNIMPACTED WITH VOCS BASED ON VISUAL AND OLFACTORY INSPECTION
- TEST PIT WITH NO SAMPLES COLLECTED BUT ASSUMED IMPACTED WITH VOCS OR SVOCS BASED ON VISUAL AND OLFACTORY INSPECTION
- AREA OF CONCERN WITH VOLATILE OR SEMI–VOLATILE ORGANIC COMPOUND IMPACTED SOILS

Dashed lines show updated AOC-2 Areas of cover

AOC-2 Area of cover to be maintained outside of remedy excavation area

AOC-2 Area of planned soil cover, adjusted per 2015 field screening

GENERAL NOTES

1. ALL SAMPLE LOCATIONS AND EXCAVATION AREAS ARE APPROXIMATE.

MAP REFERENCE

1. BASE MAP OBTAINED FROM A DRAWING ENTITLED "SURVEY MAP OF THE LANDS OF DONALD LOVE AND H. PAUL RICHARDS", PREPARED BY RAYMOND J. KIHLMIRE, L.S., FILED IN THE DCCO ON SEPTEMBER 04, 1987.

Approximate locations of soil samples (Chazen 2015)

No.	DATE	DESCRIPTION	BY
1.			

REVISIONS

PROJ. MANAGER:	GAT
CHIEF DESIGNER:	GAT
REVIEWED BY:	DATE

SCALE:
HORZ.: 1" = 60'
VERT.:
DATUM:
HORZ.:
VERT.:
0 30 60
GRAPHIC SCALE

FUSS & O'NEILL
80 WASHINGTON STREET, SUITE 301
POUGHKEEPSIE, NY 12601
845.452.6801
www.fando.com

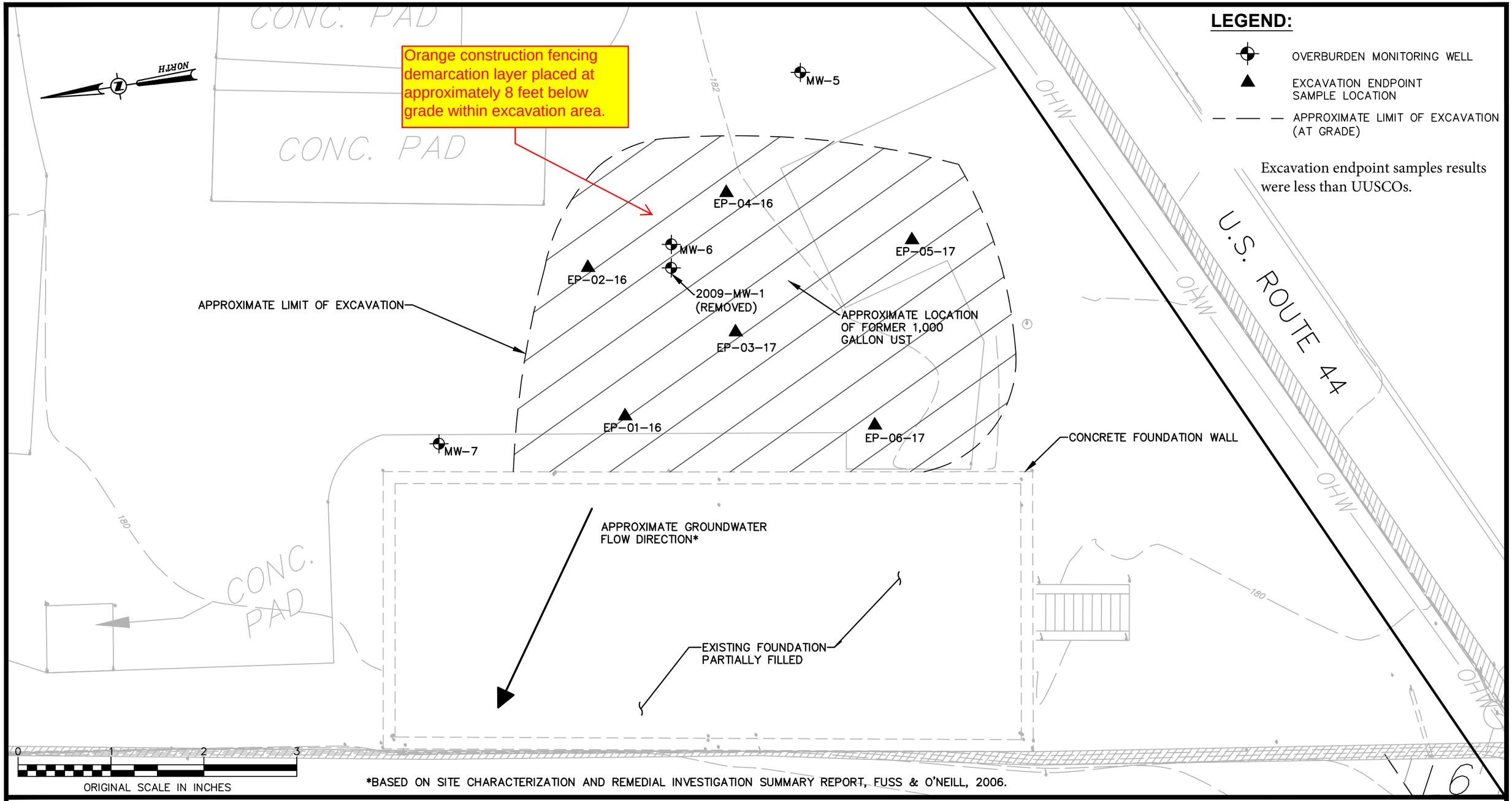
HERBERT REDL
Remaining Soil Sample Exceedances and Historic Sample Locations
2 LOVE ROAD

TOWN OF POUGHKEEPSIE NEW YORK

PROJ. No.: 20040761.A8N
DATE: JULY 2012

FIGURE 2a

CTB:
LMAN:
MS VIEW:
UCS:



Drawing Name: Z:\projects\81400-81499\81434.00 Herb Redl_Love Rd BCP\DWG\01_81434_SOIL EXCAVATION MAP.dwg Date Printed: Sep 28, 2017, 3:04pm

CHAZEN ENGINEERING, LAND SURVEYING & LANDSCAPE ARCHITECTURE CO., D.P.C.

Office Locations:

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

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

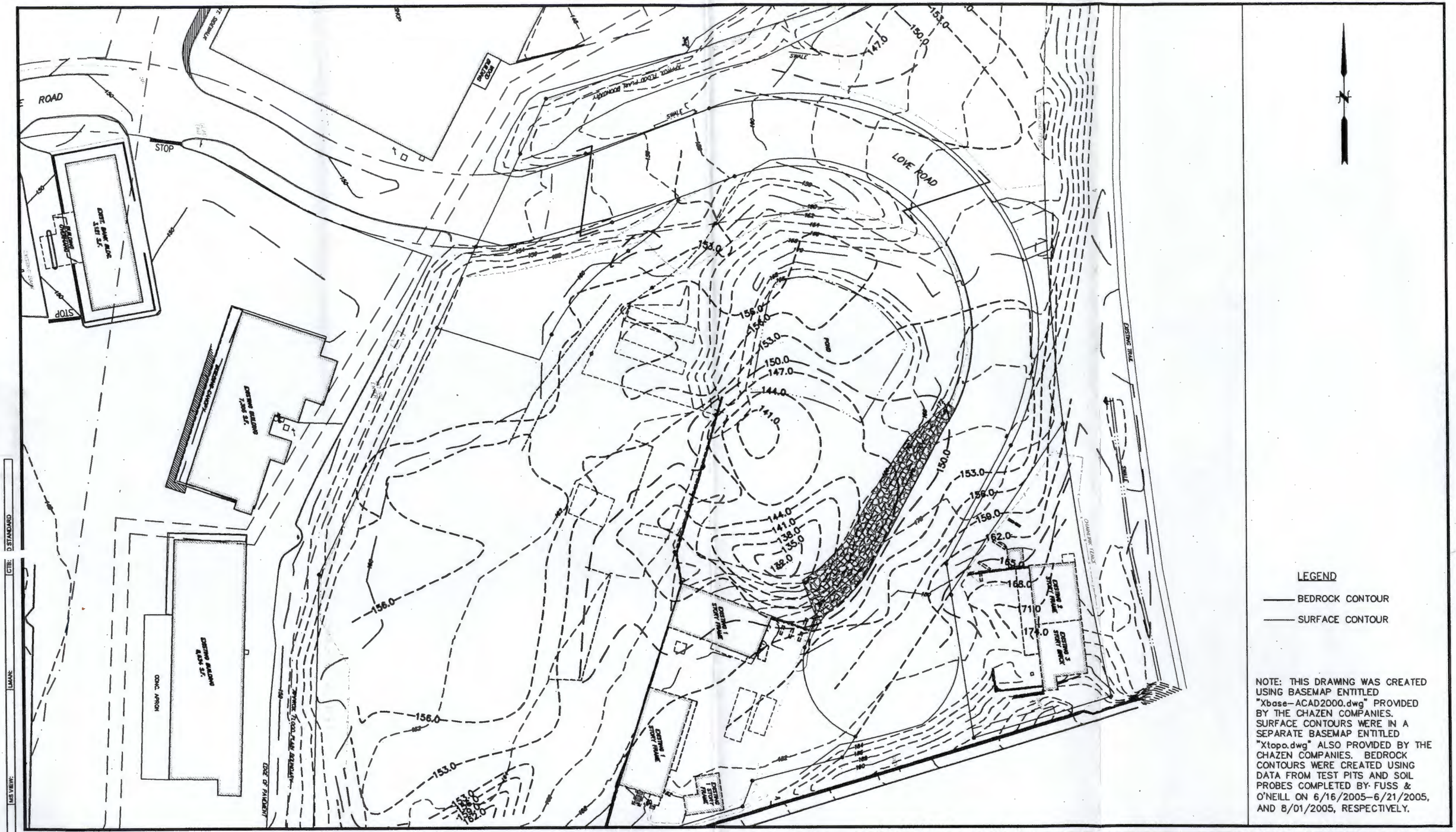
Tennessee Office:
1705 Division Street
Nashville, Tennessee 37203
Phone: (615) 380-1359

North Country Office:
375 Bay Road
Queensbury, New York 12804
Phone: (518) 812-0513

Westchester NY Office:
235 Main Street, Suite 400
White Plains, New York 10601
Phone: (914) 997-8510

AOC-2 REMEDIAL EXCAVATION MAP

designed	checked
WC	WGO
date	scale
09/27/17	1"=10'
project no.	
81434.00	
sheet no.	
FIG 2b	



LEGEND

——— BEDROCK CONTOUR

——— SURFACE CONTOUR

NOTE: THIS DRAWING WAS CREATED USING BASEMAP ENTITLED "Xbase-ACAD2000.dwg" PROVIDED BY THE CHAZEN COMPANIES. SURFACE CONTOURS WERE IN A SEPARATE BASEMAP ENTITLED "Xtopo.dwg" ALSO PROVIDED BY THE CHAZEN COMPANIES. BEDROCK CONTOURS WERE CREATED USING DATA FROM TEST PITS AND SOIL PROBES COMPLETED BY FUSS & O'NEILL ON 6/16/2005-6/21/2005, AND 8/01/2005, RESPECTIVELY.

CTB: D.STANDARD
LAYER:
MS VIEW:
UCS: WORLD

No.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJ. MANAGER:
CHIEF DESIGNER:
REVIEWED BY: DATE

TO MY KNOWLEDGE AND BELIEF, THESE MAPS ARE SUBSTANTIALLY CORRECT AS NOTED HEREON.

LAWRENCE R. GEISSLER, JR. 12327 LICENSE No.

SCALE:
HORZ.: 1" = 60'
VERT.:
DATUM:
HORZ.:
VERT.:
0 30 60
GRAPHIC SCALE

FUSS & O'NEILL of New York, PC
90 WASHINGTON STREET SUITE 301, POUGHKEEPSIE, NY 12601
845.452.6801 www.FandO.com

HERBERT REDL PROPERTIES

TOPOGRAPHIC MAP: BEDROCK AND SURFACE CONTOURS

2 LOVE ROAD

TOWN OF POUGHKEEPSIE DUTCHESS COUNTY, NEW YORK

PROJ. No.: 20040761.A1N
DATE: OCTOBER 2005

Figure 3

APPENDIX A – LIST OF SITE CONTACTS

Name	Phone/Email Address
Herbert H. Redl, property owner	845-471-3388
John Miller, P.E., NYSDEC Project Manager	518-402-9589 john.miller@dec.ny.gov
Russell Urban-Mead, QEP and Project Principal, Chazen Companies	845-486-1551 rum@chazencompanies.com
Arlette St. Romain, Project Manager, Chazen Companies	518-266-7328 arlette@chazencompanies.com
Frank Redl, Remedial Party Attorney	845-471-3388 ext 105 frank@redlh.com

APPENDIX B – METES and BOUNDS DESCRIPTION, ENVIRONMENTAL EASEMENT, and SITE SURVEY

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

THIS INDENTURE made this _____day of _____, 20__, between Owner(s) Herbert H. Redl, having an office at 80 Washington Street, Suite 100, Poughkeepsie, New York 12601, County of Dutchess, 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 20-50 Love Road in the Town of Poughkeepsie, County of Dutchess and State of New York, known and designated on the tax map of the County Clerk of Dutchess as tax map parcel numbers: 6261-01-187898, being the same as that property conveyed to Grantor by deed dated April 26, 2005 and recorded in the Dutchess County Clerk's Office in Instrument No. 2005-3468. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 4.59 +/- acres, and is hereinafter more fully described in the Land Title Survey dated July 26, 2017 prepared by Steven J. Alex, L.L.S. of Chazen Engineering & Land Surveying Co. P.C., 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: W3-1026-04-10, 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 Dutchess 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: C314113
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.

