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# Remedial Action Work Plan
# Operable Unit #1
# Buffalo Business Park Site
# 1800 Broadway
# Buffalo, New York

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Prepared by:

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Prepared for:

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Department of Environmental Remediation
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**Voluntary Cleanup Site No. V00663-9**
**Voluntary Agreement Index No. B9-0637-03-06**

**December 2003 - REVISED**

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# BUFFALO BUSINESS PARK
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# 1.0 INTRODUCTION

## 1.1 PURPOSE AND OBJECTIVE

The purpose of this Remedial Action Work Plan (Work Plan) is to document planned remedial design and remedial action activities. It is also intended to establish the criteria for performing these activities at a predetermined quality at a portion of the Buffalo Business Park, Inc. (Buffalo Business Park) Site located at 1800 Broadway Avenue, in the City of Buffalo, New York (see Figure 1) herein referred to as the subject property or Site. This Work Plan also includes a summary of work previously completed by LCS at the Site subject to the Voluntary Cleanup Agreement (VCA). Buffalo Business Park, Inc., acting as an innocent owner, has agreed to participate in the New York State Department of Environmental Conservation (NYSDEC) Voluntary Cleanup Program (VCP) and enter into a VCA for remedial action under Voluntary Cleanup Site No. V00663-9 and Index No.B9-0637-03-06. This VCA was initiated upon Buffalo Business Park's submittal of a VCA application dated May 23, 2003.

The objective of this Work Plan is to address the known on-site contamination to permit the site to potentially be used as a restricted commercial and restricted industrial property. The data collected during this work will be used to prepare a Remedial Action Report (RAR).

## 1.2 PROJECT BACKGROUND AND SITE HISTORY

The Site is situated on the southwest portion of tax parcel 101.19-1-5 and is described as ALL THAT TRACT OR PARCEL OF LAND situated in the City of Buffalo, County of Erie and State of New York, being part of Lot 42, Township 11, Range 7 of the Holland Land Company's survey, and being more particularly bounded and described as follows: Beginning at a point on the north line of Broadway (99 feet wide, and formerly known as Batavia Street), which point is 1,380.94 feet east of the east line of Bailey Avenue (66 feet wide); thence northerly at an interior angle of $89^{o}$ 41' 18" a distance of 74.40 feet to the TRUE POINT OF BEGINNING; thence easterly at an interior angle of $89^{o}$ 51' 07" a distance of 190.86 feet to a point; thence northerly, along the west face of a brick building, at an interior angle of $90^{o}$ 52';19" a distance of 16.67 feet to a point; thence easterly, along the north face of a brick building, at an interior angle of $269^{o}$ 06' 19" a distance of 57.01 feet to a point; thence northerly at an interior angle of $90^{o}$ 10' 15" a distance of 162.91 feet to a point; thence westerly at an interior angle of $90^{o}$ 07' 58" a distance of 248.09 feet to a point; thence southerly at an interior angle of $89^{o}$ 52' 02" a distance of 180.81 feet to the point and place of beginning. (see Figure 1). The site measures approximately 1.004 acres and is located in a predominantly commercial and industrial area of Buffalo, New York.

According to Historic Sanborn maps, the Site has historically been utilized as a portion of the Buffalo Industrial Park since 1961 and before being converted to the Buffalo Business Park. Prior to that time, the site has been used for railroad transport/tracks associated with the Pullman Car Company from at least 1900 until at least 1950. There is no evidence of historic structures or industrial operations on the Site. Its only apparent use has been for railcar transport and, more recently, automobile drive and parking areas.

Contamination known to exist on-site was discovered during intrusive studies completed between March 2001 and May 2002. The contaminants identified generally consisted of volatile organic compounds (VOCs). Soils were found to contain tetrachloroethene; groundwater was found to contain tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, methylene chloride and vinyl chloride. The extent of the contamination appears to be localized.

## 1.3 PROJECT DESCRIPTION

This Work Plan outlines the scope of work (SOW) for the Site, including the remedial design and remedial action activities, rationale and quality control/quality assurance basis for this scope of work. Additional tasks include preparation of an on-site worker and community health and safety plan (HASP), development of an operation, monitoring and maintenance (OM&M) plan and development of a site characterization plan to address the areas of Operable Unit #1 that are not subject to this Remedial Action. Those plans will also be submitted under separate cover.

## 1.4 PROJECT MANAGEMENT AND ORGANIZATION

### 1.4.1 Personnel

The general responsibilities of key project personnel are listed below.

| | |
|---|---|
| Project Manager | Mr. Robert J. Szustakowski will have responsibility for overall project management. |
| Field Team Leader | Mr. Douglas B. Reid will have responsibility for project management of field activities, coordination of subcontractors and LCS staff, and coordination with NYSDEC. |
| H & S/QA Officer | Mr. Douglas Reid will be responsible for the preparation of the project health and safety plan, and tracking its implementation. Mr. Reid will review the data usability summary (DUSR) prepared by an independent validator. |
| Sample Team Leader | Mr. Alan Schenk will be responsible for sample collection and management. |
| Professional Engineer | Mr. Peter McKee will review work completed and compare to this work plan. |

### 1.4.2 Specific Tasks and Services

LCS has obtained subcontractor specialists for services relating to laboratory/analytical services, data validation services, and field surveying. The planned subcontractors for utilization for the Site are as follows.

| | |
|---|---|
| Laboratory Analysis - | Severn Trent Laboratories, Inc. |
| Data Validation - | Waste Stream Technologies, Inc. |
| Excavation Services - | To be determined. |
| Surveying - | To be determined. |

## 2.0 SUMMARY OF INTRUSIVE STUDIES COMPLETED BY LCS

Prior to the submission of the VCA application, LCS conducted a Phase I Environmental Site Assessment report, dated December 9, 1999, and a draft Phase II Soil and Groundwater Study report, dated March 20, 2003. That work included the Site subject to the VCA.

Between March 2001 and May 2002, LCS conducted an extensive subsurface soil and groundwater investigation during which 27 test borings and 27 monitoring wells (3 permanent and 24 temporary) were installed at the Site. Soil and groundwater samples collected were analyzed for volatile organic compounds (VOCs) in accordance with United States Environmental Protection Agency (USEPA) SW-846 method 5030/8260. Select samples were also analyzed for Resource Conservation and Recovery Act (RCRA) metals and/or semi-volatile organic compounds (SVOCs) in accordance with USEPA SW-846 methods 6010/7471 or 7470 and 3550 or 3510/8270. The results of that analysis are summarized in Table 1 located in the Appendix. Refer to Figure 2 for sample locations. Additional assessment, as requested by the NYSDEC, will be completed as part of the Investigation Work Plan, submitted under separate cover.

## 2.1 IDENTIFICATION OF APPLICABLE STANDARDS, CRITERIA AND GUIDANCE

Based on LCS' understanding of site conditions and project goals, the following lists possible standards, criteria and guidance (SCGs) were evaluated for applicability to remedial design and/or action at the Site.

| **SCG' for Remedial Action** | **Applicability Determination** |
|---|---|
| Standards | |
| 29 CFR 1910.120 | Applicable –Incorporated into the Health and Safety Plan |
| 40 CFR Part 144 | Not Applicable |
| 10 NYCRR Part 67 | Not Applicable |
| 12 NYCRR Part 56 | Not Applicable |
| 6 NYCRR Part 175 | Not Applicable |
| 6 NYCRR Part 361 | Not Applicable |
| 6 NYCRR Part 371 | Not Applicable |
| 6 NYCRR Part 372 | Not Applicable |
| 6 NYCRR Subpart 373-4 | Not Applicable |
| 6 NYCRR Subpart 374-1 | Not Applicable Under VCA |
| 6 NYCRR Subpart 374-3 | Not Applicable |
| 6 NYCRR Part 375 | Not Applicable |
| 6 NYCRR Part 376 | Not Applicable |
| 6 NYCRR Subpart 374-3 | Not Applicable |
| 6 NYCRR Part 375 | Not Applicable Under VCA |
| 6 NYCRR Part 376 | Not Applicable |
| 19 NYCRR Part 600 | Not Applicable |
| 6 NYCRR Part 608 | Not Applicable |
| 6 NYCRR Part 661 | Not Applicable |
| 6 NYCRR Part 662 | Not Applicable |
| 6 NYCRR Part 663 | Not Applicable |
| 6 NYCRR Parts 700-706 | Applicable –Incorporated into the Site Characterization Plan |
| 6 NYCRR Part 750-758 | Not Applicable |
| Guidances | |
| TAGM 4013 | Not Applicable |
| TAGM 4031 | Applicable – Incorporated into the Remedial Action Plan |
| TAGM 4032 | Applicable –Incorporated into the Remedial Action and Site Characterization Plans |
| TAGM 4046 | Applicable –Incorporated into the Remedial Action & Site Characterization Plans |
| TAGM 4048 | Applicable – Used to develop the Remedial Action Plan |
| TAGM 4059 | Not Applicable |
| TAGM 3028 | Not Applicable |
| TOGS 1.3.1 | Not Applicable |
| TOGS 1.3.8 | Not Applicable |
| TOGS 2.1.2 | Not Applicable |
| Air Guide 1 | Not Applicable |
| State Coastal Management Policies | Not Applicable |
| Solidification/Stabilization & its Application to Waste Materials | Not Applicable |
| OSWER Directive 9200.4-17 | Not Applicable |
| NYSDOH Environmental Health Manual CSFP-530 | Not Applicable |

Based on conversations with the NYSDEC, site specific action levels (SSALs) have been established by the NYSDEC for the on-site soils and groundwater. Generally in soil, individual VOCs must be ≤ 1mg/kg and total VOCs must be ≤ 10mg/kg. Groundwater at the property boundaries must be ≤1 mg/l total VOCs.

# 3.0 REMEDIAL ACTION AND REMEDIAL TECHNOLOGY DESCRIPTION

## 3.1 GENERAL

The purpose of the remedial action is to remove impacted soils and groundwater to the extent necessary to comply with SSALs, or to the point at which continued excavation of contaminated soils is no longer practical. The primary goal is to provide adequate protection of public health and the environment.

Soils in the work area will be excavated vertically to bedrock (approximately 14 ft. bgs). During the excavation, suspected non-impacted soils will be placed adjacent to the excavation on and covered with 6 mil thick polyethylene sheeting. Known or suspected impacted soils will be excavated, loaded directly into trucks and transported to an area outside of the Site, but on a contiguous parcel also owned by the VCA volunteer (see Figure 3), for temporary staging prior to placement into an ex-situ SVES for remediation. The excavation will be continued horizontally until it appears soils have been sufficiently removed to allow removal of the impacted groundwater and to meet SSALs. The anticipated extent of excavation is based on previous studies completed on-site. The need for additional work will be determined through evaluation of the excavation confirmatory soil and groundwater sample results.

Groundwater encountered during the excavation process will be pumped from the excavation, stored temporarily on-site in specialized holding tanks and disposed of either through the local publicly owned treatment works (POTW) facility or at an approved off-site disposal facility, depending on the contaminant concentrations and the POTW requirements. Remedial work, environmental sampling and other field activities will be performed in general accordance with the techniques outlined below. A listing of appropriate guidance documents is appended to this document. (See Appendix A)

The following activities are planned.

## 3.2 PRE-REMEDIAL TASKS

Prior to the on-site remedial work, several tasks are warranted. These tasks include obtaining any necessary permits, notifying the underground facilities protection organization (UFPO), constructing a decontamination pad on-site, inspecting the site for potential health and safety hazards, marking the proposed excavation area and installation of fencing to isolate the excavation and soil staging areas.

### 3.2.1 Decontamination Pad

Prior to the initiation of field activities, an equipment decontamination pad will be constructed by the excavation subcontractor in the equipment decontamination area (see Figure 3). All equipment will be decontaminated in that area. Heavy equipment used to construct the SVES system will be mobilized from the work location to the decontamination area as necessary.

The decontamination pad will be constructed so that liquid and solid wastes can be contained and subsequently collected. The decontamination pad will be constructed using wood and high density polyethylene (HDPE) plastic or similar material as a barrier with raised berms on each side to contain decontamination water and of a sufficient size to accommodate any equipment to be decontaminated (see Section 7.5). The pad will be equipped with a sump area to allow for ready collection of decontamination waters. Decontamination waters will be stored in covered drums located adjacent to the decontamination pad. [Decontamination waters will be disposed of in the same manner as the groundwater removed from the excavation.] The decontamination pad will be reconstructed as necessary to maintain its integrity. The actual decontamination area will be chosen based on field conditions. Equipment will be decontaminated as specified in section 7.5 of this work plan.

## 3.3 SOIL REMOVAL

Under the supervision of LCS, the excavation contractor will utilize a track-mounted excavator to remove the asphalt pavement and sub base and stage it in a designated area located outside of the Site, but on a contiguous parcel also owned by the VCA volunteer (see Figure 2 for the area of excavation and Figure 3 for the location of the staging areas). This excavated asphalt pavement and sub base material will remain where it is staged for the foreseeable future. No analysis of this material is planned as there is no reason to suspect it has been in contact with the VOCs encountered at depth. The excavation will proceed with suspect non-impacted soils segregated from suspect impacted soils, based on field observations. All suspected non-impacted soils will be placed onto and covered with 6 mil thick polyethylene sheeting adjacent to the excavation. All soils known or suspected to be impacted will be excavated, placed directly into dump trucks, transported to a separate staging area adjacent to the SVES location and placed onto and covered with 6 mil thick polyethylene sheeting for eventual placement into the SVES treatment system.

The excavation will be continued vertically until bedrock is encountered (estimated at approximately 14 ft. bgs), impacted soils have been sufficiently addressed or the depth of the excavation or safety concerns preclude the continuation of work. The excavation will be continued horizontally until it appears impacted soils and/or groundwater has been sufficiently addressed pursuant SSALs.

## 3.4 GROUNDWATER REMOVAL

During the course of soil excavation, impacted groundwater is likely to enter the excavation. That water will be pumped from the excavation into portable holding tanks using pumps and hoses approved for such material. (Hoses used to pump impacted groundwater will be disposed of at an approved facility at the completion of the project.) When removal of groundwater is no longer necessary or practical [i.e., soil SSALs have been achieved and areas of groundwater contamination of greater than SSALs have been excavated], the excavation will be discontinued.

### 3.4.1 Groundwater Disposal

Groundwater contained on-site will be tested in accordance with the requirements of the POTW. Provided the groundwater meets the discharge parameters of the POTW it will be discharged into the sanitary sewer. If the groundwater requires treatment to meet POTW requirements (e.g., carbon filtering), the NYSDEC will be advised of the work associated with that task.

## 3.5 SITE RESTORATION

When the excavation is deemed complete, it will be backfilled with pea-gravel and #1 or #2 crusher-run gravel from a local quarry. Excavated non-impacted (soils containing VOCs below SSALs as determined in accordance with the procedures listed in section 5.0) will be returned to the excavation. Excavated soils will be placed toward the top of the excavation. Restoration of the excavated area will be complete when the area is paved with new asphalt and the temporary fence removed.

## 3.6 CONSTRUCTION OF EX-SITU SVES

Contaminated soils will be placed into an ex-situ SVES system to facilitate removal of VOCs from the soil through the application of vacuum through slotted piping placed in to the stockpiled soil. Vapors removed from the impacted soils will be treated prior to discharge to the atmosphere. The following section details the tasks associated with construction of the SVES.

### 3.6.1 CONSTRUCTON AREA PREPARATION

Prior to construction of the SVES, the area (estimated at approximately 100 ft. by 45 ft.) will be graded to nearly level and stones and other potentially sharp materials will be removed. An approximate two inch layer of sand will be spread over the ground surface to further protect the SVES base from rupture during placement of the impacted soils.

