REMEDIAL INVESTIGATION / ALTERNATIVES ANALYSIS
FOR
FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD
CITY OF DUNKIRK, CHAUTAUQUA COUNTY, NEW YORK

WORK PLAN

Prepared for:

Chautauqua County Department of Public Facilities
454 North Work Street
Falconer, New York 14733

Prepared by:

TVGA CONSULTANTS

One Thousand Maple Road (716) 655-8842
Elma, NY 14059-0264 (fax) (716) 655-0937

2008.0011.00 APRIL 2008

RI/AA OF FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS STREET
CITY OF DUNKIRK, CHAUTAUQUA COUNTY, NEW YORK

WORK PLAN

TABLE OF CONTENTS

1.0	**INTRODUCTION**	**1**
	1.1 General Discussion	1
	1.2 Work Plan Overview	2
2.0	**SITE BACKGROUND, PHYSICAL SETTING AND ENVIRONMENTAL HISTORY**	**3**
	2.1 Background of Project Site History	3
	2.2 Environmental History	4
	2.2.1 Phase I ESA	4
	2.2.2 Phase II ESA	6
	2.3 Site Geology and Hydrology	10
	2.4 Areas of Potential Environmental Concern	11
3.0	**INITIAL EVALUATION**	**12**
	3.1 Potential Contaminants, Affected Media and Receptors	12
	3.2 Data Quality Objectives	12
	3.3 Scope of Site Investigation	13
4.0	**RI/AA TASKS**	**14**
	4.1 Scoping	14
	4.2 Citizen Participation Program	15
	4.3 Field Investigation	15
	4.3.1 Surveying and Title Search	15
	4.3.2 Radiological Survey	16
	4.3.3 Inventory of Containers	16
	4.3.4 Subsurface Investigation	16
	4.3.5 Surface Soil/Fill Investigation	19
	4.3.6 Investigation of Sumps, Vaults and Pits	19
	4.4 Sample Analysis/Validation	19
	4.4.1 Sample Analysis	19
	4.4.2 Data Validation	19
	4.5 Data Evaluation and Qualitative Risk Assessment	20
	4.6 Development and Analysis of Remedial Alternatives	20
	4.6.1 Development of Remedial Alternatives	20
	4.6.2 Detailed Analysis of Remedial Alternatives	21
	4.7 Remedial Investigation/Alternatives Analysis Report	21
	4.8 Proposed Remedial Action Plan	21
5.0	**PROJECT SCHEDULE**	**22**
6.0	**PROJECT ORGANIZATION AND MANAGEMENT**	**22**
	6.1 Project Organization	22
	6.2 Project Management	24
7.0	**PROJECT BUDGET**	**25**
8.0	**REFERENCES**	**25**

FIGURES

Figure 1	Site Location Map
Figure 2	Tax Map
Figure 3	Project Site Plan
Figure 4	Phase II Surface Soil and Sediment Sample Map
Figure 5	Phase II Subsurface Soil Sample Map
Figure 6	Phase II Groundwater Contour Map
Figure 7	RI Surface Soil and Sediment Sample Map
Figure 8	RI Subsurface Soil Sample Map
Figure 9	Proposed Groundwater Monitoring Wells Map
Figure 10	Project Schedule
Figure 11	Project Organization Chart

TABLES

Table 1	RI/AA Sampling/Analysis Summary

ATTACHMENTS

Attachment A	Summary of Analytical Results from Phase II ESA
Table 1A	Analytical Summary of SVOCs for Phase II Surface Soil/Fill Samples
Table 1B	Analytical Summary of Inorganic Parameters for the Phase II Surface Soil/Fill Samples
Table 2A	Analytical Summary of VOCs for Phase II Sediment Samples
Table 2B	Analytical Summary of SVOCs for Phase II Sediment Samples
Table 2C	Analytical Summary of Inorganic Parameters for Phase II Sediment Samples
Table 3A	Analytical Summary of VOCs for Phase II Subsurface Soil/Fill Samples
Table 3B	Analytical Summary of SVOCs for Phase II Subsurface Soil/Fill Samples
Table 3C	Analytical Summary of Inorganic Parameters for Phase II Subsurface Soil/Fill Samples
Table 4A	Well Elevation Data for the Phase II
Table 4B	Analytical Summary of VOCs from Phase II Groundwater Samples
Table 4C	Analytical Summary of Inorganic Parameters for Phase II Groundwater Samples
Attachment B	Resumes
Attachment C	Budget

APPENDICES

Appendix A	Field Sampling Plan
Appendix B	Quality Assurance/Quality Control Plan
Appendix C	Health and Safety Plan
Appendix D	Citizen Participation Plan

1.0 INTRODUCTION

1.1 General Discussion

This Work Plan has been prepared by TVGA Consultants (TVGA) to provide a detailed description of the Remedial Investigation/Alternatives Analysis Report (RI/AA) program to be implemented at the Former Edgewood Warehouse Site located at 320 South Roberts Road, Dunkirk, New York (site). Figure 1 depicts the location of the site and Figure 2 depict the tax map of the site. The RI/AA will be completed on behalf of the Chautauqua County Department of Public Facilities pursuant to the environmental restoration and redevelopment of the subject site under the Environmental Restoration, or Brownfield, Program component of Title 5 of the Clean Water/Clean Air Bond Act of 1996, administered by the New York State Department of Environmental Conservation (NYSDEC). The County will act as the lead agency for the RI/AA program and will take responsibility for municipal cost share required by this program. The County has been selected to receive State financial assistance under this NYSDEC program for the investigation of this site, and ultimately intends to facilitate the restoration and redevelopment of this property. The purpose of the RI/AA program outlined herein is to characterize the nature and extent of contamination occurring on, and emanating from, the site, and to develop and evaluate remedial alternatives, as appropriate.

This document has been developed in general accordance with the July 2004 NYSDEC Municipal Assistance for Environmental Restoration Project Procedures Handbook, and details the scope and objectives of the RI/AA program. The following supporting technical documents have also been prepared and appended to the Work Plan:

- Field Sampling Plan (FSP)
- Quality Assurance/Quality Control (QA/QC) Plan
- Health and Safety Plan (HASP)
- Community Participation Plan (CPP)

Collectively, these plans form one document that is intended to define the scope of tasks, technical approach and specific procedures to be utilized to complete the RI/AA for the site.

The scope of the RI/AA program to be implemented at the site is the product of a scoping process that involved the review of historical information concerning the property, meetings with NYSDEC and Chautauqua County representatives, and a limited site reconnaissance. Because the RI/AA process is dynamic and iterative, the Work Plan will be modified during the site characterization process to incorporate new information and refine project objectives, as necessary.

1.2 Work Plan Overview

This Work Plan presents an initial evaluation of existing data and background information compiled during the scoping process, a general description of the RI/AA tasks, a project schedule, a staffing and management plan, and a detailed project budget. The scope and content of the supporting technical plans appended to the Work Plan are described in the following paragraphs.

The *Field Sampling Plan* (FSP) presented in Appendix A was prepared to identify and describe:

- Sampling objectives
- Sampling equipment and methods
- Sample types, locations and frequency
- Sample identification system
- Sample handling and analysis
- Field documentation and record keeping procedures
- A schedule of events and deliverables

The *Quality Assurance/Quality Control* (QA/QC) *Plan* presented in Appendix B addresses all elements of the site investigation and includes:

- A project description
- A project organization chart illustrating the lines of responsibility of the sampling personnel
- Quality assurance objectives for data
- Sample custody procedures
- The type and frequency of calibration procedures for field and laboratory instruments, internal quality control checks, and quality assurance performance audits and system audits
- Preventative maintenance procedures and schedule and corrective action procedures for the field and laboratory instruments
- Specific procedures to assess data precision, representativeness, comparability, accuracy, and completeness of specific measurement parameters
- Data documentation and tracking procedures

Appendix C contains the site-specific *Health and Safety Plan* (HASP) that complies with 29 CFR 1910.120 and was prepared for implementation prior to the commencement of field activities. The HASP provides a site background discussion and describes personnel responsibilities, protective equipment, health and safety procedures and protocols, decontamination procedures, personnel training, and the type and extent of any necessary medical surveillance. Procedures for protecting third parties, such as visitors or the surrounding community, are also specified in the HASP.

The *Citizen Participation Plan* (CPP) presented in Appendix D describes the types of information to be provided to the public and outlines the opportunities for community comment and input during the RI/AA. This Plan includes a preliminary list of potentially interested parties, a list of information repositories, community outreach, and other appropriate citizen participation activities. Furthermore, the CPP describes the procedures to be used to ensure that:

- Pertinent documents will be readily available to the public
- Communication with the public takes place at critical decision points in the remedial program
- Informational notices are mailed out and/or announced in the local media
- Project staff are identified and made accessible to the public
- Interested and/or affected parties are identified

2.0 SITE BACKGROUND, PHYSICAL SETTING AND ENVIRONMENTAL HISTORY

2.1 Background of Project Site History

The site, formerly part of a larger complex located at 320 South Roberts Road, Dunkirk, New York, was owned and operated by the American Locomotive Company (ALCO), which first developed the site in 1910. ALCO manufactured locomotives at this complex until 1930, at which time operations were converted to manufacturing process equipment primarily consisting of heat exchangers, feed water heaters, tunnel shields, pressure vessels and steel pipe, fittings and conduits. During and after World War II, manufacturing operations at the plant were expanded to include military equipment. This equipment included gun carriages, fragmentation bombs, thrust shafts and king posts for naval vessels, missile housings, nozzles, boosters and other components. Following the war, ALCO was contracted by the Atomic Energy Commission to manufacture nuclear reactor components and packaged reactor units. Work on nuclear reactors at the Dunkirk plant included the development, production, and testing of a skid-mounted, portable nuclear reactor, built to power a remote Army base on the Greenland icecap. In addition to the nuclear reactor ALCO manufactured components for the crawler for the Apollo/Saturn V space rocket. ALCO closed the Dunkirk plant in 1963 due to a combination of labor, union and management problems.

From 1963 until 1966, the site was owned by Progress Park, Inc. whose mission was to facilitate the reoccupation of the shuttered industrial complex containing the subject site. Following Progress Park Inc., the site was occupied by the Plymouth Tube Company, which began operations in the existing main building in 1967 and went out of business in 1982. The Plymouth Tube Company manufactured stainless steel feed water heater tubes for heat exchangers. During this time period, Cenedella Wood Products also occupied a 4-story building that was formerly located on the subject site, but was demolished in 1988. Cenedella Wood Products manufactured wooden pallets, crates and boxes that were utilized by Plymouth Tube to ship their final products.

The site is currently owned by Edgewood Investments, Inc., which operated a warehouse within the existing main building from 1982 until recent years. The warehouse was used for the storage of packaging supplies, operational supplies and equipment from the former Dunkirk Ice Cream and current Fieldbrook Farms Dairy facility. Since approximately 1997, the warehouse was utilized by a few small businesses. Of these, a limousine company utilized the southern annex portion of the building; a spray-on truck bed liner company utilized a room midway along the southern wall of the warehouse; and a home improvement company operated out of the eastern end of the warehouse. The buildings are currently vacant.

In the past, the site also contained another building that housed the facility power plant, a repair shop, a development area for experimental equipment, and the plant hospital. That building was demolished in 1989. A second building, presently vacant, is located near the northeastern corner of the site. It is believed that it was a former scale house associated with the rail access to the industrial complex.

The site is approximately 7 acres in size. Buildings occupy approximately 3.8 acres of the site and the remainder of the property generally consists of aged asphalt and gravel parking areas. Figure 3 shows the general layout of the site.

2.2 Environmental History

This section of the Work Plan details environmental information about the site and surrounding properties collected from typical sources, as well as sources that may be unique to the site.

2.2.1 Phase I ESA

In 1997, a Phase I Environmental Site Assessment Report (ESA) was prepared to identify potential environmental conditions in connection with the property. The following conclusions were developed during the Phase I ESA:

- An asbestos survey identified the presence of asbestos containing materials (ACMs) in the warehouse building which included pipe insulation, exterior siding, piping, and boiler insulation. Interviews with local residents also indicated that asbestos waste from within the former power plant building may have been buried on-site during the building demolition activities.

- Information obtained from interviews indicated that a 350,000-gallon underground brick cistern originally utilized to store water for fire protection at the ALCO complex is located on the southern portion of the site. The cistern was reportedly filled in with gravel.

- A site plan contained within a report summarizing a 1973 appraisal of the Plymouth Tube Company facility indicated the presence of an x-ray building to the east of the warehouse building. This building may have contained radiological sources.

- Local record sources indicate that a petroleum spill occurred on-site in connection with the demolition of the former power plant and Cenedella Wood Products building in 1988. According to those records, the suspected source of that spill, which entered the storm sewer extending beneath South Roberts Road via a floor drain in the basement, was one or more tanks damaged during demolition activities. The spill was not suspected to have impacted soil or groundwater on the site.

- Three uncovered drums containing a solid material resembling ash were noted on the eastern portion of the site in 1997.

- Several small piles of debris were noted on the eastern side of the site in the vicinity of the former scale house. The piles appeared to consist of demolition debris; however, one pile consisted of potential ACM debris.

- Several areas of surface staining were noted on the site in the area between the former warehouse and the scale house. Vegetation generally present in this vicinity was not present within the limits of the spill areas, the largest of which measured approximately ten feet by ten feet.

- Staining of the concrete surface along the southern exterior of the warehouse building was noted during the Phase I ESA. Minor staining of the floor surface was also observed throughout the inside of the warehouse. Historical engineering drawings indicated that the affected areas may have been associated with process areas in the building's manufacturing past.

- A number of what appeared to be former pits/vaults filled with concrete were noted along the eastern and southern side of the former warehouse exterior. The pits may have been used in the pickling operations, lime storage area, and neutralizing room of the former ALCO facility.

- Numerous pipes were observed to be protruding through the northern exterior wall of the former warehouse. These structures may represent potential discharge points for storm water, interior drains and / or process water.

- Two capacitor assemblies labeled as containing polychlorinated biphenyls (PCBs), along with other potential PCB-containing transformers and equipment, were stored within the warehouse building. Some of the fluorescent and high intensity discharge (HID) light fixtures within the building are also likely to be equipped with PCB-containing ballasts.

- A small brick incinerator associated with the operation of the former ALCO plant is located along the north side of the warehouse building. The types of material burned in the incinerator and the location of the ash disposal is unknown.

- Numerous storm water drains were observed along the perimeter of the warehouse building, while one storm water catch basin was noted in the parking lot on the southeastern portion of the property. Significant quantities of sediment were noted in all of the drains.

- Several floor drains and one covered pit or vault was observed inside the warehouse building and three other covered pits were noted on the exterior northern side of the building. Solid steel plates covered these pits, preventing their inspection.

2.2.2 Phase II ESA

In May 1999, a Phase II ESA was performed on the subject property to identify PCB-containing electrical equipment and investigate potential sediment, soil and groundwater contamination. The scope of the field investigation included the following major tasks:

- Examination of installed and stored electrical equipment within the on-site structures to define those items that contain, or have the potential to contain PCBs.
- Inspection of pits, drains, and sumps located on the subject property to identify and sample potentially contaminated sediments, and to determine the function of these structures, if possible. The approximate locations of the inspected structures are shown on Figure 4.
- Drilling of 16 test borings across the site and in areas of potential concern to collect, screen, and classify overburden deposits. The approximate locations of the borings are shown on Figure 5.
- Installation of eight groundwater monitoring wells to determine groundwater flow direction and facilitate the collection of representative groundwater samples. The approximate well locations are shown on Figure 6.

- Chemical analysis of sediment, soil and groundwater samples. Sediment and soil sample locations are shown on Figure 4.

The analytical results for the soil samples collected during the Phase II ESA were compared to Part 375 Residential Use and Commercial Use Soil Cleanup Objectives and the groundwater results were compared to the applicable ambient water quality standards and guidance values from NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 (1998). The analytical summary tables from the Phase II ESA with these comparisons are included as Attachment A.

The results of the survey of potential PCB-containing electrical equipment indicated that the eight step-down transformers installed on-site are air-cooled units that do not contain PCBs. No potentially PCB-containing electrical equipment was observed to be in storage within the warehouse at the time of the inspection. However, approximately 72 fluorescent lighting fixtures and 37 HID lighting fixtures that are equipped with ballasts that are likely to contain PCBs were identified in the two buildings. Federal regulations require that PCB ballasts are properly transported to, and disposed of in, a Toxic Substance and Control Act (TSCA) approved disposal facility upon removal from service.

The investigation of known and suspected vaults, sumps and drains resulted in the identification of several interior floor drains and a number of exterior trench drains and catch basins containing suspect sediment. Suspect sediment was also identified in a potential waste water separator and a drain/sump that are situated along the north side of the warehouse. Although the specific function of either of these structures was not determined, the former appeared to be designed to separate floating chemicals from an aqueous solution. Sediment samples were collected from both of these structures, and from interior and exterior drains for chemical analysis.

Additionally, two other structures were identified to the east of the warehouse. The first was identified along the eastern perimeter of the warehouse, in the vicinity of the former pickling house, and consisted of a rectangular steel cover equipped with drain or ventilation slots installed in a circular pattern with a diameter of three feet. Since the cover could not be removed, the internal configuration, function or contents of this structure were not determined. The second structure was identified in the gravel area directly east of the warehouse, and was demarcated by a round, steel manhole cover. This structure is estimated to be approximately nine feet deep, was filled to the ground surface with water, and could not be bailed down significantly for inspection. As such, it is suspected to be related to the on-site sewer system; however, the configuration, construction and precise function of this structure could not be determined.

Field observations and geologic samples collected during the performance of the drilling program at the site indicated the presence of a relatively thin layer (0 to 5 feet) of industrial fill containing foundry sand, slag and other debris across the site. This material overlies fine-grained glacial deposits, which are underlain by shale bedrock at approximate depths ranging from 12 to 20 feet below grade across the site. Groundwater flow direction across the site was determined to be to the northwest, toward the discharge area represented by Lake Erie.

With the exception of the industrial fill material, evidence of potential contamination was noted during the drilling of only two of the sixteen test borings. A moderately strong petroleum odor and a slight sheen on fill and soil samples obtained from 1 to 6 feet below the ground surface were noted during the drilling of MW-5, which is located in the center of the warehouse. However, TOV measurements were only slightly above background levels for these sample intervals. Petroleum odors were also noted in soil samples obtained from 14 to 16 feet below the ground surface at MW-6, as were elevated TOV measurements. This monitoring well was drilled down-gradient from the former power plant building, wherein a basement petroleum spill occurred in the late 1980s.

Analytical data resulting from this investigation confirmed the presence of sediment, soil and groundwater contamination on the site. Soil and sediment contaminants detected at concentrations that exceed Part 375 Commercial Use Soil Cleanup Objectives include aromatic and chlorinated hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), PCBs and metals. Additionally, groundwater contaminants include chlorinated hydrocarbons and metals. The probable sources of these compounds include new and used petroleum products, solvents, dielectric fluid, and pickling fluids that were used in connection with historic industrial operations on the property and adjoining industrial complex.

Potential mechanisms for the release of these contaminants to environmental media include chemical spills or leaks, discharges of process waste waters (e.g., rinseates containing pickling fluid residues), and storm water that was in contact with raw or waste materials. However, no existing or former confirmed point sources of contamination (e.g., leaking storage tanks, drums, or transformers, process discharges, etc.) were identified during the course of this investigation. Other potential sources of these contaminants include air emissions containing PAHs from the power plant formerly located on the subject property and the industrial fill deposited on the site. Because the types of contaminants detected on the property site are very similar to those that have been documented on the adjacent former Roblin Steel and Alumax sites, which are situated directly up-gradient from the site, contaminant migration from adjacent properties onto the subject property is yet another potential source of the on-site soil and groundwater contamination.

The drain sediments contained the greatest number and highest concentrations of contaminants found in any of the environmental media analyzed, with all of the aforementioned contaminant types being detected in the drain sediment samples. Although concentrations of VOCs were detected in each of the sediment samples, none of the concentrations exceeded the Part 375 Commercial Use Soil Cleanup Objectives. However, PCBs were detected in four sediment locations at concentrations exceeding the Commercial Use Soil Cleanup Objectives. Additionally, one PCB was detected at the concentration of 40,000 parts per billion (ppb) in the trench drain located along the eastern perimeter of the warehouse (SED-4). The high PCB concentration is likely related to leakage from electrical equipment formerly located near the southwestern corner of the building. Elevated concentrations of several PAHs and metals were also noted, and the Part 375 Commercial Use Soil Cleanup Objectives were exceeded in the samples. The relative severity of contamination in the drain sediments is attributed to the accumulation of contaminants in these structures over the operational life of the industrial facility.

PAHs and metals were the primary contaminants detected in the surface soil samples collected from the site. Only the metal, arsenic, and a few PAHs were detected at concentrations exceeding Part 375 Commercial Use Soil Cleanup Objectives.

Although a few VOCs were detected in nearly all of the subsurface soil samples, the concentrations of all of the compounds were below the Part 375 Commercial Use Soil Cleanup Objectives. Additionally, a few PAHs were detected at concentrations that exceed the Part 375 Commercial Use Soil Cleanup Objectives in samples collected from three of the ten locations analyzed. These results appear to reflect the composition of the slag and foundry sand contained within the samples. Similarly, multiple detections of metals concentrations that significantly exceeded the Part 375 Commercial Use Soil Cleanup Objectives occurred at two of the ten boring locations. Based upon these results, widespread contamination of subsurface soil does not appear to be present at the site. However, the data indicates that the industrial fill material that covers the site contains elevated concentrations of PAHs and metals.

Chlorinated hydrocarbons at concentrations that exceed the groundwater standards were detected in two monitoring wells (MW-4 and MW-8) installed along the down-gradient site boundary. The compounds detected included trichloroethene (TCE), which is one of the most widely encountered groundwater contaminants, as well as compounds that result from the breakdown of TCE in the environment. These compounds were also detected in the subsurface soil samples collected during the drilling of these wells, and have also been documented in groundwater on the former Roblin Steel and Alumax sites. Considering the relatively high solubility of these compounds in water, and their high mobility in the subsurface, these contaminants may have originated from an on-site source, such as the industrial fill or past chemical discharges to the ground surface, or may have migrated on-site. The latter scenario, however, appears less tenable because these compounds were not detected in any of the other on-site monitoring wells positioned closer to the former Roblin Steel or Alumax sites.

Lastly, the concentrations of inorganic parameters in groundwater samples collected from the site were relatively uniform across the site, and were generally below the groundwater standards. Exceptions to this include iron and manganese, which were detected in all of the wells above groundwater standards. Additionally, elevated concentrations of numerous metals were detected in the samples from two of the eight wells. The contraventions of groundwater standards at these wells (MW-5 and MW-6), however, may be attributable to the elevated turbidity of these samples.

In summary, the data collected during the course of the Phase II ESA indicated the presence of contamination in drain sediments, soil and groundwater occurring on the site. The types of contaminants detected are reflective of the past usage of the site and adjacent properties for heavy industrial purposes for nearly 100 years. With the exception of the contamination detected in the drain sediments, the levels of contamination identified in soil and groundwater samples appear to be consistent with levels typically found in industrialized areas. However, it should be noted that the extent of groundwater contamination by chlorinated solvents has not been full delineated.

A more detailed site investigation is necessary to define the magnitude and extent of contamination identified as a result of previous investigations and to confirm or deny the presence of contamination on the site in areas that have not yet been fully assessed.

2.3 Site Geology and Hydrology

Based upon a review of the Soil Survey of Chautauqua County, New York, the predominant soil unit occurring on the site is the Niagara silt loam (NgA). The Niagara soils are nearly level, very deep and somewhat poorly drained. The permeability of the Niagara silt loam is categorized as moderate to moderately slow, and the erosion hazard is characterized as slight. The *Surficial Geologic Map of New York – Niagara Sheet (1988)* indicates that the overburden underlying the site consists of lacustrine silt and clay deposits. During the Phase II ESA, subsurface soil samples were taken from across the site and confirm that silt and clay deposits prevail. The site is located within the Erie-Ontario Plain physiographic province and is underlain by bedrock consisting of Upper Devonian shale belonging to the Canadaway Group, according to the Geologic Map of New York – Niagara Sheet (1970).

A Flood Insurance Rate Map of the area indicates that the site is not within the boundaries of the 100-and/or 500-year floodplains.

Stormwater drainage on the site occurs by a storm sewer that runs beneath South Roberts Road; is conveyed to a catch basin located near the southeast corner of the site; or by overland flow and infiltration to the subsurface of the subject property in other areas across the site.

Based upon information derived from earlier site investigations, the direction of groundwater flow is generally towards the northwest. However, localized variations in groundwater flow direction may occur in the vicinity of utility lines, building foundations or other undefined subsurface features.

The New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetland Map and the U.S. Department of Interior Fish and Wildlife Service National Wetlands Inventory Map for Dunkirk, New York Quadrangle were reviewed. These maps indicate that no state or federally designated wetland areas are located on or adjoining the site.

2.4 Areas of Potential Environmental Concern

Based upon previous documentation, the following environmental concerns were identified in connection with the site:

- Asbestos containing materials (ACMs) were present in the warehouse building in 1997 and asbestos waste from previous building renovation and demolition activities may be buried on the site. The condition, location and quantity of ACM needs to be verified.
- Contaminated soil/fill and groundwater has been documented on the site.
- Electrical lighting equipment containing polychlorinated biphenyls (PCBs) is likely to be present within the on-site buildings.
- As radiological sources were historically utilized on-site, there is the potential for the presence of radioactive materials.
- Contaminated sediment and/or sludge were documented in on-site pits, drains, and vaults.
- The site is hydraulically downgradient from the adjacent Roblin Steel and Alumax sites, where historic soil, groundwater and surface contamination has been documented.

3.0 INITIAL EVALUATION

3.1 Potential Contaminants, Affected Media and Receptors

Known and suspected sources of contamination include past spills and releases of chemicals and wastes used, generated and/or stored on-site; past discharges and spills of process wastewater; leaking underground piping; and past discharges and spills from chemical storage facilities. Types of known or suspected contaminants include:

- A petroleum spill in the basement of the former power plant building
- Polycyclic aromatic hydrocarbons (PAHs) and metals in on-site soils and/or sediments
- Asbestos containing materials within the building and buried on-site
- Polychlorinated biphenyls likely to be present within lighting fixtures throughout the former warehouse building
- Chlorinated hydrocarbons in groundwater
- Radiological contamination across the property

Affected on-site media potentially include surface and subsurface soil/fill, sediment and groundwater. Soil/fill contaminated as a result of past spills or releases may act as a source of groundwater and storm water contamination. The primary pathways for potential contaminant migration appear to be particulate emissions; groundwater transport; and storm water discharges. Potentially affected off-site media include subsurface soil and groundwater.

Potential human receptors include persons living and working in and visiting the area surrounding the site as well as persons visiting, working or trespassing on the site. Potential exposure routes for these receptors include:

- Inhalation of organic vapors
- Ingestion of and/or dermal contact with contaminated soil
- Dermal contact with surface soils, surface water and/or sediment

In addition to household pets living in the vicinity of the site, terrestrial wildlife occurring on the site (e.g., rodents, birds, etc.) is considered potential environmental receptors.

3.2 Data Quality Objectives

The site-specific Data Quality Objectives (DQOs) for data collected during the site investigation are discussed in the QA/QC Plan, and are summarized below:

- To characterize the site and determine the nature and extent of contamination occurring on or in soil, fill, and groundwater

- To evaluate potential risks to human health and the environment associated with current site conditions and potential future use scenarios
- To identify, evaluate and select long-term remedial actions that are environmentally sound and cost-effective
- To maintain a state-of-the-art standard of scientific/professional practice for each procedure
- To assure the ultimate defensibility of the data generated

3.3 Scope of Site Investigation

The Remedial Investigation program to be implemented at the site will initially focus on determining the nature and extent of contamination within the following five media at the site

- Surface soil/fill
- Subsurface soil/fill
- Sediment
- Groundwater
- On-site structures

Representative grab samples of surface soil/fill will be collected from previously identified areas of concern (e.g., locations of former drum or tank storage, areas of stained soil, etc.), as well as from points selected to represent conditions across the site, and will be submitted for chemical analysis. Preliminary remedial action alternatives available to address impacted surface soils may include no action, containment or the removal and proper off-site disposal.

On-site subsurface soil/fill and groundwater will be investigated as part of the subsurface investigation program developed for the site. This program will involve the completion of test pits and advancement of soil probes, test borings, and the installation of groundwater monitoring wells to facilitate the collection and chemical analysis of samples from this media. Preliminary remedial action alternatives available to address these media include collection and treatment, excavation and disposal, containment or no action.

Sediment grab samples will be collected from drainage structures not previously sampled on the site. The investigation will allow for the determination of the function of these structures. Preliminary remedial action alternatives available to address impacted surface water include collection and treatment, excavation and disposal, containment or no action.

If significant concentrations of VOCs are identified during the investigation of soil/fill and/or groundwater, sub-slab vapor sampling will be performed. This investigation will determine if volatile organic vapors are entering the warehouse building. Preliminary remedial action alternatives available to address vapor intrusion include treatment or excavation of source material, installation of a vapor venting system or no action.

Remedial Action Objectives (RAOs) will be defined for the affected media and contaminants of concern identified as a result of the remedial investigation. The RAOs will consider the contaminant and media of interest, the exposure pathways, and preliminary remediation goals that permit a range of treatment and containment alternatives to be developed. It is anticipated that the RAOs for the above-referenced media will be achieved by either reaching the acceptable concentration or by reducing the exposure, and that the acceptable concentrations will be based upon Standard Criteria and Guidance Values (SCGs) and the intended end use of the site (e.g. to redevelop the site for commercial or industrial use). A preliminary listing of potentially relevant SCGs is provided below:

- Soil/Fill: 6NYCRR Part 375-6.8 Soil Cleanup Objectives for Restricted Commercial Use.
- Surface Water, and Groundwater: NYSDEC *Technical and Operational Guidance Series* (TOGS) 1.1.1
- Air: Guidance for Evaluations Soil Vapor Intrusion in the State of New York, October 2006, New York State Department of Health

4.0 RI/AA TASKS

4.1 Scoping

This RI/AA Work Plan was developed based upon information compiled during the initial scoping phase for the Former Edgewood Warehouse Site that involved a review of historical information pertaining to the site and operations occurring thereon; site reconnaissance; and meetings with representatives of the NYSDEC and the County. In addition, data contained in environmental reports previously completed for the site were also reviewed an evaluated.

Based upon this information, and in consultation with the NYSDEC, the remedial goals of the project will be designed consistent with 6 NYCRR Part 375 and reflective of the intended end use of the site, and will identify likely decisions, data requirements and the schedule for the project.

The scope and objectives of the RI/AA program detailed in this Work Plan and supporting technical documents were formulated based upon the evaluation of information compiled during the scoping phase. Scoping of the RI/AA will conclude with the approval of this Work Plan by the NYSDEC.

4.2 Citizen Participation Program

A program was designed to provide the community with information concerning the project as well as opportunities for their comment and input during the RI/AA. This program will be administered by the Chautauqua County with technical support from TVGA and the NYSDEC. This program is detailed in the CPP provided in Appendix D.

4.3 Field Investigation

The following subsections outline the scope of the field activities that will be conducted during the site investigation. This scope is intended to define the initial phase of remedial investigation activities and will be modified as necessary to account for information obtained during the investigation. Data gathered during these activities will also be utilized to determine the necessity for additional investigation of the site. The methods to be employed during the execution of the field tasks outlined below are detailed in the FSP (Appendix A), while the procedures to be implemented to ensure the quality of the resulting field and laboratory data are described in the QA/QC Plan (Appendix B). Table 1 is included as a Sampling and Analysis Summary which details the number of samples planned for collection from each media and the proposed analysis. Figures 7 through 9 depict both the proposed sampling locations as well as sample locations from the Phase II ESA for each media.

4.3.1 Surveying and Title Search

The objective of this task will be to perform a title search in accordance with the requirements of the ERP and to complete a boundary and topographic survey with a meets and bounds description of the site and to locate on-site structures with respect to site boundaries. The boundary and topographic survey will serve as the base map for the site. In addition, as no building floor plans currently exist, the interior of the buildings will be surveyed to delineate internal structures; walls; locations of pits, sumps, and drains; floor elevations and other features which may be pertinent to the future site remediation activities. Additionally, a survey will be completed to locate the actual location of the investigation locations. These locations will be superimposed on the base map prepared for the site.

A site specific grid system will be established by a New York State-licensed land surveyor for mapping the sample locations and monitoring wells. Elevations for the monitoring wells will be relative to a regional, local, or project-specific datum. United States Geological Survey (USGS) benchmarks will be used and will take precedence over the use of project-specific datum if they are located within 0.5 miles of the site.

4.3.2 Radiological Survey

A radiological survey will be conducted over the interior and exterior ground surfaces of the site in an effort to locate any areas of elevated radiation. The survey of the site will be based upon a system of transect lines. Additionally, the radiation meter will be used during sampling of soil/fill and sediments and during the installation of the test borings, excavation of test pits and advancement of soil probes as well as during the investigation of building surfaces and components to monitor for potential radioactive material. Results of the survey will be used to delineate areas of elevated radiation so that these areas can be marked off as Hot Zones where all personnel will be restricted from entering.

4.3.3 Inventory of Containers

An inventory of all containers at the site will be conducted in an effort to determine the number of containers present, identify the container contents, and determine if the contents are suspected to be hazardous or may require treatment prior to disposal. The inventory of containers will include:

- Marking of each 5-gallon pail, 55-gallon drum, or any other container with a reference number
- Determination and documentation of the container contents, if the container has a label or markings
- Determining and documentation of approximate volume of contents, if any
- Preparation of a site plan showing the location of identified containers

4.3.4 Subsurface Investigation

A subsurface investigation will be conducted to characterize soil and groundwater conditions at the site. The investigation will include the performance of a geophysical survey to assist in the sighting and installation of test pits, soil probes, test borings and monitoring wells to facilitate the collection and chemical analysis of soil/fill and groundwater samples. The preliminary scope of the subsurface investigation will include the following:

- A geophysical survey will be conducted to investigate density anomalies (e.g., buried tanks, cisterns, tunnels, underground utilities) potentially present in suspect areas identified during the historical review and site reconnaissance.

- Test pits will be will be excavated in areas of the site where the geophysical survey has indicated the presence of density anomalies and will be the primary means to:

- Characterize surficial geology across the site
- Investigate the thickness of fill material
- Identify and delineate areas of subsurface contamination via the field screening and chemical analysis of soil samples.

It is anticipated that this will include three days of test pit excavations. Chautauqua County plans to provide an excavator and operator to complete the test pits as part of its force account work.

- Three days of soil probing will be performed on the site with a direct push rig, primarily within the warehouse, to facilitate the classification, field screening and collection of sub-slab soil samples for laboratory analysis.

- Four test borings will be drilled on the site with a drill rig to facilitate the classification, field screening and collection of subsurface soil samples for laboratory analysis. All four of the test borings will be completed with groundwater monitoring wells to enable the determination of groundwater flow direction and gradient, and the hydraulic conductivity of the upper-most water-bearing zone, as well as the collection of groundwater samples for chemical analysis. The wells will be constructed to straddle the water table and the well screens will be up to ten feet in length.

- Test boring, soil probe and monitoring well locations will be based upon the project objectives, ease of access, freedom from obstructions, and safety considerations (e.g. appropriate set backs from overhead wires and buried services).

- Previously completed investigations of the site and adjacent properties indicate the presence soil/fill materials consisting of slag, foundry sand, soil, gravel, brick, and concrete. The materials extend from grade to a depth 2 to 7 feet below grade. The soil/fill materials overlie glacial-lacustrine deposits that are predominantly fine grained clayey silts to silty clays with varying percentages of sand and gravel. Groundwater was found during these previously completed investigations to be confined or semi-confined within these glacial deposits that consisted of an upper lacustrine unit underlain by a thin till unit that unconformably overlies shale bedrock. The depth to groundwater, based upon previous investigations, is estimated to be approximately 5 feet below ground surface (bgs). Therefore, it is assumed that the average depth of the monitoring wells will be 20 feet bgs. All test borings will be advanced using 4-1/4-inch I.D. hollow stem augers with continuous split spoon sampling. The wells will be constructed of 2-inch Schedule 40 screens and risers, and will be fitted with locking caps. If necessary to obtain sufficient groundwater, rock coring will be performed in accordance with ASTM D2113-83 when competent bedrock is encountered.

- All subsurface soil/fill samples collected from test pits and test borings will be screened for total organic vapors (TOVs) using a photoionization detector (PID). Visual observations will also be made to identify discolored or stained soils. Field screening results will be used to select up to eight subsurface soil/fill samples for chemical analysis.

- If significant groundwater contamination is identified, in-situ hydraulic conductivity tests will be completed on the four new monitoring wells to determine the permeability of the upper most water-bearing unit.

- Representative groundwater samples will be obtained from the four new wells for chemical analysis. In addition, the eight existing groundwater monitoring wells at the site will be purged and sampled, assuming they have not been damaged and are still functional. These wells were installed during the course of the 1999 Phase II ESA and have only been sampled once.

- Subsurface soil/fill and groundwater samples will be submitted and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and PCBs appearing on the Target Compound List (TCL) using NYSDEC Analytical Services Protocol (ASP) Method 2000. The samples will also be analyzed for the metals appearing on the Target Analyte List (TAL) using ASP methods. All chemical analyses will be performed by a laboratory that is accredited under the New York State Environmental Laboratory Approval Program (ELAP) Contract Laboratory Program (CLP). In addition, eight soil samples will be analyzed for asbestos using Phase Light Microscopy (PLM).

- Should soil/fill or groundwater sample results reveal the presence of significant concentrations of VOCs, a sub-slab soil vapor investigation will be performed to address potential migration of vapors into the on-site warehouse. Up to four sub-slab air quality samples will be collected from within the warehouse in general accordance with the October 2006 New York State Department of Health document entitled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York".

- A survey will be completed to locate the actual position of the test borings, soil probes, monitoring wells, monitoring well casing elevations, test pits, and sample locations. This location data will be entered into the base mapping.

4.3.5 Surface Soil/Fill Investigation

A sampling and analysis program will be implemented to characterize the chemistry of surface soil and/or fill materials. Grab samples will be collected from previously identified areas of concern (e.g., locations of former drum or tank storage, areas of stained soil, etc.), as well as from other points selected to represent conditions across the subject site. Up to 14 surface soil samples will be collected for TCL SVOCs and PCBs and TAL metals.

4.3.6 Investigation of Sumps, Vaults and Pits

Sumps, vaults and pits that were not investigated during previous assessments of the site will be examined to determine their probable functions and their contents will be sampled and analyzed for TCL VOCs, SVOCs and PCBs and TAL metals. Based on a review of existing information and performance of a site visit, seven samples will be collected from structures not previously sampled for chemical analysis.

4.4 <u>Sample Analysis/Validation</u>

4.4.1 Sample Analysis

A laboratory that is accredited under the New York State Environmental Laboratory Approval Program (ELAP) Contract Laboratory Program (CLP) will perform all chemical analyses in accordance with the Analytical Services Protocol. The target analytes and corresponding analytical methods to be utilized for the project are identified in Table 1. The data package will be in an Analytical Services Protocol (ASP) Category B format to facilitate data validation.

4.4.2 Data Validation

A NYSDEC-approved independent data validator will perform the validation of the laboratory data in accordance with the *NYSDEC Guidance for the Development of Data Usability Summary Reports*. The data package will be reviewed for completeness and compliance relative to the criteria specified in the aforementioned NYSDEC document. The validator will then conduct a detailed comparison of the reported data with the raw data submitted as part of the supporting documentation package, and will apply protocol-defined procedures for the identification and quantification of the individual analytes to determine the validity of the data. The validation report will include a narrative summary discussing all quality issues and their impact on the reported results, and copies of laboratory case narratives.

4.5 Data Evaluation and Qualitative Risk Assessment

Once the accuracy and precision of the data has been verified, evaluation of the data will be performed. All remedial investigation data will be analyzed and the results of the analyses will be presented in an organized and logical manner so that the relationship between the results for each medium is apparent. Typical activities associated with data evaluation include:

- Data review, reduction and tabulation
- Comparison with applicable regulatory levels
- Environmental fate and transport modeling/evaluation

Using these data, a risk assessment will be performed to qualitatively assess the potential human health and environmental risks associated with the site. The following activities are typically associated with this task:

- Identification of contaminants of concern
- Exposure assessment
- Toxicity assessment
- Risk Characterization

4.6 Development and Analysis of Remedial Alternatives

The following sections describe the tasks associated with the development and analysis of alternatives that will be employed to address contamination at the site.

4.6.1 Development of Remedial Alternatives

A range of remedial alternatives will be developed to address contaminated media at the site, as deemed necessary in the RI and to provide adequate protection of human health and the environment. The potential alternatives will encompass a range of alternatives including treatment, containment and removal options.

General response actions will be identified for each medium of interest. General response actions typically include containment, excavation, extraction, treatment, disposal or other actions, singly or in combination to satisfy remedial action objectives. Volumes or areas of media to which general response actions may apply will be identified. Subsequently, treatment technologies for each general response action will be identified and screened relative to their technical and economic feasibility for implementation at the site, and the potential technologies will be combined into media-specific or site-wide alternatives. The alternatives will be screened on a general basis with respect to their effectiveness, implementability, and cost, to limit the number of alternatives that undergo the detailed analysis and to provide consideration of the most promising options.

4.6.2 Detailed Analysis of Remedial Alternatives

A detailed analysis of each alternative will be completed in accordance with the requirements outlined in 6 NYCRR Part 375-6.8, Soil Cleanup Objective Section. An individual analysis of each alternative will be performed relative to the following criteria:

- Overall protection of human health and the environment
- Compliance with Standards, Criteria and Guidance
- Short-term effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Feasibility
- Community Acceptance

Furthermore, a comparative analysis of all of the remedial alternatives with respect to each other will be completed in terms of the above listed criteria.

4.7 Remedial Investigation/Alternatives Analysis Report

A Remedial Investigation/Alternative Analysis (RI/AA) Report will be prepared which:

- Summarizes and documents the investigative methods employed to characterize the site
- Describes the physical characteristics of the site
- Defines the nature and extent of contamination
- Presents the results of contaminant fate and transport modeling/evaluations
- Identifies potential health and environmental risks posed by the site
- Provides recommendations relative to future work requirements and remedial action objectives
- Describes the process utilized to develop and screen remedial alternatives
- Present the results to the detailed analysis of alternative
- Identify the most suitable remedy considering the remedial action objectives

The RI/AA Report will present sufficient information to enable the preparation of a *Proposed Remedial Action Plan* (PRAP), which summarizes the proposed remedy for public review and comment.

4.8 Proposed Remedial Action Plan

Based on the RI/AA Report, a Proposed Remedial Action Plan (PRAP) will be prepared to summarize the results of the investigation as well as describe the proposed remedy.

5.0 PROJECT SCHEDULE

The anticipated schedule for completion of the RI/AA on a task-specific basis is depicted in Figure 10. Should changes to the scope of the site characterization program occur, or should the milestones change for any reason during the RI/AA program, TVGA will submit a revised schedule for approval.

6.0 PROJECT ORGANIZATION AND MANAGEMENT

6.1 Project Organization

TVGA will be the prime consultant providing the professional environmental and engineering services required for the project, and will perform all technical and administrative services for the project through our Elma and Jamestown, New York offices.

TVGA has assembled an in-house team for this project that allows for both a clear division of responsibility and authority, as well as a reasonable span of control for each of the key project scientists and engineers. We believe that it is vitally important to establish strong working groups with well-defined lines of authority and responsibility. One of the primary functions of the Project Manager will be to assure that such interaction is occurring in a timely fashion.

Our staff is comprised of an integrated group of scientists, engineers and surveyors. The firm is structured to provide a diverse menu of abilities including: Environmental, Civil, Structural, Geotechnical, Transportation Engineering as well as Surveying, Planning and Construction Inspection Services. From TVGA's staff of over 75, we have selected a team of project professionals that are experienced in site investigation and remediation and who have the time available to be committed to this project. Key project personnel have the credentials and extensive experience in similar projects to excel in their assigned tasks, and are identified on the organization chart provided as Figure 10.

Brief biographies of the key project team members are presented below, while professional resumes for these and other team members have been included in Attachment B.

Daniel E. Riker, P.G. will serve as the Project Manager for the project. Mr. Riker is a licensed professional geologist with over 13 years of experience conducting environmental assessment, investigation and remediation projects at both active and abandoned commercial and industrial properties. In the capacity of Project Manager, Mr. Riker will be directly responsible for client communications; the coordination and oversight of technical staff and subconsultants; the daily monitoring of all aspects of the project, and the final technical review of project deliverables. Mr. Riker has served in a similar role on a number of brownfield projects performed under NY State's ERP, including projects for the Cities of Buffalo, Dunkirk and Olean. He also has grant preparation experience under both State and Federal brownfield programs.

Robert R. Napieralski, C.P.G. will serve as the Quality Assurance Officer for the project. In this capacity, Mr. Napieralski will be responsible for oversight of all QA/QC activities for the project and will remain independent of day-to-day, direct project involvement. His duties will include reviewing and approving the QAPP; conducting project audits; recommending, implementing and/or reviewing actions taken in the event of QA/QC failures; and coordinating with the technical staff, Project Manager and subcontractors to ensure that QA objectives appropriate to the project are set and that all project personnel are aware of these objectives. Mr. Napieralski is a Certified Professional Geologist with 17 years of experience, during which time he has managed numerous assessments, investigations, redevelopment feasibility studies and remedial actions at brownfield sites in the context of site-specific and programmatic agendas. He has extensive ERP experience, having functioned as Project Manager or QA Officer on five projects advanced under this program. Mr. Napieralski also has EPA Brownfield Program experience and has prepared successful investigation and cleanup grant applications under both the state and federal programs.

James C. Manzella, CHMM will serve as the Team Leader for the Remedial Investigation (RI). In this capacity he will coordinate and oversee all field activities; and be responsible for the scheduling and supervision of field personnel and subcontractors involved in the implementation of the Field Sampling Plan. He has over six years of experience with the planning and execution of RI programs and has served in similar roles on many ERP investigation projects. Mr. Manzella has served in similar roles on several RI/AA projects. He will be the secondary contact for project-related communications with the client and will perform the initial technical review of all reports and plans generated for the project.

Michael J. Finn will serve as the Team Leader for the Alternatives Analysis (AA). In this capacity, he will be responsible for the coordination and supervision of technical staff involved in the development, screening and detailed analysis of remedial alternatives. Mr. Finn will interface extensively with the RI Team Leader to identify feasible alternatives and data requirements for the analysis of the alternate remedies. He has experience with brownfield projects, including the identification and evaluation of remedial alternatives as well as the planning of remediation programs. Mr. Finn has served in a similar capacity on a number of projects.

In addition to these key personnel, the project team will include technical and clerical support staff designated based upon their capabilities and performance on similar previously completed projects.

As reflected by Figure 11, TVGA will select four specialized subcontractors to provide geophysical survey, drilling/probing, analytical laboratory, data validation services. These subcontractors will be selected based upon their experience, capabilities and competitive pricing, as well as our experience with them on other projects of similar nature. Prior, to selection, TVGA will submit to Chautauqua County and the NYSDEC, a list of subcontractors that submitted proposals for the project and provide recommendations for selection.

6.2 Project Management

TVGA has a standardized approach to project management that is chronicled in our *Project Development/Management Manual.* This approach focuses on the following issues:

- Communication
- Planning
- Scope Execution and Management
- Cost Control
- Schedule Management
- Quality Assurance and Control
- Staffing and Project Resources
- Delegation and Monitoring of Staff and Subconsultant Work
- Problem Resolution
- Project Close-Out
- Client Feedback

This process is initiated with the preparation of a project plan providing a task level breakdown of the project scope, staffing, budget, schedule, and management system. This plan is developed by the Project Manager and reviewed by all project team members, and provides a road map for the execution of the project scope. Throughout the course of the project, the management team, consisting of the Project Manager and Task Managers, will meet on a regular basis to review the technical approach and to coordinate the activities of the project. Other informal meetings between the management team and technical staff will also occur throughout the project on an as needed basis.

TVGA believes that successful project management also requires effective communications with the Client and other various parties involved in the project (e.g., regulatory agencies, community groups, etc.). Such communication is of paramount importance and must be established at project inception to define all goals, objectives, interrelationships, and technical requirements of the project. This will be accomplished through the designation of two key individuals at TVGA who will handle all communications with the Client and other involved parties, as well as the implementation of a program of periodic project meetings to provide a forum for discussing the progress of the project and other critical issues. For this project, all communications will be coordinated through the primary TVGA contact, the Project Manager, or the secondary

TVGA contact, the RI Team Leader. Project management meetings will be held on a regular basis throughout the duration of the project.