Herbert H. Redl:

By: _____

Print Name: _____

Title:_____ Date:_____

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF)

On the _____ day of _____; in the year 20 __, before me, the undersigned, personally appeared _____, 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

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 _____ day of _____, in the year 20__, 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

SCHEDULE "A" PROPERTY DESCRIPTION

SURVEY DESCRIPTION
TAX PARCEL 6261-01-187898

ALL that certain plot, piece or parcel of land on the southerly and westerly side of Love Road, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York and being more particularly bounded and described as follows;

BEGINNING at a point on the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549) at the southwesterly corner of the herein described parcel and the southeasterly corner of lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479, said point also being the southwesterly corner of Lot 1 as shown on a certain map entitled "Subdivision Map and Survey Map of the lands of Donald P. Love & H. Paul Richards" filed in the office of the Dutchess County Clerk September 4, 1987 as filed map #8104, and running;

Thence northerly along the division line between the herein described parcel on the east and said lands of Capstone Plaza 44, LLC on the west, N 01°52'20" E 199.92 feet, and N 25°48'25" E 251.10 feet to the southerly side of Love Road; thence along the southerly side of Love Road, along a non-tangent curve to the left having a radius of 265.00 feet, an arc length of 94.34 feet and a chord bearing N 79°58'43" E 93.84 feet, N 69°46'50" E 89.50 feet, along a tangent curve to the right having a radius of 115.00 feet, an arc length of 277.90 feet and a chord bearing S 40°59'29" E 215.05 feet, S 28°14'42" W 124.20 feet, S 48°47'30" W 36.00 feet, S 20°25'44" W 31.70 feet, along a non-tangent curve to the left having a radius of 54.00 feet an arc length of 76.84 feet and a chord bearing S 28°48'23" E 70.52 feet to the northerly side of said Dutchess Turnpike NYS Route 44 (State Highway #549); thence westerly, along the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549), S 32°48'41" W 17.03 feet, S 75°28'16" W 63.01 feet, S 20°44'14" W 19.03 feet, S 73°14'00" W 184.13 feet, N 71°38'02" W 82.10 feet and S 74°17'21" W 40.70 feet to the point or place of BEGINNING.

CONTAINING 3.54 Acres of Land more or less

Also ALL that certain plot, piece or parcel of land on the northerly and easterly side of Love Road, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York and being more particularly bounded and described as follows;

BEGINNING at a point on the northerly side of Love Road, said point being distant 57.03 feet northerly as measured on a course of N 25°48'25" E from the northwesterly corner of the aforementioned parcel on the southerly and westerly side of Love Road, and running;

Thence northerly along the division line between the herein described parcel on the east and lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479 on the west, N 25°48'25" E 13.23 feet and N 25°25'50" E 41.75 feet to the northwesterly corner of the herein described parcel, said point also being the northwesterly corner of Lot 2 as shown on a certain map entitled "Subdivision Map and Survey Map of the lands of Donald P. Love & H. Paul Richards" filed in the office of the Dutchess County Clerk September 4, 1987 as filed map #8104; thence easterly along the division line between the herein described parcel on the south and lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479 on the north, N 71°54'10" E 360.90 feet to the westerly line of Lands now or formerly of County of Dutchess as described in Liber 1666 of deeds at page 184; thence along a non-tangent curve to the left having a radius of 1,695.28 feet, an arc length of 528.87 feet and a chord bearing S 04°09'35" E 526.73 feet to the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549) at the southeasterly corner of the herein described parcel; thence along the northerly side of said Turnpike in part, and along the northeasterly side of Love Road in part, S 73°14'28" W 98.81 feet, N 08°15'10" W 100.14 feet, N 08°15'23" W 21.60 feet; thence continuing along the northeasterly side of Love Road, N 28°14'37" E 92.60 feet, along a non-tangent curve to the left having a radius of 165.00 feet, an arc length of 398.73 feet and a chord bearing N 40°59'29" W 308.55 feet, S 69°46'50" W 89.50 feet and along a tangent curve to the right having a radius of 215.00 feet, an arc length of 51.81 feet and a chord bearing S 76°41'04" W 51.69 feet to the point or place of BEGINNING.

CONTAINING 1.05 Acres of Land more or less

The above described parcels having a combined, total area of 4.59 Acres more or less.

TP-584 (4/13)

New York State Department of Taxation and Finance

Combined Real Estate Transfer Tax Return, Credit Line Mortgage Certificate, and Certification of Exemption from the Payment of Estimated Personal Income Tax

Recording office time stamp

See Form TP-584-I, Instructions for Form TP-584, *before completing this form. Print or type.*

Schedule A — Information relating to conveyance

Grantor/Transferor

☒ Individual
☐ Corporation
☐ Partnership
☐ Estate/Trust
☐ Single member LLC
☐ Other

Name *(if individual, last, first, middle initial)* (☐ *check if more than one grantor*): HERBERT H. REDL

Social security number: 134-28-0249

Mailing address: 80 WASHINGTON STREET

Social security number:

City: POUGHKEEPSIE | State: NY | ZIP code: 12601

Federal EIN:

Single member's name if grantor is a single member LLC *(see instructions)*:

Single member EIN or SSN:

Grantee/Transferee

☐ Individual
☐ Corporation
☐ Partnership
☐ Estate/Trust
☐ Single member LLC
☒ Other

Name *(if individual, last, first, middle initial)* (☐ *check if more than one grantee*): PEOPLE OF THE STATE OF NEW YORK

Social security number:

Mailing address: 625 BROADWAY

Social security number:

City: ALBANY | State: NY | ZIP code: 12233

Federal EIN:

Single member's name if grantee is a single member LLC *(see instructions)*:

Single member EIN or SSN:

Location and description of property conveyed

Tax map designation – Section, block & lot *(include dots and dashes)*	SWIS code (six digits)	Street address	City, town, or village	County
6261-01-187898-00	134689	LOVE ROAD	T/POUGHKEEPSIE	DUTCHESS

Type of property conveyed *(check applicable box)*

1 ☐ One- to three-family house
2 ☐ Residential cooperative
3 ☐ Residential condominium
4 ☒ Vacant land
5 ☐ Commercial/Industrial
6 ☐ Apartment building
7 ☐ Office building
8 ☐ Other _____

Date of conveyance: ____ / ____ / ____ (month / day / year)

Percentage of real property conveyed which is residential real property 100 % *(see instructions)*

Condition of conveyance *(check all that apply)*

a. ☐ Conveyance of fee interest
b. ☐ Acquisition of a controlling interest (state percentage acquired _____ %)
c. ☐ Transfer of a controlling interest (state percentage transferred _____ %)
d. ☐ Conveyance to cooperative housing corporation
e. ☐ Conveyance pursuant to or in lieu of foreclosure or enforcement of security interest *(attach Form TP-584.1, Schedule E)*
f. ☐ Conveyance which consists of a mere change of identity or form of ownership or organization *(attach Form TP-584.1, Schedule F)*
g. ☐ Conveyance for which credit for tax previously paid will be claimed *(attach Form TP-584.1, Schedule G)*
h. ☐ Conveyance of cooperative apartment(s)
i. ☐ Syndication
j. ☐ Conveyance of air rights or development rights
k. ☐ Contract assignment
l. ☐ Option assignment or surrender
m. ☐ Leasehold assignment or surrender
n. ☐ Leasehold grant
o. ☒ Conveyance of an easement
p. ☐ Conveyance for which exemption from transfer tax claimed *(complete Schedule B, Part III)*
q. ☐ Conveyance of property partly within and partly outside the state
r. ☐ Conveyance pursuant to divorce or separation
s. ☒ Other *(describe)* ENV EASEMENT

For recording officer's use	Amount received	Date received	Transaction number
	Schedule B., Part I $ _____ Schedule B., Part II $		

Schedule B — Real estate transfer tax return (Tax Law, Article 31)

Part I – Computation of tax due

1	Enter amount of consideration for the conveyance *(if you are claiming a total exemption from tax, check the exemption claimed box, enter consideration and proceed to Part III)* ☐ **Exemption claimed**	1.	0 00
2	Continuing lien deduction *(see instructions if property is taken subject to mortgage or lien)*	2.	
3	Taxable consideration *(subtract line 2 from line 1)*	3.	0 00
4	Tax: $2 for each $500, or fractional part thereof, of consideration on line 3	4.	
5	Amount of credit claimed for tax previously paid *(see instructions and attach Form TP-584.1,* Schedule G*)*	5.	
6	Total tax due* *(subtract line 5 from line 4)*	6.	0 00

Part II – Computation of additional tax due on the conveyance of residential real property for $1 million or more

1	Enter amount of consideration for conveyance *(from* Part I*, line 1)*	1.	
2	Taxable consideration *(multiply line 1 by the percentage of the premises which is residential real property, as shown in* Schedule A*)*	2.	
3	Total additional transfer tax due* *(multiply line 2 by 1% (.01))*	3.	

Part III – Explanation of exemption claimed on Part I, line 1 *(check any boxes that apply)*

The conveyance of real property is exempt from the real estate transfer tax for the following reason:

a. Conveyance is to the United States of America, the state of New York, or any of their instrumentalities, agencies, or political subdivisions (or any public corporation, including a public corporation created pursuant to agreement or compact with another state or Canada) ..... a ☒

b. Conveyance is to secure a debt or other obligation ..... b ☐

c. Conveyance is without additional consideration to confirm, correct, modify, or supplement a prior conveyance ..... c ☐

d. Conveyance of real property is without consideration and not in connection with a sale, including conveyances conveying realty as bona fide gifts ..... d ☐

e. Conveyance is given in connection with a tax sale ..... e ☐

f. Conveyance is a mere change of identity or form of ownership or organization where there is no change in beneficial ownership. (This exemption cannot be claimed for a conveyance to a cooperative housing corporation of real property comprising the cooperative dwelling or dwellings.) Attach Form TP-584.1, Schedule F ..... f ☐

g. Conveyance consists of deed of partition ..... g ☐

h. Conveyance is given pursuant to the federal Bankruptcy Act ..... h ☐

i. Conveyance consists of the execution of a contract to sell real property, without the use or occupancy of such property, or the granting of an option to purchase real property, without the use or occupancy of such property ..... i ☐

j. Conveyance of an option or contract to purchase real property with the use or occupancy of such property where the consideration is less than $200,000 and such property was used solely by the grantor as the grantor's personal residence and consists of a one-, two-, or three-family house, an individual residential condominium unit, or the sale of stock in a cooperative housing corporation in connection with the grant or transfer of a proprietary leasehold covering an individual residential cooperative apartment ..... j ☐

k. Conveyance is not a conveyance within the meaning of Tax Law, Article 31, section 1401(e) *(attach documents supporting such claim)* ..... k ☐

*The total tax (from Part I, line 6 and Part II, line 3 above) is due within 15 days from the date conveyance. Please make check(s) payable to the county clerk where the recording is to take place. If the recording is to take place in the New York City boroughs of Manhattan, Bronx, Brooklyn, or Queens, make check(s) payable to the ***NYC Department of Finance***. If a recording is not required, send this return and your check(s) made payable to the ***NYS Department of Taxation and Finance***, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-5045.

Schedule C — Credit Line Mortgage Certificate (Tax Law, Article 11)

Complete the following only if the interest being transferred is a fee simple interest.
I (we) certify that: *(check the appropriate box)*

1. ☒ The real property being sold or transferred is not subject to an outstanding credit line mortgage.

2. ☐ The real property being sold or transferred is subject to an outstanding credit line mortgage. However, an exemption from the tax is claimed for the following reason:
   - ☐ The transfer of real property is a transfer of a fee simple interest to a person or persons who held a fee simple interest in the real property (whether as a joint tenant, a tenant in common or otherwise) immediately before the transfer.
   - ☐ The transfer of real property is (A) to a person or persons related by blood, marriage or adoption to the original obligor or to one or more of the original obligors or (B) to a person or entity where 50% or more of the beneficial interest in such real property after the transfer is held by the transferor or such related person or persons (as in the case of a transfer to a trustee for the benefit of a minor or the transfer to a trust for the benefit of the transferor).
   - ☐ The transfer of real property is a transfer to a trustee in bankruptcy, a receiver, assignee, or other officer of a court.
   - ☐ The maximum principal amount secured by the credit line mortgage is $3,000,000 or more, and the real property being sold or transferred is **not** principally improved nor will it be improved by a one- to six-family owner-occupied residence or dwelling.

     Please note: for purposes of determining whether the maximum principal amount secured is $3,000,000 or more as described above, the amounts secured by two or more credit line mortgages may be aggregated under certain circumstances. See TSB-M-96(6)-R for more information regarding these aggregation requirements.
   - ☐ Other *(attach detailed explanation)*.

3. ☐ The real property being transferred is presently subject to an outstanding credit line mortgage. However, no tax is due for the following reason:
   - ☐ A certificate of discharge of the credit line mortgage is being offered at the time of recording the deed.
   - ☐ A check has been drawn payable for transmission to the credit line mortgagee or his agent for the balance due, and a satisfaction of such mortgage will be recorded as soon as it is available.

4. ☐ The real property being transferred is subject to an outstanding credit line mortgage recorded in _____ (insert liber and page or reel or other identification of the mortgage). The maximum principal amount of debt or obligation secured by the mortgage is _____. No exemption from tax is claimed and the tax of _____ is being paid herewith. *(Make check payable to county clerk where deed will be recorded or, if the recording is to take place in New York City but not in Richmond County, make check payable to the **NYC Department of Finance.**)*

Signature (both the grantor(s) and grantee(s) must sign)

The undersigned certify that the above information contained in schedules A, B, and C, including any return, certification, schedule, or attachment, is to the best of his/her knowledge, true and complete, and authorize the person(s) submitting such form on their behalf to receive a copy for purposes of recording the deed or other instrument effecting the conveyance.

Grantor signature	Title	Grantee signature	Title
	OWNER		
Grantor signature	Title	Grantee signature	Title

Reminder: Did you complete all of the required information in Schedules A, B, and C? Are you required to complete Schedule D? If you checked *e*, *f*, or *g* in Schedule A, did you complete Form TP-584.1? Have you attached your check(s) made payable to the county clerk where recording will take place or, if the recording is in the New York City boroughs of Manhattan, Bronx, Brooklyn, or Queens, to the ***NYC Department of Finance***? If no recording is required, send your check(s), made payable to the ***Department of Taxation and Finance***, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-5045.

Schedule D - Certification of exemption from the payment of estimated personal income tax (Tax Law, Article 22, section 663)

Complete the following only if a fee simple interest or a cooperative unit is being transferred by an individual or estate or trust.