### 3.6.2 SVES Base

An 30 mil thick impermeable geomembrane will be placed over the sand layer prior to placement of contaminated soils. Seams will be overlapped and taped. An earthen berm (using non-impacted excavated soils), approximately 12 inches in height will be placed around the SVES base.

### 3.6.3 Placement of Contaminated Soils

Contaminated soils will be transferred from the staging area to the SVES location. The soils will be carefully placed onto the geomembrane. Following placement of the soils, the top of the pile will be graded to remove voids in the top of the mound. Two foot wide trenches will be excavated throughout the soil mound to a depth approximately half way to the bottom of the soil mound. Currently, the soil mound is expected to measure approximately 80 ft. by 35 ft by 6 ft. The actual dimensions will be determined based on the volume of soil to be treated.

### 3.6.4 Placement of Slotted Piping

Prior to installation, the trench excavations will be lined with geotextile fabric to retain fines, but to permit the transmission of air/vapors. Two-inch diameter, 0.020 inch Schedule 40 slotted piping will be installed and surrounded with approximately 6 to 12 inches of pea-gravel and covered with geotextile fabric. The piping will be installed parallel to one another and spaced a maximum of approximately 10 feet on-center. The piping will be placed toward the middle of the soil mound. Approximately three feet of soil will be beneath and above the slotted piping (see Figures 4 and 5)..

### 3.6.5 Vacuum Monitoring Points/Vent Point

Two inch diameter Schedule 40 PVC monitoring points will be installed in the soil mound to allow monitoring of the applied vacuum and to allow atmospheric air to enter the soils and assist in vapor flow. Installation will be completed as summarized below.

Temporary 6 inch diameter Schedule 40 PVC casings will be installed during placement of the impacted soils into the SVES. The remainder of the impacted soils will be placed into the SVES surrounding each casing. Each of the 14 monitoring /vent points will be installed using approximately 4 feet of 0.020 inch slotted screen and approximately four feet of solid two inch diameter Schedule 40 PVC pipe. Morie sand (#0) will be placed around the slotted section. A hydrated bentonite seal will be installed from the top of the sand to the top of the soil mound. The six inch diameter PVC casings will then be removed by lifting them out with a backhoe or similar method.

### 3.6.6 SVES Cover

Approximate 30 mil thick Geomembrane fabric will be placed over the contaminated soil mound. Seams will be overlapped and taped. The cover will shed water such that it does not contact the contaminated soils within the SVES. As such, no sump or collection point will be necessary. Weights will be applied to the cover as necessary.

### 3.6.7 Equipment Construction

The two inch diameter Schedule 40, 0.020 inch slotted PVC piping, will be connected to two inch diameter Schedule 40 solid PVC piping and routed to one manifold equipped with two inch diameter PVC ball valves to regulate vacuum pressures. A knock out vessel (equipped with a high-level shut-off to prevent operation of the SVES if the knock out vessel is full of water) will be installed after the manifold. A six horse power (hp) rotary vane blower will to apply vacuum to the soils. The blower will be equipped with a vacuum gauge to measure the applied vacuum. Discharge piping from the blower will be connected to an activated carbon vessel(s) to reduce effluent concentrations. A regulator valve will be installed on the effluent side of blower to regulate the pressure exerted on the carbon vessels, as necessary. All mechanical and electrical systems will be non-explosion proof (unless free-phase solvent product is encountered) and will be located within an approximate 8 foot by 10 foot lockable enclosure. Sample ports will be installed in each leg at each header, before the carbon vessel(s) and after the carbon vessel(s) (see Figures 4 and 5).

Details specific to SVES startup, monitoring and maintenance will be submitted within the Operation and Maintenance (O&M) plan provided under separate cover.

## 4.0 POST EXCAVATION CONFIRMATORY SOIL SAMPLING

Confirmatory soil samples will be collected from the sidewalls and floor (if competent bedrock is not present) to determine if sufficient soils have been removed to satisfy the applicable SSALs. Generally, one soil sample will be collected for every approximate 30 linear feet (or fraction thereof) of the sidewalls of the excavation, at depths believed most likely to be impacted. One soil sample will be collected for every approximate 900 square feet (or fraction thereof) of the excavation floor, if appropriate. If soils are not homogeneous within the contaminated zone, additional soil samples will be collected from those areas. Actual locations will be determined in the field based on site conditions and observations. The estimated number of samples collected for analytical testing from each environmental media, including appropriate quality assurance samples, is summarized in Table 2. Sample designation, location rationale, estimated depths and testing parameters are summarized in Table 3. Monitoring well designation, proposed location, rational and testing parameters are summarized in Table 3.

## 5.0 SAMPLING OF NON-IMPACTED SOIL MOUND

Confirmatory soil samples will be collected from the soil mound containing the believed non-impacted excavated soils to determine if they may be reused on-site. Generally, soil samples will be collected as summarized within the following Table.

| Soil Quantity | # of Grab Samples | # of Composite Samples |
|---|---|---|
| 0-50 $yd^3$ | 1 | 1 |
| 50-100 $yd^3$ | 2 | 1 |
| 100-200 $yd^3$ | 3 | 1 |
| 200-300 $yd^3$ | 4 | 1 |
| 300-400 $yd^3$ | 4 | 2 |
| 400-500 $yd^3$ | 5 | 2 |
| 500-800 $yd^3$ | 6 | 2 |
| 800-1,000 $yd^3$ | 7 | 2 |

Best engineering judgment will be used to determine the most appropriate sampling locations. Soil samples will be collected using the excavator bucket. Surface soils will not be used as sampling material.

## 6.0 POST EXCAVATION WATER SAMPLING

Groundwater samples will be collected from one groundwater monitoring well installed after the excavation is backfilled. That monitoring well will be located within the center of the former excavation. The well installation and designation will be consistent with the Investigation Work Plan, submitted under separate cover.

### 6.1 MONITORING WELL INSTALLATION

One monitoring well will be installed within the center of the excavation using a rotary auger rig equipped with 4 ¼ inch inside diameter hollow stem augurs (HSA). No sampling will be completed; rather the augers will be advanced to the bottom of the excavation and the well installed. The excavation monitoring well will be constructed of 2 inch diameter flush jointed Schedule 40, PVC riser and screen. The screen will consist of a maximum 10-foot long section of 0.010-inch factory slotted PVC piping. Following placement of the assembled screen and riser, the annular space of the borehole will be backfilled. Generally, this will include the placement of a sand filter pack consisting of Morie sand (#0) around the well screen such that the sand extends a minimum of 1 foot above the top of the screen. A minimum two foot layer of bentonite pellets will be placed above the sand filter, tap water will be poured over pellets and they will be allowed time to hydrate. If necessary, a mixture of cement/bentonite will be placed on top of the bentonite seal and used to fill the annulus to approximately 1 foot below the ground surface. The monitoring well will be completed with an expandable locking well cap and locked. As the work area will be used as a parking and drive area, a flush mount protective casing will be utilized. Concrete will be then placed in the borehole around the protective casing and sloped away from the casing to limit surface water from entering the well.

Materials used in well installation will be stockpiled in an on-site storage area (provided a secure and appropriate location can be identified) for use as necessary. Items will be brought to the site clean and in like-new condition and kept clean and in satisfactory condition for potential use. Well materials (screen and riser pipe), will not be cleaned on-site prior to use unless the protective wrap is compromised. If decontaminating the well piping is deemed necessary, it will be washed by steam cleaning or high pressure hot water rinse. If necessary the well materials will be wrapped in clean plastic sheeting for transportation to the well location. Site personnel handling well equipment after cleaning are required to wear clean rubber gloves. A typical well installation diagram is included in Appendix B.

Monitoring wells installed during this work will be designated as follows:

VCA MW – Monitoring well proposed for this work

# 7.0 SAMPLE COLLECTION PROCEDURES AND RATIONALE

The fieldwork is focused on collecting high-quality current environmental data to determine the effectiveness of the Remedial Action and to determine the need for additional remedial work. Environmental sampling and other field activities will be performed in general accordance with the appropriate techniques as outlined below.

## 7.1 EXCAVATION SOIL SAMPLING

Due to safety concerns outlined in the HASP provided under separate cover, soil samples from within the excavation will be collected with the bucket of the excavator. A portion of the soil that was not in contact with the excavator bucket will be collected using a metal trowel. Samples for VOCs will be transferred to the required sample containers, slightly tamped-down, filled to near the top of the container, and sealed with the appropriate cap. Any soil or sediment on the threads of the container will be wiped off with a clean paper towel or equivalent prior to placing the cap on the sample container.

### 7.1.1 Headspace Screening

Soil screening will be performed by headspace screening with the photoionization detector (PID) equipped with a 10.2 or 10.6 eV lamp and calibrated in accordance with manufacture's specifications. A portion of each sample will be collected for VOC analysis and containerized to minimize loss of potential VOC constituents present in the soil sample. A representative portion of each sample will be placed into PVC bags and allowed to equilibrate to ambient temperature. The container will be slightly opened and the PID probe will be placed within the headspace of the container to allow for a reading of the VOCs within the headspace. The PID readings will be recorded on the subsurface logs and the field book. PID measurements will be used to assist in determining when impacted soils are present or appear to have been removed such that they will meet SSALs.

## 7.2 GROUNDWATER SAMPLING

Groundwater from the excavation will be sampled through excavation monitoring well #1, installed following backfilling of the excavation. The results of the subsequent laboratory analysis will be compared to the SSALs and will determine the need for further groundwater treatment. Generally, this well will be developed and sampled in a manner consistent with that of the wells installed as part of the Investigation Work Plan provided under separate cover.

Groundwater sampling from monitoring well will include initial recording of data, purging of the well, and collection of the sample. The text below addresses these items.

### 7.2.1 Initial Data Recording

Groundwater sampling begins by locating the well to be sampled and recording the appropriate field data, as summarized below.

- Observations of the well (conditions of cap, collar, casing, etc.) and the ambient conditions (weather, surrounding area, date and time, sampling crew members, and observers, if any. See also section 10.1 for information to be recorded in the field notebook.).
- Unlocking the well cover, surveying ambient air, upwind air, and air directly at the top of the well
- Taking a water level measurement, noting the reference point from which the measurement is made (typically a mark on the north lip of the inner casing).
- Sounding the bottom of the well and agitating/loosening accumulated silt/sediment (this assumes sounding indicates minimal sediment accumulation and no need for well redevelopment).

### 7.2.2 Well Development/Well Purging

The newly installed monitoring well will be developed prior to sampling. The monitoring well will be developed to remove residual sediments and to ensure good hydraulic connection with the water-bearing zone. The monitoring well will be developed after a minimum of two days subsequent to installation (to allow grout utilized in well installation to set). Development of the well will not occur until the groundwater elevation within the excavation appears to have reached static levels as determined through gauging of the groundwater elevation for two or more days. The monitoring wells will be developed as follows.

After the initial observations are recorded, the total volume of water within the well is calculated. The well is then purged of at least three volumes of standing water. Purging will be accomplished by bailing and/or inertial pumping, using a gasoline powered centrifugal pump connected to dedicated Teflon® tubing connected to a foot valve set within the well, to remove water from the well. Prior to removal of the first volume of water, and after each subsequent volume of water removed, field parameters (pH, turbidity, temperature and specific conductance) will be measured and recorded to document the presence of representative water in the well (i.e., equilibration to steady readings), or as an indicator that conditions have not reached a steady state. Prior to sample collection, the variability of field testing results between successive well volumes should not vary by more than 10% for turbidity and specific conductance, ±0.2 units for pH, and ±0.5 °C for temperature. The turbidity objective is less than 50 nephelometric turbidity units (NTUs); if parameters are stable but turbidity is still greater than 50 NTU, purging will continue until 50 NTU is achieved, or five well volumes are evacuated (whichever comes first). A minimum of three well volumes and a maximum of five volumes will be removed from the well prior to sampling.

In the event that groundwater recharge is slow, the purging process will continue until the well is purged "dry". After the water level has returned to its pre-purge level (or within a maximum of two hours), samples will be collected. If the water level is slow to recharge and does not reach to its pre-purge level within two hours, then samples can be collected after sufficient water has recharged, and the degree of recharge indicated in field notes with time and depth to water noted.

### 7.2.3 Groundwater Sampling

Prior to groundwater sampling, the monitoring well will have been developed in accordance with SOPs described in section 7.2.2. Bailers will be used for sample collection and will be equipped with a bottom check-valve. Bailers will be dedicated and made of disposable PVC. Bailers will be clean upon arrival at the site, therefore, site decontamination of bailers will not be necessary. Bailers will be lowered gently into the well with dedicated polyethylene or polypropylene line.

#### Sample Collection

Once field parameters are within specific limits as described within section 7.2.2, groundwater will be collected for analysis. Groundwater for VOC analysis will be collected as follows.

Two or three (depending on laboratory-specific requirements) 40-ml glass vials (with Teflon septa) will be used to collect samples for VOCs. The vials will be filled by gently pouring water from the top of the bailer into the vial until a convex meniscus is formed. The vials will be filled concurrently, alternating between vials. The vials will then be capped, inverted and inspected for air pockets/bubbles that may be present on the inside surfaces of the vial. If any bubbles or aggregate of bubbles are observed, then a new sample will be obtained using a new vial.

## 7.3 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) SAMPLING

In order to provide control over the collection of environmental measurements and subsequent validation, review and interpretation of generated analytical data, QA/QC samples are required.

### 7.3.1 Non-Aqueous Matrix

Equipment (Rinsate) Blanks

The purpose of this sample is to assure proper decontamination of the soil sampling equipment. The performance of field blanks requires two sets of identical bottles; one set filled with demonstrated analyte-free water provided by the laboratory and one empty set of bottles. The bottles will be either 40 ml septum vials or 4 oz. wide mouth vials. At the field location, in an area suspected to be contaminated, the water will be passed from the full set of bottles over the decontaminated sampling devices (sampling trowel) into the empty set of bottles. This will constitute identical bottle-to-bottle transfer. The blanks must be preserved in the same manner as samples and will only be analyzed for volatile organics. One rinsate blank will be collected for every 20 soil samples submitted to the laboratory or one each week, whichever is more frequent. For logistical purposes, the laboratory will provide at least one additional 40 ml vial to perform the field blank. As the soil sample will be collected from soil that did not contact the excavator bucket, no rinsate blank from the bucket will be performed.

Trip Blanks

Trip blanks will not be required for non-aqueous matrix samples.

Duplicate Samples

The purpose of this sample is to assess the quality of the laboratory analyses. Field duplicate non-aqueous matrix samples will be collected at a frequency of one per 20 environmental samples submitted to the laboratory for analysis. Obtaining duplicate samples in soil requires homogenization of the sample aliquot prior to the filling of sample containers. Regardless, volatile organic samples must always be taken from discrete locations or intervals without compositing or mixing.

All duplicate samples must be submitted to the laboratory as blind samples. A note within the field log shall be made referencing the sample location of all duplicate samples (e.g., DUP1 = Excavation Sample #1).

### 7.3.2 Aqueous Matrix

Equipment (Rinsate) Blanks

The purpose of this sample is to assure the disposable bailers are clean when received from the vendor. The performance of field blanks requires two sets of identical bottles; one set filled with demonstrated analyte free water provided by the laboratory and one empty set of bottles. The bottles should be either 40 ml septum vials or 4 oz. wide mouth vials. At the field location, in an area suspected to be contaminated, the water will be passed from the full set of bottles through the decontaminated sampling devices (disposable bailer) into the empty set of bottles. This will constitute identical bottle-to-bottle transfer. Field blanks must be preserved in the same manner as samples and will be analyzed for all the same parameters as samples collected that day. One field blank will be collected per workday. For logistical purposes, the laboratory will provide at least one additional 40 ml vial to perform the field blank. Aqueous water samples will be analyzed for volatile organics only.