7.0 PROJECT BUDGET

The table presented in Attachment C outlines the budget for the RI/AA program. The table identifies the level of effort to be expended per task by ASCE Grade; relates the level of effort to direct labor costs on a per task basis; details direct non-salary costs including reimbursable expenses and subcontractor fees; summarizes direct labor, overhead, and fixed fee values and sums them with the total other direct costs to yield the total project budget.

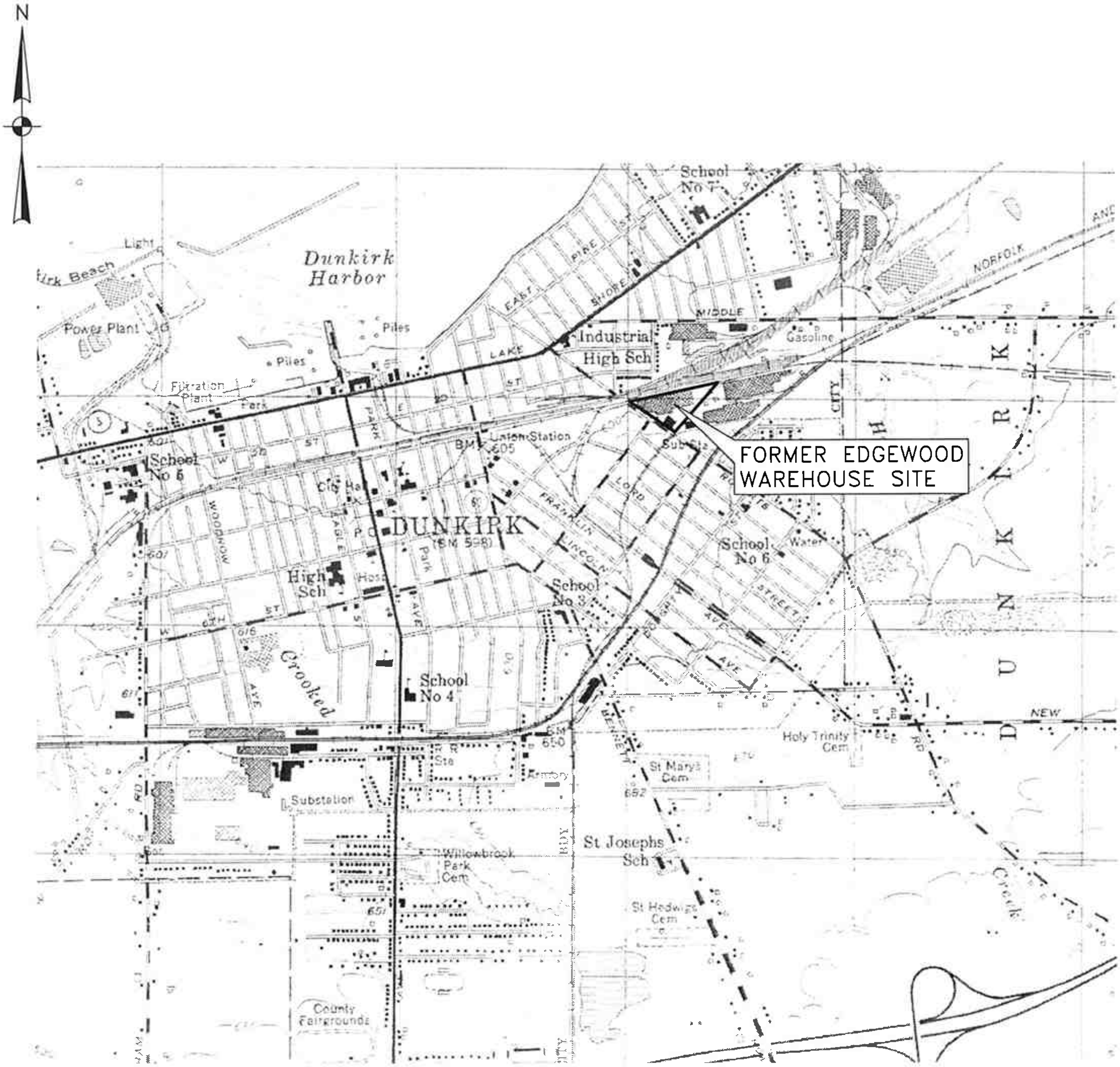
8.0 REFERENCES

Phase I Environmental Site Assessment Report, Edgewood Warehouse, October 30, 1997, Clough, Harbour, & Associates, LLP.

Phase II Environmental Site Assessment Report for the Edgewood Warehouse Site, May 7, 1999, Clough, Harbour, & Associates, LLP.

n:\2008.0011.00-edgewood warehouse ri-aa\engineering\10deliverables\ri-aa work plan\work plan\edgewood work plan.doc

FIGURES



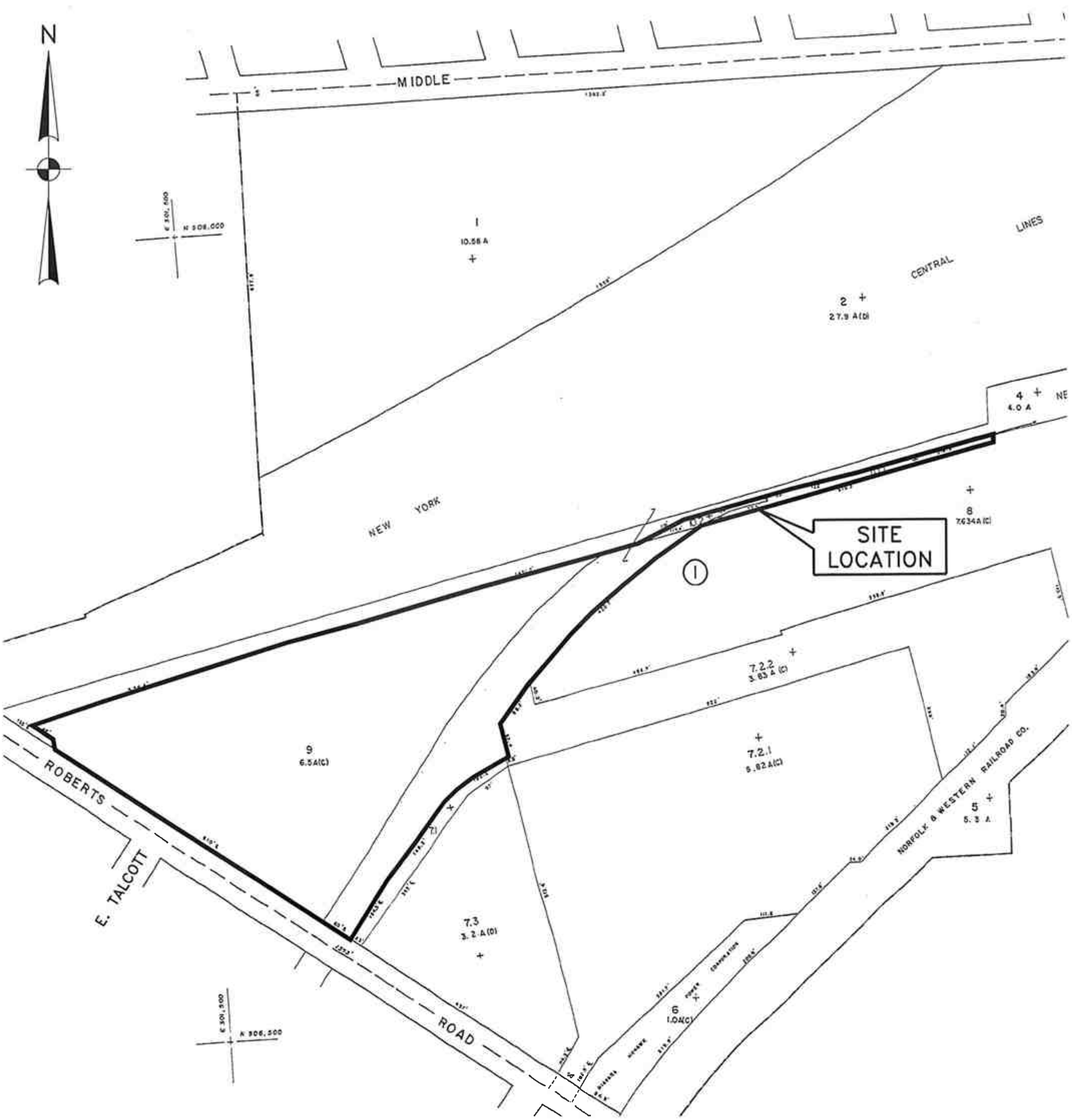
SITE LOCATION MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION/
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00	SCALE: 1: 24000	DATE: 03/13/2008	FIGURE NO. 1

N:\2008.0011.00-Edgewood Warehouse RI-AA\Engineering\CADD\CADD\Location Map.dwg 3/14/2008 10:25:19 AM EDT

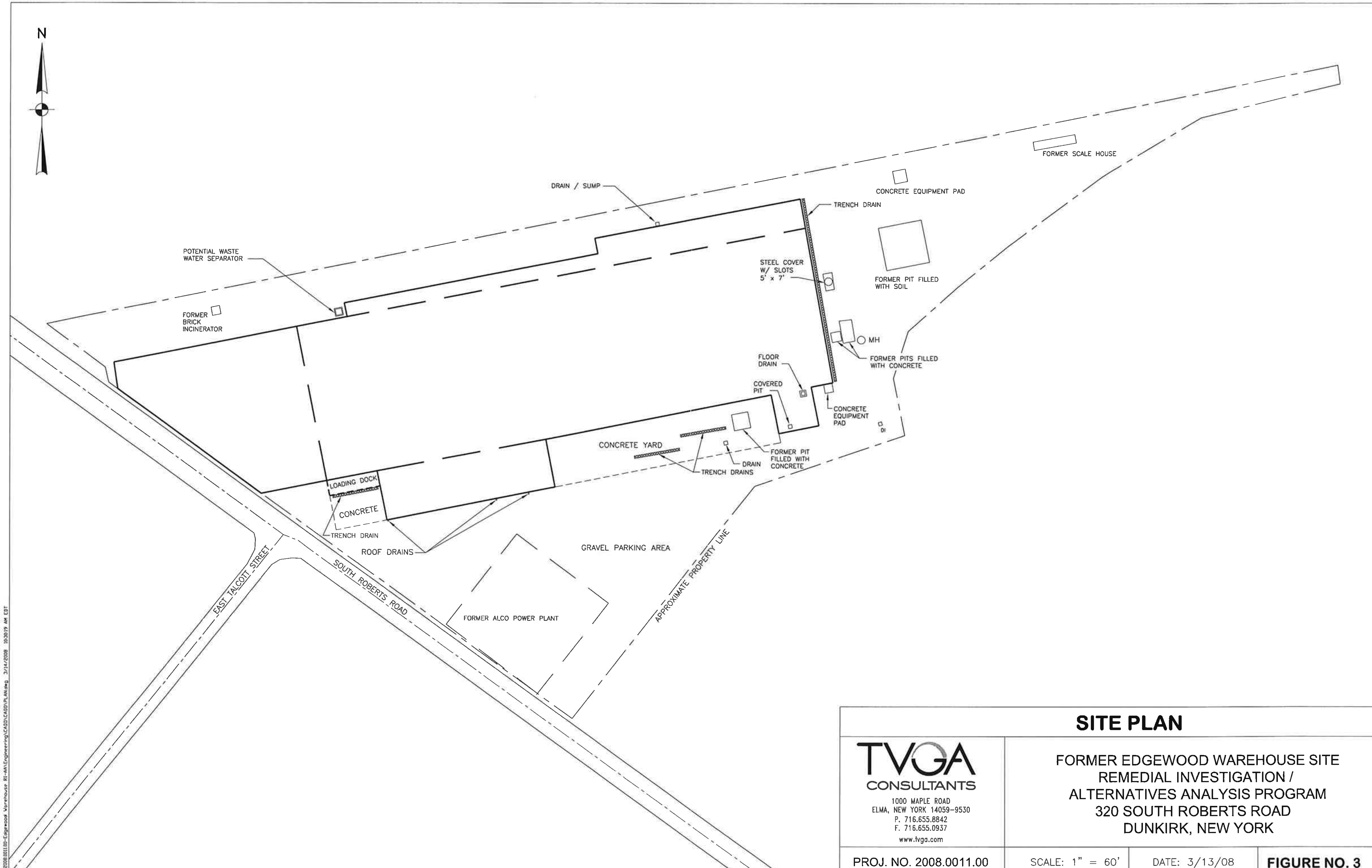


TAX MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION/
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS
DUNKIRK, NEW YORK

PROJECT NO. 2008.0011.00	SCALE: 1" = 300'	DATE: MAR 2008	FIGURE 2

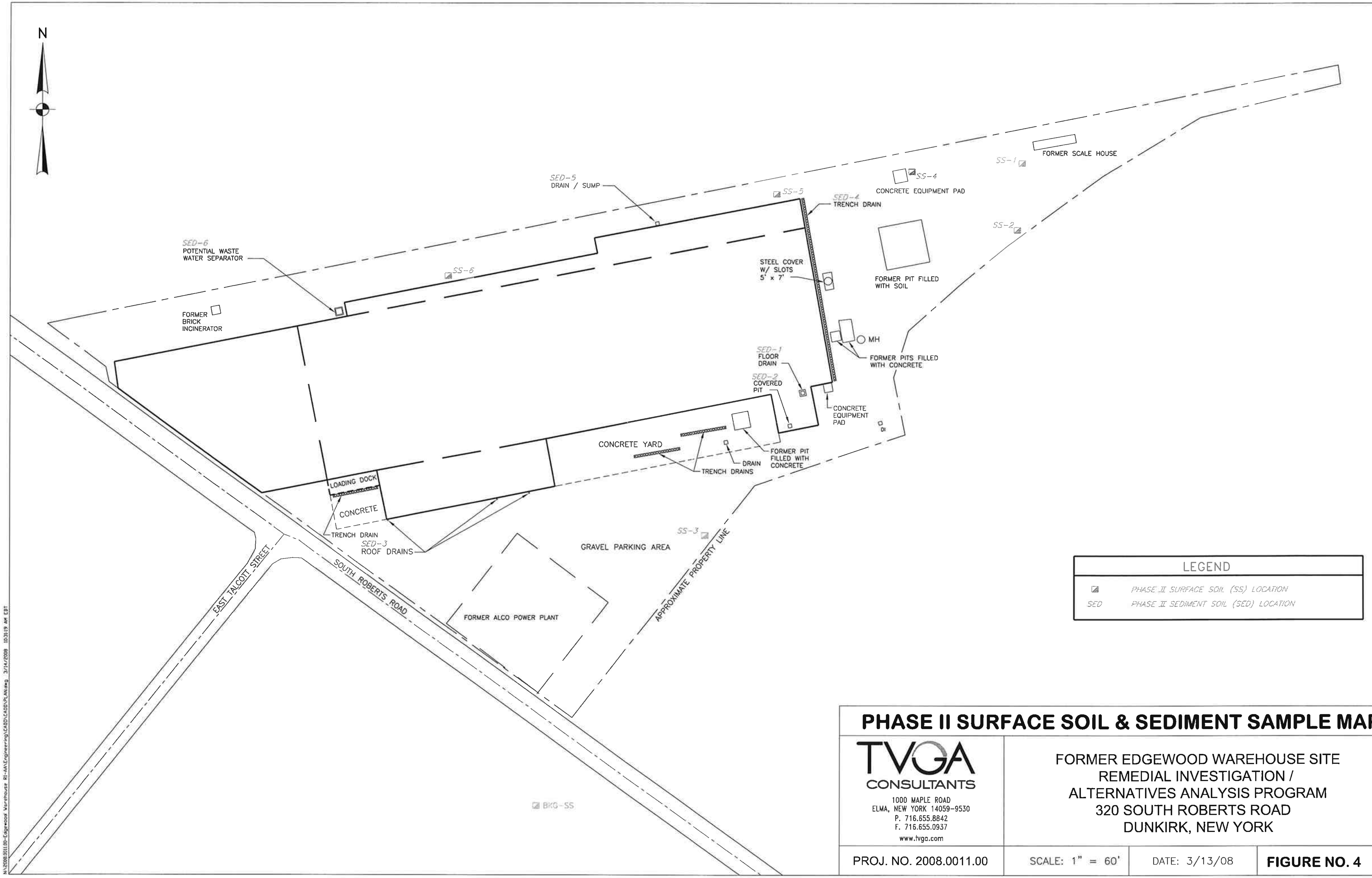


SITE PLAN

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00	SCALE: 1" = 60'	DATE: 3/13/08	FIGURE NO. 3

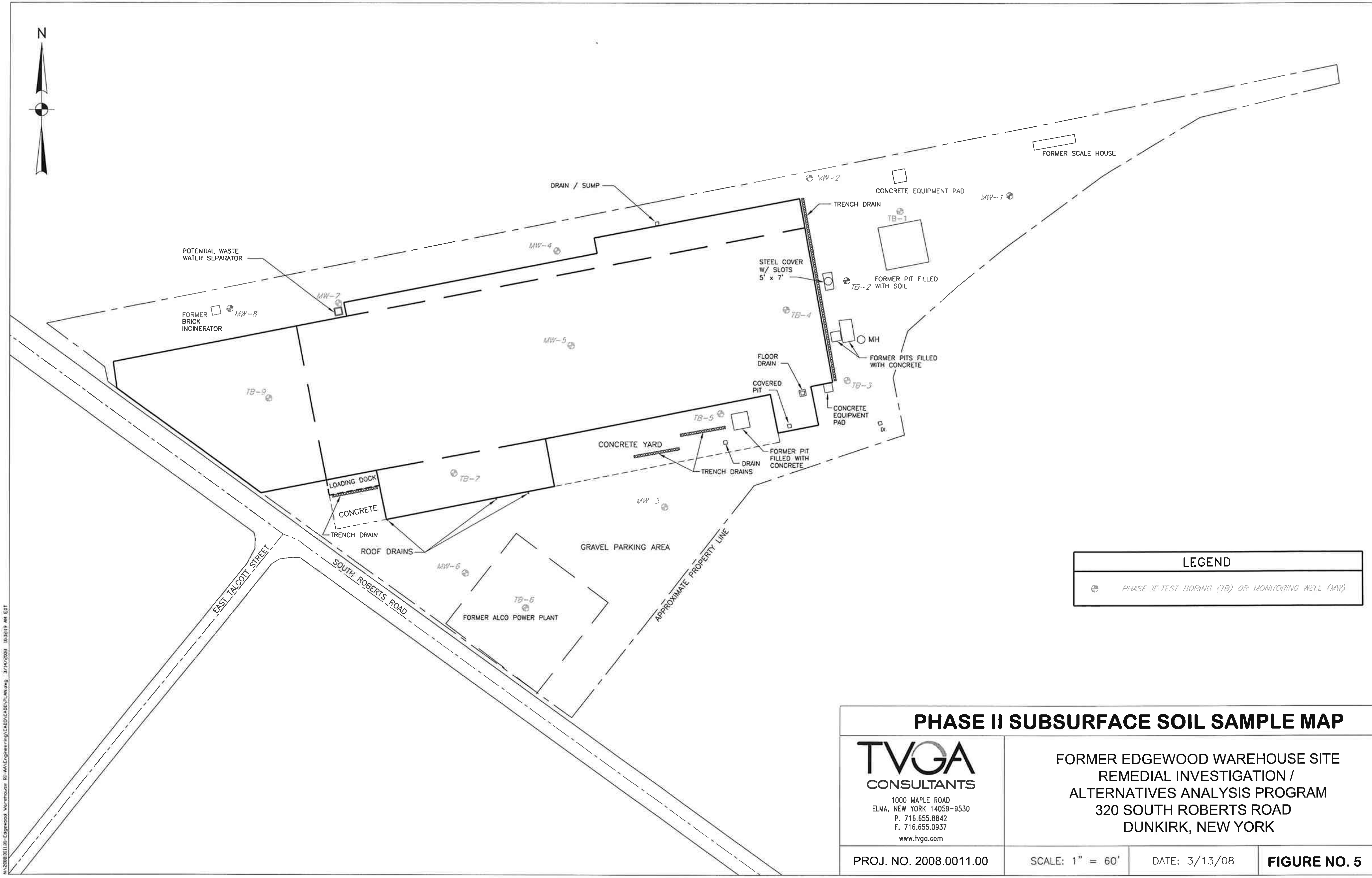


PHASE II SURFACE SOIL & SEDIMENT SAMPLE MAP

TVGA
CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00	SCALE: 1" = 60'	DATE: 3/13/08	FIGURE NO. 4

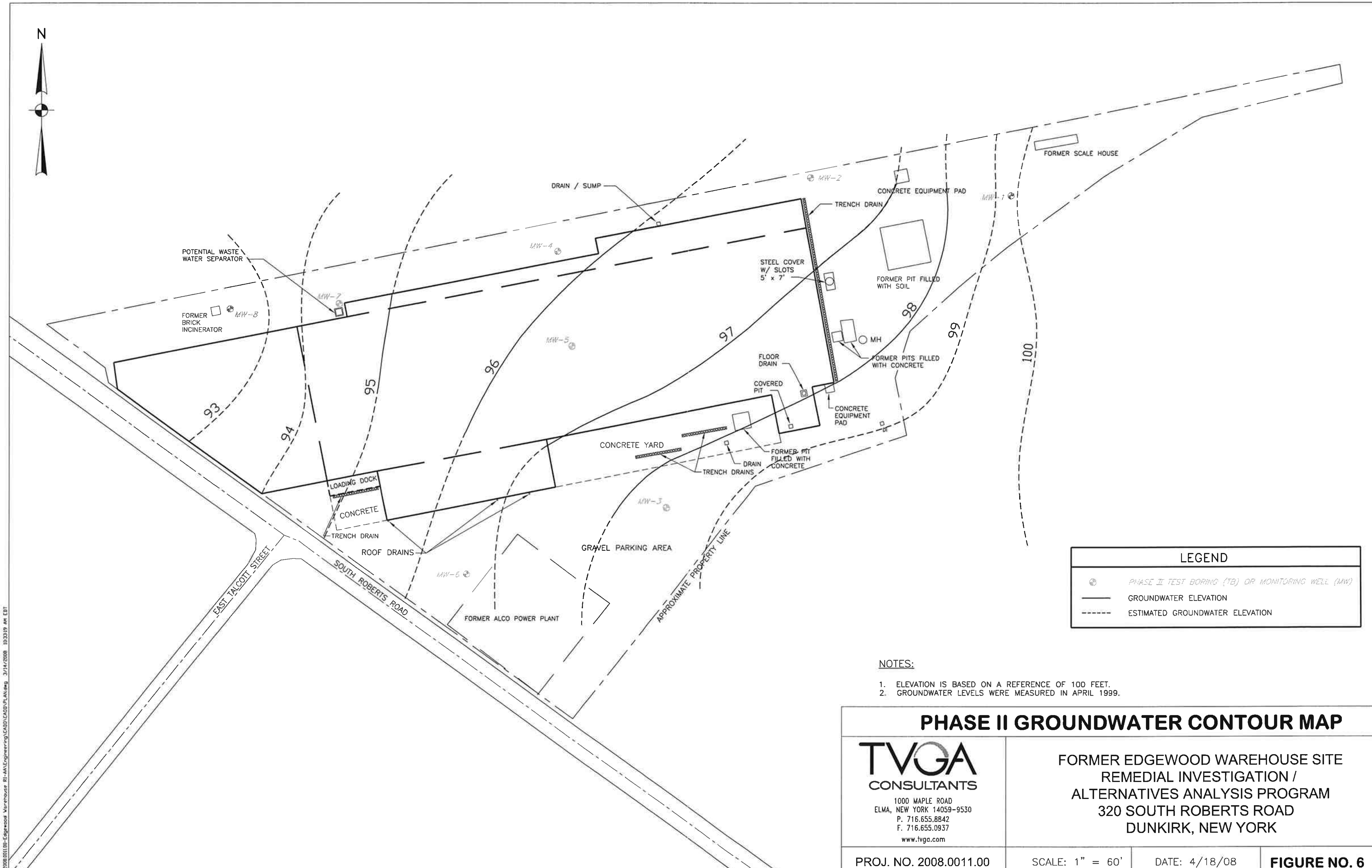


PHASE II SUBSURFACE SOIL SAMPLE MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00	SCALE: 1" = 60'	DATE: 3/13/08	FIGURE NO. 5



NOTES:

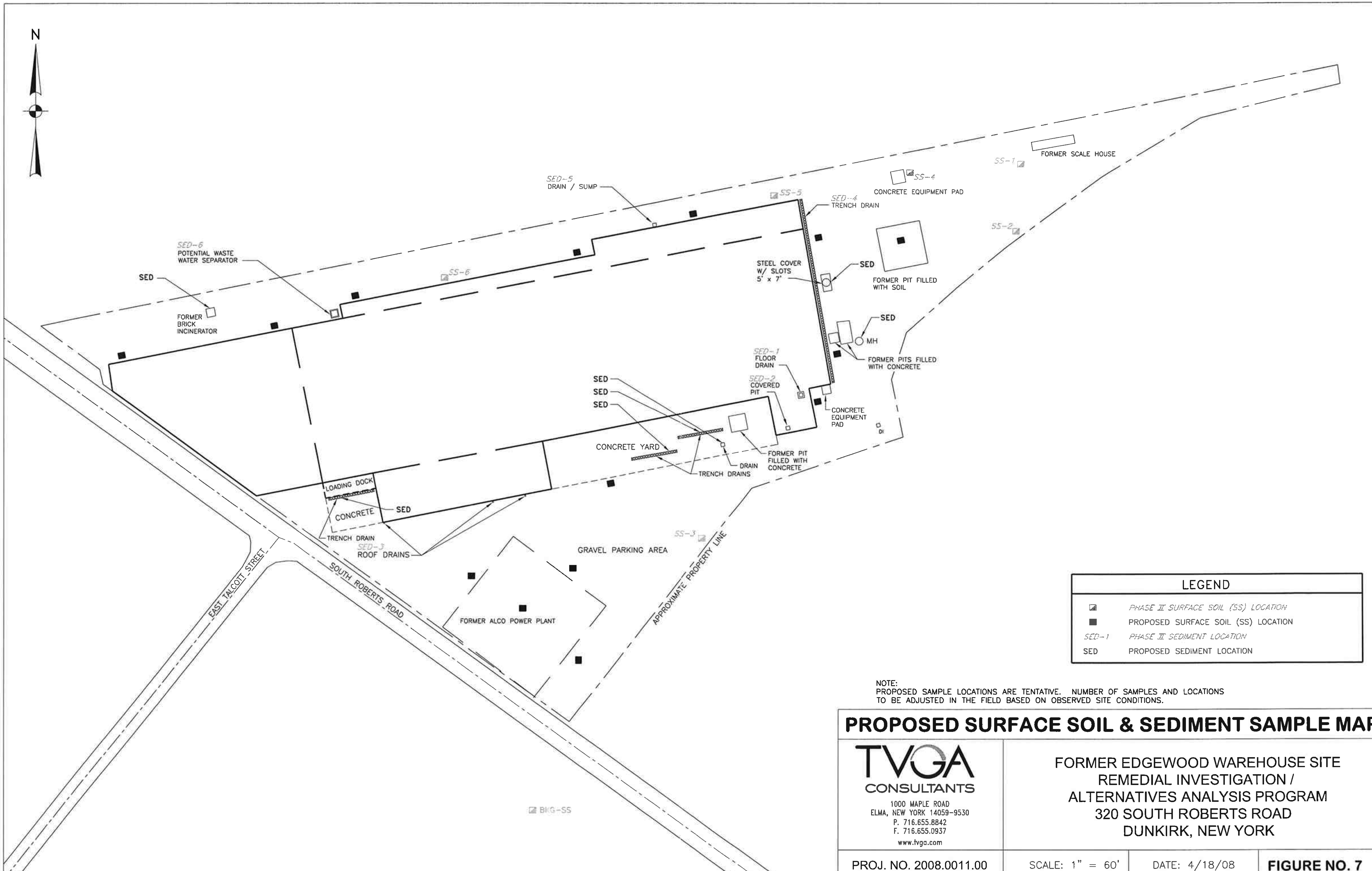
1. ELEVATION IS BASED ON A REFERENCE OF 100 FEET.
2. GROUNDWATER LEVELS WERE MEASURED IN APRIL 1999.

PHASE II GROUNDWATER CONTOUR MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00 | SCALE: 1" = 60' | DATE: 4/18/08 | FIGURE NO. 6



PROPOSED SURFACE SOIL & SEDIMENT SAMPLE MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00	SCALE: 1" = 60'	DATE: 4/18/08	FIGURE NO. 7

N:\2008.0011.00 - Edgewood Warehouse RI-AA\Engineering\CADD\PLAN.dwg, 4/18/2008 3:45:47 PM

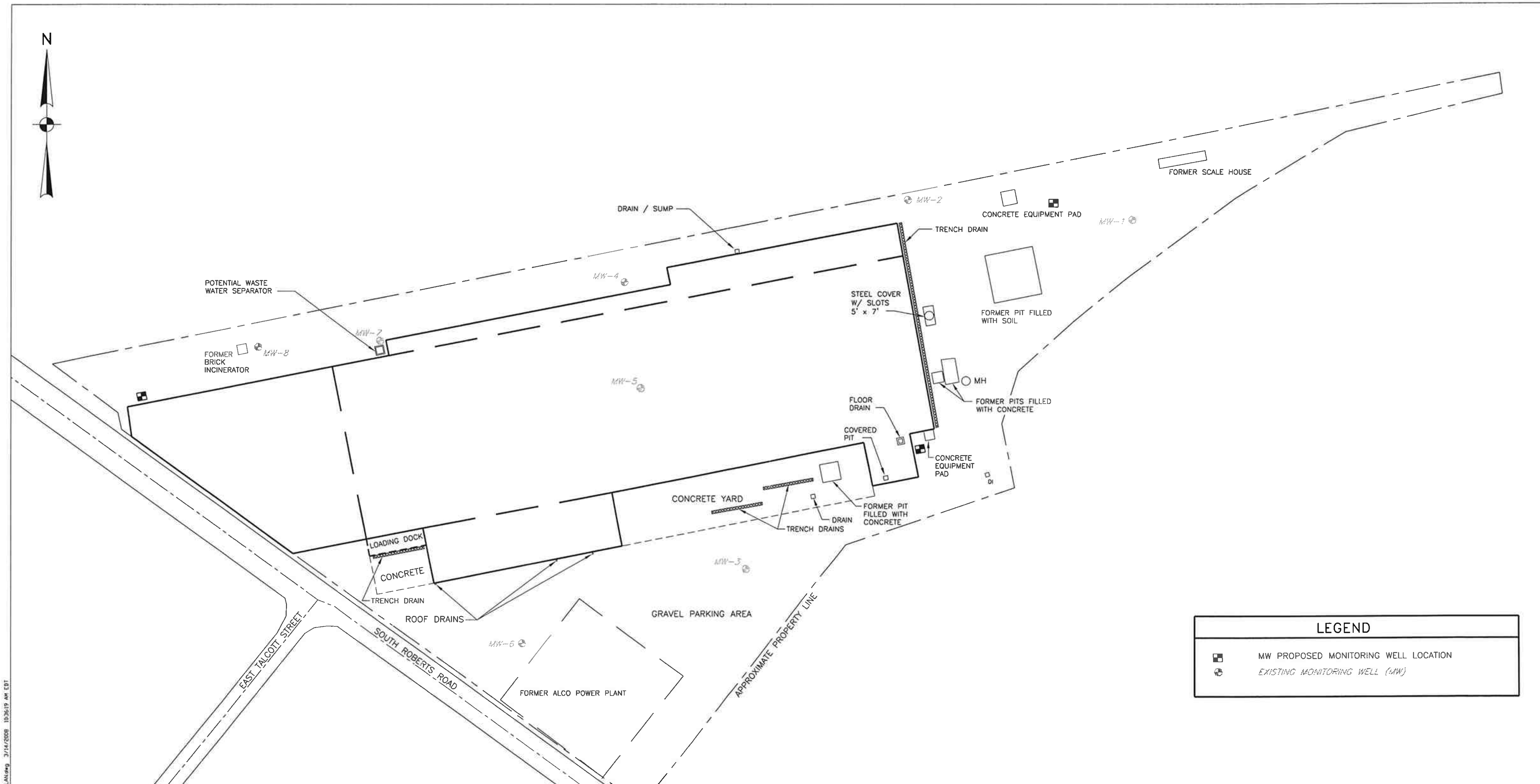
NOTE:
PROPOSED SAMPLE LOCATIONS ARE TENTATIVE. NUMBER OF SAMPLES AND LOCATIONS TO BE ADJUSTED IN THE FIELD BASED ON OBSERVED SITE CONDITIONS.

PROPOSED SUBSURFACE SOIL SAMPLE MAP

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00	SCALE: 1" = 60'	DATE: 4/18/08	FIGURE NO. 8



PROPOSED GROUNDWATER MONITORING WELL MAP

TVGA
CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00	SCALE: 1" = 60'	DATE: 4/18/08	FIGURE NO. 9

FIGURE 10

FORMER EDGEWOOD WAREHOUSE SITE RI/AA
PROJECT SCHEDULE

Task Name

RI/AA Work Plan
- Prepare Draft Work Plan
- Submit Draft Work Plan
- Finalize Work Plan
- Submit Final Work Plan to NYSDEC
- NYSDEC Approval of Work Plan

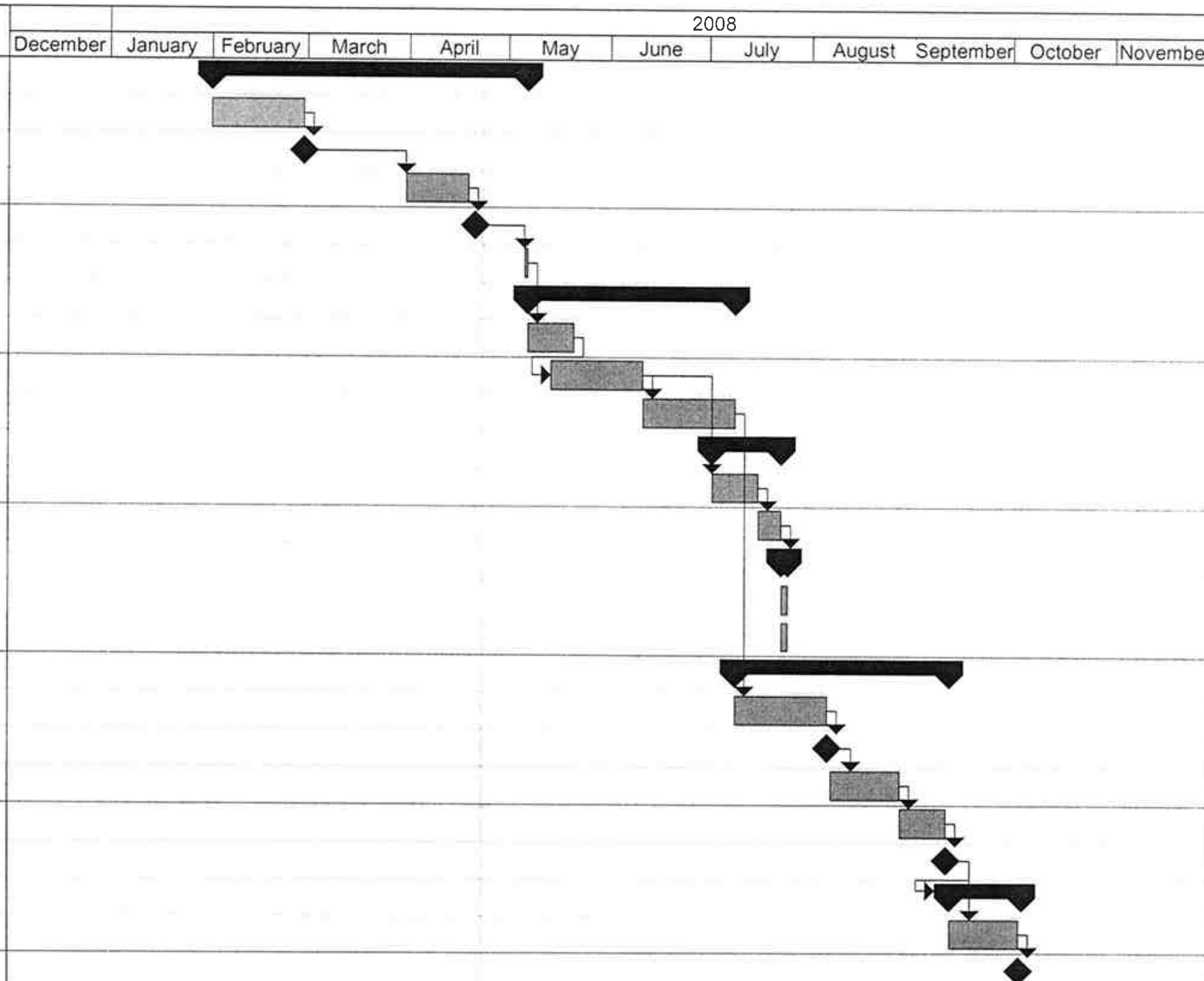
Remedial Investigation
- Conduct Field Program
- Sample Analysis
- Data Validation

Data Eval and Assessment of Risks
- Evaluate Data
- Risk Assessment

Alternatives Analysis
- Identify Potential Remedial Alternatives
- Detailed Analysis of Remedial Alternatives

RI/AA Report
- Report Preparation
- Submittal of Draft RI/AA Report
- NYSDEC Review of Draft Report
- Report Finalization
- Submittal Of Final Report

Proposed Remedial Action Plan
- Prepare Draft PRAP
- Submittal of Draft PRAP



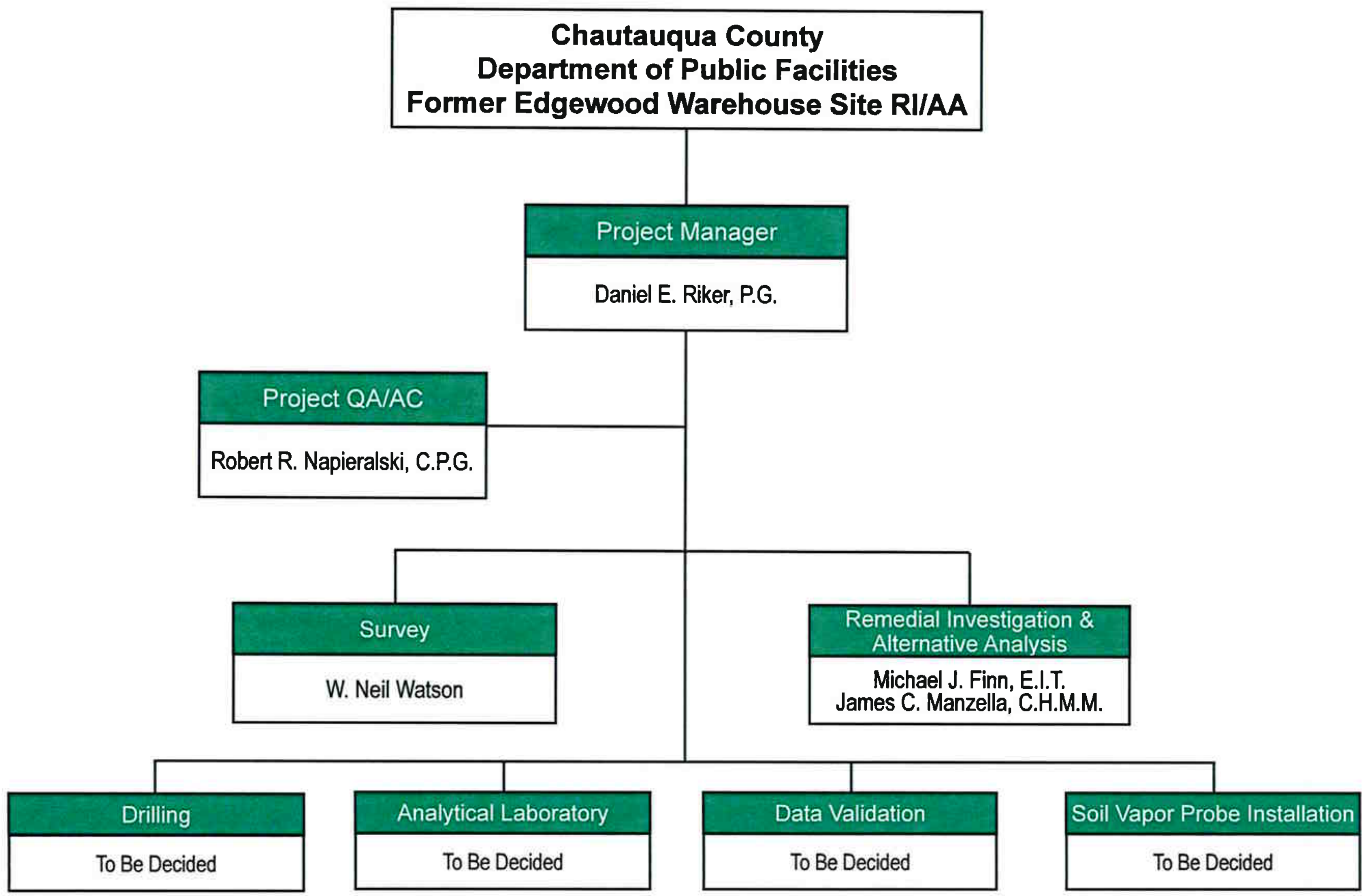
TVGA CONSULTANTS
Wed 4/23/08

Task | Milestone | External Tasks
Split | Summary | External Milestone
Progress | Project Summary | Deadline

\\tvgafs01\projects\2008.0011.00-Edgewood Warehouse RI-AA\Engineering\10Deliverables\RI-AA Work Plan\Work Plan\Project Schedule.mpp

TVGA CONSULTANTS

FIGURE No. 11



TABLES

Table 1
Sampling/Analysis Summary

RI/AA Former Edgewood Warehouse Site

Dunkirk, New York

Parameter	Method [1]	Source	Sample Type and Number: Samples	Field Duplicates	MS	MSD	Field Blanks	Rinseate Blanks	Trip Blanks	Total Samples
Groundwater										
TCL Volatiles	ASP 2000	4 New Monitoring Wells + 8 Existing Wells	12	1	1	1	-	-	3	18
TCL Semi Volatiles	ASP 2000	4 New Monitoring Wells + 8 Existing Wells	12	1	1	1	-	-	-	15
TCL PCBs	ASP 2000	4 New Monitoring Wells + 8 Existing Wells	12	1	1	1	-	-	-	15
TAL Metals	ASP 2000	4 New Monitoring Wells + 8 Existing Wells	12	1	1	1	-	-	-	15
Subsurface Soil										
TCL Volatiles	ASP 2000	Test Pits, Test Borings, Soil Probes	27	2	2	2	-	1	-	34
TCL Semi Volatiles	ASP 2000	Test Pits, Test Borings, Soil Probes	27	2	2	2	-	1	-	34
TCL PCBs	ASP 2000	Test Pits, Test Borings, Soil Probes	27	2	2	2	-	1	-	34
TAL Metals	ASP 2000	Test Pits, Test Borings, Soil Probes	27	2	2	2	-	1	-	34
Asbestos Bulk PLM	CARB 435	Test Pits, Test Borings, Soil Probes	8	-	-	-	-	-	-	8
Surface Soil										
TCL Semi Volatiles	ASP 2000	Grab Samples	14	1	1	1	-	1	-	18
TCL PCBs	ASP 2000	Grab Samples	14	1	1	1	-	1	-	18
TAL Metals	ASP 2000	Grab Samples	14	1	1	1	-	1	-	18
Sediment										
TCL Volatiles	ASP 2000	Pits, Vaults and Sumps	7	1	1	1	-	1	-	11
TCL Semi Volatiles	ASP 2000	Pits, Vaults and Sumps	7	1	1	1	-	1	-	11
TCL PCBs	ASP 2000	Pits, Vaults and Sumps	7	1	1	1	-	1	-	11
TAL Metals	ASP 2000	Pits, Vaults and Sumps	7	1	1	1	-	1	-	11
Sub-Slab Air Quality Samples										
TO-15	TO-15	Sub-Slab of warehouse interior	4	-	-	-	-	-	-	4
Helium	-	(tracer gas)	4	-	-	-	-	-	-	4

ATTACHMENT A

SUMMARY OF ANALYTICAL RESULTS FROM THE PHASE II ESA

Table 1A
Edgewood Warehouse
Analytical Summary of SVOCs for Phase II Surface Soil/Fill Samples

	SOIL CLEANUP OBJECTIVE RESIDENTIAL USE	SOIL CLEANUP OBJECTIVE COMMERCIAL USE	Background SS [5]	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Date Collected	-		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Depth	-								
Semi-Volatile Organic Compounds (ug/Kg)									
Acenaphthylene	100,000	500,000						310	
Anthracene	100,000	500,000	1,900		690	3,600	430	590	5,000
Benzo(a)anthracene	1,000	5,600	2,500	1,500	2,100	11,000	2,400	1,500	14,000
Benzo(a)pyrene	1,000	1,000	2,700	2,000 J	1,900	10,000 J	2,400	1,400	12,000
Benzo(b)fluoranthene	1,000	5,600	5,100	3,600 J	2,300	16,000 J	3,300	2,100	16,000
Benzo(g,h,i)perylene	100,000	500,000		1,500 J	880	5,600 J	970	760	9,100
Benzo(k)fluoranthene	1,000	56,000	5,700		1,000	5,300 J	1,100	580	6,000
Butyl benzyl phthalate	100,000*	500,000**							
Carbazole	100,000*	500,000**						590	4,300
Indeno(1,2,3-cd)pyrene	500	5,600	1,800		970	5,700 J	1,200	820	9,700
Chrysene	1,000	56,000	2,700	1,600	1,900	11,000	2,300	1,500	14,000
Dibenz(a,h)anthracene	330	560					320		
Dibenzofuran	100,000*	500,000**							
Bis(2-ethylhexyl)phthalate	100,000*	500,000**							
Fluoranthene	100,000	500,000	4,000	2,500	3,400	22,000	3,400	3,400	28,000
Fluorene	100,000	500,000						280	
2-methylnaphthalene	100,000*	500,000**							
Naphthalene	100,000	500,000							
Phenanthrene	100,000	500,000	1,900		2,200	17,000	2,000	3,100	23,000
Pyrene	100,000	500,000	4,300	3,100	3,200	24,000	3,700	3,100	25,000
TOTAL SVOCs	-	-	**32,600**	**15,800**	**20,540**	**131,200**	**23,520**	**20,030**	**166,100**
PCBs (ug/Kg)									
Aroclor-1254	1,000	1,000					1,000		

Notes:

1. Soil Cleanup Objectives source is 6NYCRR Part 375 Environmental Remediation Programs December 2006 Edition (Part 375)
2. Only compounds with one or more detections are shown.
3. ug/kg = micrograms per Kilogram (equivalent to parts per billion or ppb)
4. Blank spaces indicate that the analyte was not detected.
5. Background Sample collected from off-site location southwest of South Roberts Road as indicated on Figure 4

* the cap for individual SVOCs that do not have an SCO is 500,000 ug/kg for commercial use and 100,000 ug/kg for unrestricted use

(grey) Shaded represents exceedances over the Residential Soil Cleanup Objectives

(yellow) Shaded represents exceedances over the Residential and Commercial use soil Cleanup Objectives

Table 1B
Edgewood Warehouse
Analytical Summary of Inorganic Parameters for Phase II Surface Soil/Fill Samples

	SOIL CLEANUP OBJECTIVE RESIDENTIAL USE	SOIL CLEANUP OBJECTIVE COMMERCIAL USE	Background SS[5]	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Date Collected	-		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Metals (mg/kg)									
Total Solids	NA	NA	72.16	84.92	89.25	87.1	82.41	86.18	72.16
Aluminum			8,830	21,800	31,100	10,300	9,150	8,030	8,830
Antimony			10	6.12					10
Arsenic	16	16	**40.1**				**165**		**40.1**
Barium	350	400	137	183	237	114	111	59	137
Berylium	14	590	0.938	4.23	5.76	1.61	0.979	0.456	0.938
Cadmium	2.5	9.3	1.45	**3.26**	**2.94**	0.582	1.89	1.37	1.45
Calcium			17,400	110,700	155,000	90,400	15,400	1,890	17,400
Chromium	22	400	**32.8**	**158**	**90.5**	18	**40.5**	**39.4**	**32.8**
Cobalt			5.39	4.57	2.45	3.67	7.81	5.77	5.39
Copper	270	270	59.9	49.9	35.4	30	72.9	34.3	59.9
Iron			20,800	31,200	17,900	12,600	30,500	17,900	20,800
Lead	400	1,000	256	179	147	109	195	43.9	256
Magnesium			5,030	30,000	49,900	14,400	4,220	2,590	5,030
Manganese	2,000	10,000	670	**2,060**	**2,810**	1,100	1,190	551	670
Mercury	0.81	2.8	0.13				0.18	0.047	0.13
Nickel	140	310	33.2	103	35.1	19.1	75.2	34.5	33.2
Potasium			1,170	1,410	2,130	979	1,160	760	1,170
Selenium	36	1,500							
Silver	36	1,500							
Sodium			144	697	1,120	313	158	57	144
Thallium									
Vandium			15.3	11.2	10.3	16.9	15.8	13.1	15.3
Zinc	2,200	10,000	215	1,820	1870	140	582	575	215

Notes:
1. Soil Cleanup Objectives source is 6NYCRR Part 375 Environmental Remediation Programs December 2006 Edition (Part 375)
2. Average site background values for inorganic analytes were determined by averaging the results from the background samples with detectable concentrations.
3. mg/kg = milligrams per Kilogram (equivalent to parts per million or ppm)
4. Blank spaces indicates that the analyte was not detected.
5. Background Sample collected from off-site location southwest of South Roberts Road as indicated on Figure 4

(grey shading) Shaded represents exceedances over the Residential Soil Cleanup Objectives

(yellow shading) Shaded represents exceedances over the Residential and Commercial use soil Cleanup Objectives

Table 2A
Edgewood Warehouse
Anayltical Summary of VOCs for Phase II Sediment Samples

	SOIL CLEANUP OBJECTIVE RESIDENTIAL USE	SOIL CLEANUP OBJECTIVE COMMERCIAL USE	SED-1	SED-2	SED-3	SED-4	SED-5
Date Collected	-		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Volatile Organic Compounds (ug/Kg)							
Acetone	100,000	500,000			96		
2-Butanone (MEK)	100,000	500,000*			110		
cis-1,2-Dichloroethene	59,000	500,000		1,900		1,600	
Ethylbenzene	30,000	390,000					72
Tetrachloroethene	5,500	150,000		2,200			
Trichloroethene	10,000	200,000		1,400	29		
Toluene	100,000	500,000	480,000	3,900			
trans-1,2-Dichloroethene	100,000	500,000					
trans-1,3-Dichloropropene	100,000*	500,000*					
Trichloroethene	10,000	200,000					
Vinyl Chloride	210	13,000		400	400		
o-xylene	100,000**	500,000**					160
p-xylene / m-xylene	100,000**	500,000**					200
TICs							
Total VOCs			**480,000**	**9,800**	**635**	**1,600**	**432**

Notes:

1. Soil Cleanup Objectives source is 6NYCRR Part 375 Environmental Remediation Programs December 2006 Edition (Part 375)
2. Only compounds with one or more detections are shown.
3. ug/kg = micrograms per Kilogram (equivalent to parts per billion or ppb)
4. Blank spaces indicate that the analyte was not detected.