If the property is being conveyed by a referee pursuant to a foreclosure proceeding, proceed to Part II, and check the second box under *Exemptions for nonresident transferor(s)/seller(s)* and sign at bottom.

Part I - New York State residents

If you are a New York State resident transferor(s)/seller(s) listed in Schedule A of Form TP-584 (or an attachment to Form TP-584), you must sign the certification below. If one or more transferors/sellers of the real property or cooperative unit is a resident of New York State, **each** resident transferor/seller must sign in the space provided. If more space is needed, please photocopy this Schedule D and submit as many schedules as necessary to accommodate all resident transferors/sellers.

Certification of resident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) as signed below was a resident of New York State, and therefore is not required to pay estimated personal income tax under Tax Law, section 663(a) upon the sale or transfer of this real property or cooperative unit.

Signature	Print full name	Date
	HERBERT H. REDL	
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Note: A resident of New York State may still be required to pay estimated tax under Tax Law, section 685(c), but not as a condition of recording a deed.

Part II - Nonresidents of New York State

If you are a nonresident of New York State listed as a transferor/seller in Schedule A of Form TP-584 (or an attachment to Form TP-584) but are not required to pay estimated personal income tax because one of the exemptions below applies under Tax Law, section 663(c), check the box of the appropriate exemption below. If any one of the exemptions below applies to the transferor(s)/seller(s), that transferor(s)/seller(s) is not required to pay estimated personal income tax to New York State under Tax Law, section 663. **Each** nonresident transferor/seller who qualifies under one of the exemptions below must sign in the space provided. If more space is needed, please photocopy this Schedule D and submit as many schedules as necessary to accommodate all nonresident transferors/sellers.

If none of these exemption statements apply, you must complete Form IT-2663, *Nonresident Real Property Estimated Income Tax Payment Form*, or Form IT-2664, *Nonresident Cooperative Unit Estimated Income Tax Payment Form.* For more information, see *Payment of estimated personal income tax,* on page 1 of Form TP-584-I.

Exemption for nonresident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) (grantor) of this real property or cooperative unit was a nonresident of New York State, but is not required to pay estimated personal income tax under Tax Law, section 663 due to one of the following exemptions:

☐ The real property or cooperative unit being sold or transferred qualifies in total as the transferor's/seller's principal residence (within the meaning of Internal Revenue Code, section 121) from _____ (Date) to _____ (Date) *(see instructions)*.

☐ The transferor/seller is a mortgagor conveying the mortgaged property to a mortgagee in foreclosure, or in lieu of foreclosure with no additional consideration.

☐ The transferor or transferee is an agency or authority of the United States of America, an agency or authority of the state of New York, the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, the Government National Mortgage Association, or a private mortgage insurance company.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

DUTCHESS COUNTY CLERK RECORDING PAGE

RECORD & RETURN TO:

HERBERT H REDL
80 WASHINGTON ST
POUGHKEEPSIE NY 12601

RECORDED: 04/26/2005
AT: 14:47:01
DOCUMENT #: 02 2005 3468

RECEIVED FROM: HERBERT REDL

GRANTOR: REDL HERBERT H
GRANTEE: REDL HERBERT H

RECORDED IN: DEED
INSTRUMENT TYPE:

TAX
DISTRICT: T/POUGHKEEPSIE

EXAMINED AND CHARGED AS FOLLOWS:

RECORDING CHARGE: 212.00

NUMBER OF PAGES: 5

TRANSFER TAX AMOUNT:

TRANSFER TAX NUMBER: #008150

E & A FORM: Y

TP-584: Y

*** DO NOT DETACH THIS
*** PAGE
*** THIS IS NOT A BILL

COUNTY CLERK BY: MOK /
RECEIPT NO: R30674
BATCH RECORD: C00435

Colette M. Lafuente
COLETTE M. LAFUENTE
County Clerk

0 2 2 0 0 5 3 4 6 8

SP
HC
183
212

THIS INDENTURE made this 24th day of April, Two Thousand and Five

BETWEEN **Herbert H. Redl and Sue Ann Redl**, both of 80 Washington Street, Poughkeepsie, New York,

Parties of the first part, and

Herbert H. Redl, 80 Washington Street, Poughkeepsie, New York

Party of the second part,

WITNESSETH, that the parties of the first part, in consideration of Ten and no/100 ($10.00) Dollars and other good and valuable consideration lawful money of the United States, to them paid by the party of the second part, do hereby grant and release unto the party of the second part, their heirs or successors and assigns of the party of the second part forever,

ALL that tract or parcel of land situate in the Town of Poughkeepsie, County of Dutchess and State of New York on the north side of the highway leading from Poughkeepsie to Pleasant Valley, bounded and described as follows:

SEE SCHEDULE "A"

This conveyance herein is given solely for the purpose of merging three heretofore separate parcels conveyed (1) by National Propane, L.P. to Herbert H. Redl and Sue Ann Redl by Deed dated May 5, 1997 and recorded in the Dutchess County Clerk's Office in Liber 1994 of Deeds at Page 446, (2) by the County of Dutchess to Herbert Redl by Deed dated December 4, 1996 and recorded in the Dutchess County Clerk's Office in Liber 1987 of Deeds at Page 472, and (3) by Donald P. Love and H. Paul Richards to Herbert H. Redl and Sue Ann Redl by Deed dated August 16, 1999 and recorded in the Dutchess County Clerk's Office as Document #02-1999-7444 to create one parcel in title to the party of the second part.

TOGETHER with all right, title and interest, if any, of the parties of the first part in and to any streets and roads abutting the above described premises to the center lines thereof,

TOGETHER with the appurtenances and all the estate and rights of the parties of the first part in and to said premises,

TO HAVE AND TO HOLD the premises herein granted unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

AND the parties of the first part covenants that the parties of the first part have not done or suffered anything whereby the said premises have been encumbered in any way whatever, except as aforesaid.

AND the parties of the first part, in compliance with Section 13 of the Lien Law, covenant that the parties of the first part will receive consideration for this conveyance and will hold the right to receive such consideration as a trust fund to be applied first for the purpose of paying the cost of the improvement and will apply the same first to the payment of the cost of the improvement before using any part of the total of the same for any other purpose.
The word "party" shall be construed as if it read "parties" whenever the sense of this indenture so requires.

IN WITNESS WHEREOF, the parties of the first part have duly executed this Deed the day and year first above written.

Herbert H. Redl

Sue Ann Redl

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

On the 26th day of April, 2005, before me, the undersigned, a notary public in and for said state, personally appeared Herbert H. Redl personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his signature on the instrument, the individual, the person on behalf of which the individual acted, executed the instrument.

Notary Public

KATHLEEN M. SZULIST
Notary Public, State of New York
Qualified in Dutchess County
No. 4750797
Commission Expires 1/31/06

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

On the 26th day of April, 2005, before me, the undersigned, a notary public in and for said state, personally appeared Sue Ann Redl personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that she executed the same in her capacity, and that by her signature on the instrument, the individual, the person on behalf of which the individual acted, executed the instrument.

Kathleen M. Szulist
Notary Public

KATHLEEN M. SZULIST
Notary Public, State of New York
Qualified in Dutchess County
No. 4750797
Commission Expires 1/31/06

RECORD & RETURN:
Herbert H. Redl
80 Washington Street
Poughkeepsie, New York 12601

SCHEDULE "A"

(1) **ALL** that tract or parcel of land situate in the Town of Poughkeepsie, Dutchess County, New York, on the north side of the highway leading from Poughkeepsie to Pleasant Valley, formerly known as the Dutchess Turnpike:

BEGINNING at a point in the north line of said highway at or opposite an elm tree standing on or near the north line of said highway about two hundred twenty-two (222) feet westerly along said highway from the west line of the land and right of way of the Central New England Railway Company, and running thence easterly along the north line of said highway two hundred twenty-two (222) feet more or less to the west line of the lands and right of way of the Central New England Railway Company two hundred twelve feet (212) to a point in said line; thence southwesterly in a straight line to the place of beginning; together with all the right, title and interest of party of the first part in and to the highway in front of said premises to the center line thereof. Being a triangular parcel of land bounded on the east by lands of the Central New England Railway Company, on the south by the highway and northwesterly by other lands of the party of the first part.

BEING the same premises conveyed by Adirondack Bottled Gas Corporation of New York to National Propane, L.P. by deed dated June 25, 1996 and recorded in the Dutchess County Clerk's Office on July 2, 1996 in Liber 1981 of Deeds at page 401.

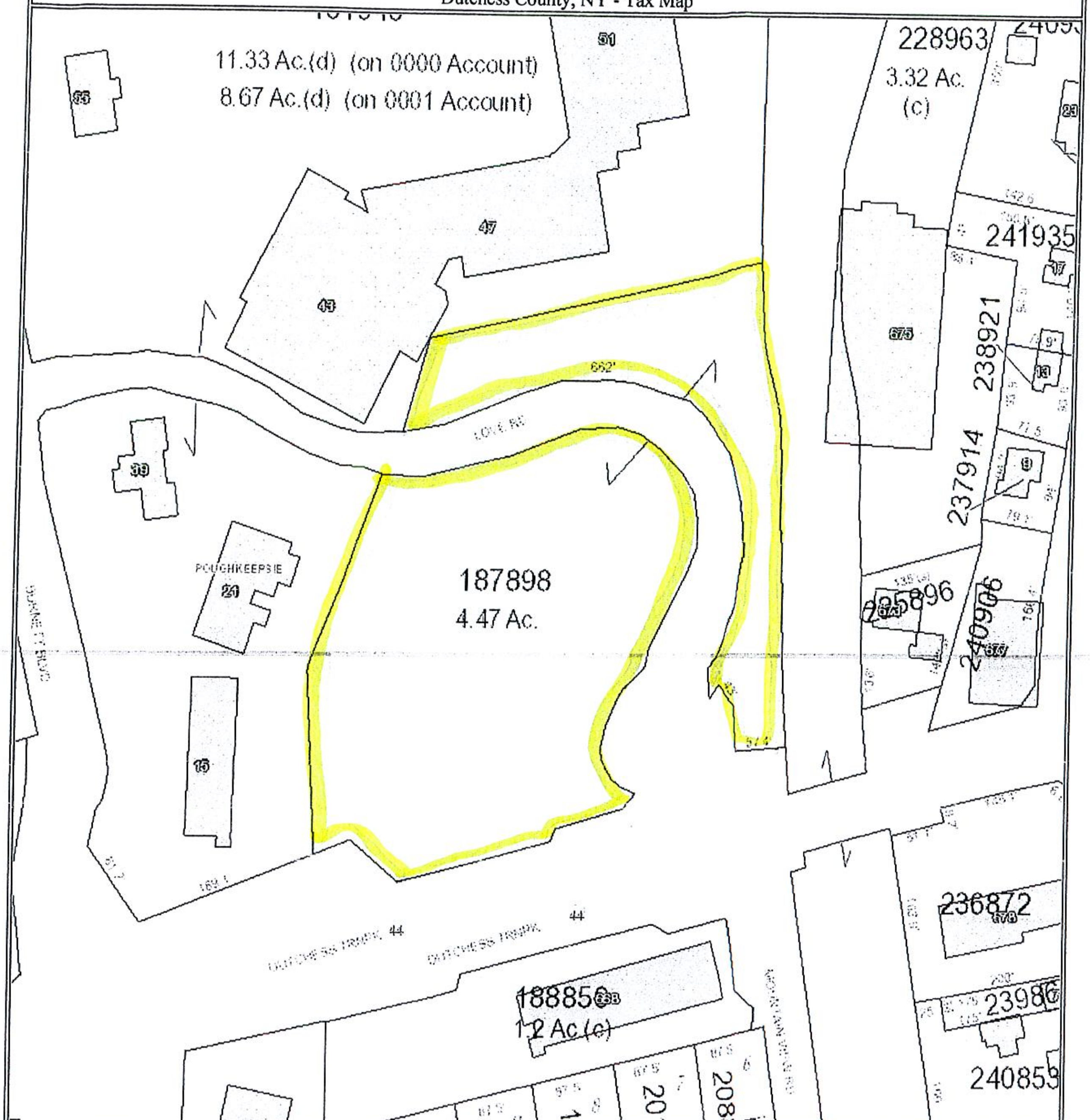
(2) ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Poughkeepsie, County of Dutchess, State of New York, described as follows:

Grid No. 14-6261-01-173893-00

(3) ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York, known as Lot #2 on Map No. 8104 on file in the Dutchess County Clerk's Office Sept. 4, 1987.

TOGETHER with all right, title and interest, if any, of the party of the first part in and to any streets and roads abutting the above described premises to the center lines thereof; TOGETHER with the appurtenances and all the estate and rights of the party of the first part in and to said premises; TO HAVE AND TO HOLD the premises herein granted unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

Dutchess County, NY - Tax Map



Parcel Grid #: 134689006261000118789800000
Municipality: Poughkeepsie

ParcelAccess Dutchess County, NY
Print date: 10/29/2014

This map is provided as a service of the Dutchess County's Intranet ParcelAccess. Absolutely no accuracy or completeness guarantee is implied or intended.

NORTH RIVER ABSTRACT CORP.
(NYS License No. 1366080)
9 Cannon Street
Poughkeepsie, NY 12601
Tel (845) 485-5188
Fax (845) 485-3206

June 14, 2017

Frank E. Redl
80 Washington Street
Suite 100
Poughkeepsie, New York 12601

Re: 14-NRA-DU-61319
20-50 Love Road
Town of Poughkeepsie
Herbert H. Redl

Dear Frank:

In reference to the above, enclosed please find certificate and Report of Title.

If you have any question in regard to same, please do not hesitate to contact the undersigned.

Very truly yours,

Adriene M. Conrad

ADRIENE M. CONRAD

AMC:p'
Enclosure

Commitment for Title Insurance

Title Number 14-NRA-DU-61319

Premises 20-50 Love Road

Issued By Old Republic National Title Insurance Company

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY, a Minnesota corporation ("Company"), for a valuable consideration, commits to issue its policy or policies of title insurance, as identified in Schedule A, in favor of the Proposed Insured named in Schedule A, as owner or mortgagee of the estate or interest in the land described or referred to in Schedule A, upon payment of the premiums and charges and compliance with the Requirements; all subject to the provisions of Schedules A and B and to the Conditions of this Commitment.