### Trip Blanks

The purpose of the trip blank is to determine whether the sample vials and/or samples have been impacted by contaminants throughout their use. Trip blanks consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte free water. These bottles will accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never to be opened by LCS personnel. Each trip blank will be analyzed for volatile organic parameters only. Trip blanks must be included at a rate of one per sample shipment except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

### Duplicate Samples

The purpose of these samples is to assess the quality of the laboratory analyses. Duplicate aqueous matrix samples will be collected at a frequency of one per 20 environmental samples submitted for laboratory analysis. One is to be collected during the sampling of the monitoring well installed within the excavation following backfilling activities.

The duplicate sample should be created by alternating filling sample containers in nearly equal portions. This will help to make sure that the two samples are homogenous.

## 7.4 AIR SURVEILLANCE AND MONITORING

Air sampling is not anticipated as part of this work plan. Air surveillance screening of volatile compounds for health and safety concerns will be performed with a portable Photovac photoionization detector (PID) or equivalent. Monitoring will be performed during invasive activities such as excavation, SVES construction, drilling, monitoring well installation, well development, and sampling. Additional details are presented in the site specific HASP provided under separate cover.

## 7.5 EQUIPMENT DECONTAMINATION

To avoid cross contamination, non-dedicated sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the following procedures outlined below.

### 7.5.1 Non-Dedicated Reusable Equipment

Non-dedicated reusable equipment such as trowels will be decontaminated between each use. Decontamination typically involves scrubbing/washing with a laboratory grade detergent (e.g. alconox) to remove visible contamination, followed by potable (tap) water. Tap water may be used from any treated municipal water system. Equipment will be allowed to air dry prior to use. Steam cleaning or high-pressure hot water cleaning may be used in the initial removal of gross, visible contamination.

### 7.5.2 Heavy Equipment

Certain heavy equipment such as the excavator, etc., may be used to obtain soil samples. Such equipment will be subject to high-pressure hot water or steam cleaning between uses. A member of the sampling team will visually inspect the equipment to check that visible contamination has been removed by this procedure prior to sampling. Samples submitted for analysis will not include material that has been in contact with the excavator bucket. Decontamination of heavy equipment will be completed on the decontamination pad.

### 7.5.3 Groundwater Holding Tanks

Groundwater holding tanks will be cleaned until no visual sediment remains using a hot water high-pressure wash or comparable method. Wash waters will be discharged to the POTW, once approved. No testing of the tank interior wash waters is anticipated.

### 7.5.4 Groundwater Pump(s) and Hose

Groundwater pumps will be cleaned using a hot water high-pressure wash. Wash waters will be discharged to the POTW, once approved. Hoses used to transmit groundwater to the holding tanks will be containerized and disposed of at an approved disposal facility.

## 7.6 GROUNDWATER SAMPLING

Groundwater from the excavation will be sampled through a groundwater monitoring well, installed following backfilling of the excavation (see above). The results of the subsequent laboratory analysis will be compared to the SSALs and will determine the need for further groundwater treatment.

Groundwater sampling from monitoring wells includes initial recording of data, purging of the well, and collection of the sample. The text below addresses these items.

### 7.6.1 Initial Data Recording

Groundwater sampling begins by locating the well to be sampled and recording the appropriate field data, as summarized below.

- Observations of the well (conditions of cap, collar, casing, etc.) and the ambient conditions (weather, surrounding area, date and time, sampling crew members, and observers, if any. See also section 10.1 for information to be recorded in the field notebook.).
- Unlocking the well cover, surveying ambient air, upwind air, and air directly at the top of the well
- Taking a water level measurement, noting the reference point from which the measurement is made (typically a mark on the north lip of the inner casing).
- Sounding the bottom of the well and agitating/loosening accumulated silt/sediment (this assumes sounding indicates minimal sediment accumulation and no need for well redevelopment).

### 7.6.2 Well Development/Well Purging

The newly installed monitoring well will be developed prior to sampling. The monitoring well will be developed to remove residual sediments and to ensure good hydraulic connection with the water-bearing zone. The monitoring well will be developed after a minimum of two days subsequent to installation (to allow grout utilized in well installation to set). Development of the well will not occur until the groundwater elevation within the excavation appears to have reached static levels as determine through gauging of the groundwater elevation for two or more days. The monitoring well will be developed as follows.

After the initial observations are recorded, the total volume of water within the well is calculated. The well is then purged of at least three volumes of standing water. Purging will be accomplished by bailing and/or inertial pumping, using a gasoline powered centrifugal pump connected to dedicated Teflon® tubing connected to a foot valve set within the well, to remove water from the well. Prior to removal of the first volume of water, and after each subsequent volume of water removed, field parameters (pH, turbidity, temperature and specific conductance) will be measured and recorded to document the presence of representative water in the well (i.e., equilibration to steady readings), or as an indicator that conditions have not reached a steady state. Prior to sample collection, the variability of field testing results between successive well volumes should not vary by more than 10% for turbidity and specific conductance, $\pm 0.2$ units for pH, and $\pm 0.5$ $^{o}$C for temperature. The turbidity objective is less than 50 nephelometric turbidity units (NTUs); if parameters are stable but turbidity is still greater than 50 NTU, purging will continue until 50 NTU is achieved, or five well volumes are evacuated (whichever comes first). A minimum of three well volumes and a maximum of five volumes will be removed from the well prior to sampling.

In the event that groundwater recharge is slow, the purging process will continue until the well is purged "dry". After the water level has returned to its pre-purge level (or within a maximum of two hours), samples will be collected. If the water level is slow to recharge and does not reach to its pre-purge level within two hours, then samples can be collected after sufficient water has recharged, and the degree of recharge indicated in field notes with time and depth to water noted.

### 7.6.3 Groundwater Sampling

Prior to groundwater sampling, the monitoring well will have been developed in accordance with SOPs described in section 7.2.2. Bailers will be used for sample collection and will be equipped with a bottom check-valve. Bailers will be dedicated and made of disposable PVC. Bailers will be clean upon arrival at the site, therefore, site decontamination of bailers will not be necessary. Bailers will be lowered gently with minimal water agitation into the well with dedicated polyethylene or polypropylene line.

#### Sample Collection

Once field parameters are within specific limits as described within Section 7.2.2, groundwater will be collected for analysis. Groundwater for VOC analysis will be collected as follows.

Two or three (depending on laboratory-specific requirements) 40-ml glass vials (with Teflon septa) will be used to collect samples for VOCs. The vials will be filled by gently pouring water from the top of the bailer into the vial until a convex meniscus is formed. The vials will be filled concurrently, alternating between vials. The vials will then be capped, inverted and inspected for air pockets/bubbles that may be present on the inside surfaces of the vial. If any bubbles or aggregate of bubbles are observed, then a new sample will be obtained using a new vial or the same vial.

# 8.0 SAMPLE HANDLING

## 8.1 SAMPLE IDENTIFICATION/LABELING

Samples will be assigned a unique identification using the sample location or other sample-specific identifier. The general sample identification format follows.

SL-XX-YY

Where:

SL = Location identifier (2 characters, as below)

EX = Excavation
EB = Equipment (Field Rinsate) Blank
TB = Trip Blank
VCA-MW = Groundwater monitoring well installed as part of this work

XX = Numerical location identifier (1 or 2 characters). This will ordinarily be a number corresponding to the sample location and will correspond to notations made within the sampling team member's field book.

YY = Numerical sample identifier (2 or 3 characters). This will ordinarily be an arbitrary, sequential number and will correspond to sample location information and numbering.

QC field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using the same system as the original. The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain-of-custody kept by the sampler and copied to the project manager. To the extent possible, sample containers will be labeled in the field prior to the collection of samples (the exact locations of soil samples to be collected are unknown, thus these containers cannot be fully labeled prior to collection). Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent water-proof ink.

- Site name, location, and job number;
- Sample identification code;
- Date and time;
- Sampler's name;
- Preservative;
- Type of sample (e.g., soil, water, etc.); and
- Requested analyses.

## 8.2 SAMPLE, BOTTLES, PRESERVATION, AND HOLDING TIME

Table 5 specifies the analytical method, matrix, holding time, containers, and preservatives for the various analyses to be completed. Sample bottle requirements, preservation, and holding times are discussed further below.

### 8.2.1 Sample Bottles

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements and any regulatory protocol requirements. All sample containers will be certified clean as provided by the analytical laboratory under sample bottle tracking sheets.

### 8.2.2 Sample Preservation

Samples will be preserved as detailed below and summarized on Table 5.

Soil Samples

Analytical (all analysis) - cooled to 4 °C with ice; no chemical preservatives added.

Aqueous Samples

Volatile Organics (VOCs) - cooled to <4 °C; HCl added.

Aqueous Samples

Groundwater for discharge to the POTW will be preserved in accordance with their requirements.

Sample preservation is checked upon sample receipt by the laboratory; this information is reported to the LCS quality assurance officer. If it appears that the level of chemical preservation added is not adequate, laboratory preservative preparation will be modified or additional preservative will be added in the field by the sampling team.

### 8.2.3 Holding Times

Holding times are judged from the verified time of sample receipt (VTSR) by the laboratory; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection. Holding time requirements will be those specified in the NYSDEC Analytical Services Protocol (ASP) (June 2000); it should be noted that for some analyses, these holding times are more stringent than the holding time for the corresponding USEPA method. Holding times for analytical parameters are included on Table 5.

Although trip blanks are prepared in the analytical laboratory and shipped to the site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

## 8.3 CHAIN-OF-CUSTODY AND SHIPPING

A chain-of-custody form will trace the path of sample containers from the project site to the laboratory. A sample Chain-of-Custody Form to be used in shipping the samples to the laboratory is included in Appendix B, Field Forms. Sample/bottle tracking sheets or the chain-of-custody will be used to track the containers from the laboratory to the containers' destination. The project manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. All sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to fieldwork.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in sealable plastic bags to prevent leaking) to maintain the samples at 4°C. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain-of-custody forms will be signed and placed in a sealed plastic bag in the cooler. The completed shipping container will be closed for transport with shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing "Environmental Samples" and the cooler will be picked up by, shipped by an overnight delivery service or hand delivered to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form and provide one copy to the Project Manager to verify receipt.

# 9.0 DATA QUALITY REQUIREMENTS

## 9.1 ANALYTICAL METHODS

Analyses for VOCs will utilize NYSDEC Analytical Services Protocol (ASP) 2000 methods as follows:

| | |
|---|---|
| Volatile Organics | OLMO4.2/ASP 2000 |

Analytical methods used during this project are presented in the NYSDEC Analytical Services Protocol (ASP), June 2000. Specific methods and references for each parameter are shown above. It is the laboratory's responsibility to be familiar with this document and procedures and deliverables within it.

LCS has subcontracted an analytical laboratory approved by NYSDEC. A single laboratory (Severn Trent Laboratories) will be utilized. Severn Trent Laboratories is certified by the NYSDOH Environmental Laboratory Approval Program and is in good standing for all the ASP/CLP parameter groups.

Analytical methods for disposal of the impacted groundwater will meet the requirements of the POTW.

## 9.2 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQOs) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this document will be used in assessing the uncertainty associated with decisions related to this site.

### 9.2.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is established by NYSDEC as part of the ASP-CLP. It is understood that such limits are dependent upon matrix interference. Quantitation limits are defined for each parameter and matrix within the NYSDEC ASP.

### 9.2.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Laboratory duplicate analyses will be performed once for every twenty samples or a minimum of one per sampling event, as specified in the NYSDEC ASP.

Relative Percent Difference (RPD) criteria, prescribed by the NYSDEC, and those determined from laboratory performance data, are used to evaluate precision between duplicates. A matrix spike duplicate will be performed once for every twenty samples for volatile organics.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value minus minimum value), and relative range are common, and may be used pending review of the data.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples for metals analyses, and matrix spikes and matrix spike duplicates for organic analyses. It will be expressed as the relative percent difference (% RPD):

$\% \text{ RPD} = 100 \times (X_1 - X_2) / (X_1 + X_2)$

where:

$X_1$ and $X_2$ are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is $\leq$ 50% RPD for all matrices.

### 9.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent recovery criteria, published by the NYSDEC as part of the ASP, and those determined from laboratory performance data, are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike will be performed once for every sample delivery group (SDG) as specified in the ASP. This will apply to volatile organic analyses. Sample (matrix) spike recovery is calculated as:

$\%R = (SSR - SR)/SA \times 100$,

where:
SSR = Spiked Sample Result
SR = Sample Result, and
SA = Spike Added

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples.

Accuracy values can be presented in a variety of ways. Accuracy is most commonly presented as percent bias or percent recovery. Percent bias is a standardized average error, that is, the average error divided by the actual or spiked concentration and converted to a percentage. Percent bias is unitless and allows accuracy of analytical procedures to be compared.

Percent recovery provides the same information as percent bias. Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

$\% \text{ Recovery} = (R/S) \times 100$

where:

S = surrogate spike concentration
R = reported surrogate concentration

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

### 9.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices, are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

### 9.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the U.S. Environmental Protection Agency (EPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;
- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and,
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

### 9.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data. The highest degree of completeness would be to find all deliverables flawless, valid and acceptable. The lowest level of completeness is excessive failure to meet established acceptance criteria and consequent rejection of data. Due to the relatively large number of data points to be generated during the site investigation process, the completeness goal is 95% useable data. It is acknowledged that this goal may not be fully achievable; for example, individual analytes (e.g., 2-hexanone) may be rejected within an otherwise acceptable analysis. The impact of rejected or unusable data will be made on a case-by-case basis. If the site investigation can be completed without the missing datum or data, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

## 9.3 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be "demonstrated analyte-free". The criteria for analyte-free water is based on the EPA assigned values for the Contract Required Detection Limits (CRDLs) and CRQLs. If the levels of detection needed on a specific site are lower than the CLP CRDLs/CRQLs, then those levels are used to define the criteria for analyte-free water.

The analytical testing required for the water to be demonstrated, as analyte free must be performed prior to the start of sample collection; thus, the laboratory will supply blank water.

### 9.3.1 Equipment (Rinsate) Blanks

To the extent possible, based on known site conditions, samples expected to be the least impacted will be collected first, so as to limit the potential for cross-over contamination. However, to confirm the adequacy of the decontamination process, equipment blanks will be collected. These blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

Field Equipment (Rinsate) blanks for soil trowels: Soil trowels will be obtained from a single vendor for this project. One rinsate blank will be collected for each soil sampling event.

### 9.3.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method. For soil samples, these samples are separate aliquots of the same sample; prior to dividing the sample into "sample" and "duplicate" aliquots, for the VOC aliquots. Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day. The blind field duplicate Relative Percent Difference (RPD) objective will be ±50% percent RPD for all matrices. Field duplicates will be collected at a frequency of 1 per 20 environmental samples for both matrices (aqueous and non-aqueous) and all test parameters.

### 9.3.3 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the lab to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for volatile VOC analysis. Trip blanks will be collected only when aqueous volatile organics are being sampled and shipped; except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

## 9.4 LABORATORY QUALITY ASSURANCE

### 9.4.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. They are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every 20 samples analyzed or as otherwise specified in the analytical protocol.

### 9.4.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample, to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a Matrix Spike and a Matrix Spike Duplicate (MS/MSD) for VOCs.