* the cap for individual VOCs that do not have an SCO is 500,000 ug/kg for commercial use and 100,000 ug/kg for unrestricted use

Shaded represents exceedances over the Residential Soil Cleanup Objectives

Shaded represents exceedances over the Residential and Commercial use soil Cleanup Objectives

Table 2B
Edgewood Warehouse
Anaytlical Summary of SVOCs for Phase II Sediment Samples

	SOIL CLEANUP OBJECTIVE RESIDENTIAL USE	SOIL CLEANUP OBJECTIVE COMMERCIAL USE	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6
Date Collected	-		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Semi-Volatile Organic Compounds (ug/Kg)								
Acenaphthylene	100,000	500,000		400	900			
Anthracene	100,000	500,000		620	1,400	480		
Benzo(a)anthracene	1,000	5,600		1,100	3,300	1,200		22,000
Benzo(a)pyrene	1,000	1,000	1,100	2,900	1,100			26,000
Benzo(b)fluoranthene	1,000	5,600	1,500 J	1,800	5,200	1,800		31,000
Benzo(g,h,i)perylene	100,000	500,000		560	1,200	500		16,000
Benzo(k)fluoranthene	1,000	56,000		630	1,600	580		11,000
Butyl benzyl phthalate	100,000*	500,000**	10,000	740				
Carbazole	100,000*	500,000**		520	1,300			
Indeno(1,2,3-cd)pyrene	500	5,600		550	1,400	530		18,000
Chrysene	1,000	56,000	970	1,300	3,800	1,300		21,000
Dibenz(a,h)anthracene	330	560						4,400
Dibenzofuran	100,000*	500,000**			720			
Bis(2-ethylhexyl)phthalate	100,000*	500,000**	1,700	1,000				
Fluoranthene	100,000	500,000	1,700	3,000	8,800	2,700	8,800	21,000
Fluorene	100,000	500,000		470	880			
2-methylnaphthalene	100,000*	500,000**					42,000	
Naphthalene	100,000	500,000	5,600		560		9,200	
Phenanthrene	100,000	500,000	1,400	3,200	8,100	2,200	8,800	8,700
Pyrene	100,000	500,000	1,800	2,800	7,100	2,200	7,600	23,000
TOTAL SVOCs	-	-	**25,770**	**21,590**	**47,360**	**13,490**	**76,400**	**202,100**
PCBs								
Aroclor-1242	1,000	1,000			3,200	40,000		
Aroclor-1254	1,000	1,000	9,700	5,600				

Notes:

1. Soil Cleanup Objectives source is 6NYCRR Part 375 Environmental Remediation Programs December 2006 Edition (Part 375)
2. Only compounds with one or more detections are shown.
3. ug/kg = micrograms per Kilogram (equivalent to parts per billion or ppb)
4. Blank spaces indicate that the analyte was not detected.

* the cap for individual SVOCs that do not have an SCO is 500,000 ug/kg for commercial use and 100,000 ug/kg for unrestricted use

(grey) Shaded represents exceedances over the Residential Soil Cleanup Objectives

(yellow) Shaded represents exceedances over the Residential and Commercial use soil Cleanup Objectives

Table 2C
Edgewood Warehouse
Anayltical Summary of Inorganic Parameters for Phase II Sediment Samples

	SOIL CLEANUP OBJECTIVE RESIDENTIAL USE	SOIL CLEANUP OBJECTIVE COMMERCIAL USE	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6
Date Collected	-		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Metals (mg/kg)								
Total Solids	NA	NA	62.4	63.86	64.55	56.5	50.61	71.24
Aluminum			13,600	8,390	14,500	22,400	14,400	7,920
Antimony			15	12.6	9.73	12.9	9.93	
Arsenic	16	16	26.2	23.5	21.2	23.9		
Barium	350	400	13,000	4,380	226	500	201	323
Berylium	14	590	1.68	1.14	1.65	3.29	0.707	0.659
Cadmium	2.5	9.3	19.2	55.1	2.28	10.9		
Calcium			69,700	45,200	58,400	58,600	54,200	2,390
Chromium	22	400	577	373	143	414	20100	63.1
Cobalt			30.8	22.3	7.76	11.3	28.8	12.1
Copper	270	270	345	323	124	194	287	3590
Iron			80,800	101,900	42,300	47,300	135,000	91,400
Lead	400	1,000	1250	475	183	605	168	393
Magnesium			13,200	8,060	9,910	11,700	3,400	2,010
Manganese	2000	10000	1,890	1,500	1,050	2,220	485	524
Mercury	0.81	2.8	2.1	0.36	0.11	2.3	0.16	0.28
Nickel	140	310	380	229	111	206	1680	72.7
Potasium			3,910	972	1,580	1,630	3,140	1,160
Selenium	36	1,500						
Silver	36	1,500						
Sodium			2,930	234	386	479	4,800	98
Thallium								
Vandium			28.9	35.5	20.5	35	114	30.4
Zinc	2,200	10,000	11,300	4,270	762	6,000	176	585

Notes:

1. Soil Cleanup Objectives source is 6NYCRR Part 375 Environmental Remediation Programs December 2006 Edition (Part 375)
2. Average site background values for inorganic analytes were determined by averaging the results from the background samples with detectable concentrations.
3. mg/kg = milligrams per Kilogram (equivalent to parts per million or ppm)
4. Blank spaces indicates that the analyte was not detected.

Shaded represents exceedances over the Residential Soil Cleanup Objectives

Shaded represents exceedances over the Residential and Commercial use soil Cleanup Objectives

Table 3A
Edgewood Warehouse
Anayltical Summary of VOCs for Phase II Subsurface Soil/Fill Samples

	SOIL CLEANUP OBJECTIVE RESIDENTIAL USE	SOIL CLEANUP OBJECTIVE COMMERCIAL USE	MW-1	MW-4	MW-5	MW-7	MW-8	TB-1	TB-3	TB-4	TB-9
Date Collected	-		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Depth	-		2-4'	2-3'	2'	2-4'	2'	1-3'	1-3'	1-3'	1-3'
Volatile Organic Compounds (ug/Kg)											
Acetone	100,000	500,000	130	47	61	130	100 J			100	
2-Butanone (MEK)	100,000	500,000*				37					
Carbon Disulfide	100,000*	500,000*			8	7	26 J				
Carbon Tetrachloride	1,400	22,000								7	
Chloroethane	10,000	350,000		12							
Chloroform	59,000	500,000					8 J				
Methylene Chloride	100,000*	500,000*					9 J				
Tetrachloroethene	10,000	200,000							370 J		
Trichloroethene	100,000	500,000		19			8 J		47 J		23
1,1,1-Trichloroethane	100,000	500,000		25				10	25 J		
1,1,2,2-Tetrachloroethane	100,000*	500,000*		6 J							
1,1-Dichloroethane	19,000	240,000		12							
1,1-Dichloroethene	47,000	190,000									8
TICs											
Total VOCs			**130**	**121**	**69**	**174**	**151**	**10**	**442**	**107**	**38**

Notes:

1. Soil Cleanup Objectives source is 6NYCRR Part 375 Environmental Remediation Programs December 2006 Edition (Part 375)
2. Only compounds with one or more detections are shown.
3. ug/kg = micrograms per Kilogram (equivalent to parts per billion or ppb)
4. Blank spaces indicate that the analyte was not detected

* the cap for individual VOCs that do not have an SCO is 500,000 ug/kg for commercial use and 100,000 ug/kg for unrestricted use

(dark shading) Shaded represents exceedances over the Residential Soil Cleanup Objectives

(yellow shading) Shaded represents exceedances over the Residential and Commercial use soil Cleanup Objectives

Table 3B
Edgewood Warehouse
Anayltical Summary of SVOCs for Phase II Subsurface Soil/Fill Samples

	SOIL CLEANUP OBJECTIVE RESIDENTIAL USE	SOIL CLEANUP OBJECTIVE COMMERCIAL USE	MW-1	MW-4	MW-6	MW-8	TB-4
Date Collected	-		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Depth	-		2-4'	2-3'	2'	2'	1-3'
Semi-Volatile Organic Compounds (ug/Kg)							
Acenaphthylene	100,000	500,000			760	2,100	
Anthracene	100,000	500,000		2,200	6,200	3,500	
Benzo(a)anthracene	1,000	5,600	320	4,700	2,300	7,700	
Benzo(a)pyrene	1,000	1,000		3,700	2,400	6,700	
Benzo(b)fluoranthene	1,000	5,600		4,900	3,900	9,700	
Benzo(g,h,i)perylene	100,000	500,000			1,200	2,600	
Benzo(k)fluoranthene	1,000	56,000		1,600	4,400	3,500	
Butyl benzyl phthalate	100,000*	500,000**					
Carbazole	100,000*	500,000**		1,600	820	3,000	
Indeno(1,2,3-cd)pyrene	500	5,600			1,300	3,100	
Chrysene	1,000	56,000	310	5,100	2,700	8,100	
Dibenzofuran	100,000*	500,000**			690	1,500	
Bis(2-ethylhexyl)phthalate	100,000*	500,000**					360
Fluoranthene	100,000	500,000	720	8,100	5,100	16,000	
Fluorene	100,000	500,000		1,800		2,200	
2-methylnaphthalene	100,000*	500,000**			750		
Naphthalene	100,000	500,000			830	2,100	
Phenanthrene	100,000	500,000	830	13,000	6,200	17,000	
Pyrene	100,000	500,000	630	8,800	5,800	13,000	
TOTAL SVOCs	-	-	**2,810**	**55,500**	**45,350**	**101,800**	**360**
PCBs							
Aroclor-1254	1,000	1,000				1,000	

Notes:

1. Soil Cleanup Objectives source is 6NYCRR Part 375 Environmental Remediation Programs December 2006 Edition (Part 375)
2. Only compounds with one or more detections are shown.
3. ug/kg = micrograms per Kilogram (equivalent to parts per billion or ppb)
4. Blank spaces indicate that the analyte was not detected.

* the cap for individual SVOCs that do not have an SCO is 500,000 ug/kg for commercial use and 100,000 ug/kg for unrestricted use

(gray) Shaded represents exceedances over the Residential Soil Cleanup Objectives

(yellow) Shaded represents exceedances over the Residential and Commercial use soil Cleanup Objectives

Table 3C
Edgewood Warehouse
Anaytical Summary of Inorganic Parameters for Phase II Subsurface Soil/Fill Samples

	SOIL CLEANUP OBJECTIVE RESIDENTIAL USE	SOIL CLEANUP OBJECTIVE COMMERCIAL USE	Background SS	MW-1	MW-4	MW-5	MW-6	MW-7	MW-8	TB-1	TB-3	TB-4	TB-9
Date Collected	-		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Depth	-			2-4'	2-3'	2'	2-4'	2-4'	2'	1-3'	1-3'	1-3'	1-3'
Metals (mg/kg)													
Total Solids	NA	NA	72.16	81.1	77.45	78.67	80.99	63.14	78.34	84.21	66.71	71.33	81.18
Aluminum			8,830	12,400	8,780	12,400	9,110	23,100	6,150	13,200	18,300	16,900	8,410
Antimony			10										
Arsenic	16	16	40.1		24.3		15.7			15.3			
Barium	350	400	137	65	138	101	121	174	103	92.4	155	126	41
Beryllium	14	590	0.938	0.691	1.1	0.758	0.832	1.11	0.422	1.14	1.03	0.929	0.494
Cadmium	2.5	9.3	1.45			0.93	0.652	1.36	0.865	0.637	1.29	1.2	
Calcium			17,400	2,010	9,880	1,890	5,540	3,300	3,140	20,600	2,620	1,710	9,570
Chromium	22	400	32.8	16.5	48.9	79.1	14	19.7	15.7	28.7	27	19.9	11.9
Cobalt			5.39	10.4	10.6	15.9	11.1	7.02	6.01	11.4	15.9	13.1	9.41
Copper	270	270	59.9	18	231	43.1	103	31.1	214	26.4	15.8	13.9	25.9
Iron			20,800	27,400	36,800	37,500	33,500	20,000	18,900	257,400	33,700	28,500	22,800
Lead	400	1,000	256	16.5	796	34.1	128	26.2	77	30	32.9	28.1	16.2
Magnesium			5,030	3,340	2,910	3,510	5,370	3,250	2,260	5,880	3,750	3,010	8,050
Manganese	2000	10000	670	389	462	226	306	210	374	588	492	856	277
Mercury	0.81	2.8	0.13	0.018	0.066	0.023	7.1	0.43	0.3	0.2	1.1	0.039	
Nickel	140	310	33.2	25.2	23	213	31.5	21.6	24.5	45.2	34.5	25.2	23.3
Potasium			1,170	1,500	1,050	1,680	1,450	1,650	788	1,430	1,940	1,190	1,080
Selenium	36	1,500											
Silver	36	1,500							12.9				
Sodium			144	153	165	114	173	128	88.8	164	146	129	116
Thallium													
Vandium			15.3	24.6	31.9	21.9	24.8	24.8	13	20.4	33.9	31.3	17.4
Zinc	2,200	10,000	215	79.3	187	110	115	110	167	108	161	100	71.8

Notes:

1. Soil Cleanup Objectives source is 6NYCRR Part 375 Environmental Remediation Programs December 2006 Edition (Part 375)
2. Average site background values for inorganic analytes were determined by averaging the results from the background samples with detectable concentrations.
3. mg/kg = milligrams per Kilogram (equivalent to parts per million or ppm)
4. Blank spaces indicates that the analyte was not detected.

Shaded represents exceedances over the Residential Soil Cleanup Objectives

Shaded represents exceedances over the Residential and Commercial use soil Cleanup Objectives

Table 4A
Edgewood Warehouse
Well Elevation Data

Date Collected	Well #	Top of Casing (TOC) Elevation (ft)	Depth to water from TOC (ft)	Corrected groundwater elevaton (ft)
4/15/1999	MW-1	100.81	0.75	100.06
	MW-2	99.73	3.60	96.13
	MW-3	101.38	2.33	99.05
	MW-4	97.79	2.02	95.77
	MW-5	96.65	4.83	91.82
	MW-6	99.53	7.04	92.49
	MW-7	99.13	4.35	94.78
	MW-8	98.24	5.83	92.41

Notes:Casing Elevations are surveyed against a reference elevation of 100 feet.
[Corrected Groundwater Elevations] = [TOC Elevation] - Depth to Water from TOC]

Table 4B
Edgewood Warehouse
Anayltical Summary of VOCs for Phase II Groundwater Samples

	TOGS	MW-2	MW-4
Date Collected		Mar-99	Mar-99
Volatile Organic Compounds (ug/Kg)			
Chloroethane	5		65
Trichloroethene	5		9
1,1,1-Trichloroethane	5	280	110
1,1-Dichloroethane	5	96	82
Total VOCs			

Notes:

1. Regulatory values are for Class GA waters in NYS Ambient Water Quality Standards TOGS 1.1.1 (Source of Drinking Water, groundwater).
2. Only compounds with one or more detections are shown.
3. ug/kg = micrograms per Kilogram (equivalent to parts per billion or ppb)
4. Blank spaces indicate that the analyte was not detected.

Shaded represents exceedances over the applicable regulation

Table 4C
Edgewood Warehouse
Anayltical Summary of Inorganic Parameters for Phase II Groundwater Samples

	TOGS	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8
Date Collected		Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99	Mar-99
Metals (mg/kg)									
Total Solids	NA			394		1030	871		776
Aluminum	NA	2.69	8.67	0.9	1.08	81.9	99.1	3.24	
Antimony	0.003								
Arsenic	0.025	0.003	0.008		0.002	0.021	0.031	0.004	0.003
Barium	1.0	0.138	0.139	0.11	0.275	0.298	1.26	0.74	0.083
Berylium	.003**	0.002	0.002	0.002	0.002	0.009	0.007	0.002	0.002
Cadmium	0.005		0.006		0.007	0.009	0.01		
Calcium	NA	83.9	119	90	126	73.2	198		171
Chromium	0.050		0.012			0.573	0.173		
Cobalt	NA					0.304	0.104	0.016	
Copper	0.2		0.117		0.02	0.049	0.323	0.025	
Iron	0.3	5.16	15.7	3.16	19.5	69.3	238	6.82	0.214
Lead	0.025	0.16	0.055	0.004	0.012	0.029	0.2	0.011	0.001
Magnesium	35**	31.5	23.1	18.1	27.9	49.4	99.9	22.4	32.3
Manganese	0.3	0.335	1.72	2.91	1.66	9.79	2.94	0.86	1.23
Mercury	0.0007						0.003		
Nickel	0.1	0.017	0.063	0.032	0.022	9.83	0.292	0.024	0.025
Potasium	NA	3.43	6.36	4.62	3.3	15.8	44.5	2.76	3.27
Selenium	0.01						0.003		
Silver	0.05								
Sodium	20	43.1	15.5	14	20.2	40.4	69.5	9.19	13.3
Thallium	0.0005**					0.001	0.004		
Vandium	NA	0.01	0.018			0.61	0.186	0.12	
Zinc	2**	0.15	0.106	0.63	0.039	0.535	0.516	0.121	0.029

Notes:

1. Regulatory values are for Class GA waters in NYS Ambient Water Quality Standards TOGS 1.1.1 (Source of Drinking Water, groundwater).
2. Only compounds with one or more detections are shown.
3. ug/kg = micrograms per Kilogram (equivalent to parts per billion or ppb)
4. Blank spaces indicate that the analyte was not detected.

Shaded represents exceedances over the applicable regulation

** New York state guidance value was used where no groundwater standard was available

ATTACHMENT B

RESUMES

DANIEL E. RIKER, P.G.

PROJECT MANAGER

TVGA CONSULTANTS

INTRODUCTION

In the role as Project Manager, Mr. Riker's duties include coordination with State and Federal regulatory agencies, oversight of technical staff, subconsultants and subcontractors involved in a variety of natural and human resource evaluations, as well as the preparation of environmental documentation and permits pursuant to State and Federal regulatory programs. Specific projects include environmental site assessment, investigation, and remediation activities performed on various transportation, industrial, and commercial projects.

TECHNICAL EXPERTISE

With over 13 years of experience in the field of environmental consulting, Mr. Riker's expertise includes contaminant characterization at brownfield sites and hazardous and solid waste facilities, including the development of project scopes, on-site implementation of characterization efforts, data evaluation and interpretation, identification and evaluation of remedial alternatives, final report preparation, and project management. Mr. Riker has developed a brownfield specialty that includes site characterization, remedial analysis and design, re-use planning, and funding procurement. He has been involved with assorted projects including preliminary site assessments, Phase I and II environmental site assessments, treatment technology assessments, remedial investigations, and remedial design projects.

PROJECT EXPERIENCE

Remedial Construction Administration and Oversight, Former Welch Foods Site, Brocton, NY – Project Manager responsible for the administration and oversight of the remediation at a former food processing facility. The $1.2M project is being completed under the New York State Environmental Restoration Program (ERP). The work includes the demolition of the existing building, the cleanup of contaminated sediments and soil, and the removal of asbestos-containing materials.

Remedial Design and Oversight, Roblin Steel Site, Dunkirk, NY – Project Manager responsible for the preparation of the Remedial Action Work Plan, contract documents, and technical specifications and the oversight and administration of the remediation of this 12-acre brownfield site. The work is being completed under a New York State Environmental Restoration Program (ERP) grant as well as a USEPA Brownfield Cleanup Grant. The remediation includes soil excavation and off-site disposal, in-situ treatment of groundwater, installation of a vapor barrier in the existing structure, and the placement of a clean soil cover.

Education:
- BA/1991/Geology/Colgate University
- MS/1994/Hydrogeology/Duke University

Professional Registration:
- 2000/Pennsylvania/ Professional Geologist, License No. PG003806E
- Current OSHA 40-Hour Health and Safety Training
- OSHA 8-Hour Hazardous Waste Supervisor Course

Professional Associations:
- Buffalo Association of Professional Geologists (Past President)
- Buffalo Niagara Enterprise, Brownfields Task Force
- New York State Council of Professional Geologists

Continuing Education:
- Fundamentals and Application of Geochemistry (NGWA 40-hour course)
- Groundwater Modeling System Training Course (Boss International 24-hour course)
- GIS Training Course (GISKey 24-hour course)

Publications:
- Daniel Riker, James Richert, Kent McManus, and Jeffrey Smith (2003). Mathematical Model Reduces Landfill Closure Costs. 18th International Conference on Solid Waste Technology and Management, Philadelphia, PA
- Daniel Riker, Kent McManus, Peter Cammarata, and Christopher Pawenski (2003). Overcoming Impediments to Redeveloping Brownfields: Two Case Studies in Buffalo, NY. RevTech Conference, Pittsburgh, PA

Years Experience:
Total Experience 14 Years
With TVGA 4 Years

Remedial Investigation/Alternatives Analysis (RI/AA) Program, Youngstown Cold Storage, Youngstown, NY – Project Manager for the RI/AA of a former apple storage facility adjacent to a public park that is being advanced under the New York State Environmental Restoration Program (ERP). The scope of the RI program includes the characterization of fill, soil, and groundwater potentially contaminated with arsenic and PCBs, and building materials that contain asbestos. The project involves the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, implementation of community involvement plan, coordination of project staff and subcontractors, and technical review of project plans and reports.

New York Power Authority, NAPL Investigation, NYPA Right-of-Way, Niagara Falls, NY – Project Manager for the delineation of non-aqueous phase liquids (NAPL) within the NYPA Lewiston Power Project conduit right-of-way in the vicinity of Royal Avenue. Work included the review of historical documents, drilling of overburden and bedrock test borings, collection of characterization samples, and preparation of work plan and final reports. Responsibilities included technical staff coordination, client and regulatory communications, and technical document review.

Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Niagara Motors Site, Dunkirk, NY – Project Manager for the SI/AA of a four-acre former engine manufacturing facility. The scope of the SI program includes a passive soil gas survey, a geophysical survey, and the characterization of potentially contaminated fill, soil, groundwater, surface water, and sediment. The project involves the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities include client and regulatory communications, implementation of community involvement plan, coordination of project staff and subcontractors, and technical review of project plans and reports.

Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Felmont Oil Site, Olean, NY – Project Manager for the SI/AA of a 22-acre former oil refining, storage, and distribution facility. The scope of the SI program includes a passive soil gas survey, a geophysical survey, and the characterization of potentially contaminated fill, soil, groundwater, surface water, and sediment. The project involves the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities include client and regulatory communications, implementation of community involvement plan, coordination of project staff and subcontractors, and technical review of project plans and reports.

Environmental Review, Mike Basil Toyota, Inc., Lockport, NY – Senior Hydrogeologist for a project involving the evaluation of information generated during due diligence activities relative to a property transaction at an automobile dealership. Duties included the review and evaluation of existing investigation and remediation information, and the preparation of a report documenting the review.

Remedial Design and Oversight, Franczyk Park, Buffalo , NY – Project Manager responsible for the implementation of a Pre-Design Investigation; the preparation of the Remedial Action Work Plan, contract documents, and technical specifications; and the oversight and administration of the remediation of this 16-acre brownfield site. The work is being completed under a New York State Environmental Restoration Program (ERP) grant. The remediation includes soil excavation and off-site disposal, installation of an interceptor trench, the placement of a clean soil cover, and the design and installation of new park equipment.

Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Buffalo, NY – Project Manager for the SI/RAR of a 16-acre former fertilizer manufacturing facility later developed as a public park. The scope of the SI program included a geophysical survey and the characterization of fill, soil, groundwater, and surface water potentially contaminated with arsenic and lead. The project involved the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, implementation of community involvement plan, coordination of project staff and subcontractors, and technical review of project plans and reports.

Chautauqua County Brownfield Assessment Demonstration Pilot Program, Chautauqua County, NY – Senior Hydrogeologist responsible for the implementation of programmatic and technical services provided in support of this EPA Brownfield Pilot Program under a multi-year contract. Duties included the preparation of a work plan for the site investigation of a former dry cleaner facility in Jamestown, New York and the preparation of quarterly progress reports for submittal to EPA.

Remedial Investigation, Insulator Manufacturing Facility, Leroy, NY – Deputy Project Manager that implemented the investigation of a manufacturing facility to characterize the source and extent of chlorinated solvent contamination. Project work included development and implementation of investigation work plan, data interpretation, and reporting. Responsible for overall project management, scoping the investigation, procuring and coordinating subcontractors, budgeting, scheduling, and directing field teams. Media of concern included soil, groundwater in overburden and fractured bedrock, surface water, and sediment.

USEPA Brownfields Cleanup Program, Chautauqua County, NY – On behalf of the Chautauqua County Department of Public Facilities, prepared a grant application and supporting technical information for the completion of the remediation of the Former Roblin Steel Site in Dunkirk, New York.

Evaluation of Remedial Technologies, Brownfield Site, Tonawanda, NY – Deputy Project Manager that evaluated remedial technologies to address various types of contamination at a 42-acre former specialty plastics manufacturing facility. The soil and groundwater contamination issues at this brownfields site include petroleum products, PCBs, resins, and metals. In addition, coordinated the evaluation of options to address two landfills located on the property.

USEPA Brownfields Assessment Demonstration Pilot Program, City of Lackawanna, NY – Assisted the City of Lackawanna with the preparation of a successful grant application under this Federal brownfield redevelopment initiative to fund the development of a city-wide brownfield inventory, develop a site evaluation process, and investigate and perform remedial planning for three high priority brownfield sites. Prepared specific sections of the application pertaining to city history and demographics, site selection and environmental site assessment planning and implementation, reuse planning and funding mechanisms, long-term benefits and sustainability, and measures of success.

PCB Investigation and Remediation, Residential Property, Buffalo, NY – Planned and implemented a remedial investigation and remediation of a residential property containing PCB-contaminated wastes. The former owner routinely dumped the contents of transformers on the property and removed the contents to recover the scrap copper. Responsibilities included the oversight of drilling activities, collection of samples for test kit and laboratory analysis, performance of test kit analysis, development of the investigation report and remedial work plan, oversight of the excavation of PCB-contaminated soil, collection of post-excavation samples, and preparation of the remedial action report.

Site Remediation, Former Service Station and Equipment Storage Facility, Northbrook, IL – Implemented the removal of five underground storage tanks and contaminated soil at a former service station and equipment storage facility. Responsibilities included preparation of a Remedial Action Plan, coordination of the remediation subcontractor, oversight of the tank and soil removal, and collection of post-excavation samples.

NYSDEC Environmental Restoration Program Remediation Grant Application, Chautauqua County, NY – On behalf of the Chautauqua County Department of Public Facilities, prepared a grant application and supporting technical information for the completion of the remediation of the former Roblin Steel site in Dunkirk, NY.

Underground Storage Tank Removal Assistance, Fort Drum, Watertown, NY – Field staff responsible for providing assistance relative to the removal of USTs formerly used to store heating oil for individual barracks. Work included screening of potentially contaminated soil with a photoionization detector (PID), coordination with on-site and regulatory personnel, and collection of soil samples for analysis.

ROBERT R. NAPIERALSKI, C.P.G.

PRINCIPAL/MUNICIPAL MARKET SECTOR LEADER

TVGA CONSULTANTS

INTRODUCTION

Mr. Napieralski has 18 years of professional environmental consulting experience for public and private sector clients and specializes in the management of multi-disciplined projects. His background includes extensive experience with Phase I and II Environmental Site Assessments, soil and groundwater remediation, Environmental Impact Statement (EIS) preparation, solid and hazardous waste management facility permitting, investigation, and remediation, and regulatory compliance issues. Mr. Napieralski has a working knowledge of State and Federal regulatory programs including Chemical and Petroleum Bulk Storage, CWA, RCRA, CERCLA, SARA, TSCA, SPDES, Voluntary Cleanup Programs, Brownfield and Recycling Grant Programs under the Clean Water/Clean Air Bond Act of 1996, and 6 NYCRR Parts 360, 420-426, 371-375, 617, and 621.

PROJECT EXPERIENCE

Site Investigation/Remedial Alternatives Report (SI/RAR), Flintkote Site, Lockport, NY – Project Manager for the SI/RAR of an abandoned six-acre site utilized for industrial purposes since the 1880s. Responsibilities include technical and administrative oversight of project staff and subcontractors involved in site characterization and remedial alternatives analysis, as well as client and regulatory communications. Duties also include technical review of project plans, reports and estimates, and analysis of potential funding opportunities via insurance asset recovery. Project also requires close communication with County planning agency to ensure integration of end use planning and remedial alternative selection.

Chautauqua County Department of Public Facilities, Term Environmental Services, Chautauqua County, NY – Program Manager for environmental services provided under nine consecutive one-year term contracts. He manages technical staff, subconsultants and subcontractors involved in environmental assignments including Phase I and II environmental site assessments, environmental impact assessment and analysis for business/industrial park developments, brownfield redevelopment, grant preparation and administration, and regulatory compliance. He is responsible for contract administration, technical review of project deliverables, Client consultation, public presentations and outreach, and regulatory communications.

Education:
- BA/1988/Geology/Hydrogeology/Boston University

Professional Registration:
- 1997/Certified Professional Geologist #10110
- Current OSHA 40-Hour HAZWOPER Certification
- OSHA 8-Hour HAZWOPER Supervisor Certification

Professional Associations:
- American Institute of Professional Geologists (AIPG)
- Association of Groundwater Scientists and Engineers (AGWSE)

Continuing Education:
- Risk Assessment for the Environmental Professional, NGWA
- Risk Based Corrective Action, ASTM
- Computer Enhanced Training for Groundwater Transport Simulations, Microengineering, Inc.
- Computer Modeling of Groundwater, SUNY Buffalo
- Environmental Impact Assessment, ALI/ABA
- Impact of Environmental Law on Real Estate Transactions, ALI/ABA

Years Experience:

Total Experience: 18 Years
With TVGA: 8 Years

Environmental Impact Assessment, Brownfield Restoration and Redevelopment, Falconer, NY – Project Manager responsible for assisting the Lead Agency, Chautauqua County Industrial Development Agency, with the environmental review pursuant to SEQRA of an environmental restoration and redevelopment project at a brownfield site. The project consisted of the environmental remediation of residual contamination at an abandoned industrial site under a Voluntary Cleanup Agreement between the NYSDEC and the developer, and the subsequent redevelopment of the property for manufacturing use. Prepared Parts 1, 2 and 3 of the full Environmental Assessment Form (EAF). Part 3 of the full EAF consisted of a detailed report describing the environmental setting of the project, the proposed remediation program, and the proposed 160,000 SF development. Assisted the Lead Agency in the preparation and filing of a Negative Declaration for the project signifying that the project would not result in any significant adverse impacts and that a DEIS would not be required.

Assessment, Remediation and Demolition of Brownfield Site, Jamestown, NY – Project Manager for the assessment and demolition of a 150,000 SF abandoned manufacturing facility. Project involved a Phase I ESA of the property and pre-demolition inspection of a building complex comprised of six structures. Responsibilities included the preparation of plans and specifications for environmental remediation, asbestos abatement and building demolition, bid administration, and monitoring of contractor activities.

Brownfield Redevelopment Feasibility Study, Former ALCO Complex, Dunkirk, NY – Project Manager for the analysis of redevelopment potential for the 30-acre site of a former locomotive manufacturing complex. Project involved the building condition assessment of a 300,000 SF building complex to determine potential for rehabilitation and/or adaptive reuse, as well as the comparative analysis of demolition and rehabilitation costs. Project also included the development of conceptual site plans for several reuse alternatives, and coordination of strategic planning process to identify critical issues (e.g., funding shortfalls, environmental liability, flow of ownership complications) and strategies for addressing said issues.

Brownfield Reuse Assessment, Flintkote Complex, Lockport, NY – Project Manager for the assessment of an abandoned manufacturing complex to determine the potential for reuse of the remaining structures. Project involved a structural evaluation and development of order of magnitude cost estimates for the rehabilitation of portions of the building complex. Recommendations and cost estimates for asbestos abatement and demolition were ultimately made.

Brownfield Cleanup and Demolition, Brownfield Site, Brocton, NY – Project Manager for the $1.2M cleanup and demolition of a former food processing facility. This project is being advanced under the New York State Environmental Restoration Program (ERP). The project entails the remediation of contamination identified in on-site fill and drainage systems, asbestos abatement, and the demolition of a 70,000 SF building complex.

Chautauqua County Brownfield Assessment Demonstration Pilot Program, Chautauqua County, NY – Responsible for the management of programmatic and technical services provided in support of this EPA Brownfield Pilot Program under a multi-year contract. Duties included the management of technical staff and subcontractors involved in the assessment, investigation, and remedial planning for multiple brownfield sites. Responsibilities also included participation in the County's Brownfield Task Force and community involvement program, as well as assisting the County with the preparation of quarterly progress reports for submittal to EPA. Project required extensive communication with regulatory personnel from EPA and NYSDEC, as well as public officials and agencies.

Chautauqua County Dept of Public Facilities, Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Dunkirk, NY – Project Manager for the SI/RAR of an abandoned 12-acre site utilized for heavy industrial purposes since the early 1900s. The scope of the SI program included a radiological survey and the characterization of fill, soil, groundwater, surface water, building components, and drainage systems contaminated with chlorinated solvents, PCBs and lead. The project involved the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, implementation of community involvement plan, technical and administrative oversight of project staff and subcontractors, technical review of project plans and reports. Duties also included the coordination of efforts to obtain cleanup funding via insurance asset recovery.

Phase I/II Environmental Site Assessments of Brownfield Pilot Sites, Niagara Falls, NY – Project Manager for the Phase I/II ESAs of two brownfield sites funded via a Supplemental EPA Brownfield Assessment Demonstration Pilot. The Phase I ESAs were performed in accordance with ASTM E-1527, while the Phase II ESAs were in accordance with site-specific work plans prepared pursuant to EPA requirements. Responsible for client and regulatory communications, public meetings, management of technical staff and subcontractors, and technical review of project deliverables (e.g., work plans, health and safety plans, ESA reports).

Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Niagara Motors Site, Dunkirk, NY – Quality Assurance Officer for the RI/AA of an abandoned four-acre site formerly utilized for the manufacture of marine engines. Project is being performed under the New York State Environmental Restoration Program (ERP). Responsibilities include review of project Quality Assurance Plan, implementation of project audits, Quality Assurance reviews of project staff and subcontractors involved in site characterization and remedial alternatives analysis, as well as client and regulatory communications. Duties also include technical review of project plans, reports and estimates.

Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Felmont Oil Site, Olean, NY – Quality Assurance Officer for the RI/AA of a 22-acre former oil refining, storage, and distribution facility. The scope of the RI program includes a passive soil gas survey, a geophysical survey, and the characterization of potentially contaminated fill, soil, groundwater, surface water, and sediment. The project involves the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, implementation of community involvement plan, coordination of project staff and subcontractors, and technical review of project plans and reports.

Remedial Action Summary Report, Buffalo Niagara International Airport (BNIA) Landside Expansion Project, Cheektowaga, NY – Responsible for managing the preparation of the post-construction, remedial action summary report for the BNIA east access improvements and parking expansion project, much of which was constructed on a NYSDEC Inactive Hazardous Waste Site, the former Westinghouse Site. The report was submitted to the NYSDEC to certify that remedial activities conducted in connection with soil and groundwater contamination encountered during construction of new access roads and parking areas were conducted in accordance with applicable standards, criteria and/or guidance.

Site Investigation/Remedial Alternatives Report (SI/RAR), Former Industrial Site, Buffalo, NY – Quality Assurance Officer for the SI/RAR of a 16-acre site formerly occupied by a fertilizer manufacturing facility and later developed as a public park. Responsibilities include technical and administrative oversight of project staff and subcontractors involved in site characterization and remedial alternatives analysis, as well as client and regulatory communications. Duties also include technical review of project plans, reports and estimates.

Site Investigation/Remedial Alternatives (SI/RAR) Report, Brownfield Site, Brocton, NY – Project Manager for the SI/RAR of a former food processing facility under the brownfield component of the Clean Water/Clean Air Bond Act. This project involved the investigation of soil, fill, groundwater, building surfaces and components, and drainage systems at this 70,000 SF facility, as well as the evaluation of appropriate remedial alternatives to address contamination identified in on-site fill and drainage systems. Responsibilities included client and regulatory communications, technical and administrative oversight of project staff and subcontractors, and technical review of project plans and reports.

Groundwater Remediation, Federal Leaking Underground Storage Tank (LUST) Sites, NY – Managed the design, installation and monitoring of several groundwater extraction and treatment systems at LUST sites owned and operated by the Federal Government. Systems utilized included a mobile unit equipped with oil/water separator, total suspended solids filtration, and liquid phase granular activated carbon components. Projects involved periodic monitoring of treatment system effluent and the procurement of applicable discharge approvals from State regulatory agencies.

Remedial Action Plan (RAP), Hamburg, NY – Prepared a RAP for regulatory review and negotiated clean-up requirements for the voluntary remediation of petroleum-contaminated soil at an automotive dealership, repair and service facility. Managed the implementation of the remedial program which involved the decommissioning and removal of 18 leaking belowground hydraulic lifts and the excavation and off-site disposal of over 3,000 tons of soil contaminated with hydraulic oil and waste oil. The project also involved the removal of an old oil/water separator and replacement with a new unit meeting current regulatory requirements for separation, as well as the removal of several previously undiscovered USTs. A field laboratory was utilized throughout the project to define the limits of contaminated soil and to verify that clean-up levels were achieved. The project was completed without suspending the daily operations of the facility.

Soil Remediation, Abandoned Industrial Facility, Cheektowaga, NY – Prepared a Remedial Action Plan (RAP) under the NYSDEC Voluntary Cleanup Program for the remediation of an inactive industrial site contaminated with chlorinated solvents. Following regulatory approval of the Remedial Action Plan, managed the remedial program consisting of the proper closure of an inactive UST, extraction and on-site treatment of contaminated groundwater in the area of concern, excavation of contaminated soil for off-site treatment and disposal, and the further investigation of down-gradient groundwater conditions. The program also involved the development and implementation of community and site-specific health and safety plans requiring continuous air monitoring for particulate and organic vapor levels.

Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Town of Ellicott, NY – Project Manager for the SI/RAR for an abandoned industrial site in Chautauqua County, NY under the Brownfield Program. Assisted municipal representatives with the preparation of a complete application for State financial assistance through the assembly of a Statement of Work (SOW) and detailed cost estimate that was approved by the NYSDEC, Division of Environmental Remediation. Also responsible for the design of the site investigation program and the management of technical staff involved in the preparation of the SI/RAR Work Plan, including the Field Sampling Plan, QA/QC Plan, Health and Safety Plan, and Citizen Participation Plan.

1996 Clean Water/Clean Air Bond Act Environmental Restoration (Brownfield) Program – Investigation Grant, Chautauqua County, NY – Prepared a successful grant application on behalf of Chautauqua County for the completion of a Site Investigation/Remedial Alternatives Report (SI/RAR) of an abandoned 12-acre heavy industrial site in Dunkirk, NY. This grant provided state funding assistance in the amount of $175,000 for the completion of the SI/RAR program.

USEPA Brownfields Assessment Demonstration Pilot Program, Chautauqua County, NY – Assisted the Chautauqua County Department of Public Facilities with the preparation of a successful grant application under this Federal brownfield redevelopment initiative to fund the development of a county-wide brownfield inventory, develop a site evaluation process, and investigate and perform remedial planning for seven high priority brownfield sites. This grant was awarded in the amount of $200,000.

1996 Clean Water/Clean Air Bond Act, 1998 Parks Grant Program, Chautauqua County, NY – Assisted the Chautauqua County Department of Public Facilities with the preparation of a successful grant application for the acquisition of 8.5 acres of land situated along the Chadakoin River in the Village of Falconer and the development of a public park. Prepared the project narrative and full Environmental Assessment Form (EAF) and supervised the development of a conceptual site plan depicting access and parking facilities, nature trails, and a canoe launch for the grant application.

Remedial Construction Administration and Oversight, Former Welch Foods Site, Brocton, NY – Principal-in-Charge responsible for the remediation and demolition of a former food processing facility. The $1.2M project is being completed under the New York State Environmental Restoration Program (ERP). The work includes the demolition of the existing building, the cleanup of contaminated sediments and soil, and the removal of asbestos-containing materials.

Remedial Design and Oversight, Franczyk Park, Buffalo, NY – Principal-in-Charge for the implementation of a Pre-Design Investigation; the preparation of the Remedial Action Work Plan, contract documents, and technical specifications; and the oversight and administration of the remediation of this 16-acre brownfield site. The work is being completed under a New York State Environmental Restoration Program (ERP) grant. The remediation includes soil excavation and off-site disposal, installation of an interceptor trench, the placement of a clean soil cover, and the design and installation of new park equipment.

JAMES C. MANZELLA, CHMM

SCIENTIST II

TVGA CONSULTANTS

Education:
- BA/1997/Environmental Studies/Allegheny College

Continuing Education:
- 2002/X-MET and Niton Training Course Covering X-Ray Fluorescence Theory and Application
- 2002/ASTM Phase II ESA Training Course
- 2002/SUNY Buffalo School of Engineering/Environmental-Civil Engineering

Years Experience:

Total Experience	8 Years
With TVGA	5 Years

INTRODUCTION

Mr. Manzella's duties include field data collection, records review, data evaluation, remedial alternatives analysis and technical report preparation. He is also responsible for the preparation of request for proposals (RFPs) for subcontractor work, preparation of subcontractor agreements and coordination of subcontractors for field investigations.

TECHNICAL EXPERTISE

Mr. Manzella has eight years of experience with Federal and State regulatory requirements, remedial investigations, aboveground storage tank inspections and evaluations, underground storage tank closures and removal oversight, lead investigations, storm water discharge permits and pollution prevention plans, environmental site assessments, environmental data evaluation and field screening. He has participated in the sampling of soils, surface water, groundwater, and storm water at numerous hazardous and non-hazardous contaminated sites and is trained and experienced in the use of both Level-C safety equipment and monitoring instruments.

PROJECT EXPERIENCE

Niagara County Office of Planning Development and Tourism, Phase I Environmental Site Assessment, White Transportation, Lockport, NY – Scientist responsible for performing a Phase I ESA in accordance with ASTM Practice 1527-00 at a 2.6-acre inactive commercial truck terminal. Responsibilities included the preparation of an ESA report that was submitted to EPA Region 2 under the Niagara County Pilot, funded by EPA.

Niagara County Office of Planning Development and Tourism, Site Investigation/Remedial Alternatives Report (SI/RAR), Flintkote Site, Lockport, NY – Field Scientist responsible for the implementation of the Field Sampling Plan (FSP) of an abandoned six-acre site utilized for industrial purposes since the 1880s. The field program included direct-push soil sampling, hollow stem auger drilling, installation, sampling and hydraulic conductivity testing of overburden and bedrock groundwater monitoring wells, and the collection of soil, surface water, concrete and sediment samples. Additionally, was responsible for the preparation of a draft report to present the findings of field investigation including review and evaluation of analytical results. Also assisted in the development of remedial alternatives and remedial cost estimates as part of the RAR.

New York State Office of Parks, Recreation and Historic Preservation, Groundwater Remediation/Quarterly Monitoring Program, Lakeside Beach State Park, Waterport, NY – Scientist for the performance of groundwater treatment and quarterly groundwater monitoring in response to a gasoline release from an underground storage tank. Work included the characterization of groundwater; identification and evaluation of treatment alternatives; the installation of oxygen-releasing compounds to stimulate biodegradation of contaminants; and quarterly monitoring. Responsibilities included the field determination of groundwater elevations, collection of groundwater samples for laboratory analysis; the installation of oxygen releasing compounds; and preparation of a quarterly reports to document findings and evaluate the effectiveness of the remedial program.

Chautauqua County Department of Public Facilities, Remedial Design and Oversight, Roblin Steel Site, Dunkirk, NY – Scientist involved with the preparation of the Remedial Action Work Plan for the remediation of this 12-acre brownfield site. The work is being completed under a New York State Environmental Restoration Program (ERP) grant as well as a USEPA Brownfield Cleanup Grant. The remediation includes soil excavation and off-site disposal, in-situ treatment of groundwater, installation of a vapor barrier in the existing structure, and the placement of a clean soil cover.

Village of Youngstown, Remedial Investigation/Alternatives Analysis (RI/AA) Program, Youngstown Cold Storage, Youngstown, NY – Scientist involved with the RI/AA of a former apple storage facility adjacent to a public park that is being advanced under the New York State Environmental Restoration Program (ERP). The scope of the RI program includes the characterization of fill, soil, and groundwater potentially contaminated with arsenic and PCBs, and building materials that contain asbestos. The project involves the identification and detailed analysis of remedial alternatives available to address the affected media. Responsibilities included client and regulatory communications, coordination of subcontractors, and preparation of project plans and reports.

City of Niagara Falls, Phase I/II Environmental Site Assessment, Highland Area Sites, Niagara Falls, NY – Scientist responsible for Field Scientist responsible for conducting the Phase I and II ESAs of two brownfield sites funded via a Supplemental EPA Brownfield Assessment Demonstration Pilot. The Phase I ESAs were performed in accordance with ASTM E-1527, while the Phase II ESAs were in accordance with site-specific work plans prepared pursuant to EPA requirements. Responsible for work plan preparation, field data collection and management, and report preparation.

New York Power Authority, NAPL Investigation, Niagara Falls, NY – Scientist responsible for implementation of the Field Sampling Plan (FSP) at the NYPA Lewiston Power Project within the conduit Right-of-Way. The field program included hollow stem auger drilling and air-rotary drilling to delineate non-aqueous phase liquids (NAPL) in the subsurface proximal to the NYPA conduits. Tasks included collecting auger spoil and decontamination fluid samples for disposal profiling purposes, and the preparation of a draft report to present the findings of the field investigation.

Jamestown Community College, James Avenue Groundwater Investigation, Jamestown, NY – Scientist responsible for investigation of potential groundwater contamination at a petroleum spill site. The investigation was designed to delineate the extent of soil and groundwater contamination. Duties included oversight and documentation of field activities including the excavation of test pits drilling and installation of test probes and monitoring wells, as well as the collection of soil and groundwater samples for chemical analysis.