This Commitment shall be effective only when the identity of the Proposed Insured and the amount of the policy or policies committed for have been inserted in Schedule A by the Company.

All liability and obligation under this Commitment shall cease and terminate six (6) months after the Effective Date or when the policy or policies committed for shall issue, whichever first occurs, provided that the failure to issue the policy or policies is not the fault of the Company.

The Company will provide a sample of the policy form upon request.

THIS REPORT IS NOT A TITLE INSURANCE POLICY. PLEASE READ IT CAREFULLY. THE REPORT MAY SET FORTH EXCLUSIONS UNDER THE TITLE INSURANCE POLICY AND MAY NOT LIST ALL LIENS, DEFECTS AND ENCUMBRANCES AFFECTING TITLE TO THE PROPERTY.YOU SHOULD CONSIDER THIS INFORMATION CAREFULLY.

IN WITNESS WHEREOF, Old Republic National Title Insurance Company has caused its corporate name and seal to be affixed by its duly authorized officers on the date shown in Schedule A.

Issued through the Office of:

Continued on back page

NORTH RIVER ABSTRACT CORP.
(NYS License No. 1366080)
9 Cannon Street
Poughkeepsie, NY 12601
Tel (845) 485-5188
Fax (845) 485-3206

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
A Stock Company
400 Second Avenue South, Minneapolis, Minnesota 55401
(612) 371-1111

By *Mark A. Bilbrey* President

Attest *David Wold* Secretary

Adrienne M. Conrad

Authorized Signatory

ORT Form 4308
ALTA Commitment for Title Insurance 6/06

CONDITIONS

1. The term mortgage, when used herein, shall include deed of trust, trust deed or other security instrument.

2. If the proposed Insured has or acquired actual knowledge of any defect, lien, encumbrance, adverse claim or other matter affecting the estate or interest or mortgage thereon covered by this Commitment other than those shown in Schedule Bhereof, and shall fail to disclose such knowledge to the Company in writing, the Company shall be relieved from liability for any loss or damage resulting from any act of reliance hereon to the extent the Company is prejudiced by failure to so disclose such knowledge. If the proposed Insured shall disclose such knowledge to the Company, or if the Company otherwise acquires actual knowledge of any such defect, lien, encumbrance, adverse claim or other matter, the Company at its option may amend Schedule B of this Commitment accordingly, but such amendment shall not relieve the Company from liability previously incurred pursuant to paragraph 3 of these Conditions and Stipulations.

3. Liability of the Company under this Commitment shall be only to the named proposed Insured and such parties included under the definition of Insured in the form of the policy or policies committed for and only for actual loss incurred in reliance hereon in undertaking in good faith (a) to comply with the requirements hereof, or (b) to eliminate exceptions shown in Schedule B, or (c) to acquire or create the estate or interest or mortgage thereon covered by this Commitment. In no event shall such liability exceed the amount stated in Schedule A for the policy or policies committed for and such liability is subject to the insuring provisions and Conditions and Stipulations and the Exclusions from Coverage of the form of policy or policies committed for in favor of the proposed Insured which are hereby incorporated by reference and are made a part of this Commitment except as expressly modified herein.

4. This Commitment is a contract to issue one or more title insurance policies and is not an abstract of title or a report of the condition of title.Any action or actions or rights of action that the proposed Insured may have or may bring against the Company arising out of the status of the title to the estate or interest or the status of the mortgage thereon covered by this Commitment must be based on and are subject to the provisions of this Commitment.

5. The policy to be issued contains an arbitration clause.All arbitrable matters when the Amount of Insurance is $2,000,000 or less shall be arbitrated at the option of either the Company or the Insured as the exclusive remedy of the parties.
You may review a copy of the arbitration rules at: http://www.alta.org/.

Schedule A

Title Number: **14-NRA-DU-61319** Effective Date: **05/14/2017**

Premises	**20-50 Love Road**
Town/Village/City	**Town of Poughkeepsie**
County	**Dutchess**

Grid **4689-6261-01-187898**

ALTA Owner's Policy 2006 (with N.Y. Endorsement Modifications) $

Proposed Insured

ALTA Loan Policy 2006 (with Endorsement Modifications)

Proposed Insured

The estate or interest in the land described or referred to in this Certificate and covered herein is: **Fee Simple**

Title to said estate or interest in said land at the effective date hereof is vested in:

HERBERT H. REDL

Source of Title:

By Deed from Herbert H. Redl and Sue Ann Redl, dated 04/26/2005 and recorded 04/26/2005 at Doc. No. 02-2005-3468, in the Dutchess County Clerk's Office.

Recertified Date: ____/____/_____ Title Recertified In:

The land referred to in this Certificate is described as follows:

SCHEDULE "A" DESCRIPTION TO FOLLOW

NOTE: This certificate is intended for lawyers only. Such exceptions as may be set forth herein may effect marketability of title. Your lawyer should be consulted before taking any action based upon the contents hereof. The Company's representative at the closing hereunder may not act as legal advisor to any of the parties or draw legal instruments for them. Such representative is permitted to be of assistance only to an attorney. It is advisable to have your attorney present at the closing.

North River Abstract Corp.

Agent for

Old Republic National Title Insurance Company

PRIVACY POLICY NOTICE

PURPOSE OF THIS NOTICE

Title V of the Gramm-Leach-Bliley Act (GLBA) generally prohibits any financial institution, directly or through its affiliates, from sharing nonpublic personal information about you with a non affiliated third party unless the institution provides you with a notice of its privacy policies and practices, such as the type of information that it collects about you and the categories of persons or entities to whom it may be disclosed. In compliance with the GLBA, we are providing you with this document, which notifies you of the privacy policies and practices of North River Abstract Corp. agent for Old Republic National Title Insurance Company.

We may collect nonpublic personal information about you from the following sources.

- Information we received from you such as on applications or other forms.
- Information about your transactions we secure from our files, or from (our affiliates or) others.
- Information we receive from a consumer reporting agency.
- Information that we receive from others involved in your transaction, such as the real estate agent or lending.

Unless it is specifically stated otherwise in an amended privacy policy notice, no additional nonpublic personal information will be collected about you.

We may disclose any of the above information that we collect about our customers or former customers to our affiliates or to nonaffiliated companies third parties as permitted by law.

We may disclose this information about our customers or former customers to the following types of nonaffiliated companies that perform marketing services on our behalf or with whom we have joint marketing agreements:

- Financial service providers such as companies engaged in banking, consumer finance, securities and insurance.
- Non-financial companies such as envelope stuffers and other fulfillment service providers.

WE DO NOT DISCLOSE ANY NONPUBLIC PERSONAL INFORMATION ABOUT YOU WITH ANYONE FOR ANY PURPOSE THAT IS NOT SPECIFICALLY PERMITTED BY LAW.

We restrict access to nonpublic personal information about you to those employees who need to know that information in order to provide products or services to you. We maintain physical, electronic, and procedural safeguards that comply with federal regulations to guard your nonpublic personal information.

Schedule B

Title Number: **14-NRA-DU-61319**

Hereinafter set forth are additional matters which will appear in our policy as exceptions from coverage unless disposed of to our satisfaction prior to the closing or delivery of the policy.

1. TAXES (SEE SEPARATE SCHEDULE).
2. MORTGAGES (NONE).
3. Any state of facts which an accurate survey would disclose.
4. The exact location, courses and dimensions are not insured without a survey certified to the Company.
5. The exact acreage of the premises is not insured.
6. Any state of facts which a personal inspection of the premises would disclose.
7. Rights of others in and to the free and uninterrupted flow of any creek or stream crossing or bounding the premises.
8. Title is not insured to any portion of the premises lying within the bed of LOVE ROAD and US ROUTE 44 A/K/A DUTCHESS TURNPIKE.
9. Rights of utility companies to maintain their poles, wires and guys.
10. Underground encroachments and easements, if any, including pipes and drains and such rights as may exist for entry upon premises to maintain and repair the same.
11. Rights of tenants, lessees or parties in possession.
12. The 2017-18 School Tax becomes a lien 07/01/2017.
13. Notes, terms, conditions, etc. as set forth on Filed Map No. 8104.
14. Option with the County of Dutchess at Doc. No. 02-2008-5052.
15. Easement with the County of Dutchess at Doc. No. 02-2008-6842.
16. Easement for public water, sanitary and storm sewers at Liber 1403, cp 465 and Liber 1403, cp 472.
17. Easement for public sewer at Liber 964, cp 407 and amended at Liber 964, cp 536.
18. Notice of Appropriation by the State of New York at Liber 1496, cp 233 (Map 287R-1 Parcels No. 307, 347, 348, 349, 350, 439).
19. Covenants and Restrictions at Liber 1426, cp 69.
20. Subject to Right of Way at Liber 1880, cp 388.

Tax Search

Account Number:
Title Number: **14-NRA-DU-61319**
Municipality **20-50 Love Road**
Town of Poughkeepsie
Year of Roll **2017**
Section Block Lot Grid **4689-6261-01-187898**
Assessed Valuation **221,000.00** Total **221,000.00**
Assessed To **Herbert H. Redl**

Lot Size **4.47 acres**
Class **330**
School District **Arlington CSD** Code

Taxes

Note: **2017 STATE, COUNTY AND TOWN TAX: $5,093.98 PAID 02/27/2017**

2016-17 ARLINGTON SCHOOL TAX: $6,669.01 PAID 10/13/2016

WATER AND SEWER ASSESSMENTS: VACANT LAND

********** 2017-18 SCHOOL TAX BECOMES A LIEN 07/01/2017 **********

Mortgages

Title Number **14-NRA-DU-61319**

NONE OF RECORD

HERBERT H. REDL
Commercial and Office Properties
80 Washington Street
Poughkeepsie, New York 12601
845-471-3388
Fax: 845-471-3851

September __, 2017

Hon. Jon Baisley
Town of Poughkeepsie Supervisor
1 Overocker Road
Poughkeepsie, New York 12603

Re: Environmental Easement

Dear Supervisor Baisley:

Attached please find a copy of an environmental easement granted to the New York State Department of Environmental Conservation ("DEC") on _____, by Herbert H. Redl, Owner, for property at Love Road, Poughkeepsie, New York Tax Map No.6261-01-187898-00, DEC Site No: C314113.

This Environmental Easement restricts future use of the above-referenced property to restricted residential uses. Any on-site activity must be done in accordance with the Environmental Easement and the Site Management Plan which is incorporated into the Environmental Easement. Department approval is also required prior to any groundwater use.)

Article 71, Section 71-3607 of the New York State Environmental Conservation Law requires that:

> 1. Whenever the department is granted an environmental easement, it shall provide each affected local government with a copy of such easement and shall also provide a copy of any documents modifying or terminating such environmental easement.
> 2. Whenever an affected local government receives an application for a building permit or any other application affecting land use or development of land that is subject to an environmental easement and that may relate to or impact such easement, the affected local government shall notify the department and refer such application to the department. The department shall evaluate whether the application is consistent with the environmental easement and shall notify the affected local government of its determination in a timely fashion, considering the time frame for the local government's review of the application. The affected local

government shall not approve the application until it receives approval from the department.

An electronic version of every environmental easement that has been accepted by this Department is available to the public at: http://www.dec.ny.gov/chemical/36045.html. If you have any questions or comments regarding this matter, please do not hesitate to contact me.

Very truly yours,

Herbert H. Redl

ENVIRONMENTAL EASEMENT
CHECKLIST/CERTIFICATION
SITE No. C314113

The following requirements and attachments must be included as part of the submission to the Department for an Environmental Easement. Upon completion of the review, an attorney must sign the checklist indicating that they have fully completed the checklist. The Department will not accept submissions which have not been signed as being accurate and complete by both the Remedial Party and Attorney. Where the property owner is not the Remedial Party, the Department also requires the Owner to sign the checklist.

1) Special Circumstances

The last owner search was completed and the deed transfer is by Quit Claim or other restricted transfer deed ☐Yes ☐No

The property in the Brownfield Cleanup Agreement includes lands under water ☐Yes ☒No

The property has multiple owners ☐Yes ☒No

If you answered "Yes" to any of these items, contact the Department's Environmental Easement contact person for a determination as to whether further title work is necessary.

2) Verification of ownership of the property

☒ Submit documentation (such as a corporate resolution) that the signatory on the easement has authority to sign the Easement
☒ Ownership of the property matches the current deed.
☒ Verification reviewed and included for authority to sign Easement.
☐ Updated copies of legal organizational documents have been reviewed and are included. Examples of the appropriate documentation will include, for:
- corporations: articles of incorporation, organizational agreements, minutes of annual meetings, resolutions, authorities for signature;
- partnerships: a copy of the partnership agreement; verification that necessary parties are participating in the Easement;
- trusts: trust agreement, affidavit of no change in the trust; and
- estates: estate letters, powers of attorney.

3) Verification of Property Subject to Easement

☒ Description of the property for the Easement and DEC Agreement/Order/SAC matches description of property in the deed (Separate submittal must be included to explain to the satisfaction of the Department why there is any discrepancy).
☒ The Tax Map identifier (SBL) matches on all documents.

4) Survey Review

- ☑ Survey includes metes and bounds description.
- ☑ Survey includes a graphic scale.
- ☑ Survey includes Tax Map Section, Block and Lot.
- ☑ Survey includes physical address and is consistent with the DEC Agreement/Order/SAC.
- ☑ The survey must bear the name, address, telephone number, signature and certification of the professional land surveyor who performed the survey, his or her official seal and registration number, the date the survey was completed, the dates of all of the surveyor's revisions.
- ☑ The survey boundaries must be drawn to a convenient scale, with that scale clearly indicated. A graphic scale, shown in feet and meters, must be included.
- ☑ The symbols and abbreviations that are used on the survey must be identified by the use of a legend.
- ☑ Diagrams must be accurately presented.
- ☑ The point of beginning of the legal description must be shown.
- ☑ The legal description must be correct.
- ☑ The legal description must state the acreage.
- ☑ If the deed(s) description differs from the measured bearings/angles/distances, both must be indicated on the survey.
- ☑ The survey must show the location of all buildings/monuments/overlaps/encroachments upon the surveyed property with their locations defined by measurement perpendicular to the nearest perimeter boundaries.
- ☑ The survey must depict the location of visible improvements within five feet of each side of boundary lines.
- ☑ The survey must show ponds, lakes, springs, rivers or a natural water boundary bordering on or running through the surveyed property; the survey must measure the location of the natural water boundary and note on the survey the date of the measurement.
- ☑ The survey must correctly depict the environmental easement area with corresponding metes & bounds description and acreage, and include the following sentence: "*This property is subject to an environmental easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law. The engineering and institutional controls for this Easement are set forth in the Site Management Plan (SMP). A copy of the SMP must be obtained by any party with an interest in the property. The SMP can be obtained from NYS Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov*". This reference must be located on the face of the survey and be in at least 15-point type.
- ☑ If the survey consists of more than one sheet, sheets must be numbered and the total number of sheets must be indicated on each sheet.