### 9.4.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: Matrix Spikes and Matrix Spike Duplicates (MS/MSD) are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD will be analyzed at a frequency of one (pair) for every 20 samples. MS/MSD will be performed on additional samples as designated by LCS field staff. In addition, matrix spike blanks (MSBs) will also be run by the lab as part of the NYSDEC ASP.

## 9.5 LABORATORY EQUIPMENT

Laboratory instrumentation will be calibrated by the laboratory according to the requirements of the 2000 Revised NYSDEC ASP, Superfund Contract Laboratory Program for each parameter or group of similar parameters, and maintained following professional judgment and the manufacturer's specifications.

# 10.0 DATA DOCUMENTATION

## 10.1 FIELD NOTEBOOK

Dedicated field notebooks will be initiated at the start of on-site work. In addition to any forms that will be filled out summarizing the field work (and become part of the project file), The field notebook will include the following daily information for all site activities:

- date;
- meteorological conditions (temperature, wind, precipitation);
- site conditions (e.g., dry, damp, dusty, etc.);
- identification of crew members (LCS staff and subcontractor present) and other personnel (e.g., agency or site owner) present;
- description of field activities;
- location(s) where work is performed;
- problems encountered and corrective actions taken;
- records of field measurements or descriptions recorded; and,
- notice of modifications to the scope of work.

During drilling operations, the supervising field personnel will add the following information:

- rig type;
- documentation of materials used;
- downtime;
- time work is performed at an elevated or lowered level of respiratory protection; and,
- diagram of well construction.

During sampling of wells, field samplers will add the following:

- sampling point locations and test results such as pH, specific conductance, etc.;
- information about sample collection;
- chain of custody information; and,
- field equipment calibration.

## 10.2 FIELD REPORTING FORMS

Field reporting forms (or their equivalent) to be utilized in this investigation are presented in Appendix B. These include:

- Auger Probe/Monitoring Well Installation Log;
- Monitoring Well Field Measurements/Well Development Log;
- Monitoring Well Construction Detail;
- Chain of Custody Form;
- PID Calibration Log; and,
- Water Quality Meter Calibration Log (pH, turbidity, specific conductivity).

These forms, when completed, will become part of the project file and final report, as appropriate.

# 11.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services will perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

## 12.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein, pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

### 12.1 LABORATORY DATA REPORTING AND REDUCTION

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 2000 revision of the NYSDEC ASP CLP. Laboratory data reports will conform to NYSDEC Category B deliverable requirements.

Copies of the laboratory's generic Quality Assurance Plan (QAP) are on file at LCS and with the NYSDEC. The laboratory's QAP will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form on computer diskette. The diskette will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

### 12.2 DATA VALIDATION

Data will be validated by Waste Stream Technologies, Inc., a NYSDEC-approved environmental laboratory. Data validation will be performed by following guidelines established in the US EPA Region 2 SOP No. HW-6, "CLP Organics Data Review" (Revision No. 8, January 1992); and SOP No. HW-2, "Evaluation of Metals Data for the Contract Laboratory Program (CLP)" (based on SOW 3/90; January 1992). These documents are checklists which are designed to formally and rigorously assess the quality and completeness of CLP data packages. The use of these USEPA SOPs will be adapted to conform to the specific requirements of the NYSDEC ASP (e.g., NYSDEC/ASP holding times; matrix spike blank requirements). Where necessary and appropriate, supplemental validation criteria may be derived from the EPA Functional Guidelines (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, Publication 9240.1-05, EPA-540/R-94/012, February, 1993; and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Publication 9240.1-05-01; EPA-540/R-94/013, PB94-963502, February, 1994).

Validation reports will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text.

## 12.3 DATA USABILITY

A data usability summary will be prepared by an independent validator. The data usability summary, which will be provided as part of the Investigation Report, encompasses both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality. If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets. The QAO will also indicate if there is a technical basis for selecting one data type over another for multiple measurements which are not in agreement.

## 12.4 FIELD DATA

Field chemistry data collected during soil screening (e.g., PID readings) will be presented in tabular form with any necessary supporting text. Unless activities resulted in significant unexpected results, field data comments can be added as footnotes to the tables.

## 13.0 PERFORMANCE AND SYSTEM AUDITS

The laboratory assigned to this project has been verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the analytical protocols to be used. Therefore, no audit of the laboratory(s) during the Investigation will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of LCS and the NYSDEC.

## 14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Monthly project status reporting to the NYSDEC will include aspects of quality control that were pertinent during the month's activities. Problems revealed during review of the month's activities will be documented and addressed. These reports will include a description of completed and on-going activities, and an indication how each task is progressing relative to the project schedule.

The project manager, through task managers, will be responsible for verifying that records and files related to this project are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

# 15.0 SCHEDULE

Fieldwork for Operable Unit #1 will be commenced after receiving approval from the NYSDEC and when the weather is deemed appropriate. Refer to Table 6 for an anticipated project schedule from approval of all work plan through submittal of the draft RAR.

## 16.0 OPERATION, MONITORING AND MAINTENANCE PLAN

An OM&M plan will be provided under separate cover.

# TABLE 1- PRIOR STUDY ANALYTICAL SUMMARY

The soil and groundwater samples collected and analyzed detected the analytes listed on the following pages. The respective concentrations as well as applicable regulatory guidance values are also listed for comparison. Analytes not detected are not shown.

### Soil - VOC Analysis by 5030/8260 (TCL)

| Compound | BH27 (10-12.25 ft. bgs) µg/kg | BH28 (8-10 ft. bgs) µg/kg | BH31 (12-14 ft. bgs) µg/kg | BH32 (12-14 ft. bgs) µg/kg | BH33 (10-12 ft. bgs) µg/kg | BH34 (10-11 ft. bgs) µg/kg | BH35 (12-15 ft. bgs) µg/kg | BH36 (14-15.75 ft. bgs) µg/kg | NYSDEC Guidance Value µg/kg |
|---|---|---|---|---|---|---|---|---|---|
| **Date Sampled** | **7/5/01** | **7/5/01** | **10/29/01** | **10/29/01** | **10/29/01** | **10/29/01** | **10/29/01** | **10/29/01** | ——— |
| 1,1-dichloroethene | <6 | <6 | 2 J | 2 J | 1 J | 1 J | 1 J | < 5 | 400 |
| acetone | <110 | 26 J | 22 J | 59 J | < 100 | 20 J | < 100 | 24 J | 200 |
| carbon disulfide | <6 | <6 | 11 | 2 J | < 5 | < 5 | 1 J | 4J | 2,700 |
| trans-1,2-dichloroethene | <6 | <6 | 8 | 2 J | < 5 | < 5 | 7 | 7 | 300 |
| 2-butanone | <110 | <120 | < 100 | 21 J | < 100 | < 100 | < 100 | < 100 | 300 |
| cis-1,2-dichloroethene | 1 J | <6 | 125 | 10 | < 5 | < 5 | 56 | 106 | NL |
| 1,1,1-trichloroethane | <6 | <6 | 3 J | 2 J | 2 J | 2 J | 1 J | 1 J | 800 |
| benzene | <6 | <6 | 7 | 15 | 7 | 7 | 3 J | 7 | 60 or MDL |
| trichloroethene | 3 J | 1 J | 177 | 9 | < 5 | < 5 | < 5 | 394 | 700 |
| toluene | <6 | <6 | 23 | 36 | 20 | 20 | 8 | 22 | 1,500 |
| tetrachloroethene | 11 | <6 | 20 | 1 J | < 5 | < 5 | < 5 | < 5 | 1,400 |
| ethylbenzene | <6 | <6 | 3 J | 5 | 3 J | 3 J | 0.9 J | 3 J | 5,500 |
| m,p-xylene | <6 | <6 | 20 | 31 | 17 | 17 | 6 | 19 | 1,200* |
| o-xylene | <6 | <6 | 6 | 10 | 5 | 6 | 2 J | 6 | 1,200* |
| bromoform | <6 | <6 | 3 J | < 5 | 3 J | 2 J | 1 J | 2 J | NL |

µg/kg = micrograms per kilogram

NYSDEC Guidance Values = Division Technical and Administrative Guidance Memorandum No. 4046 (TAGM 4046): Determination of Soil Cleanup Objectives and Cleanup levels and addendum (August, 2001).

* NYSDEC guidance value is the sum m,p-xylene and o-xylene.

NL = This analyte is not listed

MDL = Method Detection Limit

J = This value is estimated

< = Analyte was not detected at the detection level indicated.

## Soil - VOC Analysis by 5030/8260 (TCL)

| **Compound** | **BH37 (12-13.1 ft. bgs) µg/kg** | **BH38 (12-14 ft. bgs) µg/kg** | **BH39 (12-14 ft. bgs) µg/kg** | **BH40 (12-14 ft. bgs) µg/kg** | **BH41 (10-12 ft. bgs) µg/kg** | **BH42 (8-10.7 ft. bgs) µg/kg** | **NYSDEC Guidance Value µg/kg** |
|---|---|---|---|---|---|---|---|
| **Date Sampled** | **11/30/01** | **11/30/01** | **11/30/01** | **11/30/01** | **11/30/01** | **12/03/01** | —— |
| acetone | 50 | 20 | 77 | < 10 | 13 | < 10 | 200 |
| carbon disulfide | 10 | < 2 | < 2 | < 2 | < 2 | < 2 | 2,700 |
| 2-butanone | 20 | 11 | 17 | < 10 | < 10 | 14 | 300 |
| cis-1,2-dichloroethene | < 2 | 6 | < 2 | < 2 | 8 | < 2 | NL |
| benzene | 14 | 8 | 8 | 7 | 7 | 14 | 60 or MDL |
| trichloroethene | 3 | 188 | < 2 | 10 | < 2 | < 2 | 700 |
| toluene | 30 | 24 | 16 | 20 | 20 | 34 | 1,500 |
| tetrachloroethene | 13 | 6,630 | 8 | 109 | 4 | 3 | 1,400 |
| ethylbenzene | 4 | 4 | < 2 | 3 | 3 | 9 | 5,500 |
| m,p-xylene | 26 | 20 | 16 | 19 | 18 | 39 | 1,200* |
| o-xylene | 8 | 6 | 5 | 6 | 6 | 10 | 1,200* |
| bromoform | < 2 | 8 B | 11 B | 8 B | < 2 | 2 B | NL |

µg/kg = micrograms per kilogram

NYSDEC Guidance Values = Division Technical and Administrative Guidance Memorandum No. 4046 (TAGM 4046): Determination of Soil Cleanup Objectives and Cleanup levels and addendum (August, 2001).

* NYSDEC guidance value is the sum m,p-xylene and o-xylene.

NL = This analyte is not listed

MDL = Method Detection Limit

B = This analyte was also detected within the laboratory's method blank and may be the result of laboratory contamination.

< = Analyte was not detected at the detection level indicated.

▨ = Analyte detected at a concentration above NYSDEC Recommended Soil Clean up Objectives

## Soil - VOC Analysis by 5030/8260 (TCL)

| Compound | BH43 (12-14.5 ft. bgs) µg/kg | BH44 (12-14.5 ft. bgs) µg/kg | BH45 (8-11 ft. bgs) µg/kg | BH46 (12-14 ft. bgs) µg/kg | BH47 (12-14.25 ft. bgs) µg/kg | BH48 (12-14.25 ft. bgs) µg/kg | NYSDEC Guidance Value µg/kg |
|---|---|---|---|---|---|---|---|
| **Date Sampled** | **3/26/02** | **3/26/02** | **3/26/02** | **3/26/02** | **3/27/02** | **3/27/02** | ——- |
| acetone | < 10 | < 10 | < 10 | 45 | 15 | < 10 | 200 |
| carbon disulfide | < 2 | < 2 | < 2 | 4 | < 2 | < 2 | 2,700 |
| methylene chloride | 10 | 12 | 10 | 12 | 11 | 8 | 100 |
| cis-1,2-dichloroethene | 10 | < 2 | < 2 | 17 | < 2 | 4 | NL |
| benzene | 11 | 4 | 3 | 9 | 9 | 8 | 60 or MDL |
| trichloroethene | 32 | 5 | 4 | 44 | 24 | 35 | 700 |
| toluene | 56 | 44 | 14 | 37 | 151 | 101 | 1,500 |
| tetrachloroethene | 461 | 100 | 15 | 988 | 2,540 | 4,260 | 1,400 |
| ethylbenzene | 8 | 10 | < 2 | 4 | 56 | 19 | 5,500 |
| m,p-xylene | 27 | 41 | 7 | 14 | 197 | 69 | 1,200* |
| o-xylene | 10 | 16 | 2 | 6 | 70 | 23 | 1,200* |

µg/kg = micrograms per kilogram

NYSDEC Guidance Values = Division Technical and Administrative Guidance Memorandum No. 4046 (TAGM 4046): Determination of Soil Cleanup Objectives and Cleanup levels and addendum (August, 2001).

* NYSDEC guidance value is the sum m,p-xylene and o-xylene.

NL = This analyte is not listed

MDL = Method Detection Limit

< = Analyte was not detected at the detection level indicated.

▨ = Analyte detected at a concentration above NYSDEC Recommended Soil Clean up Objectives

## Soil - VOC Analysis by 5030/8260 (TCL)

| Compound | BH49 (12-14.5 ft. bgs) µg/kg | BH50 (12-14 ft. bgs) µg/kg | BH51 (12-14.5 ft. bgs) µg/kg | BH52 (12-13.75 ft. bgs) µg/kg | BH53 (12-14 ft. bgs) µg/kg | BH54 (12-14 ft. bgs) µg/kg | NYSDEC Guidance Value µg/kg |
|---|---|---|---|---|---|---|---|
| **Date Sampled** | **4/22/02** | **4/22/02** | **4/22/02** | **4/22/02** | **4/22/02** | **4/22/02** | ——- |
| methylene chloride | < 2 | < 2 | 2 | 3 | < 10 | < 2 | 100 |
| trans-1,2-dichloroethene | 3 | < 2 | < 2 | < 2 | < 10 | < 2 | 300 |
| cis-1,2-dichloroethene | 22 | < 2 | < 2 | 5 | < 10 | < 2 | NL |
| trichloroethene | 123 | < 2 | < 2 | 32 | 19 | 4 | 700 |
| tetrachloroethene | 129 | < 2 | < 2 | 1130 | 519 | 26 | 1,400 |

µg/kg = micrograms per kilogram

NYSDEC Guidance Values = Division Technical and Administrative Guidance Memorandum No. 4046 (TAGM 4046): Determination of Soil Cleanup Objectives and Cleanup levels and addendum (August, 2001).

NL = This analyte is not listed

< = Analyte was not detected at the detection level indicated.

# Groundwater - VOC Analysis by 5030/8260 (TCL)

| Compound | MW 4 µg/L | MW 4 µg/L | MW 7 µg/L | MW 8 µg/L | NYSDEC Guidance Value µg/L |
|---|---|---|---|---|---|
| **Date Sampled** | **3/24/01** | **7/20/01** | **7/20/01** | **7/10/01** | ——— |
| vinyl chloride | 2 J | < 10 | 356 J | < 10 | 2 |
| acetone | 29 J | < 100 | <10,000 | 26 J | 50 |
| carbon disulfide | < 5 | < 5 | <10,000 | 2 J | 60 |
| methylene chloride | < 5 | < 5 | 202 J | < 5 | 5 |
| trans-1,2-dichloroethene | 1 J | < 5 | 188 J | < 5 | 5 |
| cis-1,2-dichloroethene | <5 | 3 J | 1,680 | < 5 | 5 |
| trichloroethene | 25 | 5 | 2,900 | < 5 | 5 |
| tetrachloroethene | 157 | 32 | 56,600 | < 5 | 5 |

µg/L = micrograms per liter

NYSDEC Groundwater Standards = 6NYCRR Part 703, June 1998, revised April 2000

J = This value is estimated.