City of Buffalo Office of Strategic Planning, Remedial Design and Oversight, Franczyk Park, Buffalo, NY – Scientist involved with the implementation of a Pre-Design Investigation and the preparation of the Remedial Action Work Plan for the remediation of this 16-acre brownfield site. The work is being completed under a New York State Environmental Restoration Program (ERP) grant. The remediation includes soil excavation and off-site disposal, installation of an interceptor trench, the placement of a clean soil cover, and the design and installation of new park equipment.

City of Buffalo Office of Strategic Planning, Site Investigation/Remedial Alternatives Report (SI/RAR) for Franczyk Park, Buffalo, NY – Field Scientist responsible for the preparation and implementation of the Field Sampling Plan (FSP) for the site investigation of a 16-acre public park that was historically operated as an agricultural fertilizer manufacturing facility. The field program included direct-push soil sampling, hollow stem auger drilling, installation sampling and hydraulic conductivity testing of overburden groundwater monitoring wells, and the collection of soil samples. Additionally, was responsible for the preparation of a draft report to present the findings of field investigation including review and evaluation of analytical results. Also assisted in the development of remedial alternatives and remedial cost estimates as part of the RAR.

Chautauqua County Department of Public Facilities, On-Call Environmental Services Term Agreement, Various Locations, Chautauqua County, NY – Scientist responsible for performing various environmental services on an as needed basis. Duties included assisting in the preparation of a Phase II ESA site-specific work plan in accordance with the requirements outlined in EPA's Region 2 generic Sampling, Analysis, and Monitoring Plan (SAMP); assisting in the preparation of environmental site assessments and transaction screenings; as well as other miscellaneous environmental tasks.

Ansuini & Pohlman, Phase I Environmental Site Assessment Update for Auto Dealership, Lockport, NY – Scientist responsible for conducting a Phase I ESA update in accordance with the procedures outlined in ASTM Practice E 1527-00. Responsible for identifying conditions at the subject property that may have changed materially since the completion of the previous Phase I/II ESA, and ultimately to identify recognized environmental conditions associated with the subject property.

Town of Hamburg Department of Public Works, Underground Storage Tank Assessment, Hamburg, NY – Performed an assessment of an underground storage tank petroleum spill to estimate the extent of subsurface petroleum contamination. Responsibilities included coordination of onsite sampling activities, sampling of suspect areas, and the preparation of cost estimates.

Environmental Assessment Forms (EAF), Multiple Projects, NY – Prepared short and full EAFs pursuant to SEQRA for numerous projects across New York State ranging from transportation related projects to commercial development sites.

Chautauqua County Department of Public Facilities, Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Dunkirk, NY – Field Scientist responsible for the preparation and implementation of the Field Sampling Plan (FSP) for the site investigation of a 12-acre brownfield site. The field program included a radiological survey, direct-push soil sampling, drilling, installation and sampling of overburden and bedrock monitoring wells, field screening of soil and fill samples for metals using an XRF unit, and the collection of surface water and sediment samples. Additionally, was responsible for the preparation of a draft report to present the findings of field investigation including review and evaluation of analytical results. Also assisted in the development of remedial alternatives and remedial cost estimates as part of the RAR.

Chautauqua County Department of Public Facilities, Site Investigation/Remedial Alternatives Report (SI/RAR), Brownfield Site, Brocton, NY – Conducted a supplemental field sampling program in order to investigate potential off-site sediment contamination, establish local background levels for metals soils, and confirm initial sampling results. Responsibilities included groundwater well development, collection of soil, sediment and groundwater samples for laboratory analysis, and revision of the draft site investigation report based on a review of laboratory data and field investigation work.

Phase II Environmental Site Investigation, Niagara Falls, NY – Performed a Phase II ESA at a vacant heating oil distribution facility. Responsible for coordination with the client, subcontractors and NYSDEC. Activities at the site included geoprobe soil borings, field screening of samples, and collection of soil samples for laboratory analysis.

Town and Village of Hamburg Bioremediation Projects, Hamburg, NY – Prepared a Remedial Action Plan (RAP) for regulatory review and outlined the cleanup requirements for the remediation of petroleum-contaminated soil and groundwater at several town and village operated sites. Managed the implementation of the remediation plan that involved the closure and removal of six leaking underground storage tanks and the excavation and off-site disposal of over 1,000 tons of contaminated soil. The project also included the installation of monitoring/injection wells that were used to establish baseline groundwater contamination levels and to inject the bioremediation organisms.

MICHAEL J. FINN, E.I.T.

ENGINEER

TVGA CONSULTANTS

INTRODUCTION

Mr. Finn is responsible for the analysis, design and construction oversight for municipal infrastructure and brownfield redevelopment projects. He has experience with the preparation of engineering reports, contract plans, specifications and cost estimates for water, wastewater and transportation projects, and has provided construction oversight for projects involving roadway, sidewalk and utility construction. Additionally, Mr. Finn has conducted remedial alternatives analyses and assisted with remedial design and construction efforts on brownfield projects funded under the New York State Environmental Restoration Program (ERP) and USEPA Brownfield Program. Prior to joining TVGA, Mr. Finn was employed for several years by a major contractor in western New York while he completed his engineering studies. This provided him with practical experience in the review of design plans, cost estimating, bidding and construction practices that has proven beneficial relative to his design and construction management skills.

TECHNICAL EXPERTISE

Mr. Finn has experience with computer modeling, cost estimates, development of budgets, and coordination of subcontractors. He is familiar with engineering software packages including WATERCAD, Computer Aided Hydrology and Hydraulics (CAHH), and Microsoft Office. He is also familiar with design standards/regulations including 2003 NY State Storm Water Management Design, 10 States Standards for Water and Wastewater, and NYSDOT Design Standards.

PROJECT EXPERIENCE

Chautauqua County Department of Public Facilities, Remedial Design and Oversight of Roblin Steel Site, Dunkirk, NY – Engineer involved with the preparation of the Remedial Action Work Plan, contract documents, and technical specifications and the oversight and administration of the remediation of this 12-acre brownfield site. The work is being completed under a New York State Environmental Restoration Program (ERP) grant as well as a USEPA Brownfield Cleanup Grant. The remediation includes soil excavation and off-site disposal, in-situ treatment of groundwater, installation of a vapor barrier in the existing structure, and the placement of a clean soil cover.

Town of Royalton, Barden Homes Public Improvement Permit (PIP) Inspection, Middleport, NY – Engineer responsible for the construction oversight of a public road to be dedicated to the Town of Royalton. Construction included watermain, storm sewer, concrete curb, and asphalt pavement.

Education:
- BS/2005/Civil Engineering/ SUNY at Buffalo

Professional Registration:
- EIT/New York/Certificate Number: [illegible]

Years Experience: 3 Years

City of Buffalo Office of Strategic Planning, Remedial Design and Oversight, Franczyk Park, Buffalo, NY – Engineer involved with the preparation of the Remedial Action Work Plan, contract documents, and technical specifications; and the oversight and administration of the remediation of this 16-acre brownfield site. The work is being completed under a New York State Environmental Restoration Program (ERP) grant. The remediation includes soil excavation and off-site disposal, installation of an interceptor trench, the placement of a clean soil cover, and the design and installation of new park equipment.

Olean Urban Renewal Agency, Remedial Investigation/Alternatives Analysis Program (RI/AA), Former Felmont Oil Site, Olean, NY – Engineer involved in the preparation of the Site Investigation/Remedial Alternatives Report. Evaluated different alternatives to remediate petroleum contamination including environmental technologies such as in-situ air sparging with soil vapor extraction, and in-situ thermal desorption. Alternatives analysis included performing preliminary engineering calculations to determine the feasibility and order of magnitude scope of the remediation as well as preparing a cost estimate for each alternative.

NY State Department of Transportation, Route 240 (Harlem Road) Reconstruction, Cheektowaga, NY – Engineer responsible for the stormwater management design and preparation of a Stormwater Pollution Prevention Plan (SWP3) in accordance with SPDES, NYSDEC, and NYSDOT requirements. He also assisted in the storm sewer design, including resolving utility conflicts, preparing plans, profiles, tables and cost estimates in accordance with NYSDOT requirements. The stormwater management design included the use of Vortechnics stormwater treatment structures to be installed within the new storm sewer. SPDES General Permit Coverage was obtained for the project.

City of Buffalo Dept of Public Works, Grider Street Reconstruction Project, Buffalo, NY – Engineer responsible for researching the feasibility of water main reconstruction alternatives and the design of in-kind combined sewer replacement within the project. The water main reconstruction alternatives include installation of a temporary bypass waterline to provide service while the new main is installed or installing a new main in a shallow bedrock situation. Feasibility was determined by both cost and scheduling constraints. Field inspections were conducted to determine the location and depth of the existing water main, and measurements were taken to maintain continuous service to a major regional hospital. The tasks for the combined sewer replacement include completion of a spread calculation to determine spacing of new drainage inlets, overseeing plan and detail preparation, and completing a cost estimate.

Town of Grand Island, Grand Island Bike Trail, Grand Island, NY – Engineer responsible for the stormwater management design, preparation of a Stormwater Pollution Prevention Plan (SWP3) in accordance with SPDES and NYSDEC requirements, as well as a project cost estimate. The project included approximately 12,000 LF of new bike trail construction as well as road milling and resurfacing. SPDES General Permit Coverage was obtained for the project.

NY State Department of Transportation, Route 18 Pump Station Performance Evaluation, Somerset, NY – Engineer responsible for the evaluation of an existing stormwater pump station at a road depression under a railroad bridge in Somerset, NY. Duties included performing hydrologic and hydraulic analysis, determining the existing stage storage relationship in the pump station, developing proposed alternatives, preparing a detailed cost estimate, and writing an engineering report. Hydrologic analysis included gathering topographic mapping and aerial photographs, determining the area tributary to the pump station, a field investigation to confirm the drainage area and determine the condition of the channels downstream of the pump station, and developing a hydrograph to model the run-off flow into the pump station. Determining the existing stage storage relationship included creating a spreadsheet model that determined the amount of storage required in the system based on changing inflow rates. This model was also used to efficiently evaluate alternative pump configurations to optimize a proposed alternative. The cost estimate included proposed costs for the total pump reconstruction including new pumps, piping, and additional storage. The engineer's report included a summary of the findings of the analysis and the process of alternative development.

Town of Urbana, Bully Hill Water Study, Hammondsport, NY – Engineer responsible for development of the water study for the proposed Water District No 3. Duties included developing mapping for the parcels within the water district, calculating fire flow and domestic demands for commercial properties, preparing a detailed cost estimate, writing a preliminary engineering report, and aiding in the modeling of the proposed water system using WATERCAD. The cost estimate included construction costs, annual operation, maintenance, and management costs, and broke the costs down into user fees that could be used to finance part of the project. The preliminary engineering report explained the design parameters used in modeling of the proposed water district and described the financing options available to fund the project.

Gordon Jones and Associates, Cuba Memorial Hospital Senior Housing and Care Facility, Cuba, NY – Engineer responsible for preliminary study of infrastructure improvements required to support 100-acre patio home and independent senior housing facility. Study investigated the economic feasibility of providing improvements to the existing water and sanitary sewer systems within the Village of Cuba for the proposed development. Preliminary calculations were performed to determine capacity requirements and a cost estimate was prepared.

Chaintreuil, Jensen, Stark Architects, LLC, Dunn Tire Park French Drain Design, Buffalo, NY – Engineer responsible for CAD design of the plan and detail for a proposed French drain in the outfield-warning track. Developed technical specifications for all aspects of French drain installation including pipe material, geotechnical fabric, drainage stone, and other components.

David Home Builders, Ashwood Subdivision Phase 2, Detention Pond Outlet Structure, Wheatfield, NY – Engineer responsible for the design of a detention pond outlet structure at a proposed 95-lot subdivision. Duties included developing an inflow hydrograph to the pond and designing a structure to regulate the flow in accordance with the NYSDEC 2003 Stormwater Management Design Manual. The design considered the 2-, 10- and 100-year storms, all under tailwater conditions created by nearby Sawyer Creek.

David Home Builders, Ashwood Subdivision Phase 1, Sanitary Lift Station, Wheatfield, NY – Engineer responsible for the design of a lift station to service a proposed 95-lot subdivision. Duties included estimating average and maximum daily sewerage flows, sizing the wet well to balance septic conditions and pump stats, and designing CAD details for the final product. An alternative consideration was developed to allow for retrofitting of the pump motor should 180± acres of farmland tributary to the pump station be developed. A fire flow analysis for the subdivision was performed, recorded fire flow information was researched, and a model of the proposed water main was developed using WATERCAD.

American Consulting Professionals, I-190 and Route 198 Traffic Study, Niagara Falls, NY – Engineer trained on and installation of JAMAR Technologies Trax Pro Traffic Counters for six locations on the I-190/Route 198 Interchange. Responsible for removing the traffic counters after a 48-hour data collection period.

Village of Springville, Main Street Watermain Replacement, Springville, NY – Engineer responsible for the stormwater management design and preparation of a Stormwater Pollution Prevention Plan (SWP3) in accordance with SPDES and NYSDEC requirements. The stormwater management design pertained to the construction of a new prestressed concrete water tank for the project. The project also included waterline replacement as well as new waterline construction to improve the village's water service. SPDES General Permit Coverage was obtained for the project.

Erie County Water Authority, Lackawanna Watermain Replacement Project, Contract T-19, Lackawanna, NY – Construction Inspector responsible for monitoring water service installation and restoration of asphalt roadway, concrete sidewalks, and lawn areas.

Village of Youngstown, Waterfront Park Site Improvements, Youngstown, NY – Engineer responsible for the stormwater management design in accordance with New York State Department of State (NYSDOS) Department of Coastal Zone Management requirements. The stormwater management design included the use of an infiltration basin to recharge stormwater from a proposed parking lot back into the ground.

Village of Andover, Main Street Enhancement, Andover, NY – Construction Inspector responsible for monitoring the installation of new concrete sidewalk, curb, driveways, as well as the installation of a new lighting system. Aided in construction management tasks including reviewing pay requests, coordinating schedules, and addressing concerns of business owners within the site area.

ATTACHMENT C

BUDGET

RI/AA at teh Former Edgewood Warehouse Site
Budget Estimate

Labor

Level	ASCE Grade	Average Direct Rate	Task 1 SI Scoping Hrs	Amount	Task 2 SI Work Plan Prep. Hrs	Amount	Task 3 CPP Implementation Hrs	Amount	Task 4 - Investigation Geophysical/Radiological Survey Hrs	Amount	Test Pits Hrs	Amount	Borings/MWs Hrs	Amount	GW Sampling/K Test Hrs	Amount	Surface Soils Hrs	Amount	Vaults, sumps & Drains Hrs	Amount
Principal	VIII	57.01	1	$ 57.01	1	$ 57.01	1	$ 57.01	1	$ 57.01	1	$ 57.01	1	$ 57.01	1	$ 57.01	1	$ 57.01	1	$ 57.01
Sr. Engineer	VIII	40.00	1	$ 40.00	2	$ 80.00	2	$ 80.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00	1	$ 40.00
Project Manager	VIII	40.00	4	$ 160.00	4	$ 160.00	8	$ 320.00	1	$ 40.00	2	$ 80.00	2	$ 80.00	2	$ 80.00	2	$ 80.00	2	$ 80.00
Project Scientist	VIII	29.00	8	$ 232.00	8	$ 232.00	8	$ 232.00	1	$ 29.00	4	$ 116.00	4	$ 116.00	4	$ 116.00	4	$ 116.00	4	$ 116.00
Scientist	III	21.00	12	$ 252.00	20	$ 420.00		$ -	8	$ 168.00	10	$ 210.00	10	$ 210.00	30	$ 630.00	10	$ 210.00	20	$ 420.00
Technician	II	16.00	4	$ 64.00	20	$ 320.00		$ -	8	$ 128.00	20	$ 320.00	20	$ 320.00	30	$ 480.00	10	$ 160.00	20	$ 320.00
CADD Technician	II	20.00	4	$ 80.00	8	$ 160.00	2	$ 40.00	2	$ 40.00	2	$ 40.00		$ -	2	$ 40.00		$ -	2	$ 40.00
Technical Typist	NA	18.28	4	$ 73.12	8	$ 146.24		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Labor Total			38	$ 958.13	71	$ 1,575.25	21	$ 729.01	22	$ 502.01	40	$ 863.01	38	$ 823.01	70	$ 1,443.01	28	$ 663.01	50	$ 1,073.01

Level	Test Probes Hrs	Amount	Survey Boundary/Topo Hrs	Amount	Survey of Investigation Hrs	Amount	Task 5 Data Rev/Analysis Hrs	Amount	Risk Assessment Hrs	Amount	Task 6 RI Report Hrs	Amount	Task 7 ID/Eval RAs Hrs	Amount	AA Preparation Hrs	Amount	Task 8 Final RI/AA Hrs	Amount	Task 9 Draft PRAP Hrs	Amount	Project Totals Hrs	Amount
Principal	1	$ 57.01		$ -		$ -	1	$ 57.01	1	$ 57.01	2	$ 114.02	2	$ 114.02	2	$ 114.02	2	$ 114.02	1	$ 57.01	21	$ 1,197.21
Sr. Engineer	1	$ 40.00		$ -		$ -	2	$ 80.00	2	$ 80.00	4	$ 160.00	4	$ 160.00	4	$ 160.00	4	$ 160.00	1	$ 40.00	33	$ 1,320.00
Project Manager	2	$ 80.00		$ -		$ -	4	$ 160.00	2	$ 80.00	4	$ 160.00	4	$ 160.00	4	$ 160.00	4	$ 160.00	1	$ 40.00	52	$ 2,080.00
Project Scientist	4	$ 116.00	1	$ 29.00	1	$ 29.00	8	$ 232.00	8	$ 232.00	8	$ 232.00	8	$ 232.00	8	$ 232.00	8	$ 232.00	8	$ 232.00	107	$ 3,103.00
Scientist	10	$ 210.00		$ -		$ -	24	$ 504.00	16	$ 336.00	16	$ 336.00	16	$ 336.00	16	$ 336.00	16	$ 336.00	20	$ 420.00	254	$ 5,334.00
Technician	20	$ 320.00		$ -		$ -	8	$ 128.00	8	$ 128.00	40	$ 640.00	24	$ 384.00	24	$ 384.00	24	$ 384.00		$ -	280	$ 4,480.00
CADD Technician	2	$ 40.00		$ -		$ -	2	$ 40.00	2	$ 40.00	4	$ 80.00	2	$ 40.00	4	$ 80.00	2	$ 40.00	1	$ 20.00	41	$ 820.00
Technical Typist		$ -		$ -		$ -	2	$ 36.56	2	$ 36.56	8	$ 146.24	2	$ 36.56	8	$ 146.24	2	$ 36.56	2	$ 36.56	38	$ 694.64
Labor Total	40	$ 863.01	1	$ 29.00	1	$ 29.00	51	$ 1,237.57	41	$ 989.57	86	$ 1,868.26	62	$ 1,462.58	70	$ 1,612.26	62	$ 1,462.58	34	$ 845.57	792	$ 19,028.85

Expenses

Desc.	Unit	Rate	T1 Unit	Amount	T2 Unit	Amount	T3 Unit	Amount	Geophys. Unit	Amount	Test Pits Unit	Amount	Borings Unit	Amount	GW Unit	Amount	Surface Soils Unit	Amount	Vaults Unit	Amount
Mileage	$/mi	0.505	120	$ 60.60	120	$ 60.60	240	$ 121.20	120	$ 60.60	360	$ 181.80	360	$ 181.80	360	$ 181.80	120	$ 60.60	360	$ 181.80
Fed Ex	$/ea.	15.00	2	$ 30.00	4	$ 60.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Per Diem	$/day	75.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Office Telephone	$/wk	10.00	2	$ 20.00	2	$ 20.00	2	$ 20.00	1	$ 10.00	1	$ 10.00	1	$ 10.00	1	$ 10.00	1	$ 10.00	1	$ 10.00
Portable Telephone	$/day	10.00	1	$ 10.00		$ -		$ -	1	$ 10.00	3	$ 30.00	3	$ 30.00	3	$ 30.00	1	$ 10.00	3	$ 30.00
Expenses Subtotal				$ 120.60		$ 140.60		$ 141.20		$ 80.60		$ 221.80		$ 221.80		$ 221.80		$ 80.60		$ 221.80

Desc.	Test Probes Unit	Amount	Survey Boundary Unit	Amount	Survey of Investig. Unit	Amount	Data Rev Unit	Amount	Risk Assess. Unit	Amount	RI Report Unit	Amount	ID/Eval RAs Unit	Amount	AA Prep. Unit	Amount	Final RI/AA Unit	Amount	Draft PRAP Unit	Amount	Totals Unit	Amount
Mileage	240	$ 121.20	240	$ 121.20	240	$ 121.20		$ -		$ -		$ -		$ -		$ -		$ -		$ -	2880	$ 1,454.40
Fed Ex		$ -		$ -		$ -		$ -		$ -	2	$ 30.00	2	$ 30.00	2	$ 30.00	2	$ 30.00		$ -	14	$ 210.00
Per Diem		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 75.00		$ -	1	$ 75.00
Office Telephone	1	$ 10.00		$ -		$ -	1	$ 10.00	1	$ 10.00	1	$ 10.00	1	$ 10.00	1	$ 10.00	1	$ 10.00	1	$ 10.00	20	$ 200.00
Portable Telephone	2	$ 20.00	2	$ 20.00	2	$ 20.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	21	$ 210.00
Expenses Subtotal		$ 151.20		$ 141.20		$ 141.20		$ 10.00		$ 10.00		$ 40.00		$ 40.00		$ 40.00		$ 115.00		$ 10.00		$ 2,149.40

Equipment and Supplies

Desc.	Unit	Rate	T1 Unit	Amount	T2 Unit	Amount	T3 Unit	Amount	Geophys. Unit	Amount	Test Pits Unit	Amount	Borings Unit	Amount	GW Unit	Amount	Surface Soils Unit	Amount	Vaults Unit	Amount
Copies	$/pg.	0.2	1000	$ 200.00	500	$ 100.00	500	$ 100.00	50	$ 10.00	50	$ 10.00	50	$ 10.00	50	$ 10.00	50	$ 10.00		$ -
Plan Copies/Mtg. Boards	$/ea.	15.00		$ -		$ -	5	$ 75.00		$ -		$ -		$ -		$ -		$ -		$ -
PID	$/week	175.00		$ -		$ -		$ -		$ -	1	$ 175.00	1	$ 175.00		$ -	1	$ 175.00	1	$ 175.00
In-Situ MiniTroll	$/week	200.00		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 200.00		$ -		$ -
Water Level Meter	$/week	50.00		$ -		$ -		$ -		$ -		$ -	1	$ 50.00	1	$ 50.00		$ -		$ -
Disp. Bailers w/VOC Device	$/each	10.00		$ -		$ -		$ -		$ -		$ -		$ -	4	$ 40.00		$ -		$ -
MW pump	$/wk.	150.00		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 150.00		$ -		$ -
Horiba U-22	$/wk.	250.00		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 250.00		$ -		$ -
Protective Gloves	$/case	15.00		$ -		$ -		$ -		$ -	1	$ 15.00	1	$ 15.00	1	$ 15.00	1	$ 15.00	1	$ 15.00
Dust Monitor (personal)	$/wk.	280.00		$ -		$ -		$ -		$ -	1	$ 280.00	1	$ 280.00		$ -		$ -		$ -
Misc. Sampling Supplies	$/event	50.00		$ -		$ -		$ -		$ -	1	$ 50.00	1	$ 50.00	1	$ 50.00	1	$ 50.00	1	$ 50.00
Equipment and Supplies Subtotal				$ 200.00		$ 100.00		$ 175.00		$ 10.00		$ 530.00		$ 580.00		$ 765.00		$ 250.00		$ 240.00

Desc.	Test Probes Unit	Amount	Survey Boundary Unit	Amount	Survey of Investig. Unit	Amount	Data Rev Unit	Amount	Risk Assess. Unit	Amount	RI Report Unit	Amount	ID/Eval RAs Unit	Amount	AA Prep. Unit	Amount	Final RI/AA Unit	Amount	Draft PRAP Unit	Amount	Totals Unit	Amount
Copies	50	$ 10.00		$ -		$ -	250	$ 50.00	500	$ 100.00	1500	$ 300.00	250	$ 50.00	250	$ 50.00	1500	$ 300.00	250	$ 50.00	6800	$ 1,360.00
Plan Copies/Mtg. Boards		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5	$ 75.00
PID	1	$ 175.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5	$ 875.00
In-Situ MiniTroll		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 200.00
Water Level Meter		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	2	$ 100.00
Disp. Bailers w/VOC Device		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	4	$ 40.00
MW pump		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 150.00
Horiba U-22		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 250.00
Protective Gloves	1	$ 15.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	6	$ 90.00
Dust Monitor (personal)		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	2	$ 560.00
Misc. Sampling Supplies	1	$ 50.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	6	$ 300.00
Equipment and Supplies Subtotal		$ 250.00		$ -		$ -		$ 50.00		$ 100.00		$ 300.00		$ 50.00		$ 50.00		$ 300.00		$ 50.00		$ 4,000.00

Laboratory Costs

Desc.	Unit	Rate	T1 Unit	Amount	T2 Unit	Amount	T3 Unit	Amount	Geophys. Unit	Amount	Test Pits Unit	Amount	Borings Unit	Amount	GW Unit	Amount	Surface Soils Unit	Amount	Vaults Unit	Amount
TCL Volatiles	$/smp	100.00		$ -		$ -		$ -		$ -	20	$ 2,000.00	7	$ 700.00	18	$ 1,800.00		$ -	11	$ 1,100.00
TCL Semi-Volatiles	$/smp	180.00		$ -		$ -		$ -		$ -	20	$ 3,600.00	7	$ 1,260.00	15	$ 2,700.00	22	$ 3,960.00	11	$ 1,980.00
TCL PCBs	$/smp	80.00		$ -		$ -		$ -		$ -	20	$ 1,600.00	7	$ 560.00	15	$ 1,200.00	22	$ 1,760.00	11	$ 880.00
TAL Metals	$/smp	150.00		$ -		$ -		$ -		$ -	20	$ 3,000.00	7	$ 1,050.00	15	$ 2,250.00	22	$ 3,300.00	11	$ 1,650.00
Indoor Air TP-15	$/smp	500.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Asbestos PLM Soil	$/smp	30.00		$ -		$ -		$ -		$ -	8	$ 240.00		$ -		$ -		$ -		$ -
Laboratory Costs Subtotal				$ -		$ -		$ -		$ -		$ 10,440		$ 3,570.00		$ 7,950.00		$ 9,020.00		$ 5,610.00

Desc.	Test Probes Unit	Amount	Survey Boundary Unit	Amount	Survey of Investig. Unit	Amount	Data Rev Unit	Amount	Risk Assess. Unit	Amount	RI Report Unit	Amount	ID/Eval RAs Unit	Amount	AA Prep. Unit	Amount	Final RI/AA Unit	Amount	Draft PRAP Unit	Amount	Totals Unit	Amount
TCL Volatiles	10	$ 1,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	66	$ 6,600.00
TCL Semi-Volatiles	10	$ 1,800.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	85	$ 15,300.00
TCL PCBs	10	$ 800.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	85	$ 6,800.00
TAL Metals	10	$ 1,500.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	85	$ 12,750.00
Indoor Air TP-15	5	$ 2,500.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	5	$ 2,500.00
Asbestos PLM Soil		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	8	$ 240.00
Laboratory Costs Subtotal		$ 7,600.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	334	$ 44,190.00

Data Quality/Usability Review

Desc.	Unit	Rate	T1 Unit	Amount	T2 Unit	Amount	T3 Unit	Amount	Geophys. Unit	Amount	Test Pits Unit	Amount	Borings Unit	Amount	GW Unit	Amount	Surface Soils Unit	Amount	Vaults Unit	Amount
TCL Volatiles	$/smp	17.00		$ -		$ -		$ -		$ -	20	$ 340.00	7	$ 119.00	18	$ 306.00		$ -	11	$ 187.00
TCL Semi-Volatiles	$/smp	18.00		$ -		$ -		$ -		$ -	20	$ 360.00	7	$ 126.00	15	$ 270.00	22	$ 396.00	11	$ 198.00
TCL PCBs	$/smp	22.00		$ -		$ -		$ -		$ -	20	$ 440.00	7	$ 154.00	15	$ 330.00	22	$ 484.00	11	$ 242.00
TAL Metals	$/smp	18.00		$ -		$ -		$ -		$ -	20	$ 360.00	7	$ 126.00	15	$ 270.00	22	$ 396.00	11	$ 198.00
Indoor Air TP-15	$/smp	25.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Data Quality/Usability Review Subtotal				$ -		$ -		$ -		$ -		$ 1,500.00		$ 525.00		$ 1,176.00		$ 1,276.00		$ 825.00

Desc.	Test Probes Unit	Amount	Survey Boundary Unit	Amount	Survey of Investig. Unit	Amount	Data Rev Unit	Amount	Risk Assess. Unit	Amount	RI Report Unit	Amount	ID/Eval RAs Unit	Amount	AA Prep. Unit	Amount	Final RI/AA Unit	Amount	Draft PRAP Unit	Amount	Totals Unit	Amount
TCL Volatiles	10	$ 170.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	66	$ 1,122.00
TCL Semi-Volatiles	10	$ 180.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	85	$ 1,530.00
TCL PCBs	10	$ 220.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	85	$ 1,870.00
TAL Metals	10	$ 180.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	85	$ 1,530.00
Indoor Air TP-15	4	$ 100.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	4	$ 100.00
Data Quality/Usability Review Subtotal		$ 850.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	325	$ 6,152.00

Geophysical Survey

Desc.	Unit	Rate	T1 Unit	Amount	T2 Unit	Amount	T3 Unit	Amount	Geophys. Unit	Amount	Test Pits Unit	Amount	Borings Unit	Amount	GW Unit	Amount	Surface Soils Unit	Amount	Vaults Unit	Amount
EI/Radiological Survey	lump sum	13000.00		$ -		$ -		$ -	1	$ 13,000.00		$ -		$ -		$ -		$ -		$ -
Geophysical Survey Subtotal				$ -		$ -		$ -		$ 13,000.00		$ -		$ -		$ -		$ -		$ -

Desc.	Test Probes Unit	Amount	Survey Boundary Unit	Amount	Survey of Investig. Unit	Amount	Data Rev Unit	Amount	Risk Assess. Unit	Amount	RI Report Unit	Amount	ID/Eval RAs Unit	Amount	AA Prep. Unit	Amount	Final RI/AA Unit	Amount	Draft PRAP Unit	Amount	Totals Unit	Amount
EI/Radiological Survey		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 13,000.00
Geophysical Survey Subtotal		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 13,000.00

Survey and Title Search

Desc.	Unit	Rate	T1 Unit	Amount	T2 Unit	Amount	T3 Unit	Amount	Geophys. Unit	Amount	Test Pits Unit	Amount	Borings Unit	Amount	GW Unit	Amount	Surface Soils Unit	Amount	Vaults Unit	Amount
Boundary/Topo/Abstract	lump sum	8500.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Survey PM	$/hr	78.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Senior Tech	$/hr	48.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Survey Crew (2 person)	$/hr	140.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Survey Subtotal				$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -

Desc.	Test Probes Unit	Amount	Survey Boundary Unit	Amount	Survey of Investig. Unit	Amount	Data Rev Unit	Amount	Risk Assess. Unit	Amount	RI Report Unit	Amount	ID/Eval RAs Unit	Amount	AA Prep. Unit	Amount	Final RI/AA Unit	Amount	Draft PRAP Unit	Amount	Totals Unit	Amount
Boundary/Topo/Abstract		$ -	1	$ 8,500.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 8,500.00
Survey PM		$ -		$ -	2	$ 156.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	2	$ 156.00
Senior Tech		$ -		$ -	8	$ 384.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	8	$ 384.00
Survey Crew (2 person)		$ -		$ -	30	$ 4,200.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	30	$ 4,200.00
Survey Subtotal		$ -		$ 8,500.00		$ 4,740.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 13,240.00

Soil Probing Cost

Desc.	Unit	Rate	T1 Unit	Amount	T2 Unit	Amount	T3 Unit	Amount	Geophys. Unit	Amount	Test Pits Unit	Amount	Borings Unit	Amount	GW Unit	Amount	Surface Soils Unit	Amount	Vaults Unit	Amount
Mobilization	$/ea.	400.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Probing Equip. & Crew	$/day	1200.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Plastic Liners	$/ea.	3.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Borehole Abandonment	$/foot	2.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Soil Probing Cost Subtotal				$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -

Desc.	Test Probes Unit	Amount	Survey Boundary Unit	Amount	Survey of Investig. Unit	Amount	Data Rev Unit	Amount	Risk Assess. Unit	Amount	RI Report Unit	Amount	ID/Eval RAs Unit	Amount	AA Prep. Unit	Amount	Final RI/AA Unit	Amount	Draft PRAP Unit	Amount	Totals Unit	Amount
Mobilization	1	$ 400.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 400.00
Probing Equip. & Crew	2	$ 2,400.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	2	$ 2,400.00
Plastic Liners	75	$ 225.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	75	$ 225.00
Borehole Abandonment	300	$ 750.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	300	$ 750.00
Soil Probing Cost Subtotal		$ 3,775.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 3,775.00

Drilling and Excavation Costs

Desc.	Unit	Rate	T1 Unit	Amount	T2 Unit	Amount	T3 Unit	Amount	Geophys. Unit	Amount	Test Pits Unit	Amount	Borings Unit	Amount	GW Unit	Amount	Surface Soils Unit	Amount	Vaults Unit	Amount
Mobilization	$/ea	800.00		$ -		$ -		$ -		$ -		$ -	1	$ 800.00		$ -		$ -		$ -
4-1/4" HSA w/ cont. ssp	$/foot	15.00		$ -		$ -		$ -		$ -		$ -	80	$ 1,200.00		$ -		$ -		$ -
Rock Coring	$/foot	38.00		$ -		$ -		$ -		$ -		$ -	40	$ 1,520.00		$ -		$ -		$ -
2" PVC Well Installation	$/foot	15.00		$ -		$ -		$ -		$ -		$ -	120	$ 1,800.00		$ -		$ -		$ -
Protective Casings	$/ea	130.00		$ -		$ -		$ -		$ -		$ -	4	$ 520.00		$ -		$ -		$ -
Decontamination	$/hr	125.00		$ -		$ -		$ -		$ -		$ -	4	$ 500.00		$ -		$ -		$ -
Drilling and Excavation Costs Subtotal				$ -		$ -		$ -		$ -		$ -		$ 6,340.00		$ -		$ -		$ -

Desc.	Test Probes Unit	Amount	Survey Boundary Unit	Amount	Survey of Investig. Unit	Amount	Data Rev Unit	Amount	Risk Assess. Unit	Amount	RI Report Unit	Amount	ID/Eval RAs Unit	Amount	AA Prep. Unit	Amount	Final RI/AA Unit	Amount	Draft PRAP Unit	Amount	Totals Unit	Amount
Mobilization		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	1	$ 800.00
4-1/4" HSA w/ cont. ssp		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	80	$ 1,200.00
Rock Coring		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	40	$ 1,520.00
2" PVC Well Installation		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	120	$ 1,800.00
Protective Casings		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	4	$ 520.00
Decontamination		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	4	$ 500.00
Drilling and Excavation Costs Subtotal		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 6,340.00

Total Direct Labor	$ 19,028.85
Indirect Labor (1.65%)	$ 31,397.60
Fixed Fee (7.5%)	$ 3,781.98
Labor Subtotal	**$ 54,208.44**

Summary

Level / Description	Task 1 SI Scoping Amount	Task 2 SI Work Plan Prep. Amount	Task 3 CPP Implementation Amount	Task 4 - Investigation Geophysical/Radiological Survey Amount	Test Pits Amount	Borings/MWs Amount	GW Sampling/K Test Amount	Surface Soils Amount	Vaults, sumps & Drains Amount
LABOR									
Labor Total	$ 2,729.47	$ 4,487.49	$ 2,076.77	$ 1,430.10	$ 2,458.50	$ 2,344.55	$ 4,110.77	$ 1,868.75	$ 3,056.74
DIRECT COSTS									
Expenses	$ 120.60	$ 140.60	$ 141.20	$ 80.60	$ 221.80	$ 221.80	$ 221.80	$ 80.60	$ 221.80
Equipment	$ 200.00	$ 100.00	$ 175.00	$ 10.00	$ 530.00	$ 580.00	$ 765.00	$ 250.00	$ 240.00
Laboratory	$ -	$ -	$ -	$ -	$ 10,440.00	$ 3,570.00	$ 7,950.00	$ 9,020.00	$ 5,610.00
Data Quality/Usability	$ -	$ -	$ -	$ -	$ 1,500.00	$ 525.00	$ 1,176	$ 1,276	$ 825.00
Geopyhsical Survey	$ -	$ -	$ -	$ 13,000.00	$ -	$ -	$ -	$ -	$ -
Boundary/Topo Survey and Record Survey	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Probing/Drilling/Excavation	$ -	$ -	$ -	$ -	$ -	$ 6,340.00	$ -	$ -	$ -
Direct Costs Total	$ 320.60	$ 240.60	$ 316.20	$ 13,090.60	$ 12,691.80	$ 11,236.60	$ 10,112.80	$ 10,626.60	$ 6,896.80
COST/TASK (labor and direct)	$ 3,050.07	$ 4,728.09	$ 2,392.97	$ 14,520.70	$ 15,150.30	$ 13,581.35	$ 14,223.57	$ 12,515.35	$ 9,953.54

Level / Description	Test Probes Amount	Survey Boundary/Topo Amount	Survey of Investigation Amount	Task 5 Data Rev/Analysis Amount	Risk Assessment Amount	Task 6 RI Report Amount	Task 7 ID/Eval RAs Amount	AA Preparation Amount	Task 8 Final RI/AA Amount	Task 9 Draft PRAP Amount	Project Totals Amount
LABOR											
Labor Total	$ 2,458.50	$ 82.61	$ 82.61	$ 3,525.53	$ 2,819.04	$ 5,322.21	$ 4,166.52	$ 4,592.93	$ 4,166.52	$ 2,406.82	$ 54,208.44
DIRECT COSTS											
Expenses	$ 151.20	$ 141.20	$ 141.20	$ 10.00	$ 10.00	$ 40.00	$ 40.00	$ 40.00	$ 115.00	$ 10.00	$ 2,149.40
Equipment	$ 250.00	$ -	$ -	$ 50.00	$ 100.00	$ 300.00	$ 50.00	$ 50.00	$ 300.00	$ 50.00	$ 4,000.00
Laboratory	$ 7,600.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 44,190.00
Data Quality/Usability	$ 850.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,152.00
Geopyhsical Survey	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,000.00
Boundary/Topo Survey and Record Survey	$ -	$ 8,500.00	$ 4,740.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,240.00
Probing/Drilling/Excavation	$ 3,775.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,115.00
Direct Costs Total	$ 12,626.20	$ 8,641.20	$ 4,881.20	$ 60.00	$ 110.00	$ 340.00	$ 90.00	$ 90.00	$ 415.00	$ 60.00	$ 92,846.40
COST/TASK (labor and direct)	$ 15,084.70	$ 8,723.81	$ 4,963.81	$ 3,585.53	$ 2,929.04	$ 5,662.21	$ 4,256.52	$ 4,682.93	$ 4,581.52	$ 2,468.82	**PROJECT TOTAL $ 147,054.84**

APPENDIX A

FIELD SAMPLING PLAN

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS
FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD, CITY OF DUNKIRK
CHAUTAUQUA COUNTY, NEW YORK

FIELD SAMPLING PLAN

Prepared for:

Chautauqua County Department of Public Facilities
454 North Work Street
Falconer, New York 14733

Prepared by:

TVGA CONSULTANTS

One Thousand Maple Road
Elma, NY 14059-0264

(716) 655-8842
(fax) (716) 655-0937

2008.0011.00

APRIL 2008

RI/AA OF FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD, CITY OF DUNKIRK
CHAUTAUQUA COUNTY, NEW YORK

FIELD SAMPLING PLAN

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 SCOPE AND OBJECTIVES OF FIELD SAMPLING PROGRAM 1

3.0 FIELD DOCUMENTATION 2
- 3.1 Field Logbook and Forms 2
- 3.2 Photographs 3

4.0 GEOPHYSICAL SURVEY 3

5.0 RADIOLOGICAL SURVEY 4

6.0 CONTAINER INVENTORY 5

7.0 TEST PIT EXCAVATIONS 5

8.0 SOIL PROBES 6
- 8.1 Direct Push Soil Sampling 6
- 8.2 Borehole Abandonment 7

9.0 TEST BORINGS AND MONITORING WELL INSTALLATIONS 7
- 9.1 Hollow-Stem Auger Drilling 8
- 9.2 Rock Coring 8
- 9.3 Rock Core Description 9
- 9.4 Split-Spoon Sampling 10
- 9.5 Soil Classification (USCS) 11
- 9.6 Monitoring Well Installation 12

10.0 WELL DEVELOPMENT, GAUGING AND IN-SITU HYDRUALIC CONDUCTIVITY TESTING 14
- 10.1 Well Development 14
- 10.2 Water Level Monitoring 14
- 10.3 In-Situ Hydraulic Conductivity Testing 15

11.0 SUB-SLAB VAPOR SURVEY 16

12.0 SURVEYING AND TITLE SEARCH 17

13.0 ENVIRONMENTAL SAMPLING 17
- 13.1 Subsurface Soil/Fill Sampling 17
  - 13.1.1 Test Pits, Soil Probes and Test Borings 18
  - 13.1.2 Soil Screening 18
- 13.2 Surface Soil / Fill 19
- 13.3 Sediment 20
- 13.4 Groundwater 20
  - 13.4.1 Well Purging 20

13.4.1.1. Purging with a Peristaltic Pump 21
13.4.1.2. Purging with an HDPE Bailer 22
13.4.2 Groundwater Sampling 22
13.5 Air Monitoring 24
13.6 Sub-Slab Vapor Sampling 25
13.6.1 Tracer Gas 27

14.0 SAMPLE HANDLING 28
14.1 Sample Labeling 28
14.2 Chain-Of-Custody 30
14.3 Sample Shipping 31

15.0 FIELD INSTRUMENTATION CALIBRATION 32

16.0 SAMPLING EQUIPMENT DECONTAMINATION 32

17.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE 33

FIGURES

Figure 1: Typical Monitoring Well Details
Figure 2: Sub-Slab Vapor Probe Detail and Tracer Gas Schematics

TABLES

Table 1: Sampling/Analysis Summary
Table 2: Summary of Requirements for Sample Containers, Preservation, and Holding Times

ATTACHMENTS

Attachment A Field Forms
Attachment B Equipment Use and Calibration Procedures
Attachment C Low Flow Purging and Sampling Procedures

1.0 INTRODUCTION

This Field Sampling Plan (FSP) contains procedural directives to guide the execution of the field activities outlined in the Work Plan for the Remedial Investigation/Alternatives Analysis (RI/AA) program to be implemented at the Former Edgewood Warehouse Site (site). This FSP identifies the scope and objectives of the field sampling program, and provides detailed step-by-step procedures for field activities required for the procurement, collection, handling and documentation of field samples and data. Adherence to these procedures will ensure the quality and usability of the field data collected. This FSP is intended for use in conjunction with the RI/AA Work Plan, Quality Assurance/Quality Control (QA/QC) Plan, and Health and Safety Plan (HASP) developed for the site.

2.0 SCOPE AND OBJECTIVES OF FIELD SAMPLING PROGRAM

The site-specific Data Quality Objectives (DQOs) for data collected during the remedial investigation are discussed in the QA/QC Plan, and are summarized below:

- To characterize the site and determine the nature and extent of contamination occurring on or in soil, fill, and groundwater.
- To take an inventory of containers located on the site
- To evaluate potential risks to human health and the environment associated with current site conditions and potential future use scenarios.
- To identify, evaluate and select a long-term remedial action that is environmentally sound and cost-effective.
- To maintain a state-of-the-art standard of scientific/professional practice for each procedure.
- To assure the ultimate defensibility of the data generated.

The Remedial Investigation program to be implemented at the site will initially focus on determining the nature and extent of contamination within the following five media areas of the site:

- Surface soil/fill
- Subsurface soil/fill
- Sediment
- Groundwater
- On-site structures

Representative grab samples of surface soil/fill will be collected from previously identified areas of concern as well as from points selected to represent conditions across the site, and these samples will be submitted for laboratory analyses.

Subsurface soil, fill and groundwater contamination will be investigated as part of the subsurface investigation program developed for the site. This program will involve the excavation of advancement of soil probes, test pits, drilling of test borings, and the installation of groundwater monitoring wells to facilitate the collection and chemical analysis of samples from these media.

Sediment grab samples will be collected from drainage structures not previously sampled on the site. The investigation will allow for the determination of the function of these structures.

If significant concentrations of VOCs are identified during the investigation of soil/fill and/or groundwater, sub-slab vapor sampling will be performed. This investigation will determine if volatile organic vapors are entering the warehouse building.

The number of samples to be collected from each of the above-referenced media, including QA/QC samples, and the corresponding analytical methods are summarized in Table 1.

3.0 FIELD DOCUMENTATION

The documentation of field activities will entail the recording of project information, observations and measurement in a field logbook, the completion of applicable field log forms, and the compilation of a photographic record of site conditions and the field program.

3.1 Field Logbook and Forms

All pertinent field survey and sampling information shall be recorded in a logbook during each day of the field activity. No general rules can specify the extent of information that must be entered in a logbook. However, logbooks shall contain sufficient information so that someone can reconstruct the field activity without relying on the memory of the field crew.

A Daily Field Report Form shall be completed for each day of field activities. The form shall be filled out with all relevant information in the appropriate spaces on the form. Other field log forms that relate to specific site investigation tasks (e.g., soil probe and test boring logs; well installation, soil vapor survey, development and sampling logs; etc.), shall also be completed in accordance with the procedures specified in the applicable sections of this document. Examples of these forms have been provided in Attachment A.

Procedure

All entries shall be made in indelible ink. At the conclusion of each day, the author will initial the day's entries, and a line will be drawn through the remainder of the page. All corrections shall consist of line-out deletions that are initialed. At a minimum, entries shall include:

- Date and Time of starting work
- Names of all personnel at site
- Purpose of proposed work effort
- Sampling equipment to be used and calibration of equipment
- Description of work area
- Location of work area, including map reference
- Details of work effort, particularly any deviation from the field operations plan or standard operating procedures
- Field observations
- Field measurements
- Personnel and equipment decontamination procedures
- Daily health and safety entries, including levels of protection
- Type and number of samples
- Sampling method, particularly deviations from the Work Plan
- Sample location and number
- Sample handling, packaging, labeling, and shipping information (including destination)

3.2 Photographs

Photographs will be taken to provide the most accurate depiction of the field worker's observations. The photographs provide significant assistance to the field team in future inspections, informal meetings, and hearings.

Procedure

Photographs should be taken with a digital camera, which will offer the most reasonable observation point in relation to what was observed by the naked eye. A photograph must be documented if it is to be a valid representation of an existing situation. For each photograph taken, several items shall be recorded in the field logbooks:

- Date and Time
- Name of the photographer
- Direction faced and description of the subject
- Sequential number of the photograph

Immediately following the performance of the field activity, the photographs will be downloaded and saved in an appropriate directory in TVGA's computer system.

4.0 GEOPHYSICAL SURVEY

A surface geophysical survey using a potential array of geophysical survey equipment, including but not limited to a Geonics EM61, EM31 or ground penetrating radar, and solid state data logger will be performed across the site in order to investigate density anomalies (e.g. cisterns, tunnels, underground utilities) potentially present in suspect areas identified during the historical review and site reconnaissance. If anomalies are discovered as a result of this survey, test pits may be excavated in the vicinity of the anomalies in accordance with the procedures outlined in Section 7.0 of this plan, if necessary.

Procedure

- Establish a reference grid over the area to be surveyed to facilitate data acquisition along transect lines and assign a unique reference code to each line and record layout in the field log book. The line spacing/grid system will be based on field conditions and/or the type of equipment utilized by the geophysical survey subcontractor.
- Prior to use, calibrate the equipment and configure it to collect data points at defined intervals in accordance with site conditions.
- Activate the geophysical equipment and data logging function.
- Prior to data acquisition along each transect line, enter the transect reference code and direction of travel.
- Starting at one corner of the reference grid, traverse full length of a transect line, then, after entering a new transect reference code and direction of travel, proceed in the opposite direction along the next closest parallel transect line, repeating this process until data has been acquired along each transect line.
- At the completion of the data acquisition phase, store logged data for eventual download.

