SITE INVESTIGATION / REMEDIAL ALTERNATIVES
WORK PLAN
GLENMERE LAKE PROPERTY
ORANGE COUNTY, NEW YORK

NYSDEC ERP SITE NO. E3-36-071

Prepared For:

ORANGE COUNTY
DEPARTMENT OF PARKS, RECREATION AND CONSERVATION

Prepared By:

DVIRKA AND BARTILUCCI CONSULTING ENGINEERS
WOODBURY, NEW YORK

JULY 2008

SITE INVESTIGATION / REMEDIAL ALTERNATIVES WORK PLAN GLENMERE LAKE PROPERTY ORANGE COUNTY, NEW YORK

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Section 1

1.0 INTRODUCTION

1.1 Project Background

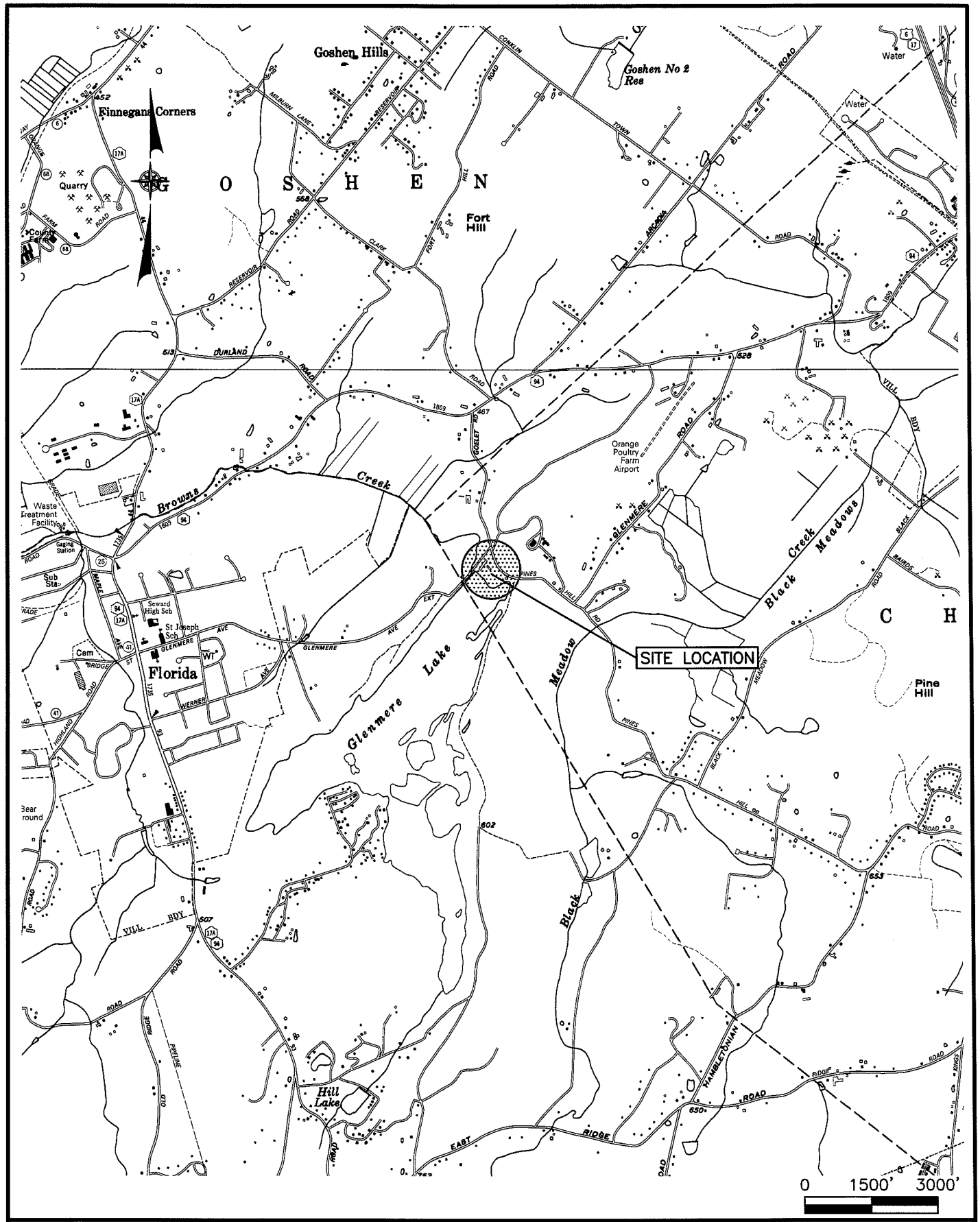
Under the New York State Department of Environmental Conservation (NYSDEC) Environmental Restoration Program (ERP), the County of Orange (Orange County) will undertake an investigation and remediation project at the Glenmere Lake Property (i.e., the site), located in Orange County, New York. A site location map is provided as Figure 1-1. This Site Investigation/Remedial Alternatives (SI/RA) Work Plan was prepared by Dvirka and Bartilucci Consulting Engineers (D&B) for Orange County in accordance with the requirements set forth in the NYSDEC's ERP Procedures Handbook, as well as NYSDEC's DER-10. The work plan provides a detailed description of the approach for completing the site investigation, including the site-specific scope of work, a site-specific Quality Assurance/Quality Control (QA/QC) Plan and a site-specific Health and Safety Plan (HASP). A Citizen Participation Plan (CPP) is provided under separate cover.