☑ In addition to county-specific requirements, submittal of the approved survey to the Department must include the following:

- A "D" sized copy (24" x 36") of the final signed, stamped map
- A 600 DPI scan of the final signed, stamped map
- An Autocad .dwg or exported .dxf file of the polyline (at a minimum) of the final survey

5) Submissions

☑ The Environmental Easement Package being submitted to the Department includes the applicable documents set forth in Attachment A.

PLEASE READ THE FOLLOWING CAREFULLY

The Remedial Party and the Remedial Party's attorney understand and acknowledge that the New York State Department of Environmental Conservation will rely on each and every answer in this statement: (1) to determine whether the Easement Package can be reviewed in a timely fashion; and (2) to determine whether the Easement Package should be approved. The Remedial Party and the Remedial Party's attorney understand and acknowledge that any false statement or misrepresentation herein will constitute cause for the revocation of the Certificate of Completion issued in reliance on this checklist and accompanying documentation. The Remedial Party and the Remedial Party's attorney further acknowledge that the failure to provide the Department with valid and enforceable Environmental Easement on the property may be grounds for the Department to revoke any Certificate of Completion for the site.

Statement of Certification and Signatures

I have reviewed the information being submitted in relation to this Easement Package and this information, to the best of my knowledge and belief, is accurate and correct. I further acknowledge that the failure to provide the Department with valid and enforceable Environmental Easement on the property may be grounds for the Department to revoke any Certificate of Completion for the site.

1) By Remedial Party:
I hereby affirm that information provided on this form and its attachments is true and complete to the best of my knowledge and belief. I further acknowledge that the failure to provide the Department with valid and enforceable Environmental Easement on the property may be grounds for the Department to revoke any Certificate of Completion for the site.

Date: _____ Signature: _____

Print Name: Herbert H. Redl

2) By Remedial Party's Attorney:
I hereby affirm that I am the attorney for _____ (entity); that I am authorized by that entity to make this certification; that this certification was prepared by me or under my supervision and direction; and that information provided on this form and its attachments is true and complete to the best of my knowledge and belief.

Date: _____ Signature: _____

Print Name: _____

Attachment

Attachment A

Documents required to be sent in hard copy with electronic formats copied to the Project Manager and Project Attorney for a complete Environmental Easement package:

1) Copy(ies) of current deed(s) and supporting title documentation (see Department Title Requirements).

2) Copy of tax map.

3) Proof of authority to obligate owner of property as set forth in "Verification of ownership of property" on the Easement checklist.

4) Legal description of the easement area, electronic copy to be in an electronic text format (i.e., MS Word or Rich Text Format).

5) One full-sized, signed Survey and an electronic Survey submitted as a fully rendered PDF (not scanned).

6) A draft Notice to Municipality, with appropriate site-specific provisions.

7) Easement Checklist with certification signed by Remedial Party and Remedial Party's attorney.

8) Signed transfer tax forms (TP-584 or ACRIS Forms).

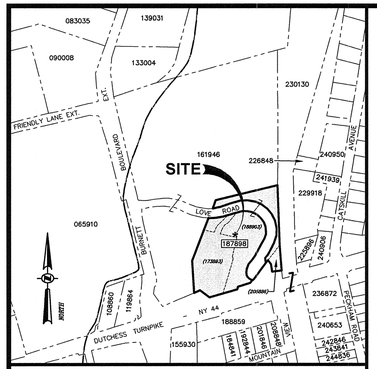
Hard copy submission shall be sent to:

Bradford Burns, Esq.
New York State Department of Environmental Conservation
Office of General Counsel
625 Broadway
Albany, NY 12233-1500

VERIFICATION OF PROPERTY SUBJECT TO EASEMENT

The description of the Premises mentioned in the Deed differs from the metes and bounds description in the Environmental Easement. This verification is submitted to comply with Paragraph 3 of the Environmental Easement Checklist.

The premises were purchased through 3 separate deeds and tax parcels. The three tax parcels were combined into one single tax parcel and an appropriate amendment was made to the Brownfield Agreement. Owner caused a new survey to be performed of the Premises which created a new single metes and bounds description for the Premises.



VICINITY / TAX MAP

SCALE: 1"=400'±

LEGEND

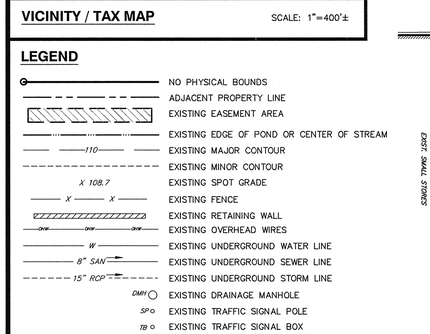
●———	NO PHYSICAL BOUNDS
— — —	ADJACENT PROPERTY LINE
▨	EXISTING EASEMENT AREA
—···—	EXISTING EDGE OF POND OR CENTER OF STREAM
——110——	EXISTING MAJOR CONTOUR
- - - -	EXISTING MINOR CONTOUR
X 108.7	EXISTING SPOT GRADE
—X—X—	EXISTING FENCE
▨	EXISTING RETAINING WALL
—OHW—OHW—	EXISTING OVERHEAD WIRES
——W——	EXISTING UNDERGROUND WATER LINE
——8" SAN→——	EXISTING UNDERGROUND SEWER LINE
- - 15" RCP→ - -	EXISTING UNDERGROUND STORM LINE
DMH ○	EXISTING DRAINAGE MANHOLE
SP ○	EXISTING TRAFFIC SIGNAL POLE
TB ○	EXISTING TRAFFIC SIGNAL BOX
ELEC □	EXISTING ELECTRICAL STRUCTURE
LP ☼	EXISTING LIGHT POLE
GV ○	EXISTING GAS VALVE
GM □	EXISTING GAS METER
GAS □	EXISTING GAS STRUCTURE
HYD ○	EXISTING HYDRANT
WV ○	EXISTING WATER VALVE
WSO ○	EXISTING WATER SHUT OFF
SIGN —o—	EXISTING SIGN

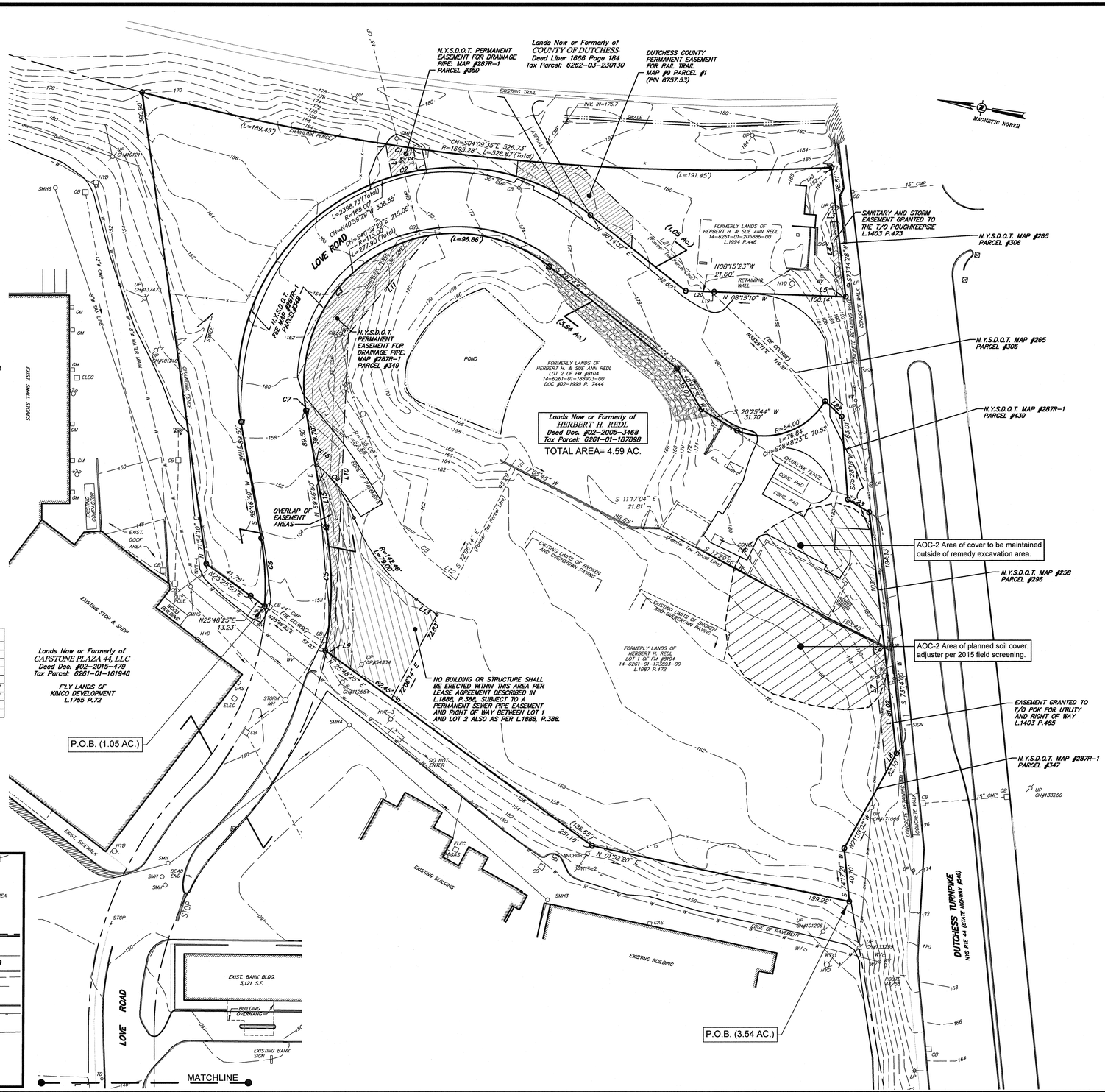
LINE TABLE

LINE	BEARING	LENGTH
L1	N 69°09'49" E	25.14'
L2	S 69°19'23" W	17.30'
L3	S 15°33'07" E	5.27'
L4	N 74°26'53" E	56.71'
L5	N 08°15'10" W	6.54'
L6	S 17°29'06" W	9.86'
L7	N 73°53'14" E	99.77'
L8	N 71°38'02" W	16.14'
L9	N 25°48'25" E	8.25'
L10	N 82°12'32" E	245.08'
L11	S 61°00'23" E	97.10'
L12	S 26°23'06" W	14.99'
L13	N 26°23'06" E	19.47'
L14	S 31°41'02" W	40.79'
L15	N 69°46'50" E	49.80'
L16	N 31°41'02" E	3.04'
L19	N 08°15'23" W	2.00'
L20	N 08°15'23" W	19.60'
L21	N 33°25'11" E	138.90'
L22	S 32°48'41" W	17.03'
L23	S 20°44'14" W	19.03'

CURVE TABLE

CURVE	RADIUS	LENGTH	CHORD
C1	1695.28'	21.12'	
C2	165.00'	19.97'	
C3	115.00'	172.51'	
C4	106.08'	49.02'	
C5	265.00'	94.34'	N79°58'43"E 93.84'
C6	215.00'	51.81'	S76°41'04"W 51.69'
C7	115.00'	8.53'	
C8	112.46'	62.37'	





RECORD DESCRIPTION TAX PARCEL 6261-01-187898:

(transposed from Deed Doc. #02-2005-3468)

(1) ALL that tract or parcel of land situate in the Town of Poughkeepsie. Dutchess County, New York, on the north side of the highway leading from Poughkeepsie to Pleasant Valley, formerly known as the Dutchess Turnpike:

BEGINNING at a point in the north line of said highway at or opposite an elm tree standing on or near the north line of said highway about two hundred twenty-two (222) feet westerly along said highway from the west line of the land and right of way of the Central New England Railway Company, and running thence easterly along the north line of said highway two hundred twenty-two {222) feet more or less to the west line of the lands and right of way of the Central New England Railway Company two hundred twelve feet (212) to a point in said line; thence southwesterly in a straight line to the place of beginning: together with all the right, title and interest of party of the first part in and to the highway in front of said premises to the center line thereof. Being a triangular parcel of land bounded on the east by lands of the Central New England Railway Company, on the south by the highway and northwesterly by other lands of the party of the first part.

BEING the same premises conveyed by Adirondack Bottled Gas Corporation of New York to National Propane, L.P. by deed dated June 25, 1996 and recorded in the Dutchess County Clerk's Office on July 2. 1996 in Liber 1981 of Deeds at page 401.

(2) ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Poughkeepsie, County of Dutchess, State of New York, described as follows:

Grid No. 14-6261-01-173893-00

(3) ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York, known as Lot #2 on Map No. 8104 on file in the Dutchess County Clerk's Office Sept. 4, 1987.