5.0 RADIOLOGICAL SURVEY

A radiological survey will be conducted over the interior and exterior ground surfaces of the site in an effort to locate any areas of elevated radiation. The survey of the site will be based upon a system of transect lines. Additionally, the radiation meter will be used during sampling of soil/fill and sediments and during the installation of the test borings, excavation of test pits and advancement of soil probes as well as during the investigation of building surfaces and components to monitor for radioactive material. Results of the survey will be used to delineate areas of elevated radiation so that these areas can be marked off as Hot Zones where all personnel will be restricted from entering.

Procedure

- Turn on the radiation meter and calibrate the instrument prior to use.
- Hold the probe immediately above the media to be screened, and slowly move the probe from left to right moving forward until the screening location has been passed over by the probe.
- Record the results of the analysis in a logbook following the procedure outlined in section 3.0.

6.0 CONTAINER INVENTORY

A container inventory will be conducted on the site to determine the number of containers present, identify the container contents and determine if any of the containers contain suspected hazardous material or materials that may require treatment prior to disposal. Based on an initial site inspection, it is believed that many of the containers have food grade materials in them. The inventory of containers will include:

- All containers (i.e., 5-gallon pails, 55-gallon drums, cans, etc) will be labeled with a reference number using a grease pencil
- Documentation of materials/content of the container if readily available (i.e., chemical numbers and/or information from labels), if the container is suspected of containing hazardous waste or any other defining characteristics (i.e., the container is leaking or contents have an odor)
- Documentation of the approximate volume of materials/contents
- A site plan showing the location of all identified containers

Sample collection and laboratory analysis of the contents of each container is not included in this inventory. Additionally, unopened containers will not be opened during this inventory.

7.0 TEST PIT EXCAVATIONS

Test pits will be will be excavated across the site and will be the primary means to characterize surficial geology across the site; investigate the thickness of fill material; and identify and delineate areas of subsurface contamination via the field screening and chemical analysis of soil samples, and investigate areas where the geophysical survey identifies density anomalies. It is anticipated that this will include three days of test pit excavations. The test pits will be completed following the procedures outlined below.

<u>Procedure</u>

- Downward excavation will take place in one-foot increments until a subsurface obstruction (i.e., tank, piping, bedrock, impassable fill material) is encountered or to the maximum reach of the backhoe (which will be a minimum of ten feet), whichever occurs first.
- Material removed from the test pit will be temporarily staged adjacent to the excavation. Material removed from the test pit that displays visual, olfactory and/or photoionic evidence of contamination will be temporarily staged on plastic adjacent to the excavation and will be segregated from materials that do not display any evidence of contamination.
- The excavated material will be characterized as described in Section 9.5, and a Test Pit Log will be completed. An example Test Pit Log is included in Attachment A.
- Screening and sampling of excavated soil will be performed in accordance with the applicable provisions of Section 13.1.2.
- Photographs of the completed test pit and excavated material will be collected.

- All soil/fill will be returned to the excavation in the same general order it originated and the area will be graded.

8.0 SOIL PROBES

Two days of soil probing will be performed across the site using direct hydraulic push sampling equipment (e.g., geoprobe or earthprobe) to collect continuous samples. The tentative soil probe locations are depicted on Figure 8 of the work plan, and were selected to focus on areas of the site that were not previously investigated. The soil probing will be completed in an effort to: characterize surficial geology across the site; define the areal extent and thickness of fill material deposited on the site; and identify and delineate areas of subsurface contamination via field screening of soil gas and soil/fill samples, and the chemical analysis of soil/fill samples. The advancement of these soil probes for the characterization, screening and sampling of subsurface soil/fill will be completed following the procedures outlined below.

8.1 Direct Push Soil Sampling

The advancement of soil probes will be completed using direct push soil sampling equipment (e.g., geoprobe or earthprobe) to collect continuous samples in accordance with the procedures outlined below. Direct push soil sampling is a standard method of subsurface soil sampling to obtain samples for characterization, and laboratory analysis. Subsurface samples obtained via direct push sampling will be classified per Section 9.5, field screened for organic vapors as per Section 13.1.2, and may be submitted for chemical analysis in an effort to define the horizontal and vertical extent of fill areas. The samples will be collected at probe locations and classified per Section 9.5 under the direct supervision of an experienced TVGA scientist or engineer.

Procedure

- Mobilize the probe rig to the site, ensure that the probe technician has appropriate equipment and that the rig and equipment have been decontaminated and are in good working condition.
- Measure the sampling equipment lengths and widths to ensure that they conform to specifications.
- With the sampler resting on the bottom of the hole, drive the sampler a total of forty eight (48) inches using direct push sampling equipment.
- Remove the sampler, open the liner or split-spoon sampler, and screen the contents immediately after opening using a Photoionization Detector (PID) and the procedures presented in Section 13.1.2. Record the PID measurement on the Soil Probe Log.
- Classify the sample pursuant to Section 9.5 and place a representative portion of the sample in a clean soil jar(s), ensuring that sufficient sample volume is collected to satisfy sample volume requirements for laboratory analysis (See Table 2 for volume requirements). If the list of possible analytes includes VOCs,

place a portion of the sample directly into the laboratory provided sample container.

- Secure the lid(s), and label the jar(s) with the project code (FEW), date, soil probe number (SP##), sample interval (feet bgs). The complete procedures for sample labeling are included in Section 14.1.
- Additionally, a representative portion of the sample should be place in a drillers jar or ziplock bag for headspace screening. If used, the opening of the drillers jar should be lined with aluminum foil prior to securing the lid.
- Document all properties and sample locations on the Soil Probe Log (Attachment A).
- Once the sample is logged, containerized and labeled, the measurement of "headspace" can be completed in accordance with the procedures outlined in Section 13.1.2.
- Continue sampling using the previous described procedures until an impassable subsurface feature is encountered, or to a depth confirming native soil and the absence of fill material.

8.2 Borehole Abandonment

Each of the soil probes will be abandoned following the completion of probing activities at each location as follows:

Procedure

- Probe holes will be backfilled with removed soil as per NYSDEC TAGM HWR-89-4032.
- At a minimum, the uppermost six inches of each probe hole will consist of compacted cohesive soil to reduce the potential vertical migration of contaminants into the subsurface.
- Remaining spoils will be managed in accordance with the procedures outlined in Section 17.0.

9.0 TEST BORINGS AND MONITORING WELL INSTALLATIONS

A total of four test borings will be drilled on the site with a rotary drill rig to facilitate the classification, field screening and collection of subsurface soil samples for laboratory analysis. All of the test borings shall be completed with groundwater monitoring wells to enable the determination of groundwater flow direction and gradient, the hydraulic conductivity of the water-bearing zones, and the collection of groundwater samples for chemical analysis. These wells will be constructed of two-inch Schedule 40 polyvinyl chloride (PVC) screens and riser.

Test boring and monitoring well locations will be based upon the project objectives, ease of access, freedom from obstructions, and safety considerations (appropriate set backs from overhead wires and buried services). Proposed boring and well locations were selected to facilitate the characterization of the site and to focus the investigation on areas of potential environmental concern identified during project scoping. The proposed locations are depicted on Figure 9 attached to the Work Plan.

The following sections define the applicable drilling and monitoring well installation procedures to be implemented at the site, including:

- Hollow-Stem Auger Drilling
- Split-Spoon Sampling
- Soil Classification
- Monitoring Well Installation/Construction

9.1 Hollow-Stem Auger Drilling

The test borings will be advanced up to a depth of 20 feet using hollow-stem augers with continuous split-spoon samples collected throughout the total depth of each borehole. Hollow-stem auger drilling is the standard method of subsurface drilling which enables the recovery of representative subsurface samples for identification and laboratory analysis and the installation of monitoring wells in the overburden.

Procedure

- Mobilize the drill rig to the site, ensure that the driller has appropriate equipment and that the rig and equipment has been decontaminated and are in good working condition.
- Drilling will utilize 4.25 inch I.D. hollow-stem augers (HSAs) which are turned into the subsurface under hydraulic down pressure to allow continuous sampling of the subsurface and also the installation of the groundwater monitoring equipment.
- Assemble auger and drill rods, and advance the boring the desired distance into the subsurface by rotating and applying down pressure with the rig hydraulics.
- The borings will be advanced incrementally to permit continuous split-spoon sampling as described in Section 9.4.
- Remove drill rods and center plug from augers and sample subsurface soils per Section 9.4, or, if the boring has been advanced to sampling refusal depth, commence rock coring or roller-bit drilling to penetrate the obstruction. Bedrock coring is not part of the anticipated RI. However, it may be necessary to core or roller-bit into bedrock to reach the upper-most water bearing zone.

9.2 Rock Coring

Rock coring is a standard drilling method used for rock formations where undisturbed core samples are required. Rock coring will be performed when required as outlined below, in accordance with ASTM D2113-83 and will be classified as per Section 9.3. Rock coring will commence after refusal with the split spoon sampler, and will proceed into the bedrock to the required depth to allow conversion of the boreholes into bedrock monitoring wells.

Procedure

- The hollow stem auger will be advanced to the top of the bedrock surface and 1 to 2 feet into the bedrock.
- Advance a double tube core barrel with a diamond bit or equivalent into the rock formation. The bit cuts a core out of the rock, which rises into an inner barrel mounted with an outer barrel. Water circulates down the outer barrel and up the borehole.
- Core runs will be a maximum of ten (10) feet in length, utilizing HQ size barrels, yielding a 3-7/8 inch rock core.
- Observe and record the rate of water use and the rate of core barrel advance.
- Retrieve the core barrel; classify the sample pursuant to Section 9.3 and place a representative portion of the sample in a clean splits spoon jar(s), install a monitoring well as per Section 9.6.

9.3 Rock Core Description

Rock classification procedures and descriptive terminology for rock core samples collected by standard bedrock coring methods are presented below.

Procedure

1. Place the core sample in good light, remove any extraneous material and wash the sample to clean it of drilling fluid, residue or mudcake.

2. Describe the wetted rock according to the following hierarchy:

    - Rock Type
    - Color
    - Bedding Thickness
    - Hardness
    - Fracturing
    - Weathering
    - Other Characteristics

3. Provide further detail for cored samples based on following steps:

    - Recombine the core and measure its length;
    - Calculate recovery percentage
    - Count the natural discontinuities and artificial (drilling related) core breaks;
    - Calculate rock quality designation; and

- Calculate fracture frequency.

4. Document descriptions in field notebook and on the appropriate field form.

9.4 Split-Spoon Sampling

Split-spoon sampling is a standard method of subsurface soil sampling to obtain representative samples for identification, and laboratory analysis, and as a measure of resistance of soil to sample penetration. Split-spoon sampling will be performed as outlined below, in accordance with ASTM D1586-84, Standard Method for Penetration Test and Split Barrel Sampling of Soils. Subsurface samples obtained via split-spoon sampling will be classified per Section 9.5; field screened for organic vapors as per Section 13.1.2, and may be submitted for chemical analysis pursuant to Section 13.1.1 in an effort to define the horizontal and vertical extent of contamination, if any, occurring on the site. The samples will be collected at boring locations with the use of a drill rig under the direct supervision of an experienced TVGA scientist or engineer.

Procedure

- Measure the sampling equipment lengths to ensure that they conform to specifications.
- Select additional components as required (i.e., leaf spring core retainer for clays or a sand trap for non-cohesive sands).
- Clean out the auger flight to the bottom depth prior to sampling.
- Remove the drill rods and lower a two-inch I.D. split-spoon sampler to the bottom of the auger column and check the depth against the length of the rods and the sampler.
- Attach the drive head sub and hammer to the drill rods without the weight resting on the rods.
- Mark four six-inch intervals on the drill rods relative to a drive reference point on the rig.
- With the sampler resting on the bottom of the hole, drive the sampler a total of 24 inches using a 140-pound hammer free falling 30 inches.
- Record the number of blows per six-inch interval on a Test Boring Log (Attachment A) and determine the "N" value by adding the blows for the six- to twelve- inch and twelve- to 18- inch interval of each sample attempt.
- Remove the sampler and screen the contents immediately after opening using a PID and the procedures presented in Section 13.1.2. Record the PID measurement on the Test Boring Log.
- Classify the sample pursuant to Section 9.5 and place a representative portion of the sample in a clean soil jar(s), ensuring that sufficient sample volume is collected to satisfy sample volume requirements for laboratory analysis (See Table 2 for volume requirements). If the list of possible analytes includes VOCs, place a portion of the sample directly into the laboratory provided sample container.

- Additionally, a representative portion of the sample should be placed in a drillers jar or a ziplock bag for headspace screening. The opening of drillers jar sample for headspace screening should be lined with aluminum foil prior to closing the lid.
- Secure the lid(s), and label the jar with the project code (FEW), date, test boring/monitoring well number, sample number, sample interval (feet bgs), and blow counts. The complete procedures for sample labeling are included in Section 14.1.
- Document all soil properties and sample locations on the Test Boring Log.
- Once the sample is logged, containerized and labeled, the measurement of "headspace" can be completed in accordance with the procedures outlined in Section 13.1.2.

9.5 Soil Classification (USCS)

This procedure is presented as a means for insuring proper field identification and description of soil collected from the soil probes and test borings. The lithology and moisture content of each soil sample will be visually and physically characterized according to the Unified Soil Classification System (USCS). This method of soil classification describes the soil types on the basis of grain size and the liquid and plastic limits. The soil logging procedures are based on ASTM D 2487-00 Standard Classification of Soils for Engineering Purposes (USCS).

Procedure

According to the USCS, all soils are divided into three major groups: coarse-grained, fine-grained and highly organic (peat). The distinction between the coarse- and fine-grained soils can be seen with the unaided eye. The soil is considered coarse-grained if more than 50 percent of the soil by weight is judged to consist of grains that can be distinguished separately.

The coarse-grained soils are divided into gravelly (G) or sandy (S) soils, depending on whether more or less than 50 percent of the visible grains are larger than the No. 4 sieve (3/16 inch). Gravelly and sandy soils are each further divided into four groups:

W – Well graded; fairly clean (< 5% finer than 0.074 mm)
P – Poorly graded (gap-graded); fairly clean (< 5% finer than 0.074 mm)
C - Clayey (> 12% finer than 0.074 mm), plastic (clayey) fines.
M - Silty (> 12% finer than 0.074 mm), non-plastic or silty fines.

Soils are represented by symbols such as GW or SP and borderline materials are represented by double symbols as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower (L), or higher (H) than 50 percent.

Soil Properties and other observed characteristics normally identified in the field, using the USCS, are defined below:

- Color
- Moisture content
- Grain size (estimated maximum grain size and estimated percent by weight of fines)
- Gradation
- Plasticity
- Predominant soil type
- Secondary soil type
- Classification symbol
- Other features including: organic; chemical or metal content; compactness; consistency; cohesiveness; dry strength and source

9.6 Monitoring Well Installation

Monitoring well installations will be designed and constructed according to ASTM D 5784-00. The newly installed groundwater monitoring wells will be screened across the uppermost water-bearing zone that is believed to exist at the overburden/bedrock interface. Should no groundwater be present at the interface, bedrock wells will be installed. Typical construction details for monitoring wells are presented as Figures 1A through 1C.

Design Materials

- Well Screen and Riser – Only new flush threaded, Schedule 40 PVC screen (machine slotted) and riser of a minimum 2-inch I.D. will be used. Screen slot opening size and length to be approximately 10 feet or less as required by formation characteristics. A vented cap shall be placed over the riser and a V-slot cut in the top edge of the riser as a monitoring reference point.
- Filter Pack – Only non-reactive granular material of known chemistry and particular graduation should be used. The filter pack should be suitable for use with the selected screen slot size.
- Bentonite Well Seal – The bentonite should be from a commercial source free of chemical additives (granular or powdered for grout and pelletized for seal).
- Cement – Low heat of hydration cement for grout and cementing protective casing such as ASTM Type II or Type IV Portland.
- Water – From a potable source of known chemistry and free of chemical constituents that may compromise integrity of installation.

- Grout – Mixture of bentonite, cement and water according to the following specifications by weight: 1.5%-3.0% bentonite, 40%-60% cement, and 40%-60% water.
- Protective Casing, Locking Cap and Lock – Protective casing with a lockable cap should be cemented in place around the riser. The inside diameter should be two to four inches larger than the outside diameter of the riser. The annular space between the casing and riser should be filled with pea gravel or coarse sand. All locks should be keyed alike.

Construction Procedures

- Advance borehole to the desired depth by means of HSA drilling.
- Remove drill rods from augers and verify borehole depth using weighted measuring tape.
- Add pre-washed medium graded sand as needed, up to one-foot in depth, to the base of the borehole through the augers. If dense non-aqueous phase liquids are present, this step may be omitted.
- Insert well screen and riser pipe into the borehole through the HSAs.
- Add appropriately graded sand to the annulus of the screen section of the well while slowing removing HSAs. Measure the depth of the sand pack frequently with the weighted tape while adding sand. Sand pack should extend one to two feet above the screen section within the borehole.
- Add bentonite pellets to seal the borehole while slowly removing the augers. The bentonite seal should extend at least two feet above the top of the sand pack. Measure the depth with the weighted tape before, during and after adding the bentonite pellets. If the bentonite seal is placed above the water table level, then potable water should be added to hydrate the bentonite pellets. The pellets should be allowed to hydrate for a minimum of two hours.
- Mix cement/bentonite grout and add to the borehole annulus from the top of the bentonite seal to the approximately two-feet below the surface.
- Remove remaining HSAs.
- Cut well riser pipe to about two feet above ground surface for stick-up type well installation. Cut well riser pipe just below ground surface for flush-mount well installation.
- Install protective casing, cap and lock, and cement in place.
- Drill a weep hole at the bottom, near the base, of the protective casing to allow accumulated water from between the well riser and casing to drain.
- Seal riser with a J-Plug and lock plug for flush-mount installation and tighten bolts, securing lid to the casing. For stick-up type casings, seal riser with a J-Plug and lock the protective casing cap.
- Document well design and construction data in the field logbook and on a Monitoring Well Installation Report Form (included in Attachment A).

10.0 WELL DEVELOPMENT, GAUGING AND IN-SITU HYDRUALIC CONDUCTIVITY TESTING

10.1 Well Development

Following the completion of test borings and monitoring well installation, each newly installed well will be developed until the discharged water is relatively sediment free and the indicator parameters (turbidity, pH, temperature, conductivity) have stabilized. Well development not only removes any sediment, but may improve the hydraulic properties of the filter pack. The effectiveness of the development procedures will be closely monitored in an effort to keep the volume of development fluids to the minimum necessary to obtain low turbidity samples. The stabilization of indicator parameters will be used as a guide for the discontinuation of well development.

Procedure

- An appropriate well development method should be selected based on well depth, length of water column, well productivity and sediment content of water. Well development options include bailing, manual pumping, powered suction-lift or submersible pumping, and air-lift method.
- Equipment should be assembled, decontaminated, if necessary and installed in the well while taking precautions not to introduce contaminants.
- Well development should proceed by the repeated removal of water from the well until the discharged water is relatively sediment free and/or indicator parameters have stabilized.
- Development effectiveness should be monitored at regular intervals using the Horiba U-10 portable water quality meter, which is capable of measuring turbidity, pH, temperature, and conductivity.
- The Horiba U-10 meter shall be calibrated in accordance with the SOP for this in Attachment B at the beginning of each operating period.
- Both the volume of water removed and the field water quality measurements should be recorded on a "Well Development Log" form (Attachment A).
- Well development may be discontinued either when the turbidity of the discharged water is less than 50 NTU or when the indicator parameter measurements stabilize.

10.2 Water Level Monitoring

The groundwater levels measured in the wells can be used to determine the groundwater gradient and flow direction. Water levels in all wells will be measured using an electronic water level indicator and/or an oil/water interface probe. For newly installed wells, measurements should be taken frequently following well development until the well has recovered to anticipated static conditions. The procedures in Section 13.4.2 will be followed when non-aqueous phase liquids (NAPLs) are present. The following procedures apply when NAPL is not present in the wells.

Procedure

- Pre-clean water level probe and lower portion of cable following the standard decontamination procedures described in Section 16.0.
- Test water level meter to check batteries and adjust sensitivity.
- Lower probe slowly into the well until the audible alarm sounds, indicating water.
- Read depth to the nearest 0.01-foot from the graduated cable using the V-notch on the well riser as a reference point.
- Repeat the measurement for confirmation and record the water level.
- Remove the cable and probe from the well, drying the cable and probe with a clean paper towel or disposable wipe.
- Replace J-Plug, protective casing cap or casing lid and lock.

10.3 In-Situ Hydraulic Conductivity Testing

If significant groundwater contamination is encountered, in-situ hydraulic conductivity tests will be completed to determine the permeability of the water-bearing units in which the wells are screened. Three of the newly installed monitoring wells will be field tested, using the slug test method, to estimate the hydraulic conductivity of the aquifer material surrounding the well screen. Wells selected for hydraulic conductivity testing should be chosen to provide an even areal distribution across the site. The hydraulic conductivities will be used to estimate the groundwater flow and contaminant transport rates, if applicable.

Procedure

- Water level fluctuations in each well will be induced by rapidly introducing a solid PVC slug or a known volume of water, into the water column.
- The rate at which the displaced water falls and returns to equilibrium is measured (falling head) and then the slug is removed and the rate at which the well water rises and returns to equilibrium (rising head) is measured.
- Procedures and equipment requirements are expected to vary depending on the rapidity of the water level response.
- In-Situ MiniTroll data logger, in combination with a pressure transducer will record induced water level changes (Standard Operating Procedures for the Calibration, use and maintenance of the In-Situ MiniTroll data pressure logger and transducer are presented in Attachment B).
- During the slug tests, water level readings will be obtained on a logarithmic scale (such that readings are made more frequently at the beginning of the test) every two-tenths of a second and recorded by the data logger.
- Data from the slug test will be evaluated using an appropriate method based on the borehole diameter for unconfined aquifers that are partially penetrated by a monitoring well.

11.0 SUB-SLAB VAPOR SURVEY

Should soil/fill or groundwater sample results reveal the presence of significant concentrations of VOCs, a sub-slab vapor investigation will be performed to address potential migration of vapors into the on-site warehouse. Up to four sub-slab air quality samples would be collected from within the warehouse in general accordance with the October 2006 New York Department of Health document entitled "Guidance for Evaluating Soil Vapor Intrusion in the State on New York. A typical sub-slab vapor probe detail is included as Figure 2.

The advancement of the sub-slab vapor probe will be completed using a concrete coring drill with a two-inch diameter core barrel. The sub-slab vapor probe will be advanced through the entire thickness of the floor slab to approximately two inches into the sub-slab material. Actual depth will be based on thickness of concrete slab. The installation of the sub-slab vapor monitoring points will be in accordance with the procedures outlined below.

<u>Design Materials</u>

- Vapor probe tubing and fittings – Only new inert laboratory or food grade quality tubing (e.g. polyethylene, stainless steel, nylon, Teflon, etc.) and fittings will be used. The diameter of the tubing will be 1/8 or 1/4 of an inch. Tubing will not extend further than two inches into the sub-slab material.
- Porous, inert backfill material (e.g., glass beads or washed #1 crushed stone) will be used to cover one inch of the probe tip.
- Surface Seal – The seal material should be from a commercial source free of VOCs and be non-shrinking. Acceptable types of surface seal material include permagum grout, melted beeswax, putty, cement, cement-bentonite, etc.
- Water – From a potable source of known chemistry and free of chemical constituents that may compromise integrity of installation.

<u>Procedure</u>

- Bring concrete coring drill on-site and insure equipment has been decontaminated and is in good working condition.
- Sub-slab probes should be completed in areas away from foundation footers and areas that may be impacted by the buildings former operations (e.g. areas with stained surface concrete or next to machinery). Additionally, the area of sample location should be inspected for cracks, floor drains, utility perforations, sumps, etc that may adversely impact the sample results. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.
- Core through the entire thickness of the floor slab by means of concrete a coring drill and remove the cuttings. The upper two inches of the sub-slab material should then be removed from the probe hole.
- Insert the tubing into the hole to an approximate depth of one inch below the bottom of the slab.

- While holding the tubing in place, add two inches of porous, inert backfill material (glass beads or washed #1 crushed stone) into the probe hole so that bottom one inch of the tubing is covered.
- Add the surface seal and place over the top of the porous material, the surface seal should extend from the top of the porous material pack to ground level. If required, potable water should be added to hydrate the seal and should be allowed to hydrate for a minimum of two hours prior to sampling.
- Tube should be capped with an inert valve.
- Document soil vapor probe design and construction data in the field logbook.

12.0 SURVEYING AND TITLE SEARCH

The objective of this task will be to perform a title search in accordance with the requirements of the ERP, to complete a boundary and topographic survey with a meets and bounds description of the site, and to locate on-site structures with respect to site boundaries. The boundary and topographic survey will serve as the base map for the site. In addition, as no building floor plans currently exist, the interior of the buildings will be surveyed to delineate internal structures; walls; locations of pits, sumps and drains; floor elevations and other features which may be pertinent to future site remediation activities. Additionally, a survey will be completed to locate the actual location of the investigation locations. These locations will be superimposed on the base map prepared for the site.

Coordinates will be established by a New York State-licensed land surveyor for the soil probes, soil vapor probes and monitoring wells. Elevations for the monitoring wells will be relative to a regional, local, or project-specific datum. United States Geological Survey (USGS) benchmarks will be used and will take precedence over the use of project-specific datum if they are located within 0.5 miles of the site.

13.0 ENVIRONMENTAL SAMPLING

Subsurface soil and fill, groundwater and, if necessary, soil vapor samples will be collected for chemical analysis to determine the magnitude and extent of contamination, if any, occurring in these media. A summary of the samples to be collected from these media, including the number and type of QA/QC samples, and the corresponding analytical methods is presented in Table 1. The following sections describe the sampling procedures that apply to these media.

13.1 Subsurface Soil/Fill Sampling

Twenty-seven subsurface soil samples will be collected from test pits, soil probes and test borings for chemical analysis. Up to eight subsurface soil samples will be collected from the test pits and analyzed for asbestos. The goal of the subsurface soil/fill sampling is to obtain analytical data from the various soil types and a range of contaminant concentrations. Factors that will be considered when selecting soil samples for analysis include TOV levels, visual and olfactory observations of contamination, the lack of visible or olfactory contamination, the soil type (i.e. fill or native), and the areal and vertical distribution of other soil samples.

13.1.1 Test Pits, Soil Probes and Test Borings

Grab samples will be selected from the test pit walls if visual or olfactory evidence exists or the PID screening determines that chemical analysis is warranted. Continuous soil/fill samples collected from the soil probes and test borings will be reviewed and evaluated for the purpose of selecting samples for chemical analysis. Sample selection will focus on soil/fill samples that exhibit elevated organic vapor levels or visual evidence of contamination. The procedures for sample selection are detailed below. In addition, two matrix spike/matrix spike duplicate (MS/MSD) pairs from a test pit and two equipment rinseate blanks from the split-spoon sampler and micro coring tube will be collected for laboratory analysis.

Procedure

- Measure and record the organic vapor levels in the headspace of all of the samples from the test pits, soil probes, and test borings using the procedures outlined in Section 13.1.2.
- Select the samples that exhibit the highest headspace concentration of organic vapors and/or display visual or olfactory evidence of contamination for chemical analysis.
- Material for VOCs analysis will be placed directly into the appropriate sample containers identified in Table 2.
- Transfer the remainder of the selected sample to a stainless steel mixing bowl. Homogenize soil in the mixing bowl with the same stainless steel trowel or scoop used to collect the sample.
- Place homogenized sample in the appropriate sample containers identified in Table 2.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0.
- Decontaminate stainless steel spatula prior to each use following the procedures outlined in Section 16.0.

13.1.2 Soil Screening

The MiniRAE 2000 photoionization detector (PID) will be utilized to screen soil for organic vapors.

Procedure

Upon successful unit zeroing and calibration (refer to Attachment B) the PID is ready for use. Prior to screening soil, background readings should be determined in the vicinity of the sampling area by holding the probe tip at shoulder level and noting any readings on the digital meter. Record any sustainable background readings noted in the logbook and the appropriate log form. Vinyl tubing, measuring approximately one-inch long (one-quarter inch outer diameter), should be placed on the end of the aluminum or plastic probe tip to avoid contaminating the PID.

Direct sample screening:

- With a spatula or spoon, the soil will be moved apart to reveal soil previously unexposed to the atmosphere.
- The tip of the PID will be placed as close to the top of the newly exposed soil sample as possible without contacting it.
- The digital meter will record the largest concentration detected and that number should be recorded in the field logbook and on the appropriate log form as well.

Sample headspace screening:

- Allow the samples to warm in the sealed split-spoon jars or zip-lock bags to room temperature for an appropriate duration depending upon ambient temperatures.
- Remove the lid from the split-spoon jar, taking care not to remove the underlying foil or carefully open one corner of the zip-lock bag.
- Immediately pierce the foil with the PID probe.
- The digital meter will record the largest concentration detected and that number should be recorded in the field logbook and on the soil boring or soil probe log.
- Secure the appropriate lid onto the sample jar.

13.2 Surface Soil / Fill

Up to 20 surface soil/fill samples will be collected for analysis of TCL SVOCs and TAL metals from previously identified areas of concern (e.g., locations of former drum or tank storage, areas of stained soil, etc.), as well as from points selected to represent conditions across the subject site. One MS/MSD pair and one equipment rinseate blank and one field duplicate will be collected for laboratory analysis.

Sampling Procedure

- Remove the overlying vegetation.
- Excavate approximately two inches of soil using a decontaminated stainless steel trowel or disposable plastic scoop and collect a sample from the selected location and screen for organic vapors using the procedure outlined in Section 13.1.2.
- The soil will be placed in a stainless steel mixing bowl.

- Homogenize soil in the mixing bowl with the same stainless steel trowel or scoop used to collect the sample.
- Place homogenized sample in the appropriate sample containers identified in Table 2.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0.
- Decontaminate mixing bowl and trowel prior to each use following the procedures outlined in Section 16.0.

13.3 Sediment

Four sediment samples will be collected from the trench drains and/or sumps within the building. Additionally, one MS/MSD pair and one equipment rinseate blank and one field duplicate will be collected for laboratory analysis.

Sampling Procedure

- Collect a sample from the selected location using a decontaminated stainless steel trowel or disposable plastic scoop and screen for organic vapors using the procedure outlined in Section 13.1.2.
- Place material for VOCs analysis directly into the appropriate sample containers identified in Table 2.
- Place remainder of the sample in a stainless steel mixing bowl.
- Homogenize soil in the mixing bowl with the same stainless steel trowel or scoop used to collect the sample.
- Place homogenized sample in the appropriate sample containers identified in Table 2.
- Sample handling, labeling, custody and shipping shall be in accordance with the procedures outlined in Section 14.0
- Decontaminate mixing bowl and trowel prior to each use following the procedures outlined in Section 16.0.

13.4 Groundwater

13.4.1 Well Purging

In order to collect representative groundwater samples, wells must be adequately purged prior to sampling. Purging requires the removal of at least one well volume of water from wells with slow recharge rate, and the removal of three to five volumes of standing water in rapidly recharging wells.

Procedure

- Remove and unlock the well cover and carefully remove the J-Plug to avoid foreign material from entering the well.
- The interior of the riser pipe should be monitored for organic vapors with a PID. If a reading greater than five parts per million (ppm) is recorded, allow the well to vent until levels drop below five ppm before proceeding with purging.
- Using an electronic water level indicator, determine the static water level below the top of the riser according to the procedure detailed in Section 10.2. If non-aqueous phase liquids (NAPLs) are suspected, use an oil/water interface probe to determine the NAPL thickness, water levels, and well depths in accordance with the procedures detailed in Section 10.2.
- Determine the depth of the well and subtract the depth to the water level to determine the length of the water column.
- Determine the volume of water in the well by multiplying the length of the water column by the appropriate conversions found on the Well Sampling Log form (Attachment A).
- Calibrate the Horiba U-10 field water quality meter in accordance with the procedures outlined in Section 15.0.
- Chose a purging technique outlined below (e.g. HDPE bailer or peristaltic pump). A peristaltic pump will generally not work in wells with water levels greater than 20 feet below grade.
- Purge water will be placed into graduated five-gallon buckets to assist in measuring volumes removed.
- Use the Horiba U-10 to periodically measure the pH, temperature, conductivity, salinity and turbidity of the purge water.
- Record the field parameter measurements on the Well Sampling Log (Attachment A).
- Record the volume removed and succeeding field parameter measurements on the Well Sampling Log form.
- Decontaminate the Horiba U-10 following the procedures outlined in Section 16.0 prior to use at each well location.
- Purging shall continue until three to five well volumes of water have been removed, or, in the case of wells with slow recharge rates, until the well is evacuated to dryness.
- In the event a well is purged to dryness, purging should be stopped and the well allowed to recharge to near static water level before sampling.
- All well purging data shall be recorded on a Well Sampling Log form (Attachment A) and in the field notebook.

13.4.1.1. Purging with a Peristaltic Pump

The groundwater monitoring wells may be purged utilizing USEPA low-flow purging techniques and a peristaltic pump with polyethylene tubing. Low-flow purging is a technique to obtain samples with minimal alterations to water chemistry and will be accomplished utilizing the procedures outlined in the USEPA Region 1 *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (Attachment C).

13.4.1.2. Purging with an HDPE Bailer

The wells may be purged using a dedicated, disposable high density polyethylene (HDPE) bailer. The dedicated, disposable HDPE bailer will have a one-liter capacity and a new section of nylon rope that will be discarded after use. The use of bailers may be necessary because the peristaltic pumps are physically limited to lifting water from depths of 20 feet or less.

13.4.2 Groundwater Sampling

Twelve groundwater samples will be collected from the monitoring wells, including the four newly installed monitoring wells and the eight existing wells installed during previous investigations located across the site and analyzed for TCL VOCs, SVOCs, PCBs and TAL metals. Additionally, one MS/MSD pair, one field duplicate, and up to three trip blanks will be collected for laboratory analysis.

Groundwater sampling should be performed as soon as practical after purging has been completed and the well has recovered sufficiently to sample, or within 24 hours after evacuation if the well recharges slowly. If a well does not contain or yield sufficient volume for all required laboratory analytical testing (including quality control), a decision will be made to prioritize analyses.

<u>Procedure</u>

If Non-Aqueous Phase Liquid (NAPL) is suspected to be present, a discrete sample from this phase must be obtained prior to purging. The determination of NAPL will be made through the use of an oil/water interface probe. The probe typically emits two different types of signals or tones; one for NAPL (free product) and one for water.

The procedure to measure the thickness of Light Non-Aqueous Phase Liquid (LNAPL) is initiated by lowering the probe until the first signal indicates the interface between air and free product has been reached. Then continue to slowly lower the probe until the second signal indicates the interface between free product and water. The probe is then lowered to the bottom of the well for the detection of Dense Non-Aqueous Phase Liquid (DNAPL). In this case, the probe will first encounter the interface between water and DNAPL, and then will encounter the contact between the DNAPL and the bottom of the well. All measurements will be recorded to the nearest 0.01-foot.

If a LNAPL is detected floating on the water surface in the well, sampling may be accomplished by the following manner:

- Using an oil/water interface probe, determine the LNAPL thickness and the static water level according to the procedure detailed above.
- Slowly lower a single check valve bailer (i.e., a bailer with a single ball valve on the bottom) down the well into the immiscible layer of NAPL. Care should be taken to lower the bailer just through the NAPL layer, but not significantly down into the underlying groundwater.
- Remove the bailer from the well, while being sure not to agitate the sample. Allow the bailer with sample to stand for a few minutes so the immiscible phases will separate.
- Decant the denser groundwater portion of the bailer into a wastewater barrel through the stopcock on the bottom of the bailer. The less dense immiscible NAPL layer may be emptied into the proper sampling containers by the same method

Sampling DNAPL may be accomplished by the following procedure:

- Using an oil/water interface probe, determine the DNAPL thickness and the static water level according to the procedure detailed above.
- Slowly lower a double check valve bailer (i.e., a bailer with a ball valve on top and bottom of the bailer) down the well until it reaches the bottom of the well.
- Slowly raise and lower the bailer in a controlled manner to collect the dense NAPL layer in the lower portion of the well.
- Slowly remove the bailer from the well, being sure not to agitate the sample. Allow the bailer with sample to stand for a few minutes so the immiscible phases separate.
- Carefully attach a threaded stopcock to the bottom of the bailer and discharge the dense immiscible layer through the stopcock into the proper sampling containers.

If LNAPL or DNAPL is not detected in the well, sampling may be accomplished by the following manner:

- Using an electronic water level indicator, determine the static water level below the top of the riser according to the procedure detailed in Section 10.2.
- The samples will be collected either from a peristaltic pump or a dedicated bailer. The samples will be collected directly from the peristaltic pump if the water level is less than 20 feet below grade. A bailer will be used when the water level is greater than 20 feet below grade.
- If a peristaltic pump is used to collect the samples, the sampling containers will be placed directly under the discharge outlet of the dedicated peristaltic tubing.
- If a bailer is used to collect the samples, the following method will be employed:
    - Slowly submerge a disposable, single check valve HDPE bailer into the water column to collect a groundwater sample.

- Allow sufficient time for the bailer to sink and fill with water, and then retrieve it to the surface in a manner that minimizes sample agitation.
- Transfer the sample from the bailer directly into the appropriate sample containers identified in Table 2 in a manner that minimizes agitation and aeration of the sample to the greatest extent possible.

- During sampling, field parameters (pH, temperature, conductivity, and turbidity) will be measured through the use of a Horiba U-10. This information will be recorded on the Well Sampling Log (Attachment A) and compared the resulting measurements with those taken at the conclusion of purging to ensure that representative groundwater samples are being collected.
- Samples will be collected in decreasing order of volatilization sensitivity (i.e., VOCs then SVOCs).
- If the turbidity level exceeds 50 nephalometric turbidity units (NTUs), implement the field filtration protocols described in the following subsection for the collection of groundwater samples for metals analysis.
- Samples will be collected in verifiably clean sample bottles (containing required preservatives) provided by the laboratory.
- All sample bottles will be labeled in the field using a waterproof permanent marker following the procedures outlined in Section 14.0.
- Sample handling, labeling, custody and shipping shall be performed in accordance with the procedures outlined in Section 14.0.
- After all sample containers have been filled at the well location (including QA/QC samples), measure and record the field parameters of the water using the Horiba U-10 meter to ensure that representative groundwater samples have been collected.
- Record all sampling data in the field notebook and on the Well Sampling Log (Attachment A).

13.5 Air Monitoring

Real-time air monitoring for volatile organic compounds (VOCs) within the work area and at the perimeter of the exclusion zone will only be conducted during intrusive activities. Ground intrusive activities include, but are not limited to, the excavation of test pits, the advancement of soil probes and the installation of monitoring wells.

VOCs must be monitored within the work zone and at the downwind perimeter of the immediate work areas (i.e., the exclusion zone) as described below and as specified in the site-specific HASP (Appendix C). Field monitoring of all intrusive excavation activities with the MiniRAE 2000 photoionization detector (PID) will be performed in accordance with the procedures outlined below.

Procedure

Upon successful unit zeroing and calibration, the PID is ready for use.

- Background readings should be determined upwind of the sampling area by holding the probe tip at shoulder level and noting any readings on the digital meter.
- Record any sustainable background readings noted in the logbook and the Direct Air Monitoring Form included as an attachment to the HASP.
- The PID meter should be operated on a continuous basis during any intrusive activities conducted during the site investigation.
- Readings should be recorded in 15-minute intervals on Direct Air Monitoring Form.
- Readings over the action levels listed in Section 5.2 of the HASP should be recorded in the log book and the health and safety procedures listed in this section should be implemented.

13.6 Sub-Slab Vapor Sampling

Should significant concentrations of VOCs exist in the soil/fill or groundwater, sub-slab vapor sampling will be performed in accordance with the October 2006 NYSDOH guidance document entitled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" and as described in the general procedures below.

To obtain representative samples and to minimize possible discrepancies, soil vapor samples should be collected in the following manner at all temporary or permanent sub-slab vapor probe locations:

- A minimum of two hours after the installation of vapor probes, one to three implant volumes (i.e., the volume of the sample probe and tube) should be purged (i.e. using a disposal syringe or industrial hygiene pump) prior to collecting the samples.
- Flow rates for both purging and collecting should not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling. This is accomplished using the CS1200P High Purity Flow Regulation System.
- Samples should be collected using conventional sampling methods in an appropriate container that:
    1. Meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation).
    2. Is consistent with the sampling and analytical methods (e.g., low flow rate; Summa canisters analyzed by EPA Method TO-15).
    3. Is certified clean by the laboratory.

- Sample size depends upon the volume that will achieve minimum reporting limits. A minimum reporting limit of one microgram per cubic meter (1 mcg/m^3) or less is sufficient for this study.
- A tracer gas (e.g., helium, butane, etc.) will be used at every sample location when collecting soil vapor samples to verify that adequate sampling techniques are being implemented (i.e., to verify infiltration of outdoor air is not occurring). The usage of tracer gas is described in Section 13.6.1.

In some cases, weather conditions may present certain limitations on vapor sampling. For example, condensation in the sampling tube may be encountered during winter sampling due to low outdoor air temperatures. Indoor air temperature should be heated or cooled to between 65 and 75 degrees Fahrenheit to avoid these conditions for 24 hours prior to and during sample collection. Anticipated limitations to the sampling should be discussed prior to the sampling event so appropriate measures can be taken to address these difficulties and produce representative and reliable data.

When soil vapor samples are collected, the following actions should be taken to document local conditions during the sampling that may influence interpretation of the results:

- If sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified.
- Outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor air sampling locations (if applicable), and compass orientation (north).
- An indoor floor plan sketch should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, locations of sumps, drains, utility perforations though building foundations, air supply registers, compass orientation, and any other pertinent information.
- Weather conditions (e.g., precipitations and outdoor temperature) should be noted for the past 24 to 48 hours.
- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

Additional information that could be gathered to assist in the interpretation of the results includes barometric pressure, wind speed and wind direction.

The field sampling team should maintain a sample log sheet summarizing the following:

- Sample identification
- Date and time of sample collection
- Sampling methods and devices
- Purge volumes
- Volume of soil vapor extracted

- If canisters are used, the vacuum before and after the samples were collected
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone
- Chain of custody protocols and records used to track samples from sampling point to analysis

13.6.1 Tracer Gas

When collecting soil vapor samples, a tracer gas serves as quality assurance/quality control measure to verify the integrity of the soil vapor probe seal. Without the use of a tracer, there is no way to verify that a soil vapor sample has not been diluted by outdoor air. A tracer gas should be used at every sampling location, every time samples are collected.

Depending on the nature of the contaminants of concern, a number of different compounds can be used as a tracer. Typically helium is used as a tracer because it is readily available, has low toxicity, and can be monitored with portable measurement devices. Butane and propane (or other gases) could also be used as tracers in some situations. Where applicable, steps should be taken to ensure that the gas used by the laboratory to clean the air sampling container is different from the gas used as a tracer during sampling (e.g., helium).

Protocol for using a tracer gas:

- Use a laboratory supplied silonite coated dome and enrich the atmosphere in the immediate vicinity of the area where the probe intersects the ground surface with the tracer gas.
- Measure a vapor sample from the probe for the presence of high concentrations (>10%) of the tracer. A cardboard box, a plastic pail, or the laboratory supplied dome can serve to keep the tracer gas in contact with the probe during the testing. If there are concerns about infiltration of ambient air through the other parts of the sampling train (such as around the fittings, not just at the probe/ground interface), the consideration should be given to ensuring that the tracer gas is in contact with the entire sampling apparatus. In these cases, field personnel may prefer to use a liquid tracer by soaking paper towels with a liquid tracer and placing the towels around the probe/ground interface, around the fittings, and/or in the corner of a shroud.

There are two basic approaches to testing for the tracer gas:

- Include the tracer gas in the list of target analytes reported by the laboratory.
- Use a PID to analyze a sample of soil vapor for the tracer gas prior to and after the sample collection.

The advantage of the second approach is that the real time tracer sampling results can be used to confirm the integrity of the probe seals prior to formal sample collection.

The schematics of tracer gas applications seen in Figure 2 depict common methods for using tracer gas. The same tracer gas application should be used for all vapor probes at the same site. In schematics (A), (B) and (C), the tracer gas is released in the enclosure prior to initially purging the sample point. Care should be taken to avoid excessive purging prior to sample collection. Care should also be taken to prevent pressure build-up in the enclosure during introduction of the tracer gas. Inspection of the installed sample probe, specifically noting the integrity of the surface seal and the porosity of the soil in which the probe is installed, will help to determine the tracer gas setup. Schematic (A) may be the most effective at preventing tracer gas infiltration; however, it may not be appropriate in some situations depending on site-specific conditions. Schematics (B) and (C) may be sufficient for permanent soil vapor probes installed in tight soils. Schematic (D) provides an example of using a liquid tracer.

Minor leakage around the probe seal should not materially affect the usability of the soil vapor sample results. If the PID detects the tracer gas at a concentration greater than ten percent, measures should be taken to enhance the probe seal to reduce infiltration of ambient air.

14.0 SAMPLE HANDLING

Proper sample labeling, handling, packing and shipping will help ensure collected samples are accurate, secure and intact when they arrive at the laboratory for analysis.

14.1 <u>Sample Labeling</u>

Proper labeling is required to prevent sample misidentification of samples collected in the field and will be performed using the procedures detailed below.

<u>Procedure</u>

- Affix a non-removable (when wet) label to each sample container.
- Cover the label with 2-inch cellophane or mylar tape.
- Write the following information on the label with a permanent waterproof marker:
  - Site Name
  - Sample Identification Code
  - Project Number
  - Date/Time
  - Sampler's Initials
  - Sample Preservative
  - Analysis Required

- Each sample of each matrix will be assigned a unique alpha-numeric identification code consisting of four (4) sequential components: (1) site code, (2) sample location, (3) sample matrix, and (4) sample type. Each of these components is defined below:

  - Project Site Code: FEW (Former Edgewood Warehouse)

  - Sample Location:

    Test Pit Designation: TP#D
    # = Test Pit Number
    D= Depth Interval: D02 = 0-2 feet
    D24 = 2-4 feet
    D46 = 4-6 feet, etc.

    Soil Probe Designation: SP#D
    # = Soil Probe Number
    D = Depth Interval: D02 = 0 – 2 feet
    D24 = 2 – 4 feet
    D46 = 4 – 6 feet, etc.

    Test Boring Designation: TB#D
    # = Test Boring Number
    D = Depth Interval: D02 = 0 – 2 feet
    D24 = 2 – 4 feet
    D46 = 4 – 6 feet, etc.

    Monitoring Well Designation: MW#XX
    # = Well Number
    XX = Well Type:IN - Interface
    XX = Well Type: BR – Bedrock

    Sub-Slab Probe: SSP#D
    # = Soil Vapor Probe Number
    D = Depth Interval D02 = 0-2 feet
    D24 = 2-4 feet
    D46 = 4-6 feet, etc.

  - Sample Matrix:
    GW = Groundwater
    SW = Standing/Surface Water
    WW = Waste Water
    S = Soil
    SED = Sediment
    SLD = Sludge
    SV = Soil Vapor

- Sample Type:
  O – Original
  FD – Field Duplicate
  MS – Matrix Spike
  MSD – Matrix Spike Duplicate
  MD – Matrix Duplicate
  TB – Trip Blank
  RB – Rinseate Blank

1. Examples of this code are provided below

- FEW -MW4-GW-O
  FEW = Former Edgewood Warehouse
  MW4 = Monitoring Well No. 4
  GW = Groundwater Sample
  O = Original

- FEW-TB5-D46-S-O
  FEW = Former Edgewood Warehouse
  TB5-D46 = Test Boring No. 5 (4-6 foot depth)
  S = Soil Sample
  O = Original

- FEW-SSP3-D510-SV-O
  FEW = Former Edgewood Warehouse
  SSP3-D5-10 = Sub-Slab Probe No. 3 (5-10 foot depth)
  SV = Soil Vapor
  O = Original

14.2 Chain-Of-Custody

The documentation of sample collection and the method used to standardize the action is referred to as a chain-of-custody (COC). The COC is a legally defensible document that may be utilized as evidence in litigation or administrative hearings by regulatory agencies. The COC procedure is based on the American Standards and Testing Materials (ASTM) Standard Guide for Sampling Chain-of-Custody Procedures (ASTM D 4840-99).

Procedure

COC procedures are essential for the presentation of sample analytical chemistry in the form of an analytical report. Proper COC procedure will minimize the loss or misidentification of samples and may ensure unauthorized persons do not tamper with collected samples.