NL = This analyte is not listed

▨ = Analyte was detected above the NYSDEC Class GA groundwater value.

## Groundwater - VOC Analysis by 5030/8260 (TCL)

| Compound | TPMW 5 µg/L | TPMW 6 µg/L | TPMW 7 µg/L | TPMW 8 µg/L | TPMW 9 µg/L | Dupe 2 = TPMW 9 µg/L | TPMW 10 µg/L | Trip Blank µg/L | NYSDEC Groundwater Standard µg/L |
|---|---|---|---|---|---|---|---|---|---|
| **Date Sampled** | **10/30/01** | **10/30/01** | **10/30/01** | **10/30/01** | **10/30/01** | **10/30/01** | **10/30/01** | **10/30/01** | —— |
| vinyl chloride | **17** | **3 J** | < 10 | < 10 | **14** | **14** | **169** | < 10 | 2 |
| 1,1–dichloroethene | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | 2 J | < 5 | 5 |
| trans-1,2-dichloroethene | 5 | 2 J | < 5 | < 5 | **31** | **32** | **54** | < 5 | 5 |
| cis-1,2-dichloroethene | **26** | **27** | 3 J | < 5 | **157** | **166** | **772** | < 5 | 5 |
| trichloroethene | 1 J | 4 J | < 5 | < 5 | < 5 | < 5 | **28** | < 5 | 5 |
| toluene | < 5 | < 5 | < 5 | < 5 | 1 J | < 5 | < 5 | < 5 | 5 |
| tetrachloroethene | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | 2 J | < 5 | 5 |

µg/L = micrograms per liter
NYSDEC Groundwater Standards = 6NYCRR Part 703, June 1998
J = This value is estimated.
< = Analyte was not detected at the detection level indicated.
▨ = Analyte was detected above the NYSDEC Class GA groundwater value.

## Groundwater - VOC Analysis by 5030/8260 (TCL)

| Compound | TPMW 11 µg/L | Dupe 3 = TPMW 11 µg/L | TPMW 12 µg/L | TPMW 13 µg/L | TPMW 14 µg/L | TPMW 15 µg/L | TPMW 16 µg/L | NYSDEC Groundwater Standard µg/L |
|---|---|---|---|---|---|---|---|---|
| **Date Sampled** | **12/03/01** | **12/03/01** | **12/03/01** | **12/03/01** | **12/03/01** | **12/03/01** | **12/03/01** | —— |
| chloromethane | 2 J, B | <10 | < 10 | < 10 | < 10 | < 10 | < 10 | NL |
| vinyl chloride | < 10 | <10 | 2 J | 2 J | < 10 | < 10 | < 10 | 2 |
| acetone | 50 J | 53 J | 56 J | 57 J | < 100 | < 100 | < 100 | 50 |
| trans-1,2-dichloroethene | < 5 | < 5 | 2 J | < 5 | 1 J | < 5 | 5 | 5 |
| cis-1,2-dichloroethene | < 5 | < 5 | 43 | 13 | 7 | 3 J | 46 | 5 |
| trichloroethene | < 5 | < 5 | 86 | < 5 | 1 J | < 5 | 6 | 5 |
| toluene | 1 J | 1 J | 4 J | < 5 | < 5 | < 5 | 8 | 5 |
| tetrachloroethene | < 5 | < 5 | 402 | 1 J | 5 | < 5 | 3 J | 5 |
| ethylbenzene | < 5 | < 5 | 1 J | < 5 | < 5 | < 5 | 1 J | 5 |
| m, p-xylene | < 5 | < 5 | 5 | < 5 | < 5 | < 5 | 4 J | 5 |
| o-xylene | < 5 | < 5 | 1 J | < 5 | < 5 | < 5 | < 5 | 5 |

µg/L = micrograms per liter

NYSDEC Groundwater Standards = 6NYCRR Part 703, June 1998, revised April 2000.

B = This analyte was also detected within the laboratory's method blank and may be the result of laboratory contamination.

J = This value is estimated.

NL = This analyte is not listed

▨ = Analyte was detected above the NYSDEC Class GA groundwater value.

## Groundwater - VOC Analysis by 5030/8260 (TCL)

| Compound | TPMW17 µg/L | TPMW18 µg/L | TPMW19 µg/L | TPMW20 µg/L | TPMW21 µg/L | TPMW22 µg/L | Dupe 4 = TPMW22 µg/L | Trip Blank µg/L | NYSDEC Guidance Value µg/L |
|---|---|---|---|---|---|---|---|---|---|
| **Date Sampled** | **3/29/02** | **3/29/02** | **4/01/02** | **3/29/02** | **3/29/02** | **4/01/02** | **4/01/02** | **4/01/02** | ——— |
| vinyl chloride | < 10 | < 10 | < 10 | < 10 | < 10 | **19** | **28** | < 10 | 2 |
| 1,1–dichloroethene | < 5 | < 5 | < 5 | < 5 | < 5 | 2 J | 3 J | < 5 | 5 |
| acetone | 143 | 39 J | < 100 | < 100 | < 100 | 102 | 123 | < 100 | 50 |
| carbon disulfide | 1 J | < 5 | < 5 | < 5 | < 5 | 1 J | < 5 | < 5 | 60 |
| methylene chloride | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | <5 | 3 J | 5 |
| trans-1,2-dichloroethene | < 5 | < 5 | < 5 | < 5 | < 5 | 4 J | 6 | < 5 | 5 |
| cis-1,2-dichloroethene | 2 J | < 5 | 1 J | < 5 | 4 J | **121** | 166 | < 5 | 5 |
| trichloroethene | 2 J | < 5 | < 5 | 2 J | 1 J | **160** | 269 | < 5 | 5 |
| toluene | **10** | **7** | < 5 | 1 J | < 5 | 3 J | 3 J | < 5 | 5 |
| tetrachloroethene | 14 | < 5 | < 5 | **6** | **6** | **688** | 1,160 | < 5 | 5 |
| ethylbenzene | 4 J | 4 J | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 | 5 |
| m, p-xylene | 16 | 20 | < 5 | 2 J | < 5 | 2 J | 2 J | < 5 | 5 |
| o-xylene | 6 | 8 | < 5 | < 5 | < 5 | < 5 | 1 J | < 5 | 5 |

µg/L = micrograms per liter

NYSDEC Groundwater Standards = 6NYCRR Part 703, June 1998, revised April 2000.

J = This value is estimated.

▨ = Analyte was detected above the NYSDEC Class GA groundwater value.

## Groundwater - VOC Analysis by 5030/8260 (TCL)

| Compound | TPMW 23 µg/L | TPMW 24 µg/L | TPMW 25 µg/L | TPMW 26 µg/L | TPMW 27 µg/L | Dupe 5 = TPMW 27 µg/L | TPMW 28 µg/L | Trip Blank µg/L | NYSDEC Guidance Value µg/L |
|---|---|---|---|---|---|---|---|---|---|
| **Date Sampled** | **4/23/02** | **4/23/02** | **4/23/02** | **4/23/02** | **4/23/02** | **4/23/02** | **4/23/02** | **4/23/02** | -------- |
| vinyl chloride | **8** | < 1 | < 1 | **3** | **9** | **10** | 4 | < 1 | 2 |
| 1,1–dichloroethene | 3 | < 1 | < 1 | < 1 | 1 | 1 | 2 | < 1 | 5 |
| acetone | **82** | **150** | **75** | < 10 | < 10 | < 10 | 23 | < 10 | 50 |
| methylene chloride | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 | 5 |
| trans-1,2-dichloroethene | **16** | < 1 | 1 | 3 | 4 | 4 | 4 | < 1 | 5 |
| cis-1,2-dichloroethene | **112** | 2 | **21** | **43** | **63** | **71** | 102 | < 1 | 5 |
| benzene | 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 1 |
| trichloroethene | **379** | < 1 | **8** | **94** | **144** | **173** | 89 | < 1 | 5 |
| toluene | 2 | < 1 | 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 5 |
| tetrachloroethene | **823** | 2 | 3 | **402** | **1,140** | **897** | 79 | < 1 | 5 |
| m, p-xylene | 2 | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 | 5 |

µg/L = micrograms per liter

NYSDEC Groundwater Standards = 6NYCRR Part 703, June 1998, Revised April 2000.

▨ = Analyte was detected above the NYSDEC Class GA groundwater value.

## Groundwater - SVOC Analysis by 3510/8270 (TCL)

| **Compound** | **MW 4 µg/L** | **NYSDEC Guidance Value µg/L** |
|---|---|---|
| **Date Sampled** | **3/24/01** | ——— |
| naphthalene | < 10 | 10 |
| bis(2-Ethyhexyl)phthalate | 4 J | 5 |

µg/l = micrograms per liter

NYSDEC Groundwater Standards = 6NYCRR Part 703, June 1998, revised April 2000.

J = This value is estimated.

▨ = Analyte was detected above the NYSDEC Class GA groundwater value.

## Groundwater - Metals Analysis by 6010/7470

| **Compound** | **MW 4 mg/L** | **NYSDEC Guidance Value mg/L** |
|---|---|---|
| **Date Sampled** | **3/24/01** | ——— |
| Barium | 0.117 | 1,000 |
| Chromium | <0.005 | 50 |

mg/l = milligram per liter

NYSDEC Groundwater Standards = 6NYCRR Part 703, June 1998, revised April 2000.

SB = Site Background

# TABLE 2 - REMEDIAL ACTION ANALYTICAL SUMMARY

## Table 2-RAP Analytical Summary
## Buffalo Business Park - VCA Index B9-0637-03-06
## Buffalo, New York

| Matrix | Parameter | Estimated Sample Quantity | Estimated Equipment (Rinsate) Blank Quantity | Estimated Matrix Spike/ Matrix Spike Duplicate Quantity | Estimated Duplicate Quantity | Estimated Trip Blank Quantity |
|---|---|---|---|---|---|---|
| *Soil* | | | | | | |
| | TCL VOCs | 11 | 1 | 1 | 1 | NA |
| *Groundwater* | | | | | | |
| | TCL VOCs | 1 | 1 | 1 | 1 | 1 |

VOCs- volatile organic compounds
NA- not applicable

# TABLE 3- SOIL ANALYTICAL AND RATIONALE SUMMARY

## Table 3 - Soil Analytical Summary
## Buffalo Business Park - VCA Index B9-0637-03-06
## Buffalo, New York

**Operable Unit #1**

| Borehole | Rationale | Anticipated Depth | Samples | Parameters |
|---|---|---|---|---|
| NW1[1] | Excavation sidewall / confirmatory soil sample | 14 ft. bgs | 2 | TCL VOCs |
| SW | Excavation sidewall / confirmatory soil sample | 14 ft. bgs | 2 | TCL VOCs |
| EW | Excavation sidewall / confirmatory soil sample | 14 ft. bgs | 2 | TCL VOCs |
| WW | Excavation sidewall / confirmatory soil sample | 14 ft. bgs | 2 | TCL VOCs |
| Bottom | Excavation sidewall / confirmatory soil sample | 14 ft. bgs | 3 | TCL VOCs |

[1] NW = North Wall

# TABLE 4- GROUNDWATER ANALYTICAL LOCATIONS AND RATIONALE SUMMARY

## Table 4 - Groundwater Analytical Summary
## Buffalo Business Park - VCA Index B9-0637-03-06
## Buffalo New York

**Operable Unit #1**

| MW[1] | Rationale | No. Samples | Parameters |
|---|---|---|---|
| VCA-MW1-OB[2] | Groundwater sampling/quarterly assessment | 1 | TCL VOCs[3] |

[1] Proposed monitoring well locations are shown on Figure 2

[2] MW4 = Excavation well for Volutary Cleanup Agreement RAP

[3] TCL VOCs = Target Compound List volatile organic compounds.

# TABLE 5- SAMPLE VOLUMES, CONTAINERS, HOLDING TIMES AND PRESERVATIVES

## Table 5 - Sample volumes, containers, holding times and preservatives
## Buffalo Business Park Site- VCA Index # B9-0637-03-06
## Buffalo, New York

| Matrix | Parameter | No. of Containers/Sample Volume | Sample Container | Sample Holding Time | Sample Preservative |
|---|---|---|---|---|---|
| *Soil* | | | | | |
| | VOCs | 1- 4 oz. | glass w/ teflon-lined cap | 7 days[1] | none |
| *Groundwater* | | | | | |
| | VOCs | 3- 40 mL | glass with teflon septum | 7 days | Hydrochloric acid |

[1] holding times are calculated from the time of arrival at the laboratory.

VOCs- volatile organic compounds

## TABLE 6- ANTICIPATED PROJECT SCHEDULE

# Table 6 - Anticipated Project Schedule
## Buffalo Business Park Site- VCA Index B9-0637-03-06
## Buffalo, New York

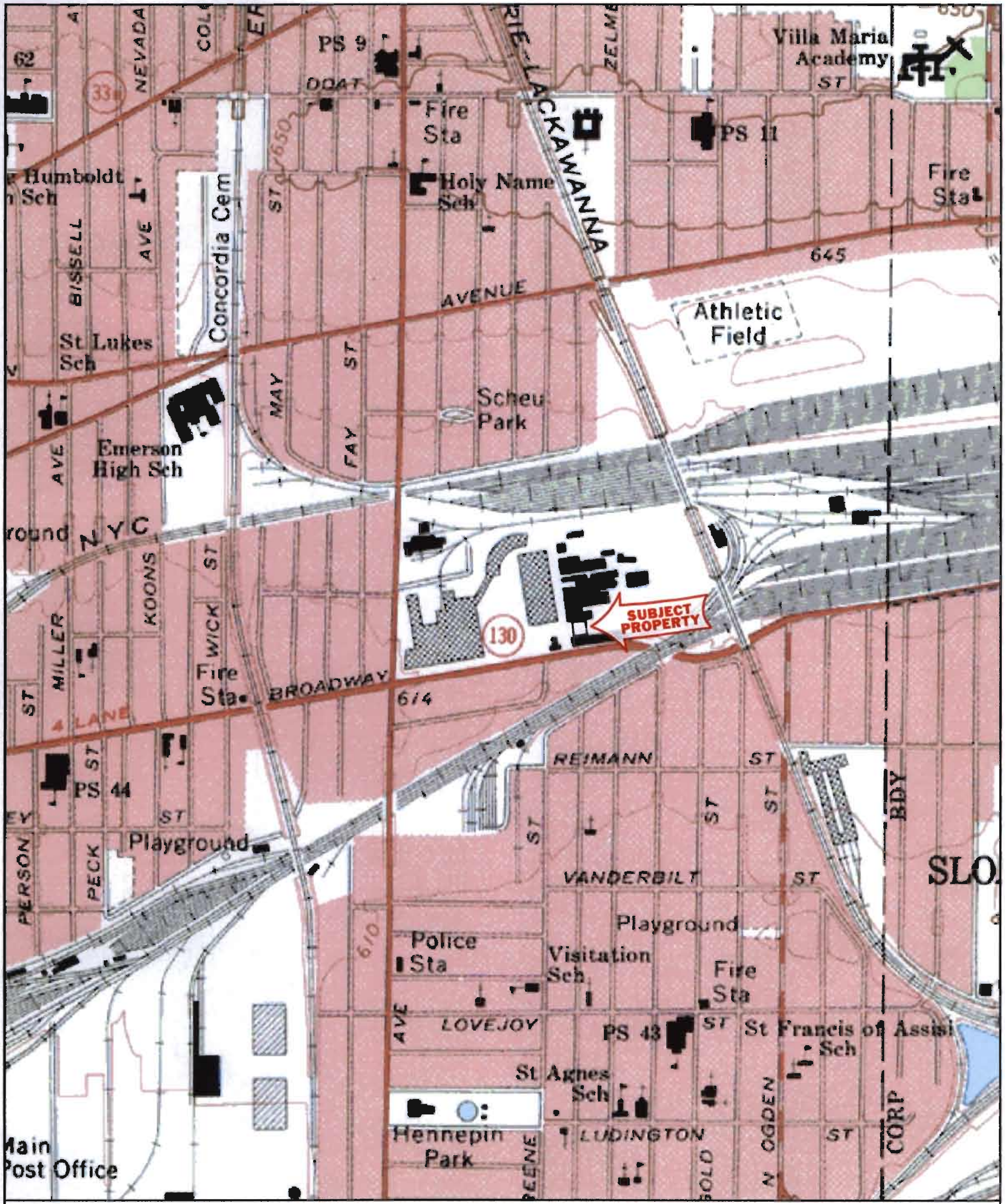
| Task | Description | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 | M12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Submit Draft RAP Work Plan | △ | | | | | | | | | | | |
| 2 | Regulatory review period | → | (4 weeks) | | | | | | | | | | |
| 3 | Prepare Final RAP Work Plan | | → | (2 weeks) | | | | | | | | | |
| 4 | Regulatory review period/approval | | → | ○ | (2 weeks) | | | | | | | | |
| 5 | Perform Remedial Action | | | → | (3 weeks) | | | | | | | | |
| 6 | Laboratory Analysis Time | | | | → | (4 weeks) | | | | | | | |
| 7 | Independent Data Validation | | | | | → | (2-3 weeks) | | | | | | |
| 8 | Prepare Draft RAP Summary Report | | | | | | → △ | (3-4 weeks) | | | | | |