TOGETHER with all right, title and interest, if any, of the party of the first part in and to any streets and roads abutting the above described premises to the center lines thereof; TOGETHER with the appurtenances and all the estate and rights of the party of the first part in and to said premises; TO HAVE AND TO HOLD the premises herein granted unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

SURVEY DESCRIPTION TAX PARCEL 6261-01-187898:

ALL that certain plot, piece or parcel of land on the southerly and westerly side of Love Road, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York and being more particularly bounded and described as follows;

BEGINNING at a point on the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549) at the southwesterly corner of the herein described parcel and the southeasterly corner of lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479, said point also being the southwesterly corner of Lot 1 as shown on a certain map entitled "Subdivision Map and Survey Map of the lands of Donald P. Love & H. Paul Richards" filed in the office of the Dutchess County Clerk September 4, 1987 as filed map #8104, and running;

Thence northerly along the division line between the herein described parcel on the east and said lands of Capstone Plaza 44, LLC on the west, N 01°52'20" E 199.92 feet, and N 25°48'25" E 251.10 feet to the southerly side of Love Road; thence along the southerly side of Love Road, along a non-tangent curve to the left having a radius of 265.00 feet, an arc length of 94.34 feet and a chord bearing N 79°58'43" E 93.84 feet, N 69°46'50" E 89.50 feet, along a tangent curve to the right having a radius of 115.00 feet, an arc length of 277.90 feet and a chord bearing S 40°59'29" E 215.05 feet, S 28°14'42" W 124.20 feet, S 48°47'30" W 36.00 feet, S 20°25'44" W 31.70 feet, along a non-tangent curve to the left having a radius of 54.00 feet an arc length of 76.84 feet and a chord bearing S 28°48'23" E 70.52 feet to the northerly side of said Dutchess Turnpike NYS Route 44 (State Highway #549); thence westerly, along the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549), S 32°48'41" W 17.03 feet, S 75°28'16" W 63.01 feet, S 20°44'14" W 19.03 feet, S 73°14'00" W 184.13 feet, N 71°38'02" W 82.10 feet and S 74°17'21" W 40.70 feet to the point or place of BEGINNING.

CONTAINING 3.54 Acres of Land more or less

Also ALL that certain plot, piece or parcel of land on the northerly and easterly side of Love Road, situate, lying and being in the Town of Poughkeepsie, Dutchess County, New York and being more particularly bounded and described as follows;

BEGINNING at a point on the northerly side of Love Road, said point being distant 57.03 feet northerly as measured on a course of N 25°48'25" E from the northwesterly corner of the aforementioned parcel on the southerly and westerly side of Love Road, and running;
Thence northerly along the division line between the herein described parcel on the east and lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479 on the west, N 25°48'25" E 13.23 feet and N 25°25'50" E 41.75 feet to the northwesterly corner of the herein described parcel, said point also being the northwesterly corner of Lot 2 as shown on a certain map entitled "Subdivision Map and Survey Map of the lands of Donald P. Love & H. Paul Richards" filed in the office of the Dutchess County Clerk September 4, 1987 as filed map #8104; thence easterly along the division line between the herein described parcel on the south and lands now or formerly of Capstone Plaza 44, LLC as described in Deed Document #02-2015-479 on the north, N 71°54'10" E 360.90 feet to the westerly line of Lands now or formerly of County of Dutchess as described in Liber 1666 of deeds at page 184; thence along a non-tangent curve to the left having a radius of 1,695.28 feet, an arc length of 528.87 feet and a chord bearing S 04°09'35" E 526.73 feet to the northerly side of Dutchess Turnpike NYS Route 44 (State Highway #549) at the southeasterly corner of the herein described parcel; thence along the northerly side of said Turnpike in part, and along the northeasterly side of Love Road in part, S 73°14'28" W 98.81 feet, N 08°15'10" W 100.14 feet, N 08°15'23" W 21.60 feet; thence continuing along the northeasterly side of Love Road, N 28°14'37" E 92.60 feet, along a non-tangent curve to the left having a radius of 165.00 feet, an arc length of 398.73 feet and a chord bearing N 40°59'29" W 308.55 feet, S 69°46'50" W 89.50 feet and along a tangent curve to the right having a radius of 215.00 feet, an arc length of 51.81 feet and a chord bearing S 76°41'04" W 51.69 feet to the point or place of BEGINNING.

CONTAINING 1.05 Acres of Land more or less

The above described parcels having a combined, total area of 4.59 Acres more or less.

SURVEY 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.

TOPOGRAPHY SHOWN HEREON WAS COMPILED FROM A FIELD SURVEY COMPLETED DECEMBER 11, 1999 AND APRIL 18, 2001. DATUM: USGS (1929 NGVD), 2 FOOT CONTOUR INTERVAL.

COPYRIGHT CHAZEN ENGINEERING, LAND SURVEYING & LANDSCAPE ARCHITECTURE CO., D.P.C., ALL RIGHTS RESERVED.

SURVEYED FROM RECORD DESCRIPTION AND AS IN POSSESSION.

SUB-SURFACE STRUCTURES NOT VISIBLE OR READILY APPARENT ARE NOT SHOWN AND THEIR LOCATIONS AND EXTENTS ARE NOT CERTIFIED.

SUBJECT TO COVENANTS, EASEMENTS, RESTRICTIONS, CONDITIONS AND AGREEMENTS OF RECORD.

SURVEY SUBJECT TO ANY RIGHT, TITLE OR INTEREST THE PUBLIC MAY HAVE FOR HIGHWAY USE.

MAP REFERENCE:

1. FILED MAP #8104 ENTITLED "SURVEY MAP OF THE LANDS OF DONALD LOVE AND H. PAUL RICHARDS", PREPARED BY RAYMOND J. KIHLMIRE, L.S., FILED IN THE DUTCHESS COUNTY CLERKS OFFICE ON SEPTEMBER 04, 1987.

TAX PARCEL NUMBER:	DEED REFERENCES:
TOWN OF POUGHKEEPSIE, DUTCHESS COUNTY, NY	
134689-6261-01-187898	HERBERT H. REDL – DOC.# 02-2005-3468
(Formerly: 134689-6261-01-173893-00	*HERBERT H. REDL – DEED LIBER 1987 PAGE 472)*
(Formerly: 134689-6261-01-188903-00	*HERBERT H. AND SUE ANN REDL– DOC#02-1999 PAGE 7444)*
(Formerly: 134689-6261-01-205886-00	*HERBERT H. AND SUE ANN REDL – DEED LIBER 1994 PAGE 446)*

ENVIRONMENTAL EASEMENT NOTE NYSDEC CONTRACT NO. C314113:

THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO TITLE 36 OF ARTICLE 71 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW.THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THIS EASEMENT ARE SET FORTH IN THE SITE MANAGEMENT PLAN (SMP). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP CAN BE OBTAINED FROM NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR AT "derweb@dec.ny.gov.".

40 0 40
SCALE IN FEET
1"=40'

10M 0 10M
SCALE IN METERS

0 1 2 3
ORIGINAL SCALE IN INCHES

I HEREBY CERTIFY THAT THIS SURVEY MAP IS BASED ON AN ACTUAL FIELD SURVEY COMPLETED JULY 17, 2017 AND THAT THIS SURVEY MAP WAS MADE BY ME OR UNDER MY DIRECTION, AND CONFORMS WITH THE MINIMUM STANDARD OF PRACTICE ADOPTED BY THE NEW YORK STATE ASSOCIATION OF PROFESSIONAL LAND SURVEYORS.

050016
STEVEN J. ALEX, L.S. #50016

CHAZEN ENGINEERING, LAND SURVEYING & LANDSCAPE ARCHITECTURE, CO., D.P.C.

THE Chazen COMPANIES®
Proud to be Employee Owned
Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

Office Locations:

☒ Hudson Valley Office:
21 Fox Street
Poughkeepsie, New York 12601
Phone: (845) 454-3980

☐ North Country Office:
375 Bay Road
Queensbury, New York 12804
Phone: (518) 812-0513

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

☐ Central NY Office:
721 East Genesee Street
Syracuse, New York 13210
Phone: (315) 251-1013

Tennessee Office:
1705 Division Street
Nashville, Tennessee 37203
Phone: (615) 953-4909

rev.	date	description

LOVE ROAD BCP

MAP OF ENVIRONMENTAL EASEMENT SURVEY PREPARED FOR HERB REDL PROPERTIES

TOWN OF POUGHKEEPSIE, DUTCHESS COUNTY, NEW YORK

designed CJS	checked
date 07/26/17	scale 1"=40'
project no. 81434.00	
sheet no. SV1	

Drawing Name: Z:\projects\81400-81499\81434.00 Herb Redl_Love Rd BCP\DWG\05_SVY_81434-00_ENV-ESMT.dwg
Xref's Attached: XTB_81434-00_H24x36; XBASE-SVY_81434-00
Date Printed: Jul 26, 2017, 1:54pm

APPENDIX C – GROUNDWATER MONITORING WELLS CONSTRUCTION LOGS

Fuss & O'Neill of New York P.C.

MONITORING WELL COMPLETION REPORT
GENERAL INFORMATION

GENERAL INFORMATION

Project Name: Redl 2 Love Road

Project Location: 2 Love Rd, Poughkeepsie, NY

F&O Engineer/Geologist: LMO, RST

Date of Completion: 8/01/05

Boring Location: SB-14 end of tree line near foundation, at TP-28

Drilling Contractor: F&O - Dan Levesque

Drilling Method: Direct Push / Beoprobe

Site ID (Boring/Well ID): SB-14/MW-01

Project No.: 20040761.A2N

Ground Surface Elevation: _____

Permit #: X

El Top of Steel Casing: X

El Top of PVC Casing: 3.6' above ground surface

Measuring Point: TPS / PVC
Well Cover (see codes): ground surface

WELL CONSTRUCTION

Well Casing/Riser
Diameter: 1" in.
Type: PVC
Stick-up: 3.6' ft.

Sump (below screen)
Diameter: 1" in.
Type: PVC
Length: _____ in.

Protective Casing
Diameter: X in. Type: X
Stick-up: X ft Depth to Bottom: X ft
Seal Material: bentonite

Screen Intervals
Screen Interval: 10' ft Diameter: 1" in. Slot Size: _____ in.
Description: (PVC) / Other: _____
Type: Perforated / (Slotted) / Wire-Wrap / Other: _____

ANNULAR FILL

Surface Seal (Approximate volumes if available)
Interval: _____ ft. Tremied: Y / (N) Volume: ~~slight~~ thin cover
Description: Concrete / Other: native material

Backfill
Interval: ~~N/A~~ 1' ft. Tremied: Y / (N) Volume: 1/2 bag bags
Description: ~~Bentonite Grout~~ Fill / Other: _____

~~Lower Seal~~
Interval: N/A ft. Tremied: Y / (N) Volume: _____ bags
Description: Bentonite / Bentonite Pellets / Grout / Other: _____

Filter
Interval: _____ ft. Tremied: Y / (N) Volume: 1 bags
Description: (Sand Filter) (type: _____) / Other: _____

Lower Backfill
Interval: _____ ft. Tremied: Y / (N) Volume: 1 bags
Description: Bentonite Grout / Fill / Other: sand

Fuss & O'Neill of New York P.C.

MONITORING WELL COMPLETION REPORT
GENERAL INFORMATION

GENERAL INFORMATION

Project Name: Redl 2 love road
Site ID (Boring/Well ID): SB-25/MW-02
Project Location: 2 Love Rd, Poughkeepsie, NY
Project No.: 20040761.A2N
F&O Engineer/Geologist: LMG
Ground Surface Elevation: x
Date of Completion: 8/01/05
Permit #: x
Boring Location: center of bowl area, SB-25
El Top of Steel Casing: x
Drilling Contractor: F30 - Dan Levesque
El Top of PVC Casing: 3.3' above grade
Drilling Method: Direct Push / Geoprobe
Measuring Point: TPS / PVC
Well Cover (see codes): ground surface

WELL CONSTRUCTION

Well Casing/Riser
Diameter: 1" in.
Type: PVC
Stick-up: 3.3 ft.

Sump (below screen)
Diameter: 1 in.
Type: PVC
Length: ____ in.

Protective Casing
Diameter: x in.
Type: x
Stick-up: x ft
Depth to Bottom: x ft
Seal Material: x

Screen Intervals
Screen Interval: ~~x~~ 10 ft
Diameter: 1" in.
Slot Size: ____ in.
Description: (PVC) / Other: ____
Type: Perforated / (Slotted) / Wire-Wrap / Other: ____

ANNULAR FILL

(Approximate volumes if available)

Surface Seal
Interval: 0" - 1" ft.
Tremied: Y / (N)
Volume: thin cover bags
Description: Concrete / Other: native material

Backfill
Interval: ____ ft.
Tremied: Y / (N)
Volume: ____ bags
Description: (Bentonite Grout) / Fill / Other: ____

Lower Seal
Interval: N/A ft.
Tremied: Y / N
Volume: ____ bags
Description: Bentonite / Bentonite Pellets / Grout / Other: ____

Filter
Interval: ____ ft.
Tremied: Y / (N)
Volume: ____ bags
Description: (Sand Filter (type: ____)) / Other: ____

Lower Backfill
Interval: ____ ft.
Tremied: Y / (N)
Volume: ____ bags
Description: Bentonite Grout / Fill / Other: Sand

Monitoring Well Construction Details

Installation Date: September 25, 2017

Drilling Method: Direct Push, Geoprobe 7822DT drill rig

Casing/Screen: 1-inch diameter PVC, 10-slot

Annual Fill: #2 sand pack to approximately 5 feet bgs, granular bentonite to 1 foot bgs.

Finish: Stick-up with lockable protective steel guard pipe.

Well ID	Location Relative to Excavation	Depth to Bottom	Top of Screen
		(feet below grade, approximate)	
MW-5	Upgradient	22	7
MW-6	Within (replaces 2009-MW-1)	27	7
MW-7	Downgradient	22	7

APPENDIX D – SITE MANAGEMENT FORMS

THE Chazen COMPANIES

ANNUAL SITE INSPECTION FORM

Love Road Development Site BCP Site No. C314113
Love Road, Poughkeepsie, Dutchess County

Performed by: _____ Date: _____ Time: _____

Part 1 - Institutional and Engineering Controls (circle one)		
1A - Is site still an unused lot with two areas of soil cover? If "NO" describe new use.	No	Yes
1B - Is there evidence of ground disturbance or other intrusive activities?	No	Yes
1C - Is there evidence of cover stresses, including settling or erosion of surface materials?	No	Yes
1D - Are there discolored, stressed, or areas absent of vegetation in soil cover area?	No	Yes
1E - Is site groundwater being used for any purpose (i.e., has a well been installed)?	No	Yes
1F - Have any buildings been constructed on the eastern area of AOC-2?	No	Yes
1G - If YES to question 1F, what were results of soil vapor intrustion investigation?		
1H - If SVI investigation docuemtned need for vapor mitigation, describe mitigation measures taken/installed.		