- The COC should be filled out with all relevant information in the appropriate space on the form. Information required at a minimum:

  - Site Name
  - Sample Identification
  - Project Number
  - Date And Time
  - Sampler's Signature
  - Sample Preservation
  - Required Analysis

- COCs should be completed in indelible ink.
- The COC is typically a carbon copy, which requires the preparer to apply sufficient pressure to mark all other pages.
- The top copy, usually a white original, should be sent to the laboratory with the samples.
- The preparer should retain the bottom copy, and any other carbon copies should be sent to the laboratory with the samples.
- The top copy of the COC should be placed in a zip-type plastic bag and placed in the cooler along with the samples and sealed according to the procedure outlined in next section.

14.3 Sample Shipping

The proper shipping of samples will help ensure sample security, by limiting access, integrity, by avoiding breakage, and validity, by maintaining temperature conditions.

Procedure

- Place about three inches of cushioning material in the bottom of the cooler.
- Place bottles in the cooler with VOA vials in the center of the cooler within zip-type bags.
- Separate bottles from one-another with foam, cardboard or bubble-wrap plastic.
- Pack top of bottles with ice in plastic zip-type bags. Ice should originate from a potable water source.
- Place additional cushioning material in cooler as needed.
- Place COC in zip-type plastic bag inside cooler on to the top of packing material and sample bottles.
- Wrap cooler with strapping tape at two locations and secure lid, complete with two custody labels on the cooler.
- Be sure any drain plugs on cooler are closed and sealed with tape.
- Place "this side up" and "fragile" labels on cooler

- Samples should be shipped the same day they are collected to a New York State Department of Health (NYSDOH) ELAP-certified (Environmental Laboratory Approval Program) laboratory for analysis.

15.0 FIELD INSTRUMENTATION CALIBRATION

Numerous field instruments will be utilized during completion of the RI that require periodic calibration and routine maintenance in order to function properly.

Procedure

Calibration and maintenance procedures for the following field instruments are presented in Attachment B.

- MiniRAE 2000 Photoionization Detector (PID)
- Solinist Model 101Water Level Indicator
- Horiba U-10 Water Quality Meter
- Solinist Model 122 Oil-Water Interface Probe
- In-Situ MiniTroll Logger Hydraulic Conductivity Meter

The MiniRAE 2000 PID should be calibrated at the beginning of each day of use as well as in the event ambient air temperatures vary by 15 ° F from the time of initial calibration. Calibration of the PID should be recorded in the field logbook and the air monitoring form (found in the HASP). The Solinst water level meter and oil/water interface probe are factory calibrated and should not require any calibration as long as the probes remain clean. Decontamination of the meters should be recorded in the field logbook. The Horiba water quality meter will be calibrated at the beginning and end of each operating period. The initial, and any subsequent calibrations, should be documented in the field logbook. The CS1200P High Purity Flow Regulation System utilized in the collection of sub-slab vapor probes will be calibrated by the laboratory.

16.0 SAMPLING EQUIPMENT DECONTAMINATION

Sampling methods and equipment have been chosen to minimize decontamination requirements and prevent the possibility of cross-contamination. All drilling and excavating equipment that comes in contact with soils will be decontaminated prior to each use at new locations. Special attention will be given to the drilling assembly, augers, and shovels. Split-spoons, soil probes and other non-disposable sampling equipment (e.g., mixing bowls, trowels, etc.) will be decontaminated prior to each use. Field instruments, such as the water level meter, and the field water quality meter will be decontaminated prior to use at new well locations, and will be triple rinsed prior to each use at a specific well location.

Procedure

Drilling and Excavating Equipment (e.g., direct-push probes, hollow-stem augers, shovels):

- Position equipment on heavy plastic sheeting.
- Manually remove foreign matter.
- Steam clean equipment and allow to air dry.
- Unless it is apparent that there may be contamination present, based upon visual and/or photoionic evidence, decontamination fluids will be allowed to infiltrate the ground surface of the site.
- Should evidence of contamination be observed, decontamination fluids will be contained for characterization and proper future management in accordance with Section 17.0.

Non-Disposable Sampling Equipment (e.g., split-spoons, stainless steel mixing bowls, etc.) and field instruments (e.g., water level meter and field water quality meter):

- Position equipment on plastic sheeting or within wash tub or bucket.
- Manually remove foreign matter.
- Wash equipment with brushes in an alconox or liquinox and potable water mixture.
- Triple rinse with deionized water.
- Allow equipment to air dry.

17.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

This section addresses the minimization and management of investigation-derived waste generated as a result of subsurface investigation activities. Wastes expected to be generated include expendable sampling-related equipment, soil and/or fill removed during the excavation of test pits, auger cuttings from test boring and well drilling, well development and purge water, and decontamination fluids.

Efforts will be made by the field team to minimize the quantity of waste generated by re-using expendable sampling equipment whenever possible, by purging only the quantity of well water necessary, and by using the least amount of decontamination fluids practicable. The field team will also attempt to minimize the quantity of waste generated by segregating clean materials from potentially contaminated materials.

It is anticipated that most waste generated during excavating, drilling and sampling activities will not require containment. All decontamination water, surplus geologic material and auger cuttings will be returned to the soil probe and test boring from which they originated, or spread on the ground surface within the interior of the site if:

- Free product is not observed; and
- Direct TOV readings are below 5 ppm.

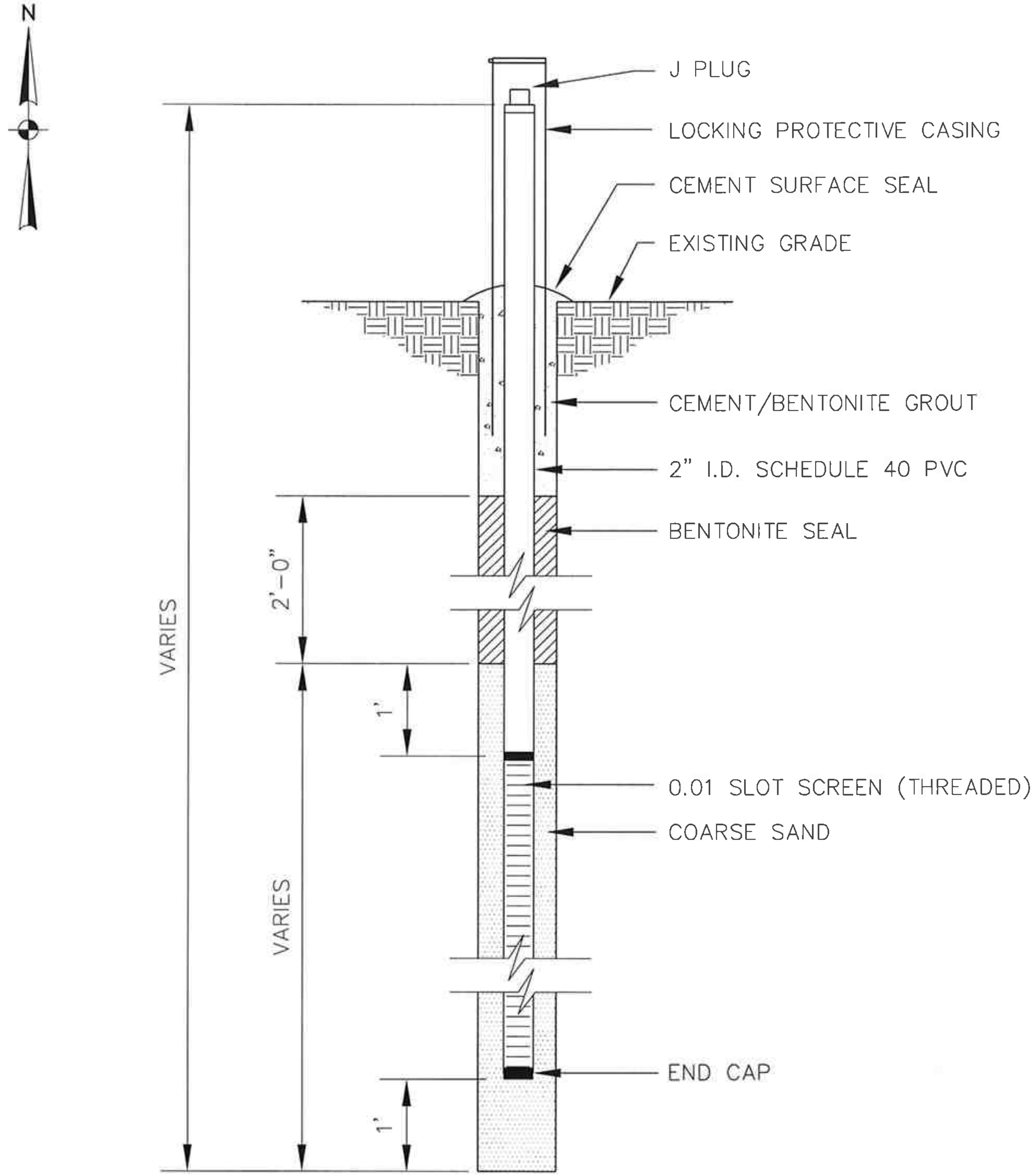
Similarly, development and purge water will be discharged to the ground surface within the interior of the site if:

- Free product is not observed on the water; and
- TOV readings from above the water are below 5 ppm.

If containment is required, excess soil materials will be placed on and covered with polyethylene sheeting in a central portion of the site. Surplus water will be placed into 55-gallon drums and staged in a central portion of the site and handled appropriately

n:\2008.0011.00-edgewood warehouse ri-aa\engineering\10deliverables\ri-aa work plan\fsp\edgewood fsp (appendix a).doc

FIGURES



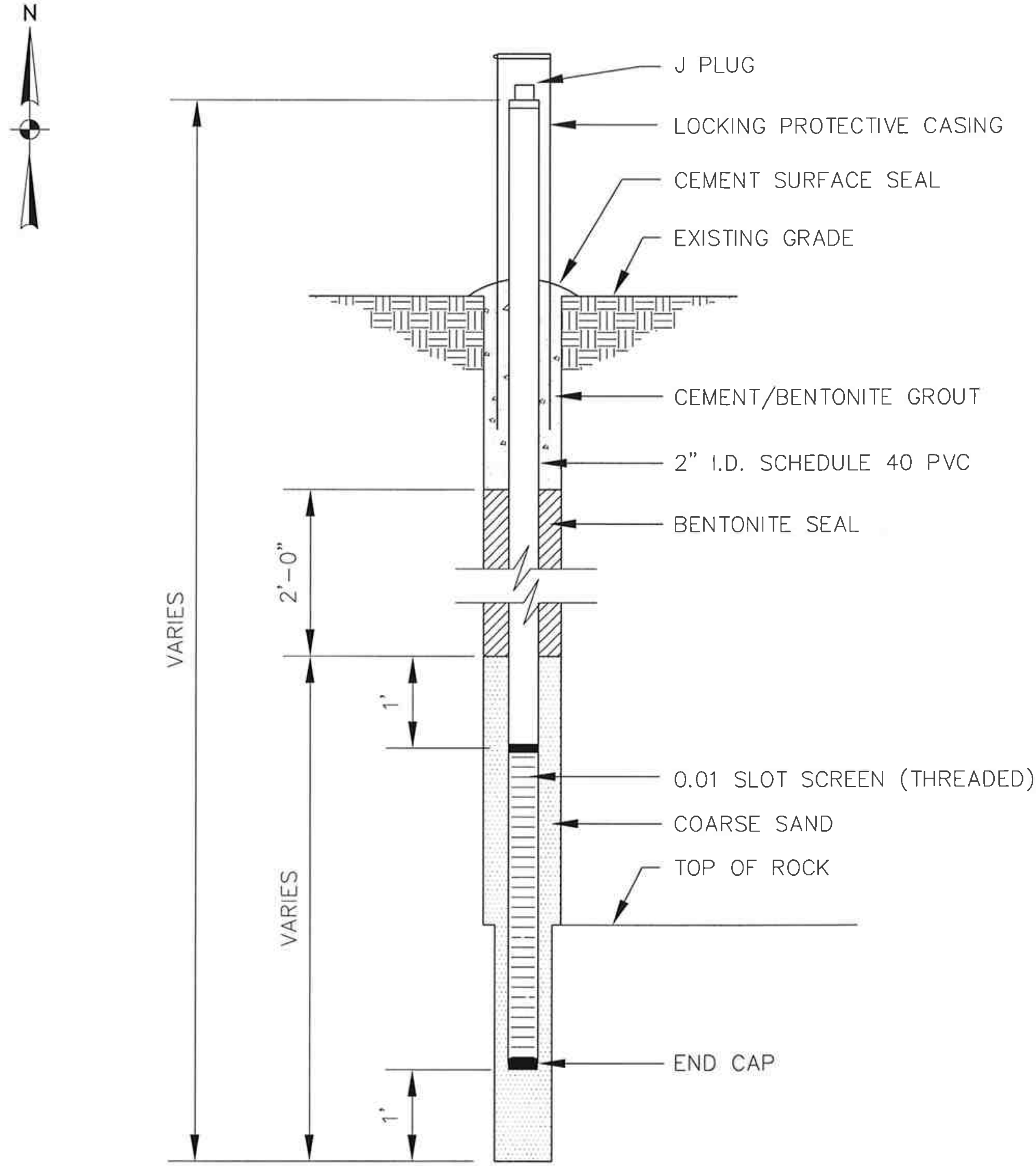
TYPICAL OVERBURDEN MONITORING WELL DETAIL

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJECT NO. 2008.0011.00	NOT TO SCALE	DATE: MARCH 2008	FIGURE NO. 1A

N:\2008.0011.00-Edgewood Warehouse RI-AA\Engineering\CADD\CADD\FSP-FIGURE 1A.DWG, 3/14/2008 2:19:20 PM, awoods



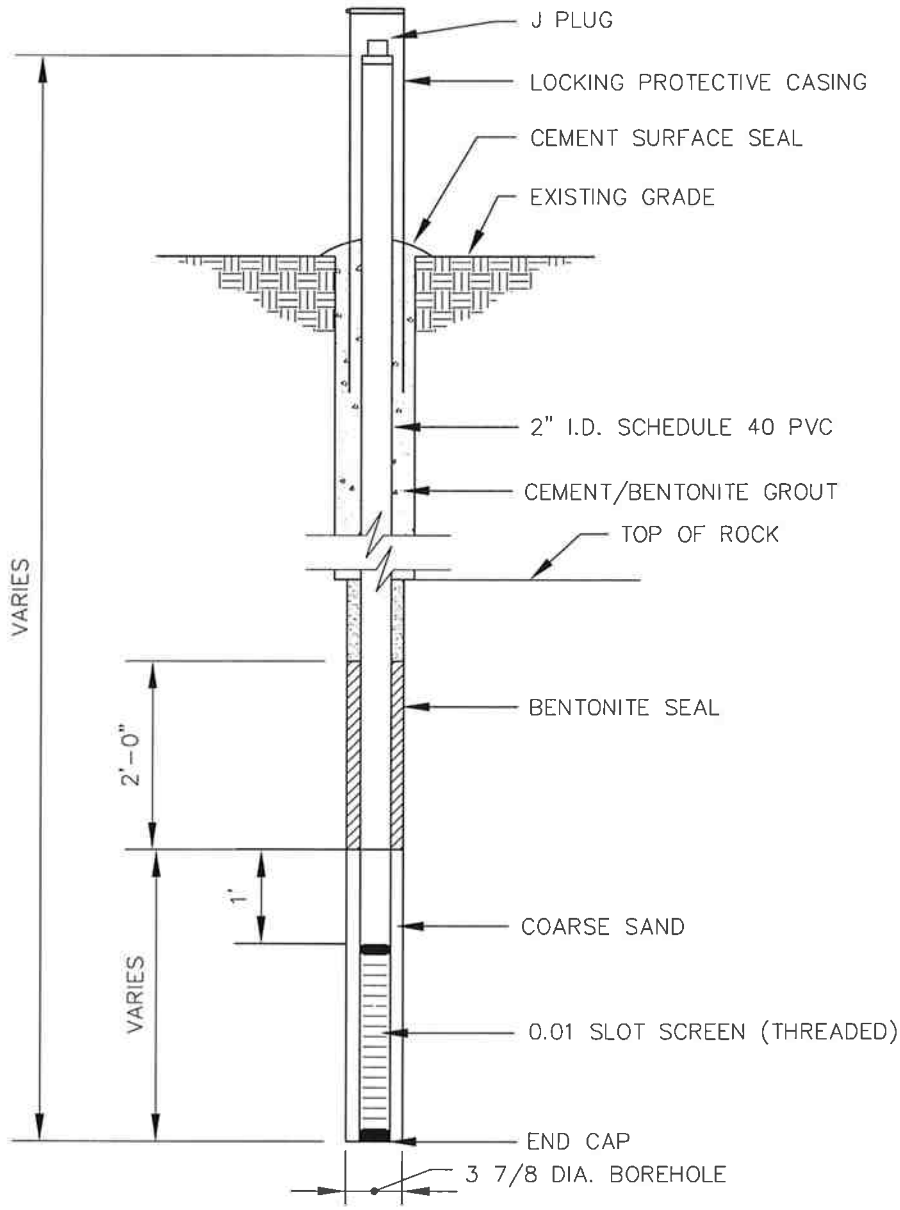
TYPICAL INTERFACE MONITORING WELL DETAIL

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJECT NO. 2008.0011.00	NOT TO SCALE	DATE: MARCH 2008	FIGURE NO. 1B

N:\2008.0011.00-Edgewood Warehouse RI-AA\Engineering\CADD\CADD\FSP-FIGURE 1B.DWG, 3/14/2008 2:41:10 PM, awoods

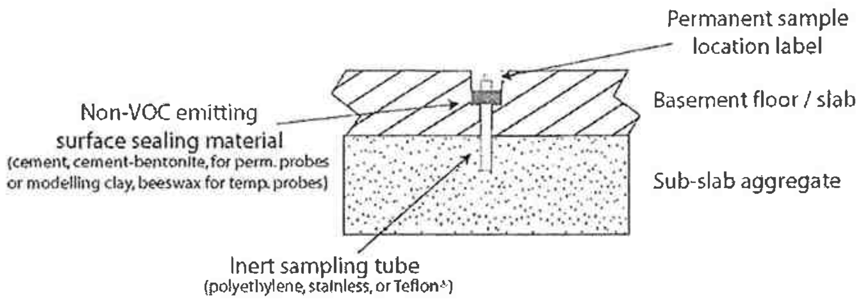


TYPICAL BEDROCK MONITORING WELL DETAIL

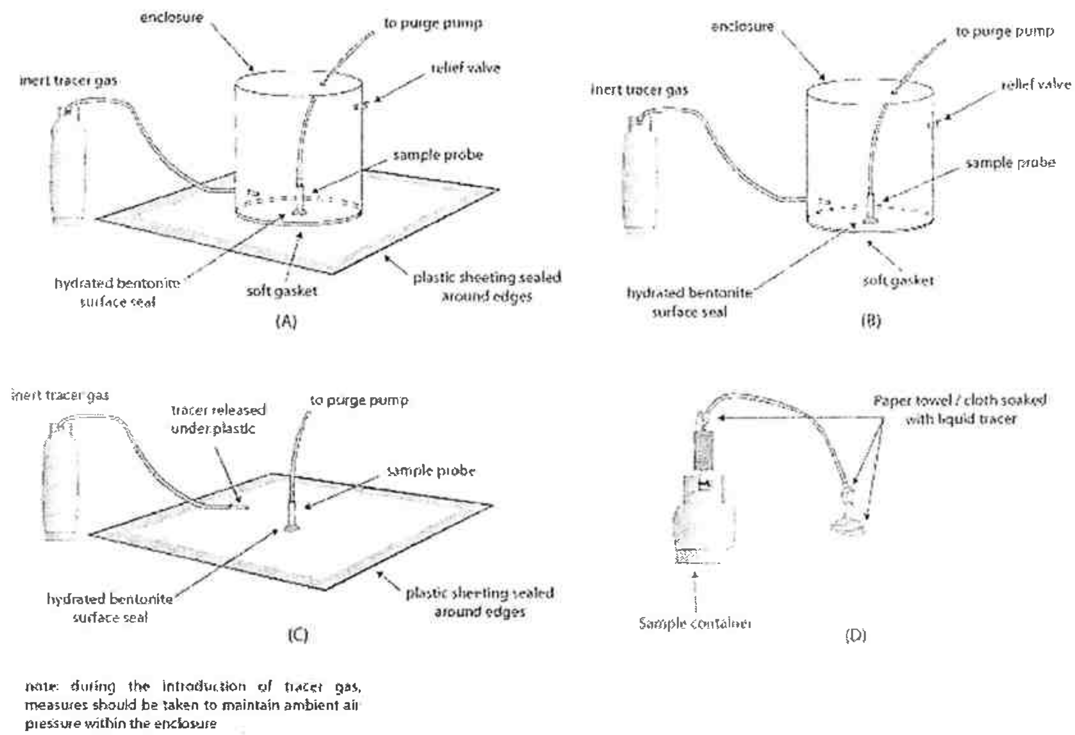
TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJECT NO. 2008.0011.00	NOT TO SCALE	DATE: MARCH 2008	FIGURE NO. 1C



SCHEMATIC OF A GENERIC SUB-SLAB VAPOR PROBE



SCHEMATICS OF GENERIC TRACER GAS APPLICATIONS WHEN
COLLECTING SOIL VAPOR SAMPLES

TYPICAL SUB-SLAB VAPOR PROBE DETAIL AND TRACER GAS SCHEMATICS

TVGA
CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE
REMEDIAL INVESTIGATION/
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS
DUNKIRK, NEW YORK

PROJECT NO. 2008.0011.00	NOT TO SCALE	DATE: MAR 2008	FIGURE 2

TABLES

Table 1
Sampling/Analysis Summary

RI/AA Former Edgewood Warehouse Site

Dunkirk, New York

			Sample Type and Number							
Parameter	Method [1]	Source	Samples	Field Duplicates	MS	MSD	Field Blanks	Rinseate Blanks	Trip Blanks	Total Samples
Groundwater										
TCL Volatiles	ASP 2000	4 New Monitoring Wells + 8 Existing Wells	12	1	1	1	-	-	3	18
TCL Semi Volatiles	ASP 2000	4 New Monitoring Wells + 8 Existing Wells	12	1	1	1	-	-	-	15
TCL PCBs	ASP 2000	4 New Monitoring Wells + 8 Existing Wells	12	1	1	1	-	-	-	15
TAL Metals	ASP 2000	4 New Monitoring Wells + 8 Existing Wells	12	1	1	1	-	-	-	15
Subsurface Soil										
TCL Volatiles	ASP 2000	Test Pits, Test Borings, Soil Probes	27	2	2	2	-	1	-	34
TCL Semi Volatiles	ASP 2000	Test Pits, Test Borings, Soil Probes	27	2	2	2	-	1	-	34
TCL PCBs	ASP 2000	Test Pits, Test Borings, Soil Probes	27	2	2	2	-	1	-	34
TAL Metals	ASP 2000	Test Pits, Test Borings, Soil Probes	27	2	2	2	-	1	-	34
Asbestos Bulk PLM	CARB 435	Test Pits, Test Borings, Soil Probes	8	-	-	-	-	-	-	8
Surface Soil										
TCL Semi Volatiles	ASP 2000	Grab Samples	14	1	1	1	-	1	-	18
TCL PCBs	ASP 2000	Grab Samples	14	1	1	1	-	1	-	18
TAL Metals	ASP 2000	Grab Samples	14	1	1	1	-	1	-	18
Sediment										
TCL Volatiles	ASP 2000	Pits, Vaults and Sumps	7	1	1	1	-	1	-	11
TCL Semi Volatiles	ASP 2000	Pits, Vaults and Sumps	7	1	1	1	-	1	-	11
TCL PCBs	ASP 2000	Pits, Vaults and Sumps	7	1	1	1	-	1	-	11
TAL Metals	ASP 2000	Pits, Vaults and Sumps	7	1	1	1	-	1	-	11
Sub-Slab Air Quality Samples										
TO-15	TO-15	Sub-Slab of warehouse interior	4	-	-	-	-	-	-	4
Helium	-	(tracer gas)	4	-	-	-	-	-	-	4

Table 2
Summary of Requirements for Sample Containers, Preservation and Holding Times

RI/AA Former Edgewood Warehouse Site

Dunkirk, New York

			Sample						
Parameter	**Method [1]**	**Source**	**Containers**	**Size**	**Amount**	**Type [2]**	**Lid**	**Preservation [3]**	**Hold Time [4]**
Groundwater									
TCL Volatiles	ASP 2000	Monitoring Wells	2	40 mL	40 mL	VOA	Septum	HCL	10 Days
TCL Semi Volatiles	ASP 2000	Monitoring Wells	2	1 L	1 L	Amber	Non-septum	-	5 days
TCL Pest/PCBs	ASP 2000	Monitoring Wells	2	1 L	1 L	Amber	Non-septum		5 days
pH	ASP 2000	Monitoring Wells	1	4 oz	4 oz	HDPE	Non-septum	-	2 days
RCRA-8 Metals	ASP 2000	Monitoring Wells	1	500 mL	500 mL	HDPE	HDPE	HNO_3, pH <2	6 mos.
Soils/Sediments									
TCL Volatiles	ASP 2000	Test Borings, Soil Probes Test Pits, Grab Samples, Interior sumps	2	4 oz.	5 grams	CWM	Non-septum	-	10 days
TCL Semi Volatiles	ASP 2000	Test Borings, Soil Probes Test Pits, Grab Samples, Interior sumps	2	8 oz.	50 grams	CWM	Non-septum	-	5 days
TCL PCBs	ASP 2000	Test Borings, Soil Probes Test Pits, Grab Samples, Interior sumps	2	8 oz.	50 grams	CWM	Non-septum	-	7 days
TAL Metals	ASP 2000	Test Borings, Soil Probes Test Pits, Grab Samples, Interior sumps	2	8 oz.	30 grams	CWM	Non-septum	-	6 mos.
Asbestos Bulk PLM	CARB 435	Test Pits	2	16 oz.	1 gram	CWM	Non-septum	-	None
RCRA-8 Metals	ASP 2000	Test Borings, Soil Probes Test Pits, Grab Samples, Interior sumps	2	8 oz.	30 grams	CWM	Non-septum	-	6 mos.

1. NYSDEC Analytical Services Protocol (2000)
2. VOA= Volatile Organic Analysis Vial, HDPE = High Density Polyethylene, CWM = Clear Wide Mouth, AWM = Amber Wide Mouth
3. Cool samples to 4 degrees celcius.
4. The holding time for mercury for both aqueous and soil/sediment samples is 26 days

ATTACHMENT A

FIELD FORMS

SOIL PROBE LOG

TVGA CONSULTANTS

PROBE NO.

Project: Former Edgewood Warehouse Site RI/AA
Client: Chautauqua County
Contractor:

Project No. 2008.0011.00
GS Elev
WS Ref Elev
N-S Coord
E-W Coord
Start Date
Finish Date
Driller
Geologist

Groundwater Data (feet)			
Date	Time	Depth	Elev

Equipment Data	Casing	Sampler	Core
Type	Acetate	Macro Core	
Diameter	1.75"	2.0"	
Weight			
Fall			

Well Construction	Depth (feet)	Sample No.	Blows per 6"	Recovery (in.)	Log	Unified	Field Description Material Classification (Burmister System) f - fine m - medium c - course "and" = 35-50% "some" = 20-35% "little" = 10-20% "trace" = 1-10%	Remarks PID Reading (ppm) Direct	Head
	5								
	10								
	15								
	20								
	25								
	30								

TEST BORING LOG

TVGA CONSULTANTS

BORING NO.

Project: Former Edgewood Warehouse Site RI/AA	Project No. 2008.0011.00
Client: Chautauqua County	GS Elev
Contractor:	WS Ref Elev
	N-S Coord
	E-W Coord
	Start Date
	Finish Date
	Driller
	Geologist

Groundwater Data (feet)				Equipment Data			
Date	Time	Depth	Elev		Casing	Sampler	Core
				Type	HSA	SS	
				Diameter	4.25"	2.0"	
				Weight		140 #	
				Fall		30"	

Well Construction	Depth (feet)	Sample No.	Blows per 6"	Recovery (in.)	Log	Unified	Field Description	Remarks PID Reading (ppm) Direct	Head
	5								
	10								
	15								
	20								
	25								
	30								

TVGA
CONSULTANTS

INSPECTOR'S DAILY REPORT

JOB TITLE: Former Edgewood Warehouse Site RI/AA

TVGA JOB NO.: 2008.0011.00

CLIENT: Chautauqua County

CONTRACTOR: ____________________

VISITORS: ____________________

PHOTOS TAKEN: ____________________

DATE: ____________________

Day of Week: S M T W T F S

I.R. No.: ____________________

Sheet No. ________ **of** ________

Contractor Hours Worked:
________ **AM** ________ **PM**

Inspector Hours Worked:
________ **AM** ________ **PM**

Weather:
________ **AM** ________ **PM**

Temperature:
________ **AM** ________ **PM**

DESCRIPTION OF WORK PERFORMED AND INSPECTED

Specify for each operation: Item No., Sub-Contractor (if any), Location and Nature of Work

ITEM NO.	INTERIM QUANT.	FINAL QUANT.	EST. NO.	DESCRIPTION OF WORK

The above described work was incorporated into this project and was inspected by:

____________________ Reviewed by: ____________________

Inspector's Signature

☐ **REVERSE SIDE USED FOR ADDITIONAL REMARKS AND SKETCHES.**

MANPOWER						EQUIPMENT				
TYPE	PRIME					TYPE	PRIME			
Foreman										
Operators										
Laborers										

TVGA CONSULTANTS

WELL DEVELOPMENT LOG

HOLE NO:

Project Name: Former Edgewood Warehouse Site RI/AA
Project Location: City of Dunkirk, New York

Project No: 2008.0011.00
Date: ______
Screen Length: ______

Purge Information:

(1) Depth to Bottom of Well: ______ (from TOC)

(2) Depth to Water: ______ ft (from TOC)

(3) Column of Water: ______ (#1 - #2)

(4) Casing Diameter: ______ in

(5) Volume Conversion: ______ gal/ft

(6) 1 Vol. of Well: ______ gal

Method of Purging: WaTerra/Bailer/Submersible/Other: ______

Volume Conversion:

1" = 0.041 2" = 0.163 4" = 0.653 6" = 1.469 8" = 2.611 10" = 4.08

Field Analysis:

Vol Purged (gal)								
Time								
ORP/EH (MV)								
pH								
Cond. (MS/CM)								
Turb. (NTU)								
D.O. (mg/l)								
Salinity (%)								
Temp. (°C)								

Total Volume Purged: ______ gal Total Purge Time: ______

Development Info:

Development Method: ______

Comments: ______

Logged By:

TVGA CONSULTANTS

WELL SAMPLING LOG

HOLE NO:

Project Name: Former Edgewood Warehouse Site RI/AA
Project Location: City of Dunkirk, New York

Project No: 2008.0011.00
Date: ____
Screen Length: ____

Purge Information:

(1) Depth to Bottom of Well: ____ (from TOC)

(2) Depth to Water: ____ ft (from TOC)

(3) Column of Water: ____ (#1 - #2)

(4) Casing Diameter: ____ in

(5) Volume Conversion: ____gal/ft

(6) 1 Vol. of Well: ____ gal

Method of Purging: WaTerra/Bailer/Submersible/Other: ____

Volume Conversion:

1" = 0.041   2" = 0.163   4" = 0.653   6" = 1.469   8" = 2.611   10" = 4.08

Field Analysis:

Vol Purged (gal)								
Time								
ORP/EH (MV)								
pH								
Cond. (MS/CM)								
Turb. (NTU)								
Salinity (%)								
D.O. (mg/l)								
Temp. (°C)								

Total Volume Purged: ____ gal   Total Purge Time: ____

Sampling Info:

Sample Method: ____

No. of Bottles: ____

Sample Time: ____

Sample Analyses: ____

Comments: ____

Logged By:

TVGA CONSULTANTS

WELL INSTALLATION REPORT

Project Name Former Edgewood Warehouse Site RI/AA
Project Number 2008.0011.00
Contractor ____________
Date of Installation ____________
Project Location ____________

Geologist ____________
Driller ____________
Well No. ____________
Boring No. ____________
Sheet __ of ____________

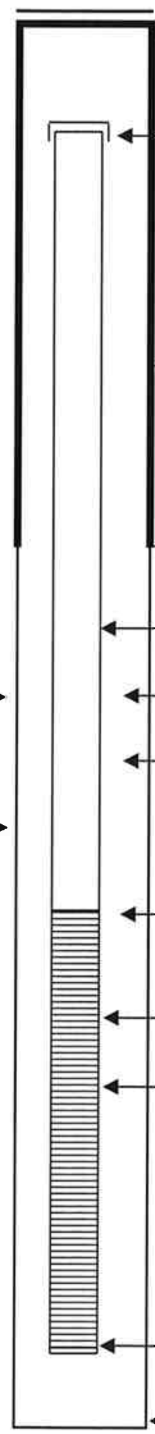
Lock No. ______

Survey Datum ______

Ground Elevation ______

______ Top of Seal

______ Top of Sand



Elevation/Stick up Above/Below Ground Surfae of Casing ____________

Elevation/Stick up Above/Below Ground Surfae of Riser Pipe ____________

Thickness of Surface Seal ____________

Type of Surface Seal ____________

Type of Protective Casing ____________

Inside Diameter of Protective Casing ____________

Elevation/Depth of Bottom of Protective Casing ____________

Inside Diameter of Riser Pipe ____________

Type of Backfill Around Riser ____________

Diameter of Bore Hole Within Test Section ____________

Type of Coupling ____________

Elevation/Depth of Top of Screen ____________

Type of Well Screen ____________

Screen Slot Size ____________

Diameter of Well Screen ____________

Type of Backfill Around Well Screen ____________

Elevation/Depth of Bottom of Well Screen ____________

Elevation/Depth of Bottom of Bore Hole ____________

ATTACHMENT B

EQUIPMENT USAGE AND CALIBRATION PROCEDURES

Horiba U-10 Water Quality Meter

ACCURACY:

The Horiba U-10 Water Quality Meter measures six water quality parameters. Measurements can be made for pH, temperature, dissolved oxygen, conductivity, turbidity, and salinity. Operation in standard mode will allow resolution to the following units: 0.1 pH, 1 ° C for temperature, 0.1 mg/l for dissolved oxygen, 0.1 mS/cm for conductivity in 10-100 range, 10 NTU for turbidity and 0.1% for salinity. Operation in expanded mode, will allow resolution to the following units: 0.01 pH, 0.1 ° C temperature, 0.01 mg/l for dissolved oxygen, 0.01 mS/cm for conductivity in 10-100 range, 1 NTU for turbidity and 0.01% for salinity.

CALIBRATION:

Calibration is necessary for all parameters except temperature and salinity, which are factory, calibrated. Calibration for the remaining parameters is completed by filling the supplied beaker with the supplied standard solution approximately 2/3 full (to the line on the beaker) and placing the probe tip in the calibration beaker. Then, press the following keystrokes:

- ❑ Turn power **ON**,
- ❑ Press **MODE** key,
- ❑ Move cursor to AUTO,
- ❑ Press **ENTER,**
- ❑ Wait until calibration is complete. Display will briefly show "END" and then "MEAS," indicating unit is reading for measuring
- ❑ If auto-calibration errors are detected the display will show "Er", which requires re-calibrating the unit. Refer to the

Consult the operations manual or seek help from the manufacturer or supplier if calibration is unsuccessful or if two-point calibration is desired.

PROCEDURE:

1. Ensure that the wire and probe have been properly cleaned before use.
2. After calibration, turn unit on. When "MEAS" is visible on the LCD, the unit is ready.
3. Record water level meter and then place probe into monitoring well into water column.
4. Depress the **ENTER** button to measure parameters.
5. Record data on log form and/or well development form.
6. Follow on-screen commands to store data. Up to 20 measurements may be stored.
7. Remove wire and attached probe while cleaning tape by holding a damp paper towel or moist toilette on the tape.
8. Decon wire and probe according to decon procedures prior to taking measurements in other monitoring wells.

MAINTENANCE:

The Horiba U-10 main unit is water-resistant and requires little maintenance other than frequent cleaning with non-abrasive soap.

MiniTroll Datalogger Hydraulic Conductivity Meter

ACCURACY:

The slug test, with the In-Situ MiniTroll Datalogger measures hydraulic conductivity of the aquifer being tested. The slug test derived hydraulic conductivities are considered accurate within one order of magnitude.

CALIBRATION:

Calibration is not necessary, because the unit is factory calibrated. The transducer should be placed in the monitoring well for one-hour prior to use to allow for temperature equilibrium.

PROCEDURE:

1. Develop monitoring well prior to performing slug tests.
2. Record static water level.
3. Ensure that the wire and transducer have been properly cleaned before use.
4. Select a transducer depth that places the transducer no less than five feet deeper than the fully submerged slug and at least two feet above the bottom of the well.
5. Attach transducer cable so that the transducer probe depth remains stable during test.
6. After installing the transducer, the water level in the well should be allowed to return to static conditions. If water level is substantially above the static water level, a bailer may be used to remove water from the well.
7. Determine the optimal slug length. Standard slug length is 10 feet. However, if the water column in the well is to small to fit the transducer and the ten-foot slug, a shorter slug must be assembled. Five-foot and one-foot sections can be used to construct a shorter length.
8. Once the water level has returned to static, the initial part of the slug test, the falling head test, can be conducted. After starting the In-Situ MiniTroll Datalogger, quickly lower the slug into the water column until the slug is completely submerged. Data collection should continue for a minimum of fifteen minutes, or until the water returns to static conditions.
9. If after allowing the water level to return to static conditions, the water level is substantially above the static water level, then a bailer may be used to remove water from the well.
10. Once the water level has returned to static, the second part of the slug test, the rising head test, can be conducted. After starting the In-Situ MiniTroll Datalogger, the slug should be quickly removed from the water column. The slug should be removed from the well to prevent water level impacts from water dripping off the slug. Care should be taken to avoid tangling the slug and the transducer cable. If the slug and cable do become tangled, the transducer probe will be raised and the test will need to proceed from the beginning.
11. Decontaminate wire and probe according to procedures prior to taking measurements in other monitoring wells.

MAINTENANCE:

Routine maintenance shall be performed in accordance with the manufacturer's specifications.

MiniRAE 2000 Photoionization Detector

ACCURACY:

The useful range of the instrument is from 0 to 2000 ppm with an accuracy of +/- 2.0 ppm and > 2000 is +/- 20% if reading. Response time is less than three seconds to 10,000 ppm.

CALIBRATION:

The MiniRAE 2000 will be calibrated using a pressurized cylinder of "span" gas. The calibration gas will be in the same matrix in which the measurements will be taken. Prior to performing the span calibration, a fresh air calibration will be performed in a clean ambient air environment to determine the zero point of the sensor calibration curve.

Fresh Air Calibration

1. Press and hold down both the **[N/-]** and **[MODE]** keys for three seconds scroll down to the "Calibrate/select Gas" option and press **[Y/+]**.

2. The first menu item in this sub menu is the "Fresh air Cal", press **[Y/+]** to begin fresh air calibration. This will take approximately 15 seconds, after which the display will return to the "Fresh air Cal" sub menu. Press the **[MODE]** to return to the previous menu.

Span Calibration

1. Connect the calibration adapter to the inlet port of the MiniRAE 2000 Monitor, and connect the tube to the regulator or Tedlar bag.

2. Press the **[Y/+]** key when the "Span Cal?" option is highlighted.

3. The display will then show "Apply gas now!". Turn on the valve of the span gas supply. The calibration can be started manually by pressing any key while "Apply gas now!" is on the display.

4. The display will count down from 30 seconds, and when it reaches 0, the display shows the calibrated value.

5. The display will read "No Gas" if the gas was improperly attached or not turned on.

6. After a span calibration is completed, the display will show the message "Span Cal Done! Turn Off Gas".

7. Turn of the gas and disconnect the calibration adapter, and press any key to return to the "Span Gas Cal?" menu.

PROCEDURE:

1. Turn the unit on in a clean environment by pressing the **[MODE]** button, located under the display screen.

2. Once the unit has run through the start up menu, which it will do every time it is turned on, cycle through to the *Current battery voltage and shutdown voltage* display by pressing the **[MODE]** key until the menu appears. The battery is fully charged at 4.8 volts or higher, and when the voltage falls below 4.4 volts there will be 20-30 min of run time left and the unit will need to be recharged.

3. The MiniRAE supports two (2) operational modes: Survey mode for the manual start/stop of measurements and display of certain exposure values; Hygiene mode for automatic measurements, running and datalogging continuously and calculation of additional exposure values.

4. To operate in the Survey mode after checking the battery cycle back through the menu until **Ready** appears on the display screen. Press the **[Y/+]** to start the measurement cycle. The pump will start and the reading will be displayed.

5. To operate in the Hygiene mode, after checking the battery cycle through to the Survey, Site ID, and Gas Name menu option and press **[Y/+]**. The "Change Op Mode" will be the first sub-menu to appear, press **[Y/+]** when this display highlighted. The unit will display the current operational mode to switch modes press the **[N/-]** to toggle to other selections. Select the Hygiene mode then press the **[MODE]** key, if there has been a change to the existing setting "save?" will appear on the display screen. To accept the change press the **[Y/+]** key.

6. Once the desired mode has been selected place probe in the atmosphere to be monitored and record the reading.

MAINTENANCE:

1. If any of the following conditions occur, consult the troubleshooting guide provided in the instruction manual:

   - Can not turn on the power after charging the battery.
   - No LED or LCD backlight.
   - Reading abnormally high or low.
   - Inlet flow to low.
   - Full scale measurement in humid environment.
   - "Lamp" message during operation.
   - The "Bat" indicator display is on.

2. In the event the troubleshooting techniques fail to resolve the problem, then the unit may require servicing by the manufacturer or supplier.

- The light source window will require cleaning every four weeks during periods of continued use.
- The meter battery will be checked at the beginning and end of each day. If the voltage is 4.4 volts or less the unit will flash the "Bat" display and will have a run time of 20-30 min.

Solonist Model 122 Oil/Water Interface Probe

ACCURACY:

The Solonist Model 122 Oil/Water Interface Probe has English graduations in feet, 10ths of feet and 100ths of feet, therefore measurements should be made to the 100^{th} of a foot. The range of the measuring tape is 100 feet. The probe typically emits two different types of signals or tones; one for free product and one for water.

CALIBRATION:

No calibration is necessary as the unit is factory calibrated and all electronics are fully encapsulated to protect against water and mechanical damage.

PROCEDURE:

1. Ensure that the tape and probe have been properly cleaned before use.
2. Turn unit on, and then depress test button to check battery, sensitivity and audio signal.
3. Place tape guide on to the top of the well, loosen wheel tightening knob, place unit on ground. Slowly unwind tape into monitoring well until the first signal indicates the interface between air and free product has been reached. Note level on tape. Then continue to slowly lower the probe until the second signal indicates the interface between free product and water. Note level on tape. For each signal raise tape until beep stops and then lower again until beep is heard.
4. Note water level to the 100^{th} of a foot.
5. Wind tape onto wheel while cleaning tape by holding a damp paper towel or moist toilette on the tape.
6. Decon tape and probe according to decon procedures prior to taking measurements in other monitoring wells.

MAINTENANCE:

The Solonist Model 122 Oil/Water Interface Probe is constructed of a stainless steel probe and a polyethylene tape that require frequent cleaning with non abrasive soap.

Troubleshooting items are as follows:

- No audible response,
  - Turn unit on,
  - adjust sensitivity,
  - check and replace 9 volt battery, or
  - inspect tape for damage.

- Continuous audible response,
  - Clean probe tip to remove debris or water, or
  - inspect tape for damage.

- Tape will not unwind,.
  - loosen measuring wheel stopper, or
  - inspect tape for tangling or damage.

If these do not solve the problem, consult the operations manual or seek help from the manufacturer or supplier.

Solonist Model 101 Water Level Meter

ACCURACY:

The Solonist Model 101 Water Level Meter has English graduations in feet, 10ths of feet and 100ths of feet, therefore measurements should be made to the 100th of a foot. The range of the measuring tape is 100 feet.

CALIBRATION:

No calibration is necessary as the unit is factory calibrated and all electronics are fully encapsulated to protect against water and mechanical damage.

PROCEDURE:

1. Ensure that the tape and probe have been properly cleaned before use.
2. Turn unit on, and then depress test button to check battery, sensitivity and audio signal.
3. Place tape guide on to the top of the well, loosen wheel tightening knob, place unit on ground. Slowly unwind tape into monitoring well until an audible beep is heard. Note level on tape. Raise tape until beep stops and then lower again until beep is heard.
4. Note water level to the 100th of a foot.
5. Wind tape onto wheel while cleaning tape by holding a damp paper towel or moist toilette on the tape.
6. Decon tape and probe according to decon procedures prior to taking measurements in other monitoring wells.

MAINTENANCE:

The Solonist Model 101 Water Level Meter is constructed of a stainless steel probe and a polyethylene tape that require frequent cleaning with non abrasive soap.

Troubleshooting items are as follows:

- No audible response,
  - Turn unit on,
  - adjust sensitivity,
  - check and replace 9 volt battery, or
  - inspect tape for damage.
- Continuos audible response,
  - Clean probe tip to remove debris or water, or
  - inspect tape for damage.
- Tape will not unwind,.
  - loosen measuring wheel stopper, or
  - inspect tape for tangling or damage.

If these do not solve the problem, consult the operations manual or seek help from the manufacturer or supplier.

Summa Canister using a Flow Regulator

ACCURACY:

Summa Canisters are used most commonly for ambient air samples and for collecting samples over time. A Summa canister is a stainless steel vessel in which the internal surfaces have been specially passivated using the "Summa process". This process uses an electro-polishing step followed by chemical deactivation to produce a surface that is very chemically inert. A canister will hold a high vacuum (>28" Hg) for up to 30 days. After this, low level concentrations of volatile organic compounds (VOCs) may appear as contaminants. When a canister is ordered for use, the laboratory prepares it by evacuating the canister using the combination of a mechanical fore-pump in conjunction with a turbomolecular vacuum pump. The reporting limit is often 0.5 ppb for most compounds.

CALIBRATION:

The flow regulator is calibrated by the analytical laboratory based on each projects specific requirements, and should not exceed 0.2 liters per minute to minimize ambient air infiltration.

PROCEDURE:

1. Ensure that the canister value is fully closed.
2. If there is a dust cap (also known as the canister valve cap), remove it from the canister valve.
3. Attach the flow controller (1/4" female Swagelock fitting) to the "canister inlet" (1/4" male Swagelock fitting), tightening the threaded nut until it is hand tight then tighten gently with a 9/16 wrench. Be careful not to over tighten.
4. To start sampling, turn the canister valve counterclockwise. This is approximately one to two turns.
5. Note the sample time on the sample tag attached to the canister.
6. If provided, check the initial vacuum of the canister with the "vacuum gauge" provided by opening the canister valve and record the vacuum reading on the sample tag.
7. To stop sampling, record the sample stop time and close the canister valve at the end point, by turning clockwise until snug. Note that if the valve is not closed at the end point the canister will eventually go to ambient pressure.
8. Remove the flow controller from the canister.
9. Replace the dust cap.
10. Wrap flow regulator and Summa canister in original packaging in which it was sent.
11. Complete chain-of-custody and return to analytical laboratory.

MAINTENANCE:

In the event the canister or flow regulator fails or does not create a seal, the unit may require servicing by the manufacturer or the analytical laboratory.

ATTACHMENT C

LOW FLOW PURGING AND SAMPLING PROCEDURES

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I

LOW STRESS (low flow) PURGING AND SAMPLING PROCEDURE FOR THE COLLECTION OF GROUND WATER SAMPLES FROM MONITORING WELLS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

July 30, 1996
Revision 2

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I

LOW STRESS (low flow) PURGING AND SAMPLING PROCEDURE FOR THE COLLECTION OF GROUND WATER SAMPLES FROM MONITORING WELLS

I. SCOPE & APPLICATION

This standard operating procedure (SOP) provides a general framework for collecting ground water samples that are indicative of mobile organic and inorganic loads at ambient flow conditions (both the dissolved fraction and the fraction associated with mobile particulates). The SOP emphasizes the need to minimize stress by low water-level drawdowns, and low pumping rates (usually less than 1 liter/min) in order to collect samples with minimal alterations to water chemistry. This SOP is aimed primarily at sampling monitoring wells that can accept a submersible pump and have a screen, or open interval length of 10 feet or less (this is the most common situation). However, this procedure is flexible and can be used in a variety of well construction and ground-water yield situations. Samples thus obtained are suitable for analyses of ground water contaminants (volatile and semi-volatile organic analytes, pesticides, PCBs, metals and other inorganics), or other naturally occurring analytes.