M1 = Month 1

△ Deliverable Report

○ Work Plan Approval

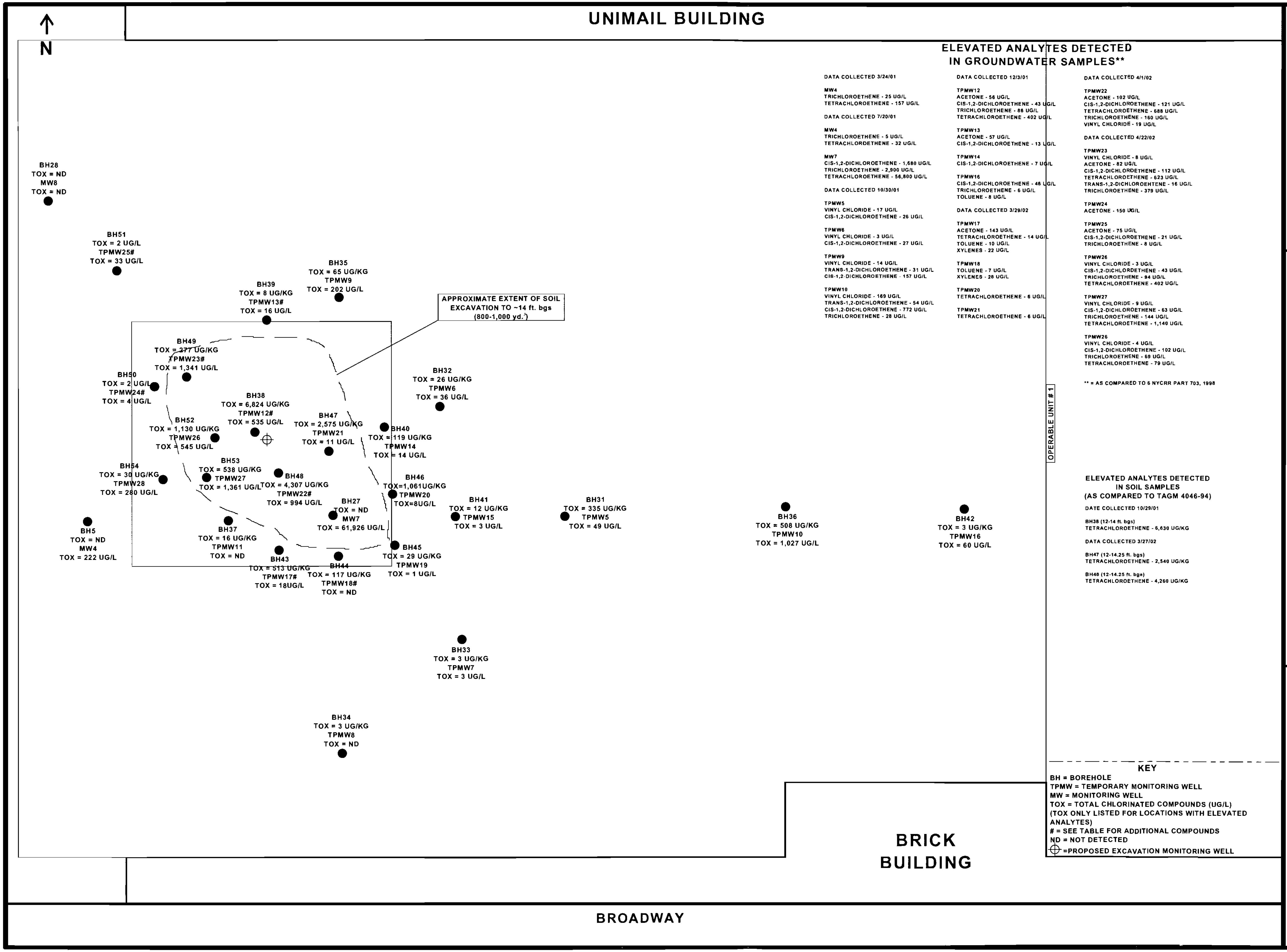
# FIGURE 1- SITE LOCATION MAP



Name: BUFFALO NE
Date: 12/17/2003
Scale: 1 inch equals 1000 feet

Location: 042° 53' 54.9" N 078° 48' 39.9" W
Caption: Figure 1 - Site Location Map

# FIGURE 2- PREVIOUS STUDY SITE PLAN



## ELEVATED ANALYTES DETECTED IN GROUNDWATER SAMPLES**

DATA COLLECTED 3/24/01

MW4
TRICHLOROETHENE - 25 UG/L
TETRACHLOROETHENE - 157 UG/L

DATA COLLECTED 7/20/01

MW4
TRICHLOROETHENE - 5 UG/L
TETRACHLOROETHENE - 32 UG/L

MW7
CIS-1,2-DICHLOROETHENE - 1,680 UG/L
TRICHLOROETHENE - 2,900 UG/L
TETRACHLOROETHENE - 56,800 UG/L

DATA COLLECTED 10/30/01

TPMW5
VINYL CHLORIDE - 17 UG/L
CIS-1,2-DICHLOROETHENE - 26 UG/L

TPMW6
VINYL CHLORIDE - 3 UG/L
CIS-1,2-DICHLOROETHENE - 27 UG/L

TPMW9
VINYL CHLORIDE - 14 UG/L
TRANS-1,2-DICHLOROETHENE - 31 UG/L
CIS-1,2-DICHLOROETHENE - 157 UG/L

TPMW10
VINYL CHLORIDE - 169 UG/L
TRANS-1,2-DICHLOROETHENE - 54 UG/L
CIS-1,2-DICHLOROETHENE - 772 UG/L
TRICHLOROETHENE - 28 UG/L

DATA COLLECTED 12/3/01

TPMW12
ACETONE - 56 UG/L
CIS-1,2-DICHLOROETHENE - 43 UG/L
TRICHLOROETHENE - 88 UG/L
TETRACHLOROETHENE - 402 UG/L

TPMW13
ACETONE - 57 UG/L
CIS-1,2-DICHLOROETHENE - 13 UG/L

TPMW14
CIS-1,2-DICHLOROETHENE - 7 UG/L

TPMW16
CIS-1,2-DICHLOROETHENE - 48 UG/L
TRICHLOROETHENE - 6 UG/L
TOLUENE - 8 UG/L

DATA COLLECTED 3/29/02

TPMW17
ACETONE - 143 UG/L
TETRACHLOROETHENE - 14 UG/L
TOLUENE - 10 UG/L
XYLENES - 22 UG/L

TPMW18
TOLUENE - 7 UG/L
XYLENES - 28 UG/L

TPMW20
TETRACHLORDETHENE - 6 UG/L

TPMW21
TETRACHLOROETHENE - 6 UG/L

DATA COLLECTED 4/1/02

TPMW22
ACETONE - 102 UG/L
CIS-1,2-DICHLOROETHENE - 121 UG/L
TETRACHLOROETHENE - 688 UG/L
TRICHLOROETHENE - 160 UG/L
VINYL CHLORIDE - 19 UG/L

DATA COLLECTED 4/22/02

TPMW23
VINYL CHLORIDE - 8 UG/L
ACETONE - 82 UG/L
CIS-1,2-DICHLORDETHENE - 112 UG/L
TETRACHLOROETHENE - 623 UG/L
TRANS-1,2-DICHLOROEHTENE - 16 UG/L
TRICHLOROETHENE - 379 UG/L

TPMW24
ACETONE - 150 UG/L

TPMW25
ACETONE - 75 UG/L
CIS-1,2-DICHLOROETHENE - 21 UG/L
TRICHLOROETHENE - 8 UG/L

TPMW26
VINYL CHLORIDE - 3 UG/L
CIS-1,2-DICHLORDETHENE - 43 UG/L
TRICHLOROETHENE - 94 UG/L
TETRACHLOROETHENE - 402 UG/L

TPMW27
VINYL CHLORIDE - 9 UG/L
CIS-1,2-DICHLOROETHENE - 63 UG/L
TRICHLOROETHENE - 144 UG/L
TETRACHLOROETHENE - 1,140 UG/L

TPMW26
VINYL CHLORIDE - 4 UG/L
CIS-1,2-DICHLOROETHENE - 102 UG/L
TRICHLOROETHENE - 69 UG/L
TETRACHLOROETHENE - 79 UG/L

** = AS COMPARED TO 6 NYCRR PART 703, 1998

## ELEVATED ANALYTES DETECTED IN SOIL SAMPLES (AS COMPARED TO TAGM 4046-94)

DATE COLLECTED 10/29/01

BH38 (12-14 ft. bgs)
TETRACHLOROETHENE - 6,630 UG/KG

DATA COLLECTED 3/27/02

BH47 (12-14.25 ft. bgs)
TETRACHLOROETHENE - 2,540 UG/KG

BH48 (12-14.25 ft. bgs)
TETRACHLOROETHENE - 4,260 UG/KG

KEY

BH = BOREHOLE
TPMW = TEMPORARY MONITORING WELL
MW = MONITORING WELL
TOX = TOTAL CHLORINATED COMPOUNDS (UG/L)
(TOX ONLY LISTED FOR LOCATIONS WITH ELEVATED ANALYTES)
# = SEE TABLE FOR ADDITIONAL COMPOUNDS
ND = NOT DETECTED
⊕ =PROPOSED EXCAVATION MONITORING WELL

*Drawn by: APS/JMR*

*Checked by: DBR*

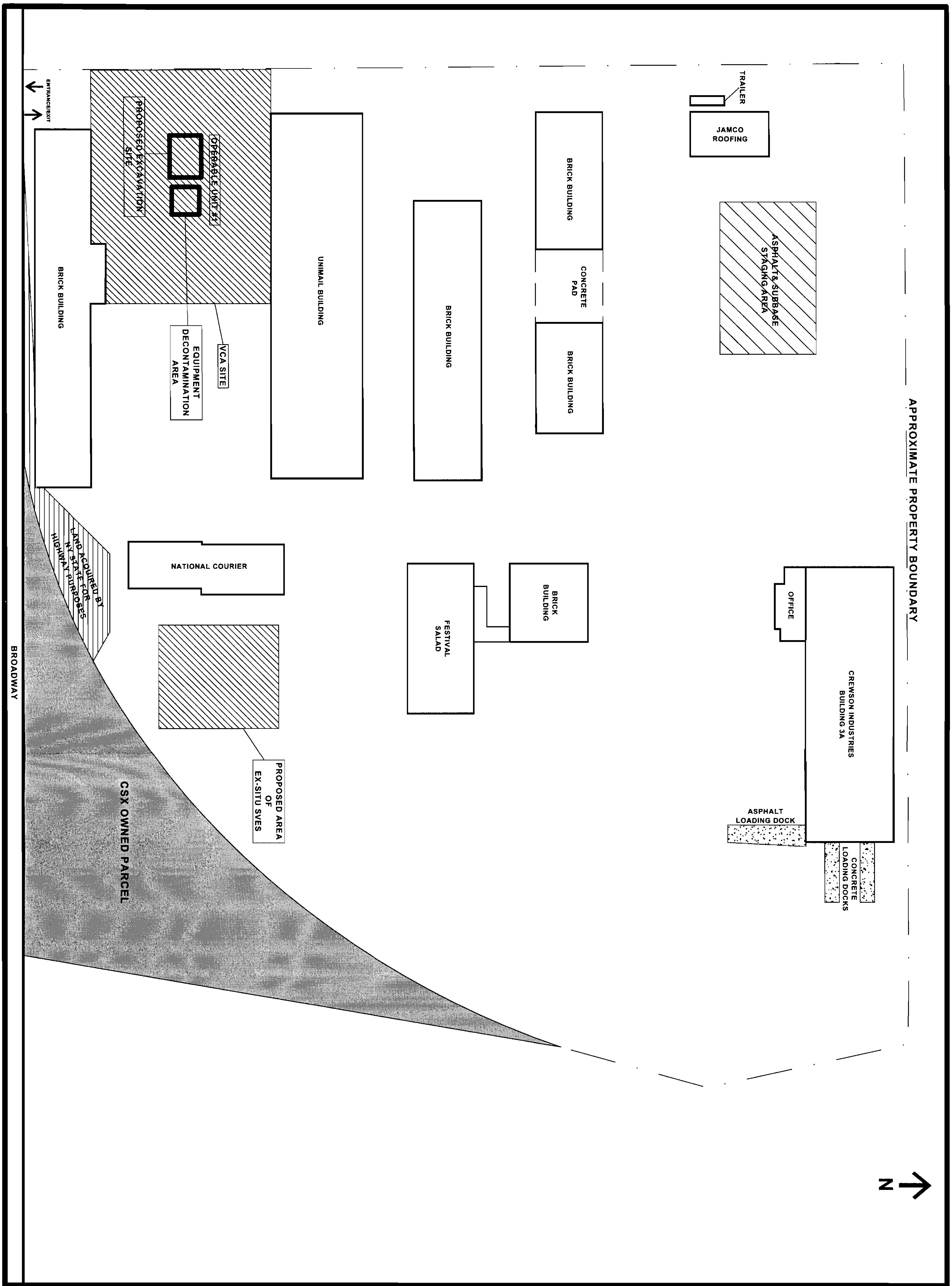
*Scale: Approx. 1 inch = 20 ft.*

*LCS Project #99B509.22*

FIGURE 2-PREVIOUS STUDY PLAN
ELEVATED ANALYTES FIGURE
BUFFALO INDUSTRIAL PARK
1800 BROADWAY
BUFFALO, NEW YORK

LCS INC.