Part 2 - General Site Conditions
2A - Describe changes since last inspection

Part 3 - Compliance with Excavation Work Plan
3A - Describe site construction activities that have been conducted since last inspection (see SMP for soil management criteria)
3B - Describe soil excavation and disposition (on site/off site). Map excavation areas and on site placement.

Part 4 - Confirm that site records are up to date

No	Yes		4A - Are there any changes that need to be documented in site records (e.g., change of ownership, site usage)
No	Yes	NA	4B - Has DEC received notice of any proposed ground intrusive activities?

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 E – HEALTH AND SAFETY PLAN

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the site. 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;
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.
- Internal QC and Checks;
- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.
- Assessing achievement of the remedial performance criteria.
- Preparing the necessary reports for the various monitoring activities.
- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;

APPENDIX F – QUALITY ASSURANCE PROJECT PLAN

Quality Assurance Program Plan

Love Road Development Site
Brownfield Cleanup Program
NYSDEC Site No. C314113

20-50 Love Road
Town of Poughkeepsie
Dutchess County, New York

May 2016

THE Chazen COMPANIES

Prepared for:

Herbert H. Redl
Commercial and Office Properties
80 Washington Street
City of Poughkeepsie, New York 12601

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7014

Prepared by:

Hudson Valley Office:
The Chazen Companies
21 Fox Street
Poughkeepsie, New York 12601

Capital District Office
(518) 273-0055

North Country Office
(518) 812-0513

TABLE OF CONTENTS

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 applicable work performed by Chazen in the areas of Remedial Investigations, Interim Remedial Measures, Alternatives Analyses, Remedial Design (RD), and long-term environmental monitoring. We note that this QAPP describes numerous investigative techniques and methods, some of which may not be applicable to the Lower South Street Redevelopment Area Brownfields Cleanup Project. However, the more expansive list of techniques is included to avoid the need for additional QAPP documentation, should another sampling method be deemed appropriate late in the investigation/remedy.

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 DER-10 “Technical Guidance for Site Investigation and Remediation. The QAPP will also reference all portions of the Work Plan relevant to the particular site.

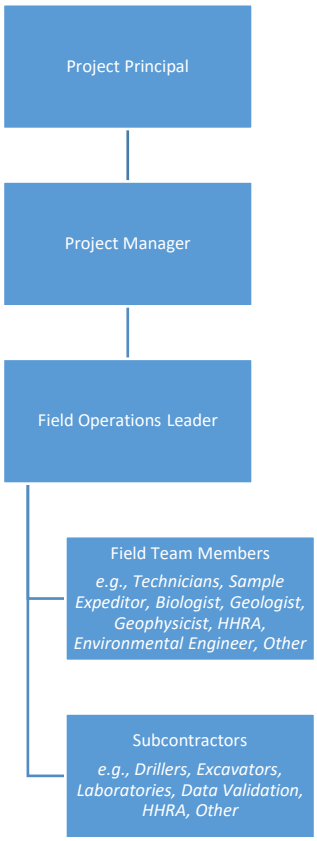
The QAPP is divided into 14 sections as described in the document “Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final”, 1988 (EPA/540/G-89/004).

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 Manager 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/she 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 an experienced member of the 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, 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 or investigations where the potential exists to contact hazardous wastes 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 a qualified firm will also be identified.

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:

- 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 are 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.

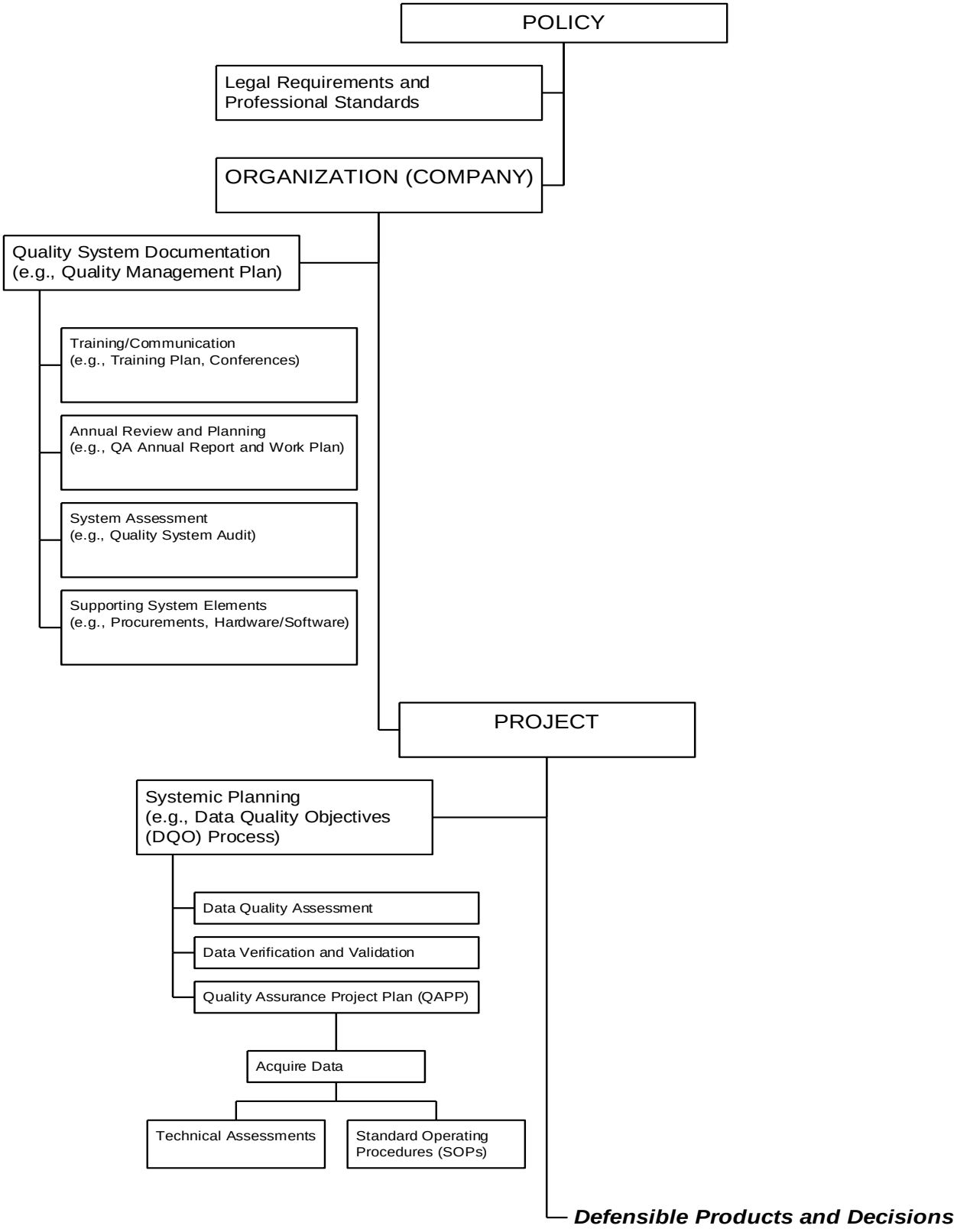
Data quality objectives are developed through an iterative process by which all the DQO elements are continually reviewed and re-evaluated to meet the overall project objectives. This process can be summarized as follows:

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:

$$\%RPD = \frac{D_1 - D_2}{\left(D_1 + D_2\right)/2} \times 100\%$$

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 such as gas chromatograph and x-ray fluorescence (XRF) analyzer. 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 DER-10.

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 Program Policy DER-10, Technical Guidance for Site Investigation and Remediation, and NYSDEC Regulations 6 NYCRR Part 375, Environmental Remediation Programs 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 may 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 a typical Sample Identification codes system for soil, groundwater, and sediment samples is shown below:

Sample Identification Code System

Digits	*Identification*	*Description*	*Code/Example*	
1, 2,3	Site Code	Three letter code to identify the site	LSS	Lower South Street
4,5	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
6, 7, 8	Sample Locator	Three numbers to identify sample site name or location	MW22	Monitoring Well Groundwater Sample from Well 22
9, 10, 11	Depth of Sample Below Reference Surface		SB01(0-2')	SB samples collected from 0 to 2 feet below ground surface (bgs)
			MW22(25)	MW sample depth is assumed to be the bottom of the well screen measured in feet bgs
			XXX	All samples obtained from drums or containers will be designated XXX
12, 13			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 (sample locator ID not used for blind field duplicates)
			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 typically 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 American Society for Testing and Materials (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.

If sampling for VOCs is needed and will use EPA Method 5035, the disposable transfer tool will be obtained from the laboratory.

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 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, PCB, and Pesticide 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	3 EnCore 5 gram samplers OR one set of 4 – 40 mL glass vials with Teflon faced septa. One unpreserved, one with 10 mL methanol and two with 5 mL deionized water and a magnetic stir bar. Each vial must be filled with at least 5 grams of soil.	10 grams	Cool (4°C). Freezing samples can extend holding time; 48 hours unfrozen holding time will be considered cumulative.	48 hours
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 DER-10 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 DER-10 will be used as guidance for on-site disposal of non-hazardous soils including:

- Backfill inside borehole to within 12 inches of the surface. Soil will not be returned to a boring if it contains free product, non-aqueous phase liquid, or grossly contaminated soil.
- Collect and dispose on-site following characterization and NYSDEC approval.
- Temporarily store on-site prior to off-site disposal.
- Transport from off-site areas that meet Unrestricted Use SCOs 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 NYSDEC DER-10 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. Alternatives for the disposal of groundwater generated during remedial investigations at hazardous or petroleum impacted sites are provided below:

- On-site disposal of non-impacted groundwater by allowing water to recharge and infiltrate into unpaved ground into the same groundwater unit in a manner which does not result in surface water runoff.
- 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;

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 direct push (e.g. Geoprobe®), 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:		**Total Depth:**	ft.
PROJECT NO.:			
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.

4.8.2 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

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 are 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. 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. 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 or Field Sampling 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, as needed.
- 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

$$(e_r)^{1/2} = \frac{c}{V_m} \qquad \text{or} \qquad \frac{1}{V_m} = \frac{(e_r)^2}{c}$$

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 (addressed separately in section 4.15), 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 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.

4.14.2 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 4.14.1 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 4- or 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 performed 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 is the preferred laboratory analytical method.

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.
  - Sample Delivery Group (SDG) ID (assigned by the laboratory on receipt of samples). The SDG is a group of up to 20 discrete samples (not including the QA/QC samples) of the same environmental media collected from the same project Site over not more than seven consecutive days and submitted for analysis by the same laboratory analytical methods and procedures. A separate chain-of-custody must be prepared for each day of sampling. If, at the end of a given day you do not have enough samples (20) to complete an SDG and will be returning within the next six days to collect more samples; place a note in the comment section of the COC that says: "Hold SDG open: Additional Samples Pending". When the SDG is complete, in the comment section of the COC add note: "SDG complete". If this SDG is the last set of samples from a specific sampling event, also add a note in the comment section that says: "Sampling Complete; no additional sample shipments pending at this time."

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

A copy of all COC records is also maintained in a project file. Pertinent COC information is recorded in the file, 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 file 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 collection.
3) Prior to leaving the field, the Analytical Lab is notified of the number, type, collection date, and shipment dates for samples. Notification to the Lab also occurs when sample shipments will arrive on a Saturday. 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, Chazen uses a MiniRae PID. This instrument measures total VOC concentrations. The operating and calibrating procedures for this instrument follow.

A MiniRAE Model 2000 or 3000 PID (hereafter simply MiniRAE) can be used to detect a variety of trace gases, particularly VOCs. The MiniRAE uses the principle of photoionization to detect and measure the VOC concentrations in the atmosphere or from a sample.

The MiniRAE 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

Methods of operation and calibration for the MiniRAE 3000 are similar to those for the MiniRAE 2000. The MiniRAE is calibrated once per day or more frequently, if necessary. The MiniRAE 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 an 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.

6.1.5 XRF Analyzer

For field screening of select metals in soil, Chazen uses a Niton XL2 GOLDD, which utilizes a Thermo-Scientific x-ray tube. The operating and calibrating procedures for this instrument follow. See the HASP for information on safely using the XRF.

The following procedure is used for transporting, operating and calibrating the Niton XL2 GOLDD:

- For shipping, the battery pack is disconnected from the analyzer, and then the XRF is shipped in its carrying case and an over-pack to protect the sensitive measuring equipment inside the analyzer. There are no X-ray tube specific US Department of Transportation (DOT) or International Air Transport Association (IATA) radiation regulations regarding shipping the Niton XL2 analyzer.
- After turning on the XRF, wait five minutes for electronics to stabilize.
- From the Main Menu, select the System Check icon the Yes. This will calibrate the XRF and verify that it is operating to specifications.
- Select the Main Range filter which provides optimum sensitivity for manganese (atomic number 25) through bismuth (atomic number 83), which will also capture lead (atomic number 82).
- Set element ranges.
- Place soil sample in a sealable plastic bag to provide an approximately 2-inch-square section. Place the analyzer against the bag so the x-ray beam shutter is covered, then press and hold trigger, and release trigger after analysis. Log results.
- As a QC check, measure the supplied reference calibration check sample at least once per shift. If correct, continue work. If incorrect, redo System Check and re-take the previous two hours of readings.
- If the XRF is lost or stolen, immediately contact Matthew Williams (Chazen) at 518-266-7313 and Eco-Rental Solution (866-843-2165 or 914-400-0324), and the local police (911).

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).

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, sometimes called rinsate blanks, are collected during each field event at a rate of one per day. 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.

Temperature Blanks: Temperature blanks are for ensuring that the samples have arrived at the lab at 4°C. The lab will check the temperature of the Temp Blank on arrival and write it on the COC when logging in the samples.

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., XRF analyzer).

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 I: 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.

15.0 REFERENCES

American Society for Testing and Materials, 1990. "Standard Practice Identification of Soils (Visual-Manual) Procedure." ASTM-D-2 488-84. Section 4 - Construction, Vol. 4.08.

American Society for Testing and Materials, 1983. "Standard Practice for Thin-Walled Tube Sampling of Soils." ASTM-D-1587; Philadelphia, PA.

American Society for Testing and Materials, 1984. "Standard Methods for Penetration Test Split Barrel Sampling of Soils." ASTM-D-1586, Philadelphia, PA.