This procedure does not address the collection of samples from wells containing light or dense non-aqueous phase liquids (LNAPLs and DNAPLs). For this the reader may wish to check: Cohen, R.M. and J.W. Mercer, 1993, DNAPL Site Evaluation; C.K. Smoley (CRC Press), Boca Raton, Florida and U.S. Environmental Protection Agency, 1992, RCRA Ground-Water Monitoring: Draft Technical Guidance; Washington, DC (EPA/530-R-93-001).

The screen, or open interval of the monitoring well should be optimally located (both laterally and vertically) to intercept existing contaminant plume(s) or along flowpaths of potential contaminant releases. It is presumed that the analytes of interest move (or potentially move) primarily through the more permeable zones within the screen, or open interval.

Proper well construction and development cannot be overemphasized, since the use of installation techniques that are appropriate to the hydrogeologic setting often prevents "problem well" situations from occurring. It is also recommended that as part of development or redevelopment the well should be tested to determine the appropriate pumping rate to obtain stabilization of field indicator parameters with minimal drawdown in shortest amount of time. With this information field crews can then conduct purging and sampling in a more expeditious manner.

The mid-point of the saturated screen length (which should not exceed 10 feet) is used by convention as the location of the pump intake. However, significant chemical or permeability contrast(s) within the screen may require additional field work to determine the optimum vertical location(s) for the intake, and appropriate pumping rate(s) for purging and sampling more localized target zone(s). Primary flow zones (high(er) permealability and/or high(er) chemical concentrations) should be identified in wells with screen lengths longer than 10 feet, or in wells with open boreholes in bedrock. Targeting these zones for water sampling will help insure that the low stress procedure will not underestimate contaminant concentrations. The Sampling and Analysis Plan must provide clear instructions on how the pump intake depth(s) will be selected, and reason(s) for the depth(s) selected.

Stabilization of indicator field parameters is used to indicate that conditions are suitable for sampling to begin. Achievement of turbidity levels of less than 5 NTU and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. Sample collection may still take place provided the remaining criteria in this procedure are met. If after 4 hours of purging indicator field parameters have not stabilized, one of 3 optional courses of action may be taken: a) continue purging until stabilization is achieved, b) discontinue purging, do not collect any samples, and record in log book that stabilization could not be achieved (documentation must describe attempts to achieve stabilization) c) discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization (note: there is a risk that the analytical data obtained, especially metals and strongly hydrophobic organic analytes, may not meet the sampling objectives).

Changes to this SOP should be proposed and discussed when the site Sampling and Analysis Plan is submitted for approval. Subsequent requests for modifications of an approved plan must include adequate technical justification for proposed changes. All changes and modifications must be approved before implementation in field.

II. EQUIPMENT

A. Extraction device

Adjustable rate, submersible pumps are preferred (for example, centrifugal or bladder pump constructed of stainless steel or

Teflon).

Adjustable rate, peristaltic pumps (suction) may be used with caution. Note that EPA guidance states: "Suction pumps are not recommended because they may cause degassing, pH modification, and loss of volatile compounds" (EPA/540/P-87/001, 1987, page 8.5-11).

The use of inertial pumps is discouraged. These devices frequently cause greater disturbance during purging and sampling and are less easily controlled than the pumps listed above. This can lead to sampling results that are adversely affected by purging and sampling operations, and a higher degree of data variability.

B. Tubing

Teflon or Teflon lined polyethylene tubing are preferred when sampling is to include VOCs, SVOCs, pesticides, PCBs and inorganics.

PVC, polypropylene or polyethylene tubing may be used when collecting samples for inorganics analyses. However, these materials should be used with caution when sampling for organics. If these materials are used, the equipment blank (which includes the tubing) data must show that these materials do not add contaminants to the sample.

Stainless steel tubing may be used when sampling for VOCs, SVOCs, pesticides, and PCBs. However, it should be used with caution when sampling for metals.

The use of 1/4 inch or 3/8 inch (inner diameter) tubing is preferred. This will help ensure the tubing remains liquid filled when operating at very low pumping rates.

Pharmaceutical grade (Pharmed) tubing should be used for the section around the rotor head of a peristaltic pump, to minimize gaseous diffusion.

C. Water level measuring device(s), capable of measuring to 0.01 foot accuracy (electronic "tape", pressure transducer). Recording pressure transducers, mounted above the pump, are especially helpful in tracking water levels during pumping operations, but their use must include check measurements with a water level "tape" at the start and end of each record.

D. Flow measurement supplies (e.g., graduated cylinder and stop watch).

E. Interface probe, if needed.

F. Power source (generator, nitrogen tank, etc.). If a gasoline generator is used, it must be located downwind and at least 30 feet from the well so that the exhaust fumes do not contaminate the samples.

G. Indicator field parameter monitoring instruments - pH, Eh, dissolved oxygen (DO), turbidity, specific conductance, and temperature. Use of a flow-through-cell is required when measuring all listed parameters, except turbidity. Standards to perform field calibration of instruments. Analytical methods are listed in 40 CFR 136, 40 CFR 141, and SW-846. For Eh measurements, follow manufacturer's instructions.

H. Decontamination supplies (for example, non-phosphate detergent, distilled/deionized water, isopropyl alcohol, etc.).

I. Logbook(s), and other forms (for example, well purging forms).

J. Sample Bottles.

K. Sample preservation supplies (as required by the analytical methods).

L. Sample tags or labels.

M. Well construction data, location map, field data from last sampling event.

N. Well keys.

O. Site specific Sample and Analysis Plan/Quality Assurance Project Plan.

P. PID or FID instrument (if appropriate) to detect VOCs for health and safety purposes, and provide qualitative field evaluations.

III. PRELIMINARY SITE ACTIVITIES

Check well for security damage or evidence of tampering, record pertinent observations.

Lay out sheet of clean polyethylene for monitoring and sampling equipment.

Remove well cap and immediately measure VOCs at the rim of the well with a PID or FID instrument and record the reading in the field logbook.

If the well casing does not have a reference point (usually a V-cut or indelible mark in the well casing), make one. Describe its location and record the date of the mark in the logbook.

A synoptic water level measurement round should be performed (in the shortest possible time) before any purging and sampling activities begin. It is recommended that water level depth (to 0.01 ft.) and total well depth (to 0.1 ft.) be measured the day before, in order to allow for re-settlement of any particulates in the water column. If measurement of total well depth is not made the day before, it should not be measured until after sampling of the well is complete. All measurements must be taken from the established referenced point. Care should be taken to minimize water column disturbance.

Check newly constructed wells for the presence of LNAPLs or DNAPLs before the initial sampling round. If none are encountered, subsequent check measurements with an interface probe are usually not needed unless analytical data or field head space information signal a worsening situation. Note: procedures for collection of LNAPL and DNAPL samples are not addressed in this SOP.

IV. PURGING AND SAMPLING PROCEDURE

Sampling wells in order of increasing chemical concentrations (known or anticipated) is preferred.

1. Install Pump

Lower pump, safety cable, tubing and electrical lines slowly (to minimize disturbance) into the well to the midpoint of the zone to be sampled. The Sampling and Analysis Plan should specify the sampling depth, or provide criteria for selection of intake depth for each well (see Section I). If possible keep the pump intake at least two feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well. Collection of turbid free water samples may be especially difficult if there is two feet or less of standing water in the well.

2. Measure Water Level

Before starting pump, measure water level. If recording pressure transducer is used-initialize starting condition.

3. Purge Well

3a. Initial Low Stress Sampling Event

Start the pump at its lowest speed setting and slowly increase the speed until discharge occurs. Check water level. Adjust pump speed until there is little or no water level drawdown (less than 0.3 feet). If the minimal drawdown that can be achieved exceeds 0.3 feet but remains stable, continue purging until indicator field parameters stabilize.

Monitor and record water level and pumping rate every three to five minutes (or as appropriate) during purging. Record any pumping rate adjustments (both time and flow rate). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump (for example, 0.1 - 0.4 l/min) to ensure stabilization of indicator parameters. Adjustments are best made in the first fifteen minutes of pumping in order to help minimize purging time. During pump start-up, drawdown may exceed the 0.3 feet target and then "recover" as pump flow adjustments are made. Purge volume calculations should utilize stabilized drawdown value, not the initial drawdown. Do not allow the water level to fall to the intake level (if the static water level is above the well screen, avoid lowering the water level into the screen). The final purge volume must be greater than the stabilized drawdown volume plus the extraction tubing volume.

Wells with low recharge rates may require the use of special pumps capable of attaining very low pumping rates (bladder, peristaltic), and/or the use of dedicated equipment. If the recharge rate of the well is lower than extraction rate capabilities of currently manufactured pumps and the well is essentially dewatered during purging, then the well should be sampled as soon as the water level has recovered sufficiently to collect the appropriate volume needed for all anticipated samples (ideally the intake should not be moved during this recovery period). Samples may then be collected even though the indicator field parameters have not stabilized.

3b. Subsequent Low Stress Sampling Events

After synoptic water level measurement round, check intake depth and drawdown information from previous sampling event(s) for each well. Duplicate, to the extent practicable, the intake depth and extraction rate (use final pump dial setting information) from previous event(s). Perform purging operations as above.

4. Monitor Indicator Field Parameters

During well purging, monitor indicator field parameters (turbidity, temperature, specific conductance, pH, Eh, DO) every three to five minutes (or less frequently, if appropriate). Note: during the early phase of purging emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments. Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings, taken at three (3) to five (5) minute intervals, are within the following limits:

turbidity (10% for values greater than 1 NTU),
DO (10%),
specific conductance (3%),
temperature (3%),
pH (± 0.1 unit),
ORP/Eh (± 10 millivolts).

All measurements, except turbidity, must be obtained using a flow-through-cell. Transparent flow-through-cells are preferred, because they allow field personnel to watch for particulate build-up within the cell. This build-up may affect indicator field parameter values measured within the cell and may also cause an underestimation of turbidity values measured after the cell. If the cell needs to be cleaned during purging operations, continue pumping and disconnect cell for cleaning, then reconnect after cleaning and continue monitoring activities.

The flow-through-cell must be designed in a way that prevents air bubble entrapment in the cell. When the pump is turned off or cycling on/off (when using a bladder pump), water in the cell must not drain out. Monitoring probes must be submerged in water at all times. If two flow-through-cells are used in series, the one containing the dissolved oxygen probe should come first (this parameter is most susceptible to error if air leaks into the system).

5. Collect Water Samples

Water samples for laboratory analyses must be collected before water has passed through the flow-through-cell (use a by-pass assembly or disconnect cell to obtain sample).

VOC samples should be collected first and directly into pre-preserved sample containers. Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

During purging and sampling, the tubing should remain filled with water so as to minimize possible changes in water chemistry upon contact with the atmosphere. It is recommended that 1/4 inch or 3/8 inch (inside diameter) tubing be used to help insure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, use one of the following procedures to collect samples: (1) add clamp, connector (Teflon or stainless steel) or valve to constrict sampling end of tubing; (2) insert small diameter Teflon tubing into water filled portion of pump tubing allowing the end to protrude beyond the end of the pump tubing, collect sample from small diameter tubing; (3) collect non-VOC samples first, then increase flow rate slightly until the water completely fills the tubing, collect sample and record new drawdown, flow rate and new indicator field parameter values.

Add preservative, as required by analytical methods, to samples immediately after they are collected if the sample containers are not pre-preserved. Check analytical methods (e.g. EPA SW-846, water supply, etc.) for additional information on preservation. Check pH for all samples requiring pH adjustment to assure proper pH value. For VOC samples, this will require that a test sample be collected during purging to determine the amount of preservative that needs to be added to the sample containers prior to sampling.

If determination of filtered metal concentrations is a sampling objective, collect filtered water samples using the same low flow procedures. The use of an in-line filter is required, and the filter size (0.45 um is commonly used) should be based on the sampling objective. Pre-rinse the filter with approximately 25 - 50 ml of ground water prior to sample collection. Preserve filtered water sample immediately. Note: filtered water samples are not an acceptable substitute for unfiltered samples when the monitoring objective is to obtain chemical concentrations of total mobile contaminants in ground water for human health risk calculations.

Label each sample as collected. Samples requiring cooling (volatile organics, cyanide, etc.) will be placed into a cooler with ice or refrigerant for delivery to the laboratory. Metal samples after acidification to a pH less than 2 do not need to be cooled.

6. Post Sampling Activities

If recording pressure transducer is used, remeasure water level with tape.

After collection of the samples, the pump tubing may either be dedicated to the well for resampling (by hanging the tubing inside the well), decontaminated, or properly discarded.

Before securing the well, measure and record the well depth (to 0.1 ft.), if not measured the day before purging began. Note: measurement of total well depth is optional after the initial low stress sampling event. However, it is recommended if the well has a "silting" problem or if confirmation of well identity is needed.

Secure the well.

V. DECONTAMINATION

Decontaminate sampling equipment prior to use in the first well and following sampling of each subsequent well. Pumps will not be removed between purging and sampling operations. The pump and tubing (including support cable and electrical wires which are in contact with the well) will be decontaminated by one of the procedures listed below.

Procedure 1

The decontaminating solutions can be pumped from either buckets or short PVC casing sections through the pump or the pump can be disassembled and flushed with the decontaminating solutions. It is recommended that detergent and isopropyl alcohol be used sparingly in the decontamination process and water flushing steps be extended to ensure that any sediment trapped in the pump is removed. The pump exterior and electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

Flush the equipment/pump with potable water.

Flush with non-phosphate detergent solution. If the solution is recycled, the solution must be changed periodically.

Flush with potable or distilled/deionized water to remove all of the detergent solution. If the water is recycled, the water must be changed periodically.

Flush with isopropyl alcohol (pesticide grade). If equipment blank data from the previous sampling event show that the level of contaminants is insignificant, then this step may be skipped.

Flush with distilled/deionized water. The final water rinse must not be recycled.

Procedure 2

Steam clean the outside of the submersible pump.

Pump hot potable water from the steam cleaner through the inside of the pump. This can be accomplished by placing the pump inside a three or four inch diameter PVC pipe with end cap. Hot water from the steam cleaner jet will be directed inside the PVC pipe and the pump exterior will be cleaned. The hot water from the steam cleaner will then be pumped from the PVC pipe through the pump and collected into another container. Note: additives or solutions should not be added to the steam cleaner.

Pump non-phosphate detergent solution through the inside of the pump. If the solution is recycled, the solution must be changed periodically.

Pump potable water through the inside of the pump to remove all of the detergent solution. If the solution is recycled, the solution must be changed periodically.

Pump distilled/deionized water through the pump. The final water rinse must not be recycled.

VI. FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not compromised the quality of the ground water samples. All field quality control samples must be prepared the same as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples shall be collected for each batch of samples (a batch may not exceed 20 samples). Trip blanks are required for the VOC samples at a frequency of one set per VOC sample cooler.

Field duplicate.

Matrix spike.

Matrix spike duplicate.

Equipment blank.

Trip blank (VOCs).

Temperature blank (one per sample cooler).

Equipment blank shall include the pump and the pump's tubing. If tubing is dedicated to the well, the equipment blank will only include the pump in subsequent sampling rounds.

Collect samples in order from wells with lowest contaminant concentration to highest concentration. Collect equipment blanks after sampling from contaminated wells and not after background wells.

Field duplicates are collected to determine precision of sampling procedure. For this procedure, collect duplicate for each analyte group in consecutive order (VOC original, VOC duplicate, SVOC original, SVOC duplicate, etc.).

If split samples are to be collected, collect split for each analyte group in consecutive order (VOC original, VOC split, etc.). Split sample should be as identical as possible to original sample.

All monitoring instrumentation shall be operated in accordance with EPA analytical methods and manufacturer's operating instructions. EPA analytical methods are listed in 40 CFR 136, 40 CFR 141, and SW-846 with exception of Eh, for which the manufacturer's instructions are to be followed. Instruments shall be calibrated at the beginning of each day. If a measurement falls outside the calibration range, the instrument should be re-calibrated so that all measurements fall within the calibration range. At the end of each day, check calibration to verify that instruments remained in calibration. Temperature measuring equipment, thermometers and thermistors, need not be calibrated to the above frequency. They should be checked for accuracy prior to field use according to EPA Methods and the manufacturer's instructions.

VII. FIELD LOGBOOK

A field log shall be kept to document all ground water field monitoring activities (see attached example matrix), and record all of the following:

Well identification.

Well depth, and measurement technique.

Static water level depth, date, time and measurement technique.

Presence and thickness of immiscible liquid (NAPL) layers and detection method.

Pumping rate, drawdown, indicator parameters values, and clock time, at the appropriate time intervals; calculated or measured total volume pumped.

Well sampling sequence and time of each sample collection.

Types of sample bottles used and sample identification numbers.

Preservatives used.

Parameters requested for analysis.

Field observations during sampling event.

Name of sample collector(s).

Weather conditions.

QA/QC data for field instruments.

Any problems encountered should be highlighted.

Description of all sampling equipment used, including trade names, model number, diameters, material composition, etc.

VIII. DATA REPORT

Data reports are to include laboratory analytical results, QA/QC information, and whatever field logbook information is needed to allow for a full evaluation of data useability.

EXAMPLE (Minimum Requirements)
Well PURGING-FIELD WATER QUALITY MEASUREMENTS FORM

Location (Site/Facility Name) ______________________
Well Number ____________ Date ______________________
Field Personnel ______________________
Sampling Organization ______________________
Identify MP ______________________

Depth to (below MP) ______ top / ______ bottom of screen
Pump Intake at (ft. below MP) ______________
Purging Device; (pump type) ______________

Clock Time 24 HR	Water Depth below MP ft	Pump Dial[1]	Purge Rate ml/min	Cum. Volume Purged liters	Temp. °C	Spec. Cond.[2] µS/cm	pH	ORP/Eh[3] mv	DO mg/L	Turb-idity NTU	Comments

1. Pump dial setting (for example: hertz, cycles/min, etc).
2. µSiemens per cm(same as µmhos/cm)at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

APPENDIX B

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS
FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD
CITY OF DUNKIRK, CHAUTAUQUA COUNTY, NEW YORK

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

Prepared for:

Chautauqua County Department of Public Facilities
454 North Work Street
Falconer, New York 14733

Prepared by:

TVGA CONSULTANTS

One Thousand Maple Road
Elma, NY 14059-0264

(716) 655-8842
(fax) (716) 655-0937

2008.0011.00

MARCH 2008

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS
FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD
CITY OF DUNKIRK, CHAUTAUQUA COUNTY, NEW YORK

QUALITY ASSURANCE/QUALITY CONTROL PLAN

TABLE OF CONTENTS

1.0	**INTRODUCTION**	**1**
2.0	**PROJECT ORGANIZATION AND RESPONSIBILITIES**	**1**
3.0	**QA OBJECTIVES FOR MEASUREMENT DATA**	**3**
	3.1 Data Quality Objectives	3
	3.2 Standard Criteria and Guidance Values	4
	3.3 Data Quality Assessment	4
4.0	**SAMPLING PROCEDURES**	**6**
5.0	**SAMPLE CUSTODY**	**6**
6.0	**CALIBRATION PROCEDURES**	**6**
	6.1 Field Instruments	6
	6.2 Laboratory Instruments	7
7.0	**ANALYTICAL PROCEDURES**	**7**
8.0	**DATA REDUCTION, VALIDATION AND REPORTING**	**7**
	8.1 Field and Technical Data	7
	8.2 Laboratory Data	8
9.0	**INTERNAL QUALITY CONTROL**	**9**
	9.1 Batch QC	9
	9.2 Matrix-Specific QC	9
	9.3 Additional QC	10
10.0	**PERFORMANCE AND SYSTEM AUDITS**	**11**
	10.1 Field Audits	11
	10.2 Laboratory Audits	11
	10.3 Office Audits	12
11.0	**PREVENTATIVE MAINTENANCE**	**12**
12.0	**DATA ASSESSMENT PROCEDURES**	**12**
	12.1 Precision	12
	12.2 Accuracy	13
	12.3 Completeness	13
13.0	**CORRECTIVE ACTIONS**	**14**
	13.1 Field Incidents	14

13.2 Laboratory Incidents 14
13.2.1 Incoming Samples 15
13.2.2 Sample Holding Times 15
13.2.3 Instrument Calibration 15
13.2.4 Reporting Limits 15
13.2.5 Method QC 15
13.2.6 Calculation of Errors 16
13.3 Documentation 16

14.0 QUALITY ASSURANCE REPORTS 16

ATTACHMENTS

Attachment A SOP for Engineering Calculations

1.0 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Plan addresses the major QA/QC programs and procedures to be implemented during the RI/AA of the Former Edgewood Warehouse Site to ensure the quality and ultimate validity of the data generated as a result of the site investigation activities identified in the Work Plan and detailed in the Field Sampling Plan (FSP). The Work Plan contains a description of the project site, its history of use and occupancy, and a preliminary evaluation of potential areas of environmental concern, while the FSP provides a detailed description of the methods and equipment to be employed to collect and analyze environmental samples. The purpose of this QA/QC Plan is to establish the policies, organization, objectives, functional activities, and specific QA/QC activities required to ensure the quality of the field and laboratory data generated in association with the investigation of the project site.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The organization of the project team and general responsibilities of each of its members are outlined in Section 6.0 of the Work Plan and illustrated in the organization chart presented therein. The following paragraphs detail the specific responsibilities relative to quality assurance of key members of the project team.

TVGA Project Manager

Responsible for project implementation and the commitment of the resources necessary to meet project objectives and requirements. The Project Manager's primary function is to ensure that technical, financial and scheduling objectives are achieved. The Project Manager will serve as the primary point of contact and control for matters concerning the project. Specific duties and functions of the Project Manger include, but are not limited to, the following:

- Define project objectives, including Data Quality Objectives (DQOs), and develop and implement a detailed work plan and schedule;
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task;
- Acquire and apply technical and corporate resources as needed to ensure performance within budget and schedule constraints;
- Inform all staff concerning the project's special considerations;
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product;
- Review the work performed on each task to ensure its quality, responsiveness and timeliness;
- Review and analyze overall task performance with respect to planned requirements and authorizations;
- Oversee field and laboratory QA/QC programs to ensure compliance with the QA/QC Plan;

- Review results of performance and system audits and initiate, implement and document corrective actions;
- Approve all external reports (deliverables) before their submission to the client and/or regulatory agencies;
- Ultimately responsible for the preparation and quality of interim and final reports; and
- Represent the project team at meetings.

TVGA QA Officer

The QA Officer will remain independent of direct job involvement and routine, daily operations and will have direct access to corporate management as necessary to resolve any QA disputes. The QA Officer will be responsible for implementing the QA program in conformance with the demands of specific investigations, TVGA policies, and client requirements. Specific functions and duties include:

- Review and approval of QA policies and procedures;
- Conducting QA program training sessions for technical staff;
- Verification of compliance with corporate and project specific QA procedures and requirements;
- Conducting or supervising field and office audits and documenting results;
- Notifying the Project Manager of QA problems;
- Assist in corrective action selection and implementation;
- Documentation of corrective actions; and
- Review of external reports (project deliverables).

TVGA Remedial Investigation Team Leader

The RI Team Leader will be responsible for the implementation of the site characterization program, including the coordination and direct supervision of field personnel and subcontractors. Specific responsibilities include:

- Oversight of field operations;
- Provide on-site technical support to field personnel;
- Supervise proper implementation of procedures specified in the Field Sampling Plan;
- Ensure adherence to all field QA/QC protocols (e.g., sample collection, labeling, handling, packaging, and shipment; calibration of field instruments, field documentation, etc.);
- Recognize the need for, and implement necessary corrective actions during field operations;
- Ensure health and safety guidelines are followed to avoid compromising sample integrity;
- Validate field data on an ongoing basis;
- Serve as technical liaison with analytical laboratory; and
- Communicate QA problems to Project Manager and QA Officer and implement corrective actions as directed.

Laboratory Quality Assurance Manager

The selected analytical laboratory will provide a Laboratory QA Officer, whom is responsible for ensuring that all of the specific requirements of the quality assurance program are followed on a daily basis. Additional responsibilities are as follows:

- Develop and implement QA plan;
- Update the QA Plan on a regular basis (annually), or as often as necessary to ensure the generation of data which meets client requirements;
- Oversee the daily functions of the QA program to verify that all elements of the program are followed;
- Perform regular audits, both scheduled and unscheduled;
- Document variations from the QA program and notify the Laboratory Director and laboratory administration of variations and corrective actions taken;
- Develop, implement and oversee in-house QC program for alternate source reference standards;
- Evaluate data from in-house QC program and make recommendations to laboratory management for corrective actions;
- Prepare QC reports for specialty projects;
- Be knowledgeable of developments in industry standards and apply new procedures in QA/QC to the laboratory program;
- Audit subcontract laboratories and prepare reports to document compliance with equivalent QA/QC programs and standards; and
- Prepare and submit reports to the laboratory administration on the ongoing status of the laboratory QA/QC programs.

Data Validator

A qualified data validator will review and assess of the analytical data generated by the laboratory to determine the acceptability or validity of the data relative to stated project goals and requirements for usability. The data validator will be responsible for reviewing the data package with respect to completeness and compliance, and will complete a detailed evaluation of the validity of the data, the results of which are to be reported to the TVGA Project Manager and QA Officer.

3.0 QA OBJECTIVES FOR MEASUREMENT DATA

3.1 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative or quantitative statements that specify the quality of the data required from a data collection program to support the intended use of the data and associated decisions. Pursuant to the United States Environmental Protection Agency (USEPA) publication, *Data Quality Objectives Process for Hazardous*

Waste Site Investigations (2000), the project DQOs will be achieved utilizing the definitive data category. The analyses of samples will provide definitive data generated using rigorous analytical methods, such as reference methods approved by the NYSDEC and USEPA. A summary of the analytical methods to be utilized is presented in the FSP.

The site-specific DQOs for data collected during the site investigation are as follows:

- To characterize the site and determine the nature and extent of contamination occurring on or in soil, groundwater, and surface water;
- To evaluate the potential risks to human health and the environment associated with current site conditions and potential future use scenarios;
- To identify, evaluate and select a long-term remedial action that is environmentally sound and cost-effective;
- To maintain the highest possible scientific/professional standards for each procedure; and,
- To assure the ultimate defensibility of the data generated.

3.2 Standard Criteria and Guidance Values

Data generated during the site investigation will be compared with the applicable Standard Criteria and Guidance Values (SCGs) that are protective of human health and the environment under current and future use scenarios. A preliminary listing of potentially relevant SCGs is provided below:

- Soil and Sump Shipment: 6NYCRR Part 375-6.8 Soil Cleanup Objectives.
- Surface Water, and Groundwater: NYSDEC *Technical and Operational Guidance Series* (TOGS) 1.1.1
- Air: Guidance for Evaluations Soil Vapor Intrusion in the State of New York, October 2006, New York State Department of Health

3.3 Data Quality Assessment

The USEPA specifies five major characteristics of data quality that must be addressed in environmental sampling and analytical projects. These include precision, accuracy, representativeness, comparability, and completeness. Specific QA objectives established for each of these parameters are identified and discussed below for chemical analytical data to be generated for the project.

Precision

A measurement of agreement among individual measurements of the same property under similar conditions. It is expressed in terms of relative percent difference (RPD) between replicates or in terms of the standard deviation. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling procedures. Precision is evaluated using analyses of laboratory matrix spike/matrix spike duplicates and matrix duplicates, which not only exhibit sampling and analytical precision, but indicate precision through the reproducibility of the analytical results. The QA objective for precision is to comply with the RPD criteria specified for the New York State Department of Environmental Conservation (NYSDEC) Analytical Service Protocol (ASP) or USEPA methods to be employed for this project.

Accuracy

The degree of agreement of a measurement (or measurement average) with an accepted reference or true value. It is a measure of system bias, and is usually expressed as the difference of measured verses true values or as a percentage of the difference. Sources of error include the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analytical techniques. Accuracy will be determined on the basis of blank sample analysis (e.g., equipment blanks, trip blanks, etc.) and surrogate recoveries from spiked samples. The QA objective for accuracy is to achieve the acceptable percent recovery criteria specified for the methods identified in the FSP.

Representativeness

Expresses the degree of accuracy and precision of data that represents a characteristic of a data population, process condition, a sampling point, or an environmental condition. It is a qualitative parameter that is most dependant on the proper design of the sampling program. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives. The sampling procedures described in the FSP have been selected with the goal of obtaining representative samples for the media of concern.

Completeness

A measure of the amount of valid data obtained compared to the amount expected to be collected under normal conditions. It is usually expressed as a percentage. The QA objective for completeness is to collect and analyze all environmental samples in a manner such that valid data is obtained from 95 percent of the samples. Achievement of this objective will rely on the use of strict sample identification and custody procedures, use of standard reference materials, proper instrument calibration and maintenance, analysis of quality control samples, performance audits, and corrective action anytime QC acceptance criteria are exceeded.

Comparability

Expresses the confidence with which one data set can be compared to another. The objective for comparability is the generation of site characterization data that can be used to make valid comparisons with other data that may be generated in the future at this or other sites. This objective also involves the analysis of the environmental samples collected during the investigation in a manner that produces results comparable to the results that would be obtained by another laboratory using the same analytical procedure. This goal will be achieved through the application of standard techniques for sample collection and analysis, and the reporting of data in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability.

4.0 SAMPLING PROCEDURES

A detailed discussion of sampling activities for the project site is found in the FSP (Appendix A). The following considerations form the basis for the sampling program developed for the project site:

- Site background and history;
- Sampling objectives;
- Sample location and frequency;
- Sample designation;
- Sampling equipment and procedures; and
- Sample handling and analysis.

The sampling objectives, locations and frequency are based upon an evaluation of the data quality objectives discussed in Section 3.1. Sampling procedures are derived from standard protocols that are consistent with USEPA and NYSDEC methods of sample collection. A summary of the analytical parameters, number of samples, sample preservation, and holding times for the project is shown in the FSP.

5.0 SAMPLE CUSTODY

Sample custody is a vital aspect of the remedial investigation program. The samples must be traceable by chain-of-custody procedures from the time of sample collection until the time the data are utilized for any major decision. Evidence of sample collection, shipment, and laboratory receipt must be documented to accomplish this. Specific procedures regarding sample custody are described in Section 14.0 of the FSP.

6.0 CALIBRATION PROCEDURES

6.1 Field Instruments

Field instruments will be utilized for the real-time measurement of the chemical and/or physical characteristics of ambient air, groundwater, soil and fill. The instruments will also be utilized for health and safety monitoring during the field sampling program. The field instruments to be used will include the following:

- A photoionization detector (PID) – for measuring total organic vapors (TOVs), and to measure samples for tracer gas used before and after soil vapor collection
- A water level meter – for measuring depths in monitoring wells
- An oil/water interface probe – to determine levels of oil product in monitoring wells
- A water quality meter - capable of measuring pH, temperature, conductivity, turbidity and salinity
- A transducer and datalogger – for determining pressure differences in monitoring wells related to changes induced in the water column
- A MIE DR2000 Particulate Air Monitor – for measuring fugitive dust emissions during intrusive site investigation activities

The procedures to be utilized to calibrate and maintain these instruments shall be in accordance with Section 15.0 of the FSP and/or the manufacturer's recommendations.

6.2 Laboratory Instruments

Calibration procedures, frequencies and standards for laboratory measurement variables and systems shall be in accordance with the applicable NYSDEC ASP methodologies. These procedures are part of the system audits outlined in the laboratory Quality Assurance Plan.

7.0 ANALYTICAL PROCEDURES

The FSP summarizes the laboratory methods to be employed for the chemical analysis of soil, fill, sediment, soil vapor, surface water and groundwater samples generated during the site investigation. These analyses will be performed by a NYSDEC ELAP CLP accredited laboratory utilizing the applicable protocols and QA procedures required for the respective NYSDEC ASP and USEPA methods.

8.0 DATA REDUCTION, VALIDATION AND REPORTING

The following procedures summarize the practices to be utilized for the reduction, validation, and reporting of both field and laboratory data.

8.1 Field and Technical Data

Both objective (measurement) and subjective (description) data are subject to data validation. All data collection in the field shall be documented following the procedures detailed in Section 3.0 of the FSP. Objective data shall be validated at the time of collection (for example, triplicate measurements) as well as by the RI Team Leader to ensure that the correct codes and units have been included.

After data reduction into tabular or figure form, the objective data shall be reviewed for anomalous or inconsistent values by the RI Team Leader. Any anomalous or inconsistent data shall be resolved or clarified by evaluating the raw field data, equipment calibration logs, etc., and consultation with field personnel.

Subjective field and technical data shall be evaluated by the RI Team Leader for reasonableness and completeness. Whenever possible, peer review shall also be utilized in the data validation process in order to maximize consistency in data evaluation. Periodic field reviews of subjective data collection shall be conducted.

Data reduction, validation and reporting of engineering analysis and calculation data shall follow the procedures documented in TVGA's Standard Operating Procedure (SOP) for Engineering Analysis and Calculation Validation Procedures (Attachment A).

All validated field and technical data shall be reported in draft and final RI reports for review and comment.

8.2 Laboratory Data

The soil and aqueous samples collected during the RI/AA program will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs) appearing on the Target Compound List (TCL) using NYSDEC ASP methods. The samples will also be analyzed for the metals appearing on the Target Analyte List (TAL) using ASP methods. NYSDEC ASP Category B deliverable requirements will be employed for the documentation and reporting of the analytical results. The standard NYSDEC report forms will be completed by the analytical laboratory and included in the deliverable data packages. Data will also be reported in computer disk deliverable formats as specified in NYSDEC ASP. The soil vapor samples collected during the RI/AA program will be analyzed VOCs in accordance with the NYSDOH guidance for evaluating soil vapor intrusion in the state of New York, October 2006 gasoline list, and EPA TO-15 deliverable requirements. Specific laboratory data reduction, review and reporting procedures are detailed in the laboratory Quality Assurance Plan, which can be made available upon request.

The validation of the laboratory data will be performed by a qualified data validator. Validation of 100 percent of the data will be performed in accordance with the NYSDEC Guidance for the Development of Data Usability Summary Reports. The data package will be reviewed for completeness and compliance relative to the criteria specified in the aforementioned NYSDEC document. The validation report will include a narrative summary discussing all quality issues and their impact on the reported results, and copies of laboratory case narratives.

9.0 INTERNAL QUALITY CONTROL

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as the effect the sample matrix may have on the data being generated. Two types of internal checks are performed and are described as batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be according to the specified analytical method and project specific requirements. Acceptable criteria and/or target ranges for these QC samples are presented within the procedures for the specific analytical methods used for the project samples.

QC results that vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. QC samples including any project-specific QC to be analyzed are discussed below.

9.1 Batch QC

Method Blanks

A method blank is defined as laboratory-distilled or deionized water that is carried through the entire analytical procedure. The method blank is used to determine the level of background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples

A matrix spike blank (MSB) sample is an aliquot of water that is spiked with all elements being analyzed for calculation of precision and accuracy to verify that the analysis that is being performed is in control. A MSB will be performed for each matrix parameter.

9.2 Matrix-Specific QC

Matrix Spike Samples

An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD) are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix. MS/MSDs (and MS/MD for metals only) will be performed.

Matrix Duplicates

The matrix duplicate (MD) is two representative aliquots of the same sample which are prepared and analyzed identically. Collection of duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. Obtaining duplicate samples from a soil matrix requires homogenization (except for volatile organic compounds) of the sample aliquot prior to filling sample containers in order to best achieve representative samples; however, due to interferences, lack of homogeneity, and the nature of the soil samples, the analytical results are not always reproducible. Duplicate samples are to be included at a frequency of one per 20 samples per matrix for metals only.

9.3 Additional QC

Rinseate (Equipment) Blanks

A rinseate or equipment blank is a sample of laboratory-demonstrated analyte-free water passed through and over the cleaned sampling equipment. An equipment blank is used to indicate potential contamination from ambient air and from sample instruments used to collect and transfer samples. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The equipment blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Equipment blanks for non-aqueous matrices should be performed at a rate of one per set of sampling equipment.

Trip Blanks

Trip blanks are not required for non-aqueous matrices, but are necessary for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. These samples then accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with collected samples for analysis. These bottles are never opened in the field, and must be returned to the lab with the same set of bottles they accompanies into the field. Trip blanks will be analyzed for volatile organic compounds (VOCs) only at a frequency of one per VOC sample shipment.

Blind Field Duplicates

A blind field duplicate (BFD) is a duplicate sample collected from a given sampling location, the identity of which is documented by the sampling team but is not revealed to the laboratory. The BFD is subjected to the same analytical methods as the field sample of the same matrix collected from the same location. The data resulting from the analysis of the BFD are compared with those associated with the field sample from the same location to assess the data precision and to verify the reproducibility of the laboratory results. BFD samples are to be collected at a frequency of one per 20 samples per matrix.

10.0 PERFORMANCE AND SYSTEM AUDITS

Audits shall be performed to ascertain whether the QA/QC Plan is being correctly implemented, and to review and evaluate the adequacy of field and laboratory performance, where applicable. Performance audits are a quantitative evaluation of the laboratory's measurement systems, and are conducted by introducing control samples into the data production process. System audits are on-site qualitative inspections and reviews of the components and implementation of the quality assurance program, including field, laboratory and office aspects of the program, to verify compliance with the QA/QC Plan.

10.1 Field Audits

At least one unannounced field audit will be conducted during the field investigation program. Follow-up audits shall be conducted should inconsistencies or problems be identified. The audit, to be performed by the QA Officer or designated TVGA personnel, will assess the effectiveness of the QA program, identify non-conformances, and verify that identified deficiencies are corrected. At a minimum, the field audit shall evaluate:

- Project responsibilities and staffing;
- Health and safety provisions (e.g., personal protective equipment, air monitoring, etc.);
- Sample collection, handling and custody procedures;
- Sample identification;
- QC samples;
- Sample packaging and shipping procedures;
- Equipment calibration and decontamination procedures; and
- Field documentation; and
- Corrective action procedures.

The results of the field audit will be the basis for any corrective actions deemed appropriate.

10.2 Laboratory Audits

Internal and external laboratory performance and system audits will be conducted by the laboratory. The laboratory QA Plan (available upon request) describes the laboratory's program for internal performance audits. In addition to conducting internal reviews and audits, as part of its established quality assurance program, the laboratory is required to participate in regularly scheduled evaluations and audits administered by state and federal agencies. These external audits are performed as part of the certification process and to monitor the laboratory performance. The audits also provide an external quality assurance check of the laboratory and provide reviews and information on the management systems, personnel, standard operating procedures, and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance.

10.3 Office Audits

Office audits may also be performed on files containing relevant project documentation. Project files are evaluated against internal document control procedures. Office audits are performed by the QA Officer on a random percentage of projects. For this project, random field logbooks and project files will be audited by the project QA Officer and the results will be presented in the monthly progress report.

11.0 PREVENTATIVE MAINTENANCE

Preventative maintenance of equipment is essential if project resources are to be used cost-effectively. Preventative maintenance will consist of two forms: (1) a schedule of routine preventative maintenance activities to minimize down-time and ensure accuracy of the measurement systems; and (2) availability of critical spare parts and backup systems and equipment. The preventative maintenance approach for specific pieces of equipment used in sampling, monitoring, and documentation will follow manufacturer specifications and good field and laboratory practices. Performance of these maintenance procedures will be documented in the field notebooks.

Field instruments, in general, will be maintained in accordance with manufacturer's recommendations. Support equipment, including safety devices, vehicles, etc., are also periodically inspected to maintain performance standards necessary for all site activities. Responsibilities for instrument maintenance activities of laboratory equipment, and appropriate schedules, are discussed in the laboratory QA Plan (available upon request).

12.0 DATA ASSESSMENT PROCEDURES

12.1 Precision

Precision is evaluated using analyses of a field duplicate and/or laboratory MS/MSD which not only exhibits sampling and analytical precision, but also indicates analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision, and is calculated as follows:

$$RPD = \frac{|x_1 - x_2|}{\left[\frac{(x_1 + x_2)}{2} \right]} \times 100$$

Where:

X_1 = Measured value of sample or matrix spike
X_2 = Measured value of duplicate or matrix spike duplicate

Precision will be determined through the use of MS/MSD (for organics) and ms/mp (for inorganics) analyses. RPD criteria for this project must meet the method requirements.

12.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed through the use of known and unknown QC samples and spiked samples. It is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to the organic fractions (e.g., volatiles, semi-volatiles, PCBs), and is calculated as follows:

$$Accuracy(\%R) = \frac{(x_s - x_u)}{K} \times 100$$

Where: x_s = Measured value of the spiked sample;
x_u = Measured value of the unspiked sample; and
K = Known amount of spike in the sample.

Accuracies between 70 to 130 percent will be required for analytical results generated during this project.

12.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the total amount expected to be obtained, and is calculated as follows:

$$Completeness(\%) = \frac{(x_v - x_n)}{N} \times 100$$

Where: x_v = Number of valid measurements;

x_n = Number of invalid measurements; and

N = Number of valid measurements expected to be obtained

The completeness goal for analytical results generated during the project is 95 percent.

13.0 CORRECTIVE ACTIONS

The Project Manager has the primary responsibility for initiating and implementing corrective action relative to field activities, while the analytical Laboratory Director is responsible for taking corrective action in the laboratory. It is their combined responsibility to see that all sampling and analytical procedures are followed as specified in applicable documents and that the data generated meet the prescribed acceptance criteria. Other project team members shall also be responsible for problem recognition and corrective actions within the context of their assigned tasks. Some potential incidents that would elicit corrective action, and the corresponding responses are outlined in the following subsections.

13.1 Field Incidents

During the field program, corrective action may be initiated by the Project Manager, RI Team Leader, Field Auditor, or the NYSDEC on-site representative. The need for corrective action may arise due to field audits or in the normal course of field operations. Typical corrective actions may include:

- Replacement of equipment, either in part or totally, due to malfunction;
- Recalibration of field instruments;
- Additional instruction of personnel in the proper procedures, whenever necessary;
- Discussion of any unique on-site problems in order to arrive at an appropriate solution;
- Correction of custody forms and field logs and notebooks when errors occur.

13.2 Laboratory Incidents

Laboratory corrective actions shall be implemented to resolve problems and restore proper function to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. The following subsections discuss potential laboratory corrective actions.

13.2.1 Incoming Samples

Problems noted during sample receipt shall be documented by the laboratory. The TVGA Project Manager shall be contacted immediately for problem resolution.

13.2.2 Sample Holding Times

If any sample extraction and/or analyses exceed method holding time requirements, the TVGA Project Manager shall be notified immediately for problem resolution.

13.2.3 Instrument Calibration

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with the method requirements. If any initial/continuing calibration standards exceed QC limits, recalibration must be performed and, if necessary, reanalysis of all affected samples back to the previous acceptable calibration check.

13.2.4 Reporting Limits

The laboratory must meet the required detection limits for each analytical method. If difficulties arise in achieving these limits due to a particular sample matrix, the laboratory must notify the TVGA Project Manager for problem resolution. In order to achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures in an attempt to retain the required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, the TVGA Project Manager will be immediately notified so that appropriate corrective actions can be initiated.

13.2.5 Method QC

All QC, including blanks, matrix duplicates, matrix spikes, matrix spike duplicates, surrogate recoveries, matrix spike blank samples, and other method-specified QC samples, shall meet the method requirements. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected samples shall be reanalyzed and/or re-extracted/re-digested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed and/or re-extracted/re-digested, then reanalyzed. TVGA shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

13.2.6 Calculation of Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review, calculation and/or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

13.3 Documentation

Immediate corrective actions taken in the field will be documented in the field logbook and approved by the RI Team Leader or Project Manager. Corrective actions that result in deviations from the work plan or QA/QC Plan should be documented in a memo to the Project Manager or QA Officer, who will ensure that the appropriate changes are incorporated in the final report. Corrective actions initiated as a result of the field audit must be thoroughly documented by the RI Team Leader and submitted to the QA Officer and Project Manager. All documentation shall be maintained in the project file.

The laboratory maintains a rigorous corrective action documentation system that includes corrective action memos and database change forms that are permanently filed in the sample delivery group file for future reference. The Laboratory Director and Lab QA Officer are notified in writing of all corrective actions taken. Furthermore, the laboratory will notify the TVGA Project Manager of all corrective actions that may have an impact on the quality of the data. A more detailed discussion of laboratory corrective action documentation procedures is presented in the laboratory QA Plan.

14.0 QUALITY ASSURANCE REPORTS

Periodically during the performance of this investigation, field and laboratory personnel will be required to report the performance of all measurement systems to management. Field personnel will report to the TVGA Project Manager or QA Officer. Laboratory personnel reporting requirements are discussed in the laboratory QA Plan.

The frequency of reporting will be daily or weekly as appropriate during the period of time that measurements are being made in the field and/or laboratory. Reporting of measurement system performance will generally be verbal. However, if a problem requiring corrective action is encountered, a formal written report will be prepared.

The results of the field audit as well as any office audits conducted during the course of the project will be formally recorded by, or on behalf of, the TVGA QA Officer and will be reported to the TVGA, NYSDEC Project Managers. The audit reports will summarize the results of the audit and will specifically identify any problems identified as well as the corresponding corrective actions.

The results of performance and system audits conducted by the laboratory are compiled by the Lab QA Officer and formally reported to the Lab Director. If a QC problem arises in the laboratory, the Laboratory Director will immediately contact the TVGA Project Manager to discuss an appropriate corrective action. Whenever a laboratory QA/QC problem requiring corrective action arises, the Laboratory Director will prepare a formal written report to document the nature of the QA/QC problem and the corrective action(s) taken to resolve the problem. This report will be submitted as soon as possible to the TVGA Project Manager.

Serious analytical or sampling problems will be reported to the NYSDEC Project Managers. The time and type of corrective action, if warranted, will depend on the severity of the problem and relative overall importance of the project. Corrective actions may include altering procedures in the field or modifying laboratory protocol. The NYSDEC will be consulted by the TVGA Project Manager prior to the selection and implementation of corrective actions that represent significant modifications to the RI/AA Work Plan or supporting technical plans.

APPENDIX C

HEALTH AND SAFETY PLAN (HASP)

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS
FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD, CITY OF DUNKIRK
CHAUTAUQUA COUNTY, NEW YORK

HEALTH AND SAFETY PLAN

Prepared for:

Chautauqua County Department of Public Facilities
454 North Work Street
Falconer, New York 14733

Prepared by:

TVGA CONSULTANTS

One Thousand Maple Road
Elma, NY 14059-0264

(716) 655-8842
(fax) (716) 655-0937

2008.0011.00

MARCH 2008

DISCLAIMER

This Health and Safety Plan has been written for the exclusive use of TVGA and its employees. Properly trained and experienced TVGA subcontractors may also use it as a guideline document. However, TVGA does not guarantee the health and safety of any person entering the site.

Due to the potentially hazardous nature of the site and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury at the site. The health and safety guidelines in this plan were prepared specifically for this site and should not be used on any other site without prior research by trained health and safety specialists.

TVGA claims no responsibility for the use of this Plan by others. The Plan is written for the specific site conditions, purpose, dates, and personnel specified and must be amended if these conditions change.