# FIGURE 3- GENERALIZED WORK AREA SUMMARY PLAN



**LCS INC.**

**FIGURE 3**
**BUFFALO BUSINESS PARK**
**1800 BROADWAY**
**BUFFALO, NEW YORK**

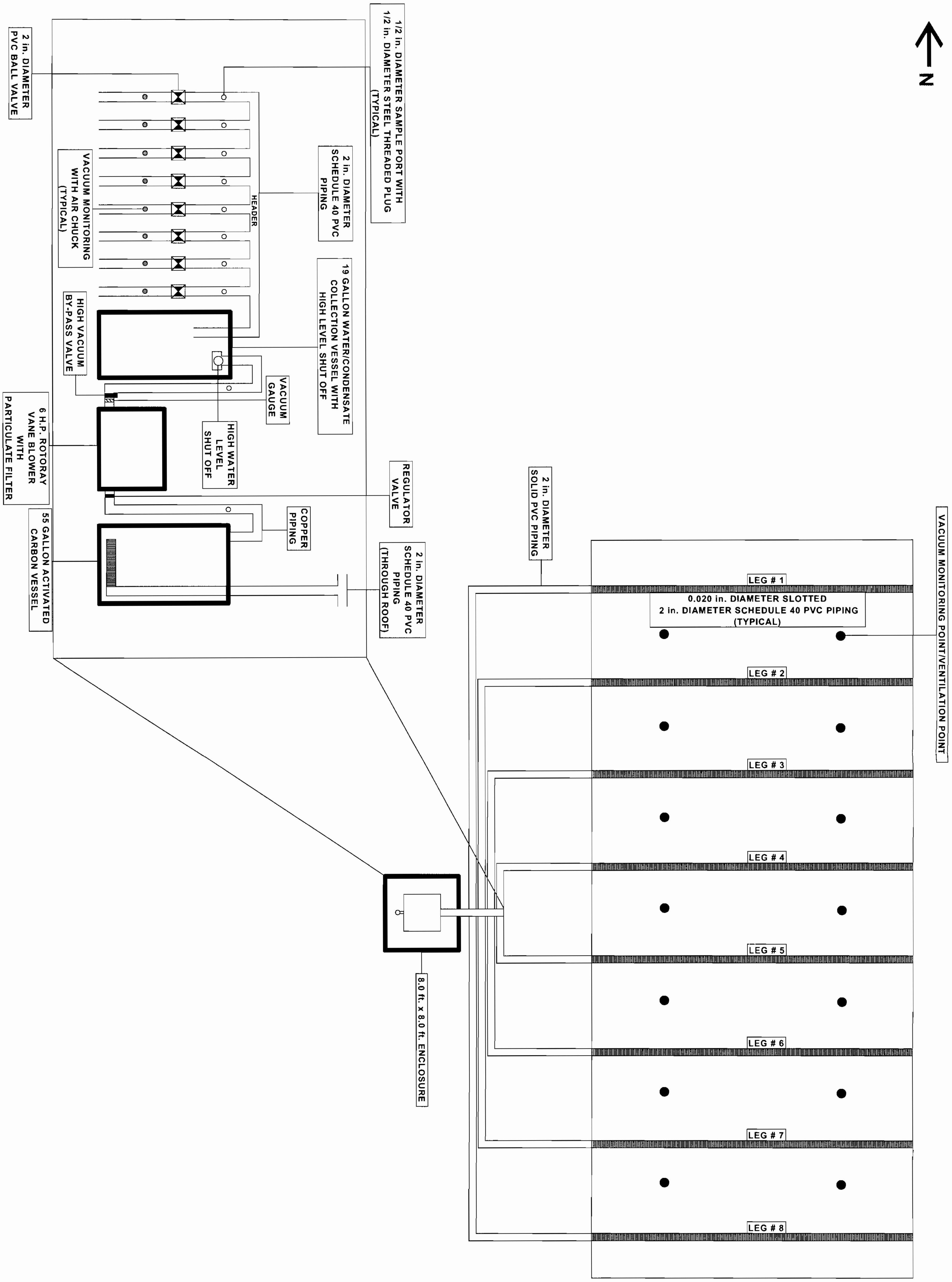
*Drawn by: APS/JMR*

*Checked by: DBR*

*Scale: Approx. 1 inch = 100 ft.*

*LCS Project # 99B509.26*

**FIGURE 4- GENERALIZED EX-SITU SVES PLAN**



LCS INC.

**FIGURE 4 - GENERALIZED**
**EX-SITU SVES PLAN**
**1800 BROADWAY**
**BUFFALO, NEW YORK**

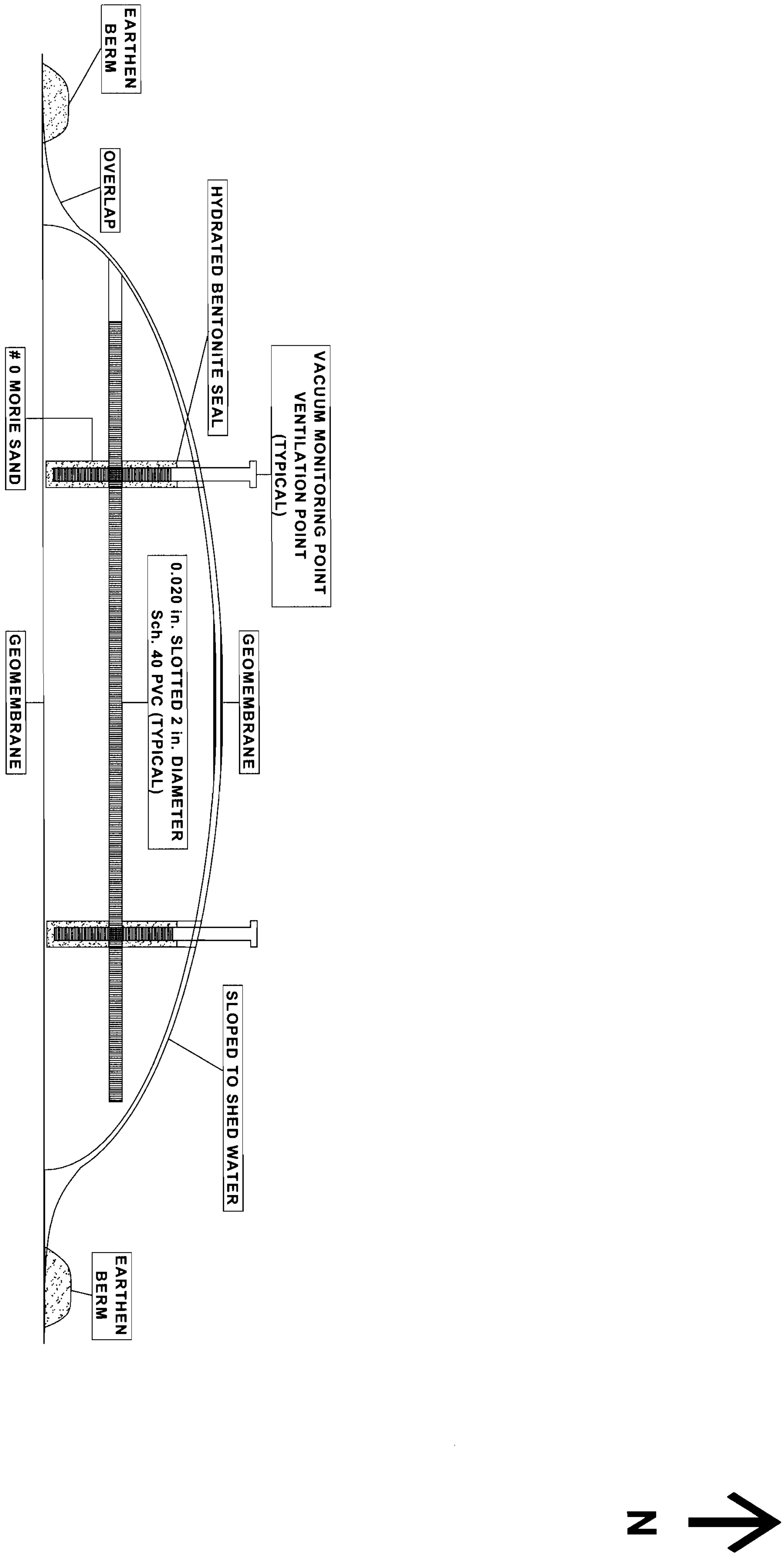
*Drawn by: JMR*

*Checked by: DBR*

*Scale: Approx. 1 inch = 10 ft.*

*LCS Project #99B509.26*

**FIGURE 5- EX-SITU SVES CROSS-SECTION PLAN**



**LCS INC.**

## FIGURE 5 - GENERALIZED
## EX-SITU SVES CROSS-SECTION PLAN
## 1800 BROADWAY
## BUFFALO, NEW YORK

*Drawn by: JMR*

*Checked by: DBR*

*Scale: Approx. 1 inch = 5 ft.*

*LCS Project #99B509.26*

# APPENDIX A- REFERENCE DOCUMENTS

## REFERENCE

Sampling Guidelines and Protocols, NYSDEC, Division of Water, March 1991.

Compendium of Superfund Field Operations Methods, US EPA, December 1987 (EPA/540/P-87/001).

Soil Sampling Quality Assurance User's Guide (Second Edition), US EPA, March 1989, (EPA/600/8-89/046).

USEPA Region II CERCLA Quality Assurance Manual, Revision 1, USEPA Region II, October 1989.

# APPENDIX B- FIELD FORMS

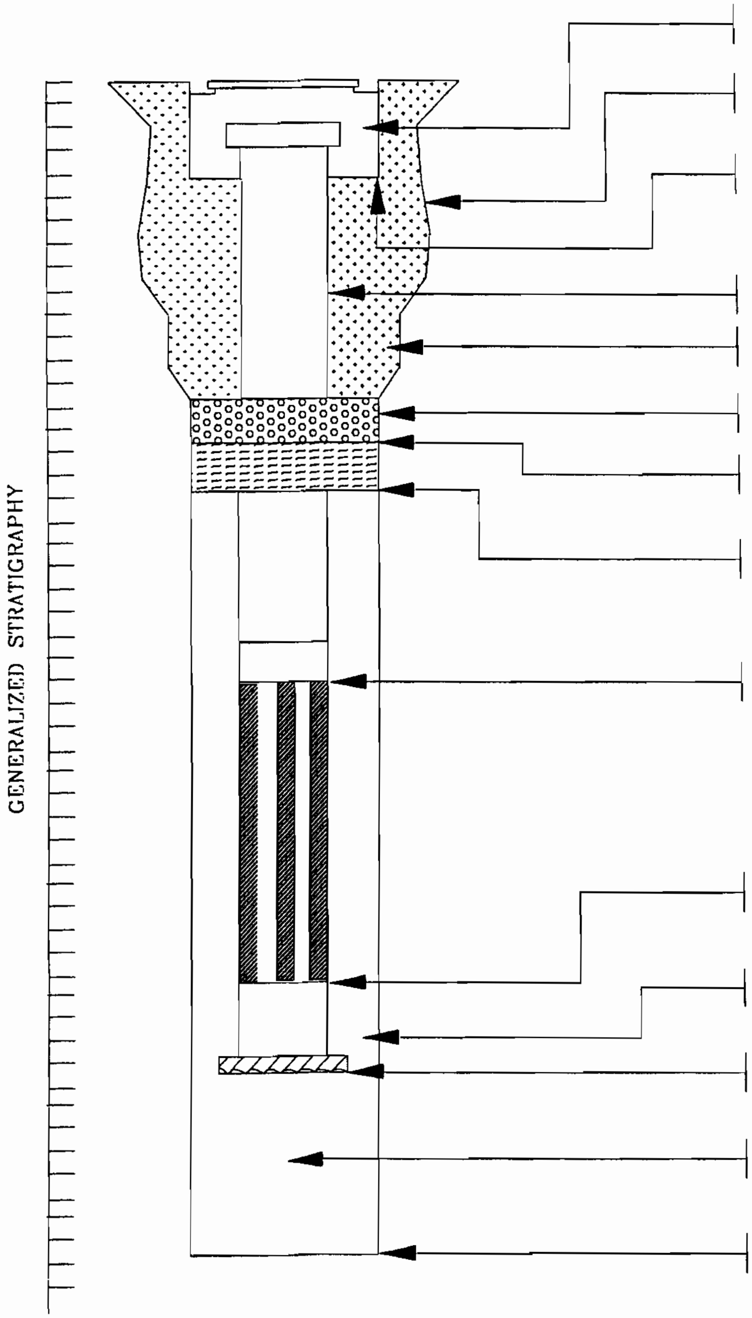
LCS, Inc.

# WELL CONSTRUCTION DETAIL

PROJECT/LOCATION: ______________________ PROJECT No. __________

CLIENT: ______________________________ WELL No. __________

DATE COMPLETED: ______________ SUPERVISED BY: ______________



REFERENCE POINT
Elevation/Depth: _____

SURFACE SEAL
Type/Depth: _____

DEPTH OF SURFACE CASING: _____

RISER PIPE Size/Type: _____

DIAMETER OF BOREHOLE: _____

TYPE OF FILL: _____

TOP OF SEAL Elevation/Depth: _____
TYPE OF SEAL: _____

TOP OF FILTER PACK Elevation/Depth: _____
FILTER PACK MATERIAL: _____

TOP OF SCREEN Elevation/Depth: _____
SCREEN SIZE/TYPE: _____

BOTTOM OF SCREEN Elevation/Depth:______

BOTTOM OF FILTER PACK
Elevation/Depth:______

BOTTOM OF PLUGGED BLANK SECTION
Elevation/Depth: _____

TYPE OF FILLER
BELOW PLUGGED BLANK:______

BOTTOM OF BOREHOLE
Elevation/Depth: _____

NOTES

Project Number:____________________ Site:________________________________

Date:____________________

## Well Development Water Quality Parameters Summary

| Well # | Depth to Water (ft. BTOC) | Total Depth of Well (ft.) | Depth to Product (ft. BTOC) | Well Volume (Gallons) | Volume Removed (Gallons) | pH | Conductivity (Microhms/cm) | Turbidity (NTU units) | Dissoved Oxygen (mg/L) | Temperature (Celcius) | Color/Clarity |
|---|---|---|---|---|---|---|---|---|---|---|---|
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# PID Calibration Record Sheet

*pre-job* **Date:** ________ **Time:** ________

| | zero gas (0.0 ppm) | span gas (100.0 ppm) |
|---|---|---|
| Before: | ________ | ________ |
| After: | ________ | ________ |

*post-job* **Date:** ________ **Time:** ________

| | zero gas (0.0 ppm) | span gas (100.0 ppm) |
|---|---|---|
| Before: | ________ | ________ |
| After: | ________ | ________ |

---

*pre-job* **Date:** ________ **Time:** ________

| | zero gas (0.0 ppm) | span gas (100.0 ppm) |
|---|---|---|
| Before: | ________ | ________ |
| After: | ________ | ________ |

*post-job* **Date:** ________ **Time:** ________

| | zero gas (0.0 ppm) | span gas (100.0 ppm) |
|---|---|---|
| Before: | ________ | ________ |
| After: | ________ | ________ |

---

**Notes:**

* parts per million (ppm) in units equivalent to Isobutylene

**instrument to be calibrated before and after sampling

# Chain of Custody Record

**SEVERN TRENT SERVICES**

**Severn Trent Laboratories, Inc.**

STL-4124 (0700)

| | | | |
|---|---|---|---|
| Client | Project Manager | Date | Chain of Custody Number 009173 |
| Address | Telephone Number (Area Code)/Fax Number | Lab Number | Page ______ of ______ |

City | State | Zip Code | Site Contact | Lab Contact

Project Name and Location (State)

Carrier/Waybill Number

Contract/Purchase Order/Quote No.

| | | | Matrix | | | | | Containers & Preservatives | | | | | | | Analysis (Attach list if more space is needed) | | | | | | | | | | | | Special Instructions/ Conditions of Receipt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample I.D. No. and Description (Containers for each sample may be combined on one line) | Date | Time | Air | Aqueous | Sed. | Soil | | Unpres. | H2SO4 | HNOS | HCl | NaOH | ZnAc/ NaOH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months

(A lee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

| | | | | | |
|---|---|---|---|---|---|
| 1. Relinquished By | Date | Time | 1. Received By | Date | Time |
| 2. Relinquished By | Date | Time | 2. Received By | Date | Time |
| 3. Relinquished By | Date | Time | 3. Received By | Date | Time |

Comments

**DISTRIBUTION:** WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

## Photo Ionization Detector

Calibration of the photo ionization detector (PID) used for air monitoring and screening of soil samples for volatile organics will be completed as follow. All calibration data must be maintained within the calibration log book and/or the bound field log book.