Benson, R., et al., 1988. Geophysical Techniques for Sensing Buried Wastes and Waste Migration. National Water Well Association. 236 p.

Bouwer, H. and R.C. Rice, 1976. "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells." Water Resource Research, 12:423-428.

Bouwer, H., 1989. "The Bouwer and Rice Slug Test - An Update.," Groundwater 27, No. 3, May-June, 1989.

Cooper, H.H., Bredehoeft, and S.S. Papadopulos, 1976. "Response of a finite diameter well to an instantaneous charge of water." Water Resources Research, Vol 3., No. 1; pp. 263-269.

Dawson, K, Istok, J., 1991. Aquifer Testing - Design and Analysis of Pumping and-Slug Tests. Lewis Publishers, 344 p.

Driscoll, F.G., 1989. Groundwater and Wells. Johnson Filtration Systems, Inc., St. Paul, MN (Second Edition), 1108 p.

Hvorslev, M.J., 1985. "Time lag and soil permeability in groundwater observations." U.S. Army Corps of Engineer, Waterway Experiment Station Bulletin 36. Vicksburg, MS 50 p.

Milsom, J., 1989. Field Geophysics. Open University Press, 182 p.

New York State Department of Environmental Conservation, May 3, 2010, DER-10 Technical Guildance for Site Investigation and Remediation

NYS Department of Environmental Conservation Division of Hazardous Substances Regulation, 1991. "RCRA Quality Assurance Project Plan Guidance"

NYSDEC, 1993. "Analytical Services Protocol." Revised September 1993.

Puls, Robert W. and Michael J. Barcelona, United States Environmental Protection Agency, 1995. "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures"

United States Environmental Protection Agency, 1987. "A Compendium of Superfund Field Operations Methods."

United States Environmental Protection Agency, 1987. "Data Quality Objectives for Remedial Response Activities (Development Process)." (PB88-131370).

United States Environmental Protection Agency, 1988. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA - Interim Final." (EPAJ54O/G-89/0004).

United States Environmental Protection Agency, October 1989, "Laboratory Data Validation, Functional Guidelines for Evaluating Inorganic Analyses."

Unites States Environmental Protection Agency, June 1991, "National Functional Guidelines for Organics Review."

United States Environmental Protection Agency, 1986. "Test Methods for Evaluating Solid Wastes." SW-846, November 1986, Third Edition.

United States Environmental Protection Agency, 1988. "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses." July 1, 1988.

Wilson, N., 1995. Soil Water and Groundwater Sampling. Lewis Publishers, 188 p.

APPENDIX G – EXCAVATION WORK PLAN (EWP)

G-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 NYSDEC. Table G-1includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix A**.

Table G-1: Notifications*

Herbert H. Redl, property owner	845-471-3388
John Miller, P.E., NYSDEC Project Manager	518-402-9589 john.miller@dec.ny.gov
Russell Urban-Mead, QEP and Project Principle, Chazen Companies	845-486-1551 rum@chazencompanies.com
Arlette St. Romain, Project Manager, Chazen Companies	518-266-7328 arlette@chazencompanies.com
Frank Redl, Remedial Party Attorney	845-471-3388 ext 105 frank@redlh.com

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings 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 to be encountered 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;
- 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 (HASP), in electronic format, if it differs from the HASP provided in **Appendix E** of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

G-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when 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 and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections G-6 and G-7 of this Appendix.

G-3 SOIL STAGING METHODS

Soil stockpiles 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 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 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 the NYSDEC.

G-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 remedial party (if applicable) and its contractors are 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).

A truck wash will be operated on-site, as appropriate. 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.

G-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.

Truck transport routes are as follows:

1. Exit site via Love Road and head west to Burnett Road (approx.. 450 feet)
2. Turn left on Burnett Road, head south to Route 44 (approx. 650 feet)
3. Turn right or left on Route 44.

All trucks loaded with site materials will exit the vicinity of the site using only this approved truck route. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

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

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

G-6 MATERIALS DISPOSAL OFF-SITE

All material 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 material 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 Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

G-7 MATERIALS REUSE ON-SITE

Material reuse on-site will comply with the requirements of NYSDEC DER-10 Section 5.4(e)4.

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. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the 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.

G-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters 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, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

G-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. The existing cover system is comprised of a minimum of 24 inches of clean soil, or asphalt pavement, concrete covered sidewalks and building foundations. The demarcation layer, consisting of orange construction fencing material will be replaced 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 SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), 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 an updated SMP.

G-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. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

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 listed in Table 375-6.8(b). 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.

G-11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a 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 the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

G-12 EXCAVATION 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 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 Review Report.

G-13 COMMUNITY AIR MONITORING PLAN (CAMP)

The CAMP provided in **Appendix H** of this SMP will apply to intrusive Site excavation work.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

G-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. 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 remedial party'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.

G-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 H – COMMUNITY AIR MONITORING PLAN (CAMP)

COMMUNITY AIR MONITORING PLAN

HERBERT REDL PROPERTIES
2 LOVE ROAD
POUGHKEEPSIE, NEW YORK

October 2005

Prepared for:

Herbert Redl Properties
80 Washington Street
Poughkeepsie, New York 12601

For Submittal to:

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

Prepared by:

Fuss & O'Neill of New York
80 Washington Street, Suite 301
Poughkeepsie, New York 12601

COMMUNITY AIR MONITORING PLAN
HERBERT REDL PROPERTIES
2 LOVE ROAD
POUGHKEEPSIE, NEW YORK

TABLE OF CONTENTS

Appendices

1.0 INTRODUCTION

This document presents the Community Air Monitoring Plan (CAMP) developed to address possible contact with airborne potentially hazardous materials or substances that may occur during site work at the Redl 2 Love Road BCP site (Site #C314113). This CAMP addresses specific air monitoring precautions and procedures to be taken during field work conducted at this BCP site.

The procedures and protocols in this plan have been established to provide a mechanism to protect project personnel and residents in adjacent neighborhoods from potential inhalation exposure to known site contaminants encountered during the remedial investigation. This plan addresses activities conducted by Fuss & O'Neill and its direct associates. It is not intended to include other site personnel or subcontractors not directly employed by Fuss & O'Neill.

Proposed remediation field activities at the Redl 2 Love Road property, including, but not limited to, an Interim Remedial Measure (IRM) for removal of an Underground Fuel Storage Tank, may result in the creation of potential exposure pathways via inhalation of dust and other potentially hazardous materials during soil removal and moving activity. These conditions could include the release of hazardous substances into the air in the form of vapors, dusts, or mists. These substances can enter the body through ingestion, inhalation, or direct skin or eye contact. Monitoring will be performed to ensure appropriate personal protective measures are employed during site activities and/or that appropriate measures are taken to reduce the likelihood that persons in the vicinity of the site during remediation activities are exposed to the hazardous substances.

2.0 AIR MONITORING

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be necessary. The subject BCP site is known to be contaminated with both heavy metals and VOCs, and therefore requires both particulate and VOC monitoring. Radiological contamination is not a concern at the subject site.

2.1 Continuous vs. Periodic Air Monitoring

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

The proposed IRM is to excavate an underground fuel storage tank, which requires the excavation of soil and soil sampling. Due to the conditions at the subject site and the close proximity of a residential neighborhood, continuous air monitoring is required during the tank and soil excavation. Periodic air monitoring is required while sampling around the area of the tank.

2.2 Initial Determinations

Observations will be made prior to any additional site work with direct reading organic vapor meters, combustible gas indicators, and oxygen detectors, etc. All instruments to be used during site activities will meet the established requirements set forth by OSHA, NIOSH, and state agencies where applicable.

All site monitoring will be conducted by or under the direction of the Site Health and Safety Officer or designated representative. All readings obtained will be recorded in a dedicated site notebook maintained by the Field Operations Leader. The Field Operations Leader will maintain all monitoring instruments throughout the site investigation to ensure their reliability and proper operation.

Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions.

3.0 VOC MONITORING

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area on a continuous basis during ground intrusive activities, or as otherwise specified. During non-intrusive ground activities, volatile organic compounds must be monitored at the downwind perimeter of the work area daily at 2 hour intervals (as opposed to continuously). The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below:

Point of Measure	Action Level	Action
Downwind Perimeter	> 5 ppm above background	Temporarily halt activities, continue monitoring.
Downwind Perimeter	< 5 ppm above background	Resume work activities with continued monitoring.
Downwind Perimeter	> 5 ppm, < 25 ppm	Halt work activities, identify source of vapors, take corrective action to abate emissions, continue monitoring.
Perimeter of Work Area	> 25 ppm	Shut down activities.

For measured VOC concentrations of 5-25 ppm, work activities can resume once the abovementioned steps have been followed. 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) must be below 5 ppm over background for the 15-minute average. If total organic vapor levels exceed 5 ppm above background levels, further provisions are discussed in the Vapor Emission Response Plan (Section 6.0).

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

4.0 PARTICULATE MONITORING (PM_{10})

During both ground intrusive and non-intrusive activities, particulates should be monitored continuously upwind, downwind, and within the work area at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. The 15-minutes running average will be compared with the following:

Particulate (PM_{10}) Monitoring Action Levels for 15-minute Average Concentrations		
Point of Measure	Action Level	Action
Downwind Perimeter	> 100 $\mu g/m^3$ above background	Employ dust suppression techniques.
Downwind Perimeter	100-150 $\mu g/m^3$ above upwind level, no visible dust	Continue work activities with dust suppression.
Downwind Perimeter	> 150 $\mu g/m^3$ above upwind level	Halt work activities, initiate a re-evaluation of activities. Resume when suppression measures reduce particulates to < 150 $\mu g/m^3$.
Perimeter of Work Area	> 25 ppm	Shut down activities

Similar to VOC monitoring activities, all readings must be recorded and be available for State (DEC and DOH) personnel to review.

5.0 MONITORING PROCEDURES AND ENGINEERING CONTROLS

5.1 Monitoring Procedures

Monitoring will be performed by the project Health and Safety Supervisor (HSS) or designee. Air monitoring instrumentation will be utilized in specific site work areas to monitor the worker breathing zone, and at the perimeter to monitor off-site migration. Personal air sampling for specific airborne contaminants may be performed at the direction of and under the supervision of the HSS. The types of instruments used and the contaminants they can detect are illustrated in Table 1. All air monitoring will be recorded on the Field Air Monitoring Logs located in Appendix A.

Table 1. Air Monitoring Instrumentation

Air Monitoring Instrument Name	Acronym	Contaminant(s) Monitored
Detector Tubes		Gases, Organic vapors, others
HNu Photoionization Detector	PID(OVM)	Organic Vapors
Handheld Aerosol Monitor	HAM	Dust, Particulate Material
Flame Ionization Detector	FID(OVA)	Organic Vapors

Background Monitoring

Real-time monitoring will occur as part of determining atmospheric background levels. Background levels will be established before conducting real-time monitoring in any restricted or exclusion zone work area.

Instrument Calibration and Maintenance

All monitoring equipment will be calibrated minimally once per day before each day's use. Monitoring equipment will be maintained on a schedule corresponding to the manufacturer's suggested maintenance schedule.

5.2 Engineering Controls

When airborne contaminants are detected in the area of ground-intrusive activities, engineering controls may be utilized to reduce the exposure potential to the worker and surrounding residents, and to prevent shutting down an operation. Various types of engineering controls may be utilized on a project such as this. Some available methods are listed below; however, this list does not provide the only types of engineering controls that may be available. Other methods may be implemented that are more effective and/or efficient than the ones listed below.

- Utilization of water to soak down area to minimize dust
- Utilization of polysheeting to cover stockpiles
- Utilization of calcium chloride

When considering on-site workers, it is more desirable to reduce employee exposure potential than to increase levels of employee personal and respiratory protection. The implementation of engineering controls will aide in reducing employee exposure potential.

5.3 Dust Suppression Techniques

Dust suppression may include utilization of water. The exclusion zone areas and access roads can be wetted when required by visible reference or as an action level is approached or exceeded.

During intrusive activities, such as soil sampling, project team members will conduct air monitoring in the working zone utilizing a NHu photoionization detector (PID). If PID readings in the work zone indicate concentrations of volatile organic vapors of 5 parts per million for a sustained period of 15 minutes, that activity will be shut down until field conditions stabilize and mitigation arrangements can be made to upgrade to an appropriate safety level. If warranted, field personnel will don splash protective clothing, including tyvek suits, chemical resistant gloves and boot covers, and safety glasses equipped with side shields.

Dust control measures including applying water to work areas will be implemented to control dust levels.

The approach for air monitoring and the establishment of appropriate action levels will be determined prior to commencement of work at the site.

6.0 VAPOR EMISSION RESPONSE PLAN

If the ambient air concentration of organic vapors exceeds 5 ppm above background levels at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background levels, work activities can resume. If the organic vapor levels are greater than 5 ppm above background levels but less than 25 ppm above background levels at the perimeter of the work area, activities can resume provided the organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm above background levels.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring, as directed by the HSO, will be implemented to assess vapor emission, which may impact the nearest

residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Major Vapor Emission: If any organic levels greater than 5 ppm above background levels are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If following the cessation of the work activities, or as the result of an emergency, organic levels persist above background levels 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if the following levels persist for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect; if organic vapor levels are approaching 5 ppm above background levels.

However, the Major Vapor Emission Response Plan shall immediately be placed into effect if organic vapor levels are greater than 10 ppm above background levels. Upon activation, the following activities will be undertaken as part of the Major Vapor Emission Response Plan:

- Emergency services will be notified. Emergency phone numbers are identified in the Emergency Services section on page 2 of this Plan.
- The local police authorities will immediately be contacted by the HSO and advised of the situation.

Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the HSO.

Appendix A

Field Air Monitoring Log

FIELD AIR MONITORING LOG

DATE: _____ SITE: _____ PAGE __OF __

SITE SAFETY OFFICER: _____

SAFETY MONITORS: _____

WEATHER CONDITIONS: _____

INSTRUMENTATION CONDITION: _____

ACTIVITY/REASON FOR MONITORING	LOCATION	TIME	READING	INITIALS

APPENDIX I

REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

REMEDIAL SYSTEM OPTIMIZATION REPORT OUTLINE FOR LOVE ROAD DEVELOPMENT SITE

TABLE OF CONTENTS