RI/AA OF FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD, CITY OF DUNKIRK
CHAUTAUQUA COUNTY, NEW YORK

HEALTH AND SAFETY PLAN

TABLE OF CONTENTS

1.0	**INTRODUCTION**	**1**
2.0	**KEY PERSONNEL**	**2**
2.1	Off-Site Personnel	2
2.2	On-Site Personnel	2
2.3	Personnel Responsibilities	3
3.0	**SITE ENTRY**	**4**
3.1	Objectives	4
3.2	Safety Meetings	4
3.3	Safety Training	4
3.4	Medical Surveillance	4
3.5	Site Mapping	5
3.6	Meteorological Data	5
4.0	**HAZARD EVALUATION**	**5**
4.1	Physical Hazards	5
4.2	Chemical Hazards	7
4.3	Exposure Limits	7
4.4	Dispersion Pathways	8
4.5	Potential IDLH and Other Dangerous Conditions	8
5.0	**MONITORING AND ACTION LEVELS**	**10**
5.1	Air Monitoring	10
5.2	Action Levels	10
6.0	**SITE CONTROL MEASURES**	**12**
6.1	On-Site Control Measures	13
6.2	Off-Site Control Measures	14
7.0	**HAZARD COMMUNICATION**	**15**
8.0	**CONFINED SPACE ENTRY**	**15**
9.0	**PERSONAL PROTECTIVE EQUIPMENT (PPE)**	**15**
10.0	**DECONTAMINATION**	**17**
11.0	**EMERGENCY PROCEDURES**	**18**
11.1	Communication	18
11.2	Personnel Injury	18
11.3	Fire/Explosion	19
11.4	PPE Failure	19
11.5	Other Equipment Failure	19
11.6	Spill Containment	19

12.0	**EMERGENCY MEDICAL CARE**	**19**
12.1	Hospital	19
12.2	Emergency Notification Numbers	20
13.0	**STANDARD OPERATING PROCEDURES**	**20**
14.0	**COMMUNITY HEALTH AND SAFETY PLAN**	**21**
14.1	Potential Impacts	21
14.2	Monitoring Plan	21
14.3	Site Control	22
14.4	Engineering Controls	22
14.5	Emergency Notification	22

LIST OF FIGURES

Figure 1: Map to Hospital

LIST OF ATTACHMENTS

Attachment A: Certification
Attachment B: Medical Data Sheet
Attachment C: Direct Reading Air Monitoring Form
Attachment D: New York State Department of Health Generic Community Air Monitoring Plan

1.0 INTRODUCTION

TVGA Consultants, on behalf of the Chautauqua County, will provide engineering and environmental services associated with the Remedial Investigation/Alternatives Analysis (RI/AA) program to be implemented at the Former Edgewood Warehouse Site located in the City of Dunkirk, Chautauqua County, New York (Site). The Site has a history of heavy industrial/manufacturing and commercial uses since 1909. The property has been utilized in the manufacture of: locomotive parts, military equipment, stainless steel feed-water tubes and heat exchangers; and wooden crates and boxes. The property has also been utilized as a machine shop, a tank paint shop, offices, storage facility. Based upon the sites history, the sources of environmental concern include the presence of surface soil, subsurface soil, sediment, surface water and/or groundwater contaminated with polycyclic aromatic hydrocarbons (PAHs), RCRA metals, chlorinated hydrocarbons, and asbestos containing building materials.

This Health and Safety Plan (HASP) has been developed to govern all field investigation work at the Former Edgewood Warehouse Site. This plan is intended to ensure that the procedures used during planned field investigation activities meet reasonable professional standards to protect human health and safety of workers and the surrounding community. This Plan incorporates, by reference, the applicable requirements of the Occupational Safety and Health Administration in 29 CFR Parts 1910 and 1926.

The requirements and guidelines in the HASP are based on a review of available site specific information and an evaluation of potential hazards. These requirements can and will be modified by Senior Level Management (SLM), the Project Team Leader (PTL), the Site Safety Officer (SSO) or the Work Party Personnel (WPP), if necessary.

All field personnel working on this project must familiarize themselves with this HASP and abide by its requirements. Since every potential health and safety hazard encountered at a site cannot be anticipated, it is imperative that personnel are equipped and trained to respond promptly to a variety of possible hazards. Adherence to this HASP will minimize the possibility that personnel at the site and the public will be injured or exposed to significant health hazards. Information on potential health, safety and environmental hazards is discussed in conjunction with appropriate protective measures including assignment of responsibility, personal protective equipment (PPE) requirements, work practices, and emergency response procedures.

In general, contractors and subcontractors are responsible for complying with the HASP, as well as all Federal, State and local regulations pertaining to their work. With TVGA's permission, a contractor should modify this HASP to address activities of their employees within the scope-of-work this Plan addresses. These changes to the HASP by the contractor must be approved by TVGA. TVGA personnel can and must stop work by a TVGA contractor who is not following the health and safety procedures required by this HASP. However, the contractor/subcontractor expressly retains all responsibility for the safety of their personnel while working on this site.

This HASP is specifically intended for those personnel who will be conducting activities within the defined scope of work in specified areas of the site. Specific tasks covered by this HASP may include, but are not limited to:

- Performing inspections to characterize environmental hazards;
- Conducting non-intrusive inspections and instrument surveys;
- Excavating earthen materials, fill, debris, etc.;
- Collecting soil/fill samples from soil probes and test borings;
- Surface water/ sediment sampling;
- Installation and sampling of groundwater monitoring wells;
- Installation and sampling of soil vapor probes; and
- Decontaminating personnel and equipment.

2.0 KEY PERSONNEL

2.1 Off-Site Personnel

Title: Principal
Description: Responsible for defining project objectives, allocating resources, determining the chain of command, and evaluating program outcome.
Contact: Robert R. Napieralski, TVGA, (716) 655-8842

Title: Project Manager
Description: Reports to upper level management, has authority to direct response operations, assumes total control over site activities.
Contact: Daniel E. Riker, TVGA, (716) 655-8842

2.2 On-Site Personnel

Title: Site Safety Officer
Description: Advises the field team on all aspects of health and safety issues, recommends stopping work if any operation threatens worker or public health and safety.
Contact: James C. Manzella, TVGA (716) 655-8842

Title: Project Team Leader
Description: Responsible for field team operations.
Contact: James C. Manzella, TVGA (716) 655-8842

Title: Work Party Personnel
Description: Performs field operations
Contact: TVGA personnel, Chautauqua County personnel, and subcontractor personnel.

2.3 Personnel Responsibilities

The primary safety personnel include the Project Team Leader (PTL), the Site Safety Officer (SSO) and the Work Party Personnel (WPP). For this project, the PTL and the SSO will be the same individual. Additionally, Senior Level Management (SLM) has the responsibility to ensure all project personnel are aware of the requirements of the HASP. The SLM may also recommend policy changes on safety matters including work practices, training and response actions and will provide the necessary resources to conduct the project safely. The PTL is responsible for the implementation of the HASP. The PTL is also responsible for conducting the initial on-site training.

The SSO is responsible for the day-to-day implementation of the HASP. The SSO will assist the PTL in providing initial training for all project personnel and for providing additional training in the form of safety meeting to discuss changed site conditions or upgrade training on an as needed basis. The SSO is also responsible for daily calibration of real-time air monitoring equipment and will ensure that all personnel assigned to operate the instrumentation are properly trained in its use and maintenance.

The SSO has the following specific responsibilities:

- Assuring that a complete copy of this HASP is at the site prior the start of field activities and that all workers are familiar with the document;
- Conducting training and briefing sessions if appropriate, prior to the start of field activities at the site and repeat sessions as necessary;
- Ensuring the availability, use, and proper maintenance of specified personal protective, decontamination, and other health and safety equipment;
- Maintaining a high level of safety awareness among team members and communicating pertinent matters to them promptly;
- Assuring that all field activities are performed in a manner consistent with Company policy and the HASP;
- Monitoring for dangerous conditions during field activities;
- Assuring proper decontamination of personnel and equipment;
- Preparing all health and safety documentation;
- Coordinating with emergency response personnel and medical support facilities, and representatives of the NYSDEC;
- Initiating immediate corrective actions in the event of an emergency or unsafe condition;
- Notifying the SLM and PTL promptly of an emergency, unsafe condition, problem encountered, or significant exceptions to the requirements in this HASP;
- Recommending improved health and safety measures to the SLM, or the PTL.

The SSO has the authority to:

- Suspend field activities or otherwise limit exposures if the health and safety of any persons appears to be endangered;

- Direct Company or contractor personnel to alter work practices that are deemed not properly protective of human health of the environment; and
- Suspend an individual from field activities for significant infraction of the requirements in this HASP.

The WPP is responsible for providing air monitoring during intrusive activities at the site. The WPP is directly responsible to the SSO and will assist the SSO in the day-to-day implementation of the HASP.

Site personnel are responsible for following the requirements of the HASP. They should become thoroughly familiar with the requirements of exposures that may adversely affect the health and safety of on-site personnel, off-site population, or the environment.

3.0 SITE ENTRY

3.1 Objectives

The objectives of the site entry will initially focus on determining the nature and extent of contamination associated with environmental media. The investigation of subsurface conditions will be completed through the performance of a geophysical survey; the excavation of test pits; direct-push soil probes; hollow-stem auger drilling and spilt-spoon sampling; and groundwater monitoring well installation, development, and sampling. The investigation of surface conditions will be completed by collecting surface soil samples from suspect areas, and field screening of soils and fill with a photoionization detector (PID).

3.2 Safety Meetings

To ensure that the HASP is being followed, the Project Team Leader (PTL) shall conduct a safety meeting prior to initiating any site activity.

3.3 Safety Training

The SSO will confirm that every person assigned to a task has had adequate training for that task and that the training is up-to-date by checking with the TVGA Human Resources Office. TVGA and subcontractor personnel working on the site shall have a minimum of at least 24 hours of classroom-style health and safety training and 3 days of on-site training, as required by OSHA 29 CFR 1910.120. All training will have been conducted and certified in accordance with OSHA regulations outlined in 29 CFR 1910.120.

3.4 Medical Surveillance

All TVGA and subcontractor personnel working on this investigatory project will have had a medical surveillance physical consistent with OSHA regulations in 29 CFR 1910.120, and performed by a qualified occupational health physician. The SSO shall confirm prior to initiation of work on this site that every person assigned to a task has had an annual physical, has passed the medical examination, and has been determined medically fit by the occupational health physician for this type of work.

3.5 Site Mapping

A map of the site showing all areas to be accessed during the environmental investigation is depicted on Figure 4 of the Work Plan. A map showing the route from the site to the nearest hospital has been included as Figure 1.

3.6 Meteorological Data

Fieldwork is expected to be completed March through June 2008. Average temperatures for these months are expected to reach highs of approximately 70°F and lows of 15°F. Precipitation for these months is likely to be in the form of rain and or snow. Prior to each day's activities, the daily forecast should be monitored for indications of adverse work conditions.

4.0 HAZARD EVALUATION

4.1 Physical Hazards

Physical hazards such as the following may be encountered on site:

- Slippery surfaces - trip/fall
- Electrical - shock, fire
- Mechanical/Large Equipment - cuts, amputation, trauma
- Uneven Terrain/Excavations/Soil piles/Sink Holes - trip/fall

The planned test pit and drilling investigations also presents hazards specific to working with heavy equipment. Personnel working on or around the drill rig trucks, or backhoes should be aware of the precautions listed below. The practices are meant to be guidelines, and are not all-inclusive of the safety measures necessary while performing intrusive activities.

Utility Clearance

Personnel involved in intrusive work shall determine the minimum distance from marked utilities which work can be conducted with the assistance of the locator line service.

- Elevated superstructures (e.g., drill rig, backhoe, etc) shall remain a distance of 10 feet away from utility lines and 20 feet away from power lines.

- During all intrusive activities (e.g., drilling, excavating, probing), the locator line service should be contacted to mark underground lines before any work is started.

Drilling / Probing Safety

TVGA personnel working in the vicinity of drilling or direct-push soil probing rigs shall adhere to the following practices:

- The drilling site should be inspected before the start of work to identify unsafe conditions or operations that the subcontractor may not be aware of.
- TVGA personnel monitoring the drilling activity and inspecting the environmental samples will attend the contractor's daily safety briefing.
- Before the mast is raised, check for overhead obstructions.
- Remind drill rig personnel of their responsibility to safely fill or cover any open borehole or excavation left unattended for any period of time.
- Personnel shall wear steel-toed shoes, safety glasses, hearing protection and hard hats during drilling operations.
- The area shall be roped off, marked or posted, to keep the area clear of pedestrian traffic or spectators.
- All personnel should be instructed in the use of the emergency kill switch on the drill rig.

Heavy Equipment Operations

Working around heavy equipment can be dangerous because of the size and power of the equipment, the limited field of vision of the operator and the noise levels that can be produced by the equipment. Heavy equipment to be utilized at the site may include drill rigs, trucks and backhoes.

To ensure the safety of TVGA personnel in the work area, the following safety procedures regarding heavy equipment must be reviewed prior to and followed during work activities:

- Personnel should never approach a piece of heavy equipment without the operators' acknowledgment and stoppage of work or yielding to the employee.
- Never walk under the load of a bucket or stand beside an opening truck bed.
- Maintain visual contact with the operator when in close proximity to the heavy equipment.

- Wear hearing protection while on or around heavy equipment, when normal conversation cannot be heard above work operations.

Steel-toed shoes, safety glasses, and a hard hat shall be worn for all work conducted near heavy equipment.

4.2 Chemical Hazards

Known and suspected sources of contamination include potential past spills and releases of chemicals and wastes used, generated and/or stored on-site; and past discharges and spills of untreated process wastewater. Potential chemical hazards, which could be encountered during the site investigation, include, but are not limited to:

- Solvents
- Polycyclic aromatic hydrocarbons (PAHs)
- Metals
- Asbestos building materials

4.3 Exposure Limits

Recommended Exposure Limits (RELs), and OSHA Permissible Exposure Limits (PELs) for several of the above chemical hazards are listed below. A complete list of the compounds detected on-site will be available upon completion of sampling and laboratory analysis. The RELs and PELs for the compounds listed below can be found in the NIOSH Guide to Chemical Hazards.

CHEMICAL	**REL** [1]	**PEL** [2]
Vinyl Chloride	CA	2.56 mg/m^3
Benzo (a) anthracene	0.10 mg/m^3	0.20 mg/m^3
Chrysene	0.10 mg/m^3	0.20 mg/m^3
Benzo (b) fluoranthane	0.10 mg/m^3	0.20 mg/m^3
Benzo (a) pyrene	0.5 mg/m^3	1.0 mg/m^3
Chloroethene	CA	2600 mg/m^3
1,1-Dichlorethane	400 mg/m^3	400 mg/m^3
1,1,1-Trichloroethane	1900 mg/m^3	1900 mg/m^3
Trichloroethene	CA	100 ppm
Aluminum	10 mg/m^3	15 mg/m^3

Arsenic	0.002 mg/m^3	0.01mg/m^3
Berylium	0.0005 mg/m^3	0.002 mg/m^3
Cadmium	CA	0.005 mg/m^3
Chromium	0.50 mg/m^3	1.0 mg/m^3
Copper	1.0 mg/m^3	1.0 mg/m^3
Iron	5.0 mg/m^3	10.0 mg/m^3
Lead	0.05 mg/m^3	0.05 mg/m^3
Nickel	0.015 mg/m^3	0.10 mg/m^3
Zinc	5.0 mg/m^3	5.0 mg/m^3
Asbestos[3]	0.1 fiber/cm^2	0.1 fiber/cm^2

1 REL = NIOSH recommended exposure limits, up to 10 hour work day exposure limit, 40 hours/week. REL in mg/m^3 = (REL in ppm x molecular weight) / 24.45.

2 PEL = OSHA permissible exposure limit, 8 hour exposure limit, 40 hours/week, OSHA 29 CFR 1910.1000. REL in mg/m^3 = (REL in ppm x molecular weight) / 24.45.

OSHA = Occupational Safety and Health Agency

NIOSH = National Institute for Occupational Safety and Health

N.A. = no applicable value available

CA = NIOSH recommends the substance be treated as a potential human carcinogen

3 The exposure limits for asbestos are derived from 12NYCRR Part 56-8.1(b)(2)

4.4 Dispersion Pathways

Potential exposure mechanisms that can transport particulate and organic compounds from the areas of investigation to other areas of the site as well as beyond the boundaries of the site are:

- Volatilization and wind transport of organic and inorganic compounds
- Surface water runoff from contaminated areas
- Groundwater flowing beneath the site

4.5 Potential IDLH and Other Dangerous Conditions

The Immediately Dangerous to Life and Health (IDLH) levels for chemicals potentially on-site and their IDLH level are listed below.

CHEMICAL	IDLH
Vinyl Chloride	CA
Benzo (A) Anthracene	CA (80 $mg/m^{3)}$
Chrysene	CA (80 $mg/m^{3)}$
Benzo (B) Fluoranthane	CA (80 $mg/m^{3)}$
Benzo (A) Pyrene	CA (80 $mg/m^{3)}$
Chloroethene	3800 ppm
1,1-Dichlorethane	3000 ppm
1,1,1-Trichloroethane	700 ppm
Trichloroethene	CA (1000 ppm)
Aluminum	N.D.
Arsenic	5 mg/m^3
Berylium	4 mg/m^3
Cadmium	9 mg/m^3
Chromium	250 mg/m^3
Copper	100 mg/m^3
Iron	2500 mg/m^3
Lead	100 mg/m^3
Nickel	10 mg/m^3
Zinc	500 mg/m^3
Asbestos	CA

CA = NIOSH recommends the substance be treated as a potential human carcinogen

The IDLH level is defined only for the purpose of respirator selection. The IDLH level represents a maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without experiencing any escape-impairing or irreversible health effects.

Visible indicators of potential IDLH conditions as well as other dangerous conditions are listed below.

- Confined spaces
- Unstable overhead structures
- Unusually colored solid or liquid wastes
- Containers or accumulation structures (e.g., drums, pits, sumps, etc.), the contents of which are unknown

- Potentially explosive or flammable situations indicated by bulging drums, gas generation, effervescence, or instrument readings
- Extremely hazardous materials such as cyanide, phosgene
- Visible vapor clouds
- Biological indicators such as dead animals, stressed vegetation

5.0 MONITORING AND ACTION LEVELS

5.1 Air Monitoring

The following environmental monitoring instruments and methods shall be used on site during the RI/AA program at the specified intervals. Due to the limited potential for dust generation during the RI/AA activities, dust will not be monitored during the RI/AA. However, dust levels will be monitored during the IRMs.

Photoionization Detector (PID)

A PID shall be used continuously at the downwind perimeter of the work area, during sampling of soils and sediments and the installation of the test borings, and advancement of soil probes to monitor for volatile organic compounds. The PID shall be calibrated daily following manufacturers' recommendations (see Section 15.0 of the Field Sampling Plan). Readings and calibration data shall be recorded in daily logs by the SSO.

Dust

A personal dust monitor (MIE pDR-1000 or equal) will be used continuously in the vicinity of the work area, during the installation of the test borings, and advancement of soil probes to monitor for airborne particulate matter. The particulate meter shall be calibrated daily following the manufacturers' recommendations. Readings and calibration data shall be recorded in daily logs by the SSO.

Temperature

Ambient temperature should be monitored throughout the work day for potential heat or cold stress conditions.

5.2 Action Levels

Should action levels be encountered, work operations shall cease until further evaluation is performed and safe levels are prevalent. If through engineering controls and monitoring, safe levels (below action levels) cannot be achieved, an upgrade in personal protection equipment shall be mandated by the SSO, or operations shall cease in that portion of the site. The action levels for this project are as follows:

- Volatile organic compounds (PID monitor): consistent readings of greater than 5 ppm above background levels in the breathing zone.
- Dust: refer to "New York State Department of Health Generic Community Air Monitoring Plan" (Attachment D)
- Temperature: ambient air temperature below 36°F for cold stress, and above 90°F for heat stress.

<u>Vapor Emission Response Plan</u>

If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume (while using the appropriate PPE) 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 over background.

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 SSO will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

<u>Major Vapor Emission</u>

If any organic levels greater than 5 ppm over background 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 5 ppm above background 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 levels greater than 5 ppm above background persist for more than 30 minutes in the 20-Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect. The Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels in the 20-Foot Zone are greater than 10 ppm above background.

<u>Major Vapor Emission Response Plan</u>

Upon activation, the following activities will be undertaken:

- All Emergency Response Contacts as listed in the HASP be contacted.

- The local police authorities will be immediately contacted by the SSO 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 Site Safety Officer.

Particulate Emission Response Plan

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

If after implementation of dust suppression techniques, downwind particulate levels are greater than 150 ug/m^3 above the upwind level, work must be stopped and a re-evaluation of activities should be examined. Work may continue with dust suppression techniques provided they are successful in reducing the downwind particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

Dust Suppression Techniques

Dust suppression techniques may include but are not necessarily limited to the following measures:

- Reducing the number of areas subject to intrusive investigation, and limiting the number of exposed soil areas
- Restricting vehicle speeds
- Applying water on exposed soil surfaces or backhoe bucket
- Wetting equipment used in intrusive activities
- Restricting work during extreme wind conditions
- Use a street sweeper on paved roads, where feasible

6.0 SITE CONTROL MEASURES

Maintaining specific work zones both on-site and off-site, along with other precautionary measures outlined throughout this HASP will help control site access.

6.1 On-Site Control Measures

Temporary fencing or caution tape around the perimeter of the work areas will provide a suitable measure to control access to the work areas and to prevent unauthorized access to on-site work zones.

The SSO will establish and clearly mark the following areas with consultation of the PTL:

Exclusion Zone (EZ)

This will be the actual work area where potential contamination may exist. An outer boundary will be established and clearly marked. The area of the EZ will be established based on site work conditions, exposure monitoring, etc. In general, the EZ will incorporate the area being probed or drilled and a 50-foot radius around the area.

- Access to the EZ will be limited to employees and visitors who have a minimum 24-Hour Hazardous Site Worker training, protective equipment and responsibilities for work in the EZ. The entry of unauthorized personnel into the EZ will be prohibited.

- The Exclusion Zone will be in areas of intrusive activities such as drilling, installation of monitoring wells, excavating and sampling. The limits of the zone will change, as necessary, depending on the SSO's judgment regarding work conditions, air sampling, etc.

- Drilling or excavation activities inside the EZ will commence at Level D. Air monitoring will be performed while drilling or excavating proceeds using a photoionization detector (PID) and a particulate monitor.

Contamination Reduction Zone (CRZ)

An area between the actual work site (EZ) and Support Zone (SZ) will be established to facilitate employee and equipment decontamination, protective equipment storage and supply, and employee rest areas.

- The location of the CRZ will be established in an area offering minimal contamination and will be subject to change based on the SSO's judgments considering work conditions, air monitoring, etc.

- The CRZ will contain a boot wash with brushes and soap, a source of wash water for washing equipment and hands, and plastic garbage bags to contain disposable protective equipment.

Support Zone (SZ)

An area free from contamination will be identified and clearly marked where administrative or other support functions (not requiring entrance to the EZ or CRZ) can be performed. The actual sighting of the SZ will be established by the PTL and SSO by considering distance from the EZ, visibility, accessibility, air monitoring data, etc.

All personnel working in the study area will enter their names in a site log, which will be maintained in the SZ. Personnel will only enter an EZ after proceeding through a designated entry / checkpoint at the CRZ. Before engaging in any site work, all personnel involved in such work will be briefed on the following:

- Identity of PTL/SSO
- Boundaries, exit and entry point locations of the Exclusion Zone
- Decontamination procedures when required
- Chemical, radiological and physical hazards suspected of being in the EZ and their signs and symptoms of exposure
- Location of first aid equipment and qualified personnel
- Procedures to be used in contacting emergency personnel, including potential site evacuation procedures in case of emergencies
- Location of emergency equipment
- Location of emergency meeting point
- Contractor staff person in charge;
- Activities taking place that day
- Location of emergency eyewash station
- Heat or cold stress symptoms. All personnel will be advised to watch for signs of stress in staff working in EZ. Symptoms are defined in Attachment E
- Personnel protective equipment requirements and limitations

6.2 Off-Site Control Measures

Although the majority of the site investigation activities will be conducted within the interior area of the Site, background surface soil samples will be collected from separate off-site locations. Residential properties and public roads may be adjacent to a few of the proposed sample locations. Accordingly, the following control measures will be instituted to protect the public from physical and chemical hazards associated with this off-site sampling:

- A localized contaminant reduction zone (CRZ) shall be established at the periphery of the EZ toward the site interior, if possible, to regulate flow of personnel and equipment into and out of the zone.
- Only properly trained and certified project personnel will be permitted to enter the CRZ and EZ.

- The SSO or other member of the WPP will be present throughout the duration of sampling activities to monitor the work zone and prevent unauthorized parties from entry.

7.0 HAZARD COMMUNICATION

In compliance with 29 CFR 1910.1200, any hazardous materials brought on site by any personnel (TVGA or contractors) shall be accompanied with the material's MSDS. The SSO shall be responsible for maintaining the MSDS' on site, reviewing them for hazards that working personnel may be exposed to, and evaluating their use on site with respect to compatibility with other materials including personal protective equipment, and their hazards. Should the SSO deem the material too hazardous for use on site, the party responsible for bringing the material on site shall remove it from the site. No other hazardous materials are expected to be used during the environmental investigation at the site.

8.0 CONFINED SPACE ENTRY

No confined space entry by TVGA personnel is anticipated during the completion of this project. Should a potential confined space hazard exist, all proper confined space entry procedures, techniques, and equipment shall be consistent with OSHA regulations in 29 CFR 1910.146.

9.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Based on evaluation of the potential hazards for the site, the initial levels of PPE have been designated as modified Level D for all site activities which is addressed below. No changes to the specified levels of PPE shall be made without the approval of the SSO and the PTL. If action levels are reached, work shall cease and further evaluations shall be performed by the SSO and advisors.

Modified Level D Protection

- Safety glasses with side shields
- Chemical resistant gloves
- Steel-toe and shank boots
- Hard hat
- Neoprene or butyl rubber outer boots

For the protection of site personnel, organic gas/vapor emissions will be continuously monitored during ground intrusive operations, and the required level of protection upgraded if action levels warrant. If an upgrade in PPE is warranted, Level C Protection including full face air-purifying respirators with appropriate cartridges will be implemented.

Level C Protection

Level C Protection, the maximum level likely to be needed at this site, includes the following;

- Full-face air purifying respirators with NIOSH/MSHA - approved high efficiency (HEPA) canisters for acid mists/organic vapors (half-face respirators may be substituted for certain tasks, by approval of the SSO)
- Chemical-resistant (Poly-Tyvek) clothing, one piece, long sleeved
- Outer and inner gloves. Inner gloves to be tight-fitting latex or vinyl. Outer gloves of neoprene or nitrile
- Steel-toe and shank boots (chemical resistant);
- Disposable Tyvek "booties"
- Neoprene or butyl rubber outer boots
- Gloves and boots taped
- Hard hat

For all personnel that may be required to wear full-face respirators (all persons working near a borehole, for example), only NIOSH/MSHA - approved respirators will be used. These will contain cartridges approved for removal of organic vapors/acid mists and particulate. All team members will be fit-tested for respirators. Due to possible difficulties in achieving a proper seal between face and mask, persons with facial hair will not be fitted for respirators, nor will they be allowed to work in areas requiring respiratory protection. Unless the SSO directs otherwise, when respirators are used, the cartridges should be replaced after eight hours of use, or at the end of each shift, or when any indication of breakthrough or excess resistance to breathing is detected.

Donning PPE

The following procedures should be followed when donning protective equipment.

- Inspect all equipment to ensure it is in good condition
- Don protective suit and gather suit around waist
- Put on outer boots over feet of the suit and tape at boot/suit junction
- Don inner gloves
- Don top half of protective suit and seal (as necessary)
- Don respirator protection (if necessary)
- Don outer gloves and tape at glove/suit junction (as necessary)
- Have assistant check all closures and observe wearer to ensure fit and durability of protective gear

10.0 DECONTAMINATION

Level C or higher PPE utilized during site operations warrants the institution of decontamination procedures.

Contaminated material must be either decontaminated or isolated immediately. All materials brought into the Exclusion Zone are presumed contaminated. Alconox and water shall be used as the decontamination solution. Decontamination equipment consisting of large wash tubs, scrub brushes, plastic sheeting, distilled water, plastic garbage bags, trash barrel, and respirator wipes will be used.

Protective clothing, especially reusable boots and gloves, will be decontaminated before leaving the Exclusion Zone by a thorough soap-and-water wash on the decontamination pad. Washing and rinsing solutions will be disposed on site in areas where test pits were excavated unless elevated levels are detected with a PID. If elevated levels are detected, it may be necessary to dispose of decon solutions in a drum or an approved containment tank. Solid waste materials (disposable gloves and garments, tape, plastic drop cloths, etc.) will be containerized for proper disposal. Personnel will be advised that all clothing worn under protective clothing (underwear, shirts, socks, trousers) on-site should be laundered separately from street clothing before redressing. If protective clothing is breached and personal clothing becomes contaminated, the personal clothing will be disposed.

Use of disposable sampling equipment will limit decontamination requirements. The need for widespread vehicle decontamination will be limited by keeping to a minimum the number of vehicles entering the Exclusion Zone. Vehicles leaving the Exclusion Zone must be decontaminated by high pressure and temperature water.

Personal Decontamination

The following steps must be taken to decontaminate personnel leaving a Level B or C work area.

- Place equipment and sample containers that must be decontaminated on a plastic drop cloth;
- Place disposable supplies and equipment in a labeled drum;
- Scrub non-disposable gloves and outer boots (if used) with a brush in a detergent water, then rinse in clean water;
- Remove outer gloves and boot covers;
- Remove protective garments, safety boots and hard hat;
- Wash inner gloves;
- Remove and wash respiratory protection (if worn);
- Remove inner clothing (as necessary for Draft decontamination at end of shift);
- Thoroughly wash face, hands and body; and
- Redress.

Equipment Decontamination

Personnel must take the following steps to decontaminate equipment and sample containers leaving Level A, B, or C work areas:

- Don protective equipment at Modified Level D;
- Wash reusable equipment in detergent solution and/or an appropriate solvent, or steam clean;
- Dry sample containers, etc., with paper towels (if necessary) and place on a clean drop cloth;
- Remove and discard used respirator cartridges. Wash respirators in fresh detergent water, rinse in clean water, and disinfectant. Store in a closed plastic bag, away from sources of contamination; and
- Launder clothing before reuse (or place in appropriate labeled impervious containers for transport to laundry).

Organic vapor/HEPA cartridges are the appropriate canisters for use with the involved substances. All respirators used shall be NIOSH and/or MSHA approved and their use shall be consistent with OSHA regulations in 29 CFR 1910.134. All on-site personnel wearing a respirator shall have respirator clearance from a qualified occupational health physician. In addition, the respirator wearers on site shall perform qualitative fit tests to ensure proper fit of the face seal of the respirator. Filter cartridges used shall be of the same manufacturer as the respirator and shall be changed on a daily basis at a minimum and/or if breathing becomes difficult.

11.0 EMERGENCY PROCEDURES

Prior to entering the site, all personal will complete the attached emergency data sheet. On-site personnel will abide by the following emergency procedures.

- The SSO shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate measures are followed.
- Non-emergencies will be treated on site, documented and the injured party will be directed to seek further medical attention.
- All occupational injuries and illnesses will be reported, recorded, and investigated.

11.1 Communication

The SSO will have a cellular-type telephone on-site at all times for direct outside communications with emergency response organizations.

11.2 Personnel Injury

Upon notification of personnel injury the SSO will assess the nature of the injury. The appropriate first aid shall be initiated and, if necessary, contact shall be made for an ambulance and with the designated medical facility. If the injury increases the risk to others, activities on site will stop until the added risk is removed or minimized.

11.3 Fire/Explosion

Upon notification of fire or explosion, the designated emergency signal shall be sounded and all site personnel shall assemble at a safe distance upwind of the involved area. The SSO shall alert the appropriate fire department through the 911 emergency reporting system.

11.4 PPE Failure

If any site worker experiences a failure or alteration of PPE that affects the protection factor, that person and his or her buddy shall immediately exit the work area. Reentry and resuming work activities shall not be permitted until the equipment has been repaired or replaced.

11.5 Other Equipment Failure

If any equipment on site fails to operate properly, the Field Team Leader and the SSO shall be notified and will determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the remediation tasks, all personnel shall leave the work zone until the situation is evaluated and appropriate actions taken.

11.6 Spill Containment

Should a release of a chemical material occur on site, the SSO shall contain the spill to the extent immediately possible by the use of absorbent booms, pigs, pads, etc. The SSO shall contact appropriate spill response public departments (local or state) and a hazardous materials response contractor for further containment (refer to Section 12.0).

12.0 EMERGENCY MEDICAL CARE

12.1 Hospital

Name: Brooks Memorial Hospital
Address: 529 Central Ave, Dunkirk, NY
Hospital Emergency Room#: (716)-366-1111 Ext. 4414
Directions from site: Turn right on South Roberts Road to Lake Shore Drive East. Turn left on Lake Shore Drive East. Turn left on Central Avenue. The hospital is on the west side of Central Avenue. Estimated drive time is 4 minutes and it is 1.37 miles.

12.2 Emergency Notification Numbers

Fire Department: 911
Police Department: 911
Department of Emergency Services: 911

Chautauqua County Health Department, Environmental Division:
3 North Street, Mayville, New York 14757-1007
(716) 753-4000

Chautauqua County Emergency Services:
2 Academy Street, Suite A, Mayville, NY 14757-1007
(716)753-4341
911 (24-Hour Emergency Number)

NYSDEC Spill Response Unit: (716) 851-7220
NYSDEC Spill Hotline: 800-457-7362
NYSDOH Division of Environmental Health Assessment: (716) 847-4502

13.0 STANDARD OPERATING PROCEDURES

- Restricted areas are not to be accessed.
- Avoid unrestricted areas that seem questionable or unsafe.
- Minimize contact with hazardous substances.
- Use remote sampling, handling, and/or container-opening techniques whenever possible.
- Protect monitoring and sampling instruments by bagging, if necessary.
- Wear disposable outer garments and use disposable equipment where appropriate.
- All PPE and skin surfaces should be checked for cuts and/or punctures.
- Do not eat, smoke, or drink within the exclusion or contamination reduction zones.
- Due to the potential for the absorption, inhalation, or ingestion of toxic substances, those personnel required to take prescription drugs should not enter this site until their medication program is reviewed and approved for site access by a qualified physician.
- All personnel must be familiar with Client's operating safety procedures.
- The buddy system must always be used and enforced.
- No workers with beards or heavy sideburns are allowed to wear respirators.
- Use of contact lenses is prohibited on site.
- All heavy equipment involved should be equipped with available back-up signals.
- Eating, drinking, chewing gum or tobacco, smoking, or any similar practice is prohibited
- Hands and face must be thoroughly washed upon leaving the Exclusion Zone
- Whenever decontamination procedures for outer garments are in effect, it is recommended that the entire body should be thoroughly washed, as soon as possible, after the protective garment is removed. Thorough showers are required of all personnel at the completion of the workday.

- No excessive facial hair, which interferes with a satisfactory fit of the mask-to-face seal, is allowed for personnel required to wear respiratory protective equipment.
- Medicine and alcohol can exaggerate the effects from exposure to toxic chemicals.
- Fluids will be provided to staff to replace perspiration and will be sealed in containers. All fluids for ingestion will be kept in the Support Zone.
- Due to the effects of protective outer wear decreasing body ventilation, there exists an increase in the potential for heat casualties.
- All field personnel should check for any personal habit, which may allow contaminated soil or water onto or into the body. Jewelry, including watches, shall not be worn within the Exclusion Zone.
- All first aid treatments will be reported to the SSO, who will record each incident.

14.0 COMMUNITY HEALTH AND SAFETY PLAN

14.1 Potential Impacts

Potential hazards to the general public and surrounding community posed by this site investigation plan relate primarily to fugitive dust (particulate) emissions, organic contaminants and physical hazards associated with the operation of heavy equipment and open excavations. Potential exposure mechanisms that can transport particulates, both contaminated and non-contaminated, and volatile organic compounds beyond the site boundary include:

- Contaminated dust projected by wind erosion; and
- Volatile organic compounds transmitted by wind currents.

The site is located in an area that consists mainly of commercial properties. Commercial properties are primarily located west and north of the site, and are of a sufficient separation distance that it is unlikely that they will be adversely impacted by the site investigation activities.

Limiting potential exposure mechanisms that can transport contaminants beyond the site boundary will be completed by implementation of an air monitoring plan, maintaining site control, the use of engineering controls and following emergency procedures.

14.2 Monitoring Plan

The drilling and test pit excavation activities are not expected to produce measurable fugitive dust. Probing activities generally do not produce fugitive dust. The hollow stem auger drilling will produce limited auger spoils, which will likely be damp, therefore limiting the amount of dust produced. Dust will be monitored on a visual basis. Additionally, based on visual and/or olfactory observations an air monitoring program will measure VOCs at the sampling locations on a continuous basis.

Should action levels be encountered, work operations shall cease until further evaluation is performed and safe levels are prevalent. If through engineering controls and monitoring, safe levels (below action levels) cannot be achieved, an upgrade in personal protection equipment shall be mandated by the SSO, or operations shall cease in that portion of the site. The action levels for this project and the response measures to be implemented to protect the community in the event that these action levels are exceeded are presented in Section 5.2.

14.3 Site Control

During the implementation of the investigation, TVGA will block the access into the site to the extent practicable using posts, cones rope and/or caution tape. Access to the working area will be restricted via the site control measures detailed in Section 6.0.

14.4 Engineering Controls

In the event measurable dust levels are detected during the drilling of test borings or excavation of test pits, then standard dust suppression techniques may be utilized, including the following:

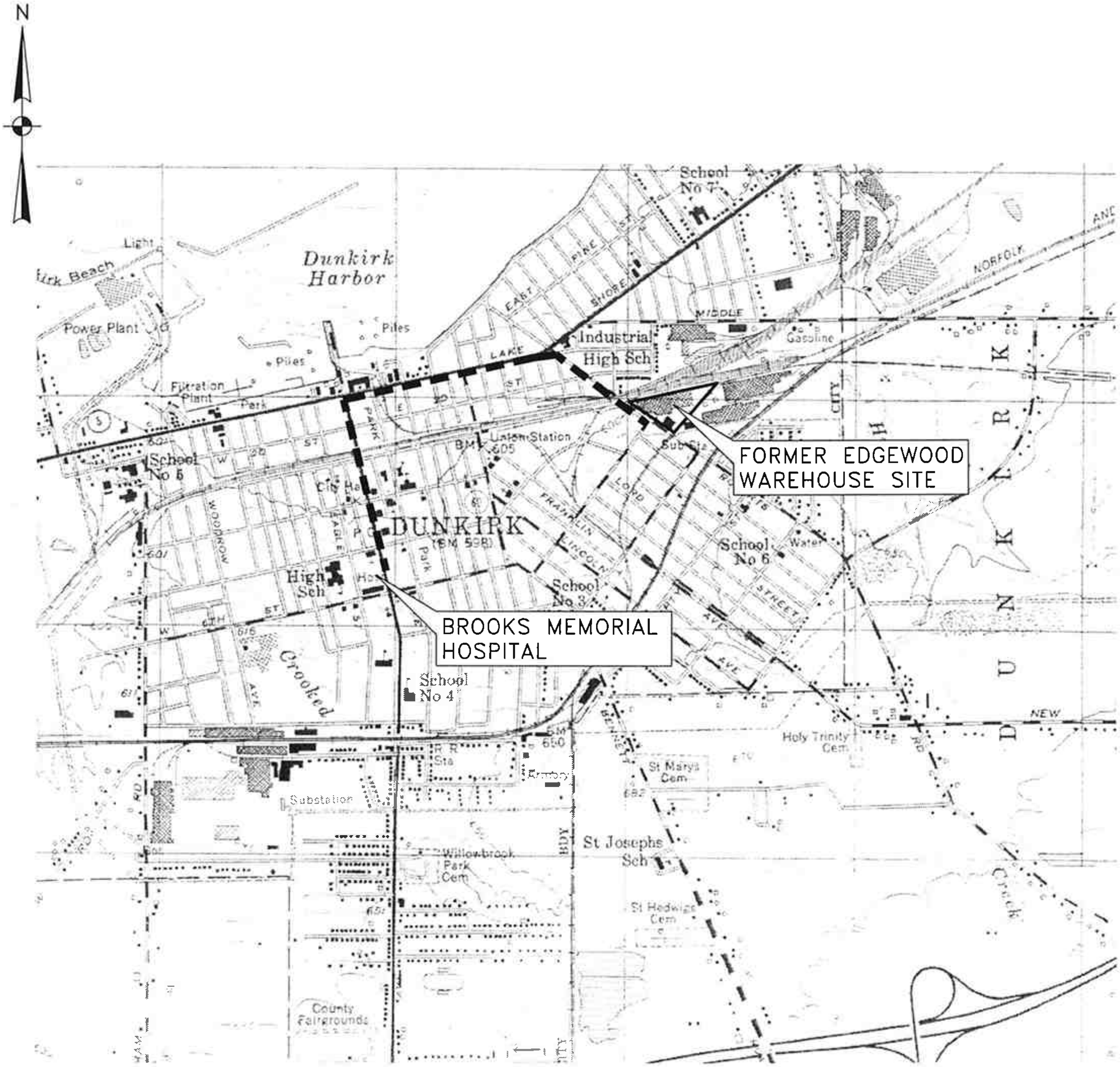
- Wetting excavation faces, and equipment during excavation.
- Restricting vehicle speeds to 10 mph.
- Postponing excavation activities during severe winds.
- Covering excavated areas and material after excavation activity ceases.
- Decreasing the number and size of excavations.

If the dust suppression techniques being utilized do not reduce airborne particulate then investigation activities will be suspended, until a review of the engineering controls can be completed.

14.5 Emergency Notification

This HASP has been developed to include details on emergency coordination and notification procedures to be implemented during an incident. The procedures for specific emergencies are outlined in Section 11.0 and the contact information for local emergency personnel is included in Section 12.0. In the event community health and safety is in question, dialing 911 will summon Fire and Police personnel which can take appropriate actions as necessary.

FIGURE 1: MAP TO HOSPITAL



MAP TO HOSPITTAL

TVGA
CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER EDGEWOOD WAREHOUSE SITE
REMEDIAL INVESTIGATION /
ALTERNATIVES ANALYSIS PROGRAM
320 SOUTH ROBERTS ROAD
DUNKIRK, NEW YORK

PROJ. NO. 2008.0011.00	SCALE: 1: 24000	DATE: MARCH 2008	FIGURE NO. 1

N:\2008.0011.01-EdgewoodRI/AA\Engineering\CADD\CADD\Map to Hospital.dwg 3/14/2008 1:40:19 PM EDT

ATTACHMENT A

CERTIFICATION

TVGA CONSULTANTS

RI/AA OF FORMER EDGEWOOD WAREHOUSE SITE

CERTIFICATION

PROJECT LOCATION: Former Edgewood Warehouse Site, 320 South Roberts Road, City of Dunkirk, Chautauqua County, NY
PROJECT NO. 2008.0011.00

Senior Level Management shall sign this form after she/he has conducted a pre-entry briefing.

Each employee conducting field work shall sign this form after the pre-entry briefing is completed and prior to commencing work on site. A copy of this signed form shall be kept at the site, and the original sent to the PTL, for inclusion into the project file.

Site Personnel Sign-off

☐ I have received a copy of the Site-Specific Health and Safety Plan.

☐ I have read the Plan and will comply with the provisions contained therein.

☐ I have attended a pre-entry briefing outlining the specific health and safety provisions on this site.

Name: ______________________________ Date: ____________
______________________________ Date: ____________
______________________________ Date: ____________
______________________________ Date: ____________
______________________________ Date: ____________
______________________________ Date: ____________

TVGA Project Team Leader

☐ A pre-entry briefing has been conducted by myself on ______________________.

☐ I deferred the pre-entry briefing responsibility to the Site Health and Site Safety Officer (SSO).

Name: ______________________________ Date: ____________________.

ATTACHMENT B

MEDICAL DATA SHEET

TVGA CONSULTANTS

MEDICAL DATA SHEET

This brief Medical Data Sheet will be completed by all personnel potentially working on-site and will be kept in the Support Zone during the performance of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to the hospital facilities is required:

Site: ______________________________

Name: ______________________________ Home Telephone ______________

Address: ______________________________

____

Age: __________ Height: __________ Weight: __________

Person to Contact in Case of Emergency:

______________________________ Phone No. __________

Drug or other Allergies: ______________________________

____

Particular Sensitivities: ______________________________

Do You Wear Contacts? YES NO

Provide a Checklist of Previous Illnesses or Exposures to Hazardous Chemicals:

____

____

____

What Medications are you presently using? ______________________________

____

Do you have any Medical Restriction? ______________________________

____

____

Name, Address, and Phone Number of Personal Physician: ______________________________

____

____

ATTACHMENT C

DIRECT READING AIR MONITORING FORM

TVGA CONSULTANTS

DIRECT READING AIR MONITORING FORM

DATE: ____________________

PROJECT: Former Edgewood Warehouse Site

PROJECT #: 2008.0011.00

WEATHER CONDITIONS: ____________________

WIND DIRECT/SPEED: ____________________

USER: ____________________

CALIBRATION: ____________________

CALIBRATED BY: ____________________

COMMENTS: ____________________

ACTIVITY	INSTRUMENT	WORKING RANGE	TIME	READING	COMMENTS

ATTACHMENT D

NEW YORK STATE DEPARTMENT OF HEALTH GENERIC COMMUNITY AIR MONITORING PLAN

New York State Department of Health
Generic Community Air Monitoring Plan

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

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

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

Community Air Monitoring Plan

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

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

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

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

APPENDIX D

CITIZEN PARTICIPATION PLAN

REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS
FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E93213207032)
320 SOUTH ROBERTS ROAD, CITY OF DUNKIRK
CHAUTAUQUA COUNTY, NEW YORK

CITIZEN PARTICIPATION PLAN

Prepared for:

Chautauqua County Department of Public Facilities
454 North Work Street
Falconer, New York 14733

Prepared by:

TVGA CONSULTANTS

One Thousand Maple Road (716) 655-8842
Elma, NY 14059-0264 (fax) (716) 655-0937

2008.0011.00 MARCH 2008

RI/AA OF FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD, CITY OF DUNKIRK
CHAUTAUQUA COUNTY, NEW YORK

CITIZEN PARTICIPATION PLAN

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROJECT MAILING LIST	1
3.0	IDENTIFICATION OF A LOCAL DOCUMENT REPOSITORY	1
4.0	FACT SHEETS	1
5.0	MEETINGS	2
6.0	RECEIVE AND CONSOLIDATE PUBLIC COMMENTS	2

1.0 INTRODUCTION

The site-specific Citizen Participation Plan (CPP) described herein follows guidelines set forth by the New York State Department of Environmental Conservation (NYSDEC) in their Citizen Participation in New York's Hazardous Waste Site Remediation Program, and has been tailored to the particular needs of the Former Edgewood Warehouse Site (project site). The CPP establishes a framework of activities to provide a context in which two-way communication between Chautauqua County and the community can be attained. The CPP will be proactive, early and ongoing throughout the duration of the investigation.

2.0 PROJECT MAILING LIST

For the purpose of informing the public of all relevant project activities, a mailing list will be compiled by the County and regularly maintained. For these purposes, the term "public" shall include area residents, government officials, media, business interests, environmental and civic groups, and other interested parties. A list of adjacent property owners will be compiled utilizing Section Block Lot (SBL) numbers and their corresponding tax payer information housed at the local municipal building. This portion of the list will be maintained in confidence and will not be included as part of the CPP available at the document repository (as described below). The NYSDEC will review the project mailing list for completeness.

Appropriate media outlets including local newspapers, radio and television stations will be identified and added to the project mailing list. In addition, existing mailing lists comprised of local elected officials, business and other civic and environmental groups will be identified, compiled and supplemented as needed. Enhanced outreach will be conducted to ensure that all parties, including the project staff, with information about the project site are included on the master list.

3.0 IDENTIFICATION OF A LOCAL DOCUMENT REPOSITORY

The local repository will be the Dunkirk Free Library at 536 Central Avenue, Dunkirk, New York because it is situated in a geographic location suitable to the project site and surrounding area, will provide for handicapped accessibility, and will be open to the public outside normal business hours. The repository will help ensure that pertinent documents and other project information are readily available to the public. Through fact sheets and/or meetings described below, the public will be made aware of the repository location.

4.0 FACT SHEETS

A series of fact sheets will be produced and distributed at major milestones within the project. It is anticipated that two fact sheets will be prepared, which will be made available through direct mail to all individuals and organizations included on the mailing list. These fact sheets will be published:

- Prior to initiation of the Remedial Investigation/Alternatives Analysis program,
- Upon announcement of the public comment period for the Proposed Remedial Action Plan,

Additional fact sheets may also be issued throughout the project's duration if necessary, especially if there is significant community interest in the project. Fact Sheets will be one-color, double-sided, 8.5 by eleven inch documents with text and graphics.

5.0 MEETINGS

Given the size and nature of the site investigation, one public meeting may be conducted by the County. The meeting will likely coincide with the issuance of the Proposed Remedial Action Plan (PRAP) and will occur at the beginning of or during the public comment period relative to the PRAP. Meeting dates, times and locations will be announced via press releases to local media outlets, and notices will be sent to all individuals included on the project mailing list.

6.0 RECEIVE AND CONSOLIDATE PUBLIC COMMENTS

All citizen inquiries and comments that are received shall be maintained as part of the project database. All inquiries will be acknowledged and responded to. This feedback loop is a particularly important piece of any public involvement program in that it helps to build and maintain trust, which later becomes critical to public buy-in. This individual attention is seen as a minimal investment in terms of the return the NYSDEC will gain by understanding wide-spread concerns and issues, long before a Record of Decision is reached. In addition to the above-referenced meeting, another public meeting may be scheduled if there is significant public interest in the project.

N:\2008.0011.00-Edgewood Warehouse RI-AA\Engineering\10Deliverables\RI-AA Work Plan\CPP\Edgewood CPP (Appendix D).doc