1. Install sampling probe onto PID unit.
2. Turn PID on and allow to run for approximately five minutes or until steady readings are obtained.
3. Attach the regulator to the "zero air" compressed gas cylinder.
4. Attach the tubing from the regulator to the sampling probe.
5. Open the regulator valves until the flow indicator indicates sufficient gas flow.
6. Record the PID measurement in the calibration log when stable. ( Log is stored behind the carrying case padding in lid).
7. Press the "Enter" key on the PID.
8. Select the "Set" prompt on the PID.
9. Press the "Cal" prompt on the PID.
10. Press the "zero" prompt.
11. Allow the unit to calibrate (Display will say "Select?" when complete).
12. Record the PID measurement in the calibration log when stable.
13. Detach the regulator from the "Zero Air" compressed gas cylinder.
14. Attach the regulator to the "Span Gas" compressed gas cylinder.
15. Attach the tubing from the regulator to the sampling probe.
16. Open the regulator valve until the flow indicator indicates sufficient gas flow.
17. Record the PID measurement in the calibration log when stable.
18. Press the "Enter" key on the PID.
19. Select the "Set" prompt on the PID.
20. Press the "Cal" prompt on the PID.
21. Press the "Span" prompt.
22. Press the "Enter" key.
23. Allow the unit to calibrate (Display will say "Select?" when complete).
24. Record the PID measurement in the calibration log when stable.

Repeat above steps if PID does not calibrate properly. Calibration of the PID is to be completed at the start and end of each workday. See the equipment manual included with the PID calibration log for any additional information.

## Horiba U-10 Water Quality Checker

Calibration of the Horiba U-10 Water Quality Checker is as follows:

1. Fill the calibration beaker to about 2/3 with the standard solution. Note the line on the beaker
2. Fit the probe over the beaker. Note that the beaker is specially shaped to prevent the Dissolved Oxygen (DO) sensor from being immersed in the standard solution. This is because the DO auto-calibration is done using atmospheric air.
3. With the power on, press the MODE key to put the unit into the MAINT mode. The lower cursor should be on the AUTO Sub-Mode; if it is not use the MODE key to move the lower cursor to AUTO.
4. With the lower cursor on AUTO, press the ENT key. The readout will show CRL. Wait a moment and the upper cursor will gradually move across the four auto-calibration parameters, one by one. When the calibration is complete, the readout will briefly show END and then will switch to MEAS mode.

If an error occurs, recalibrate the instrument. If errors still persist, consult the operations manual located in the equipment caring case.

# APPENDIX C- PERSONNEL INFORMATION

Name: **Peter M. McKee**
Title: Professional Engineer
Years with Firm: Three
Education: State University at Buffalo, 1975, MBA
University of Notre Dame
1970, MS Chemical Engineering, Teaching Fellowship
1969, BS Chemical Engineering, Dean's List
Certifications: Professional Engineering License – State of NY, 1983

Experience: 1983 – Present DIOCESE OF BUFFALO
Director of Purchasing:

As Director of Purchasing for the Diocese of Buffalo, I oversee a staff of 13 who perform the purchasing and resulting accounting function for the 350 churches, 100 schools, seven hospitals and 15 nursing homes that are located within the Catholic Diocese of Buffalo. In the 15 years I have served as Director, our revenues have risen from $3.7 million to over $7 million.

1976 – 1983 POLYMER APPLICATIONS
Plant Manager:

(Polymer Applications produced phenolic resins for the tire and automobile industry.) Direct report to the company president and responsible for all manufacturing, maintenance and engineering for the facility which employed approximately 60 people. The plant operated on a three-shift, 24-hour, five-day week basis and was a batch-type operation.

1975 – 1976 CARBORUNDUM COMPANY
Marketing Manager

1971 – 1975 LUCIDOL – PENWALT DIVISION
Research Engineer

1970 – 1971 EXXON CHEMICAL COMPANY
Process Engineer

CIVIC INVOLVEMENT: Zoning Board of Appeals – Town of Grand Island
Planning Board – Town of Grand Island
St. Stephen's New Church Committee
Ronald McDonald House of Buffalo – Former Director
National Catholic Group Purchasing Association – Chmn, Board
St. Stephen's Church Parish Council – Past President
Erie County Environmental Commission – G.I. Representative
Notre Dame Alumni - Board of Directors, WNY Chapter
- National Advisory Board

Name: **Robert J. Szustakowski**
Title: Chief Operating Officer
Years with Firm: Six
Years with Other Firms: Eleven
Education: Masters of Science degree in Geology (hydrogeochemistry concentration), Syracuse University, Syracuse, New York
Bachelors of Science degree in Geochemistry/Chemistry, State University of New York at Fredonia (1985), Fredonia, New York
Affiliations: Buffalo Association of Professional Geologists
Environmental Bankers Association
Certifications: HAZWOPPER
OSHA Personnel Protection and Safety Course
OSHA Personnel Protection Supervisors Course
ASTM Conference on Environmental Site Assessments for Property

Experience: Mr. Szustakowski is a graduate of Syracuse University with a Masters of Science in Geology. Over the past seventeen years, Mr. Szustakowski has been involved in all aspects of the management of environmental field projects on a nation wide basis. He has managed environmental projects ranging from small corner gas stations to multi-million dollar industrial sites. He has been involved with permit preparation and training and developed and implemented seminars to industries related to hazardous material handling and disposal. Mr. Szustakowski has overseen numerous hydrogeologic investigations, groundwater contaminant studies and related work around solid and hazardous waste facilities.

As the Assistant Vice President, Environmental Risk Analysis Officer for a Buffalo area lender, he was responsible for developing the Environmental Risk Analysis Unit of the bank, designed and enforced environmental due diligence policies based on the bank's risk tolerance and regulations. Responsibilities included: pre-qualifying consultants; competitive bidding and ordering; oversight and issuance of internal reports of all environmental projects (amounting to over 600 projects per year, Nation-wide); final decision making authority related to environmental risks to the bank; and, day-to-day monitoring of large environmental projects (budget tracking, internal reporting and invoice reconciliation). Major accomplishments include: methodically reviewed and remediated bank's owned "environmentally impaired" properties to allow for subsequent sale; completed pre-acquisition environmental due diligence on banks with multi-billion dollar mortgage portfolios and real estate holdings.

At LCS, Mr. Szustakowski is responsible for review of all environmental investigations completed. He specializes in counseling financial institutions in environmental risks associated with real estate lending and fore closures as well as policy preparation.

Relevant Projects Include:

Stuart-Oliver-Holtz Inactive Hazardous Waste Site, Rochester, New York – As project manager for a NYSDEC-contract consultant, Mr. Szustakowski devised the investigation work plan as part of the Remedial Investigation at this hazardous waste site. The work plan included test pit excavations, test borings, shallow and deep groundwater monitoring wells and surface water and sediment sampling. The work plan was prepared to NYSDEC Remedial Investigation requirements.

Projects (continued):

Apartment Complex, Nutley, New Jersey – Mr. Szustakowski acted as project manager for a detailed investigation of this state-listed hazardous waste site. Historically, the apartment complex was a portion of a paint factory was burned down in the 1970's. PCB and metals contamination had been identified in on-site soils. The work was completed in accordance with the New Jersey Department of Environmental Protection (NJDEP) Chapter 26E regulations for investigations at hazardous waste sites. The scope included surface and subsurface soil sampling, groundwater well installation and sampling, sump pit sampling and report preparation. On-going work includes characterization and disposal of investigation-derived wastes.

Metal Working Facility, Portland, Oregon – In this on-going project, Mr. Szustakowski acts as independent technical reviewer for a Remedial Investigation and Feasibility Study completed at an Oregon Department of Environmental Quality (ODEQ) hazardous waste site. The site is under investigation as a potential source of solvent contamination to a municipal water supply. Mr. Szustakowski's role is to provide review and oversight on behalf of the property owner of the various environmental consultants working on the project. The work, all completed to ODEQ requirements, has included groundwater investigation down to approximately 110 feet into three separate aquifers, hydrogeologic modeling, groundwater and soil sampling, indoor air quality testing, etc. Currently, an interim remedial measure has been approved for installation while the remedial investigation continues to assess the extent and remedial options to address the deeper groundwater impact.

Batavia Landfill Superfund Site, Batavia, New York –Mr. Szustakowski was involved in numerous aspects of the Remedial Investigation and Feasibility Study at this USEPA Superfund Site. Field work included test pits into magnesium waste pits, monitoring well installations and collection of surface soil and groundwater samples for analysis. Data analysis included assessment of hydrogeological conditions and development of a computer groundwater model of the site and surrounding areas.

Armonk Inactive Hazardous Waste Site, Armonk, New York – Mr. Szustakowski was involved in data reduction, interpretation and report preparation of the NYSDEC-funded Remedial Investigation at this inactive hazardous waste site. This included assessment of the vertical and horizontal extent of solvent contamination caused by releases of dry cleaning solvents into on-site septic systems.

Industrial Facility, Lockport, New York – Mr. Szustakowski devised a hydrogeological investigation to investigate a RCRA hazardous waste storage facility. The investigation was intended to assess the groundwater impact around a series of sludge lagoons. Due to the hydrogeologic conditions, the investigation had to include three separate groundwater zones, including a perched zone, a top-of-rock zone and deep rock zone. Responsibilities included well placement, well installation, groundwater sampling, data analysis and preparation of investigatory and monitoring reports for submittal to the NYSDEC.

Name: **Douglas B. Reid**
Title: VP, Environmental Services
Years with Firm: Six
Years with Other Firms: Three
Education: Bachelors of Science degree in Environmental Science (chemistry and geology concentration), Slippery Rock University (1995), Slippery Rock, Pennsylvania
Affiliations: Buffalo Association of Professional Geologists
Certifications: HAZWOPPER
ASTM Conference on Environmental Site Assessments for Property

Experience: Mr. Reid is a graduate of Slippery Rock University with a Bachelors of Science in Environmental Science with a concentration n chemistry and geology. Over the nine years, Mr. Reid has been involved in all aspects of the management of environmental projects on a nation wide basis. He has managed environmental projects ranging from small corner gas stations to multi-million dollar sites. He has been involved with numerous soil and groundwater investigations, remedial investigation and feasibility studies, pilot test programs, remedial system installations, monitoring and maintenance.

At LCS, Mr. Reid is responsible for implementation and oversight of all intrusive investigations and remedial projects completed throughout the company.

Relevant Projects Include:

Oil Terminal, Big Flats, New York – Mr. Reid acted as Field Manager for a detailed investigation following a large-scale petroleum release to the subsurface. Mr. Reid was responsible for design, implementation and evaluation of several large-scale pilot studies. Mr. Reid was also responsible for interacting with New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency personnel.

Apartment Complex, Nutley, New Jersey – Mr. Reid acted as a project manager for a detailed investigation of this state-listed hazardous waste site. Historically, the apartment complex was a portion of a paint factory was burned down in the 1970's. PCB and metals contamination had been identified in on-site soils. The work was completed in accordance with the New Jersey Department of Environmental Protection (NJDEP) Chapter 26E regulations for investigations at hazardous waste sites. The scope included surface and subsurface soil sampling, groundwater well installation and sampling, sump pit sampling and report preparation. On-going work includes characterization and disposal of investigation-derived wastes.

Alloy Recycling Facility, Lockport, New York – Mr. Reid was responsible for extensive soil and groundwater investigations and remedial action plan development to address impacted soil and groundwater discovered on-site.

Industrial Park, Batavia, New York – Mr. Reid acted as project manager to assess the environmental quality of the on-site soils and groundwater for potential impact by historical on-site operations as well as petroleum-bulk storage.

Relevant projects (continued):

Industrial Park, Buffalo, New York – Mr. Reid acted as project manager to assess the environmental quality of the on-site soils and groundwater for potential impact by historical on-site operations as well as petroleum-bulk storage.

Trinity Steel Site (Former Bethlehem Steel property) – Hamburg, New York – Mr. Reid acted as project manager to assess the environmental quality of the on-site soils for potential impact by historical on-site operations, petroleum bulk storage and filling of the subject property with unknown materials.

Name: **Alan Schenk**
Title: Environmental Scientist
Years with Firm: Three
Years with
Education: Bachelors of Science degree in Environmental Studies, State University of New York at Buffalo (2002), Amherst, New York

Certifications:
HAZWOPPER
ASTM Conference on Environmental Site Assessments for Property
NYSDOL Certified Asbestos Inspector
RAD 2 Worker Trained

Experience:

Mr. Shenk is a graduate of the State University of New York at Buffalo with a Bachelors of Science degree in Environmental Studies. Over the past three years, Mr. Schenk has managed environmental projects ranging from small corner gas stations to large industrial sites. He has been involved with numerous soil and groundwater investigations, underground storage tank system closures and remediation projects.

Relevant Projects Include:

Industrial Park, Buffalo, New York – Mr. Schenk acted as assistant project manager to assess the environmental quality of the on-site soils and groundwater for potential impact by historical on-site operations as well as petroleum-bulk storage.

Trinity Steel Site (Former Bethlehem Steel property) – Hamburg, New York – Mr. Schenk acted as assistant project manager to assess the environmental quality of the on-site soils for potential impact by historical on-site operations, petroleum bulk storage and filling of the subject property with unknown materials.

Former Gasoline Station, Rochester, New York – Mr. Schenk acted as assistant project manager for the investigation of a gasoline station impacted with petroleum contaminants. Activities included preparation of the site investigation work plan, report preparation including an exposure assessment/receptor analysis and to obtain spill closure.

Name: **Jeff Rowley**
Title: Environmental Scientist
Years with Firm: Three
Years with
Education: Bachelors of Science degree in Geology, State University of New York at Buffalo (2003), Amherst, New York
Certifications: HAZWOPPER
ASTM Conference on Environmental Site Assessments for Property
RAD 2 Worker Trained

Experience: Mr. Rowley is a graduate of the State University of New York at Buffalo with a Bachelors of Science degree in Geology. Over the past three years, Mr. Rowley has performed field activities on environmental projects ranging from small corner gas stations to large industrial sites. He has been involved with numerous soil and groundwater investigations, underground storage tank system closures and remediation projects.

Relevant Projects Include:

Industrial Park, Buffalo, New York – Mr. Rowley acted as a sampling technician. That work included well development, sampling and sample packing for various analytical parameters.

Trinity Steel Site (Former Bethlehem Steel property) – Hamburg, New York – Mr. Rowley acted as a sampling technician. That work included soil sampling for various analytical parameters. to assess the environmental quality of the on-site soils for potential impact by historical on-site operations, petroleum bulk storage and filling of the subject property with unknown materials.

Active Gasoline Station, Buffalo, New York – Mr. Rowley acted as the field manager for the investigation of a gasoline station impacted with petroleum contaminants and significant amounts of free-phase petroleum product. Activities included plume delineation and preparation of site investigation maps and logs for presentation to the New York State Department of Environmental Conservation (NYSDEC).