The scope of work presented in Section 3.0 of this document was developed based on the potential environmental areas of concern (AOCs) identified through D&B's review of background information provided by Orange County and multiple site visits (see Section 2.0).

1.2 Project Objectives

The primary objectives of the site investigation scope of work include:

- Investigate the identified AOCs associated with the site (see Section 2.5) and determine if they have resulted in surface or subsurface contamination and evaluate the extent of the contamination, if any.
- Evaluate local soil and groundwater quality to assess if chemical concerns exist relative to applicable NYSDEC standards and guidelines.
- Determine the need for supplemental data that may be necessary to adequately delineate the vertical and horizontal extent of contaminated soil and/or groundwater, if any.



Dvirka and Bartilucci
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GLENMERE LAKE PROPERTY
ORANGE COUNTY, NEW YORK

SITE LOCATION MAP

FIGURE 1-1

F:\2777\1234 OC SITE LOCATION MAP.dwg, FIG 1-1, 6/3/2008 10:56:38 AM, AStrauss

- Identify potential migration pathways of any identified contamination from the point of discharge to soil, groundwater and surface water.
- Identify potential human and environmental exposure pathways associated with identified contamination, if any.

1.3 Work Plan Organization

The remainder of this work plan further describes the site history, and the sampling objectives and methodologies that will be used, and is formatted as follows: Section 2.0 outlines the site description and history, as well as the identified AOCs; Section 3.0 outlines the proposed field program; and Section 4.0 identifies a tentative schedule for implementation of the work plan, along with project personnel. The QA/QC plan and HASP are provided as appendices.

Section 2

2.0 SITE BACKGROUND AND AREAS OF CONCERN

The information regarding the site background provided in this section, as well as the identified AOCs, is based on D&B's review of background information provided by Orange County and multiple site visits.

2.1 Current Site Description

The Glenmere Lake property is owned by Orange County and is located on Pine Hill Road in the Town of Chester, Orange County, New York (see Figure 1-1). The 9.9-acre site borders the northeast end of the 350-acre Glenmere Lake, which serves as the Village of Florida's drinking water supply. The Village of Florida's water treatment facility is located within approximately 500 feet of the site. The site is easily accessible from Glenmere Lake Road (a turn-off from State Route 17A, just south of the Village of Florida), situated across the road from the 40,000-square foot Glenmere Lake Estates mansion. A site plan is provided as Figure 2-1.

The Glenmere Lake property is an overgrown parcel with four dilapidated buildings encompassing an estimated 20,000 square feet in floor area. The buildings include a house, a milk barn and two connected structures with another barn area and a garage area with below-grade stairs. In addition, a former concrete pump house and an uncontrolled dumping ground containing asbestos shingles are present at the site.

2.2 Site History

The 9.9-acre Glenmere Lake property was originally part of a 1,440-acre estate owned by Richard Goelet in the 1940's, under the name "Glenmere Lake Estates, Inc." Mr. Goelet built a 40,000-square foot mansion on a hill across from the site, and built servant's quarters, a maintenance facility and stables on the 9.9-acre site. The estate was sold to A.M. Gootnick in 1977 and Abraham Prusoff operated the land as a resort and golf course. In 1978, Orange County

SITE BOUNDARY

GATE

GLENMERE
LAKE
ESTATES

GRAVEL
PARKING
AREA

CHAIN LINK
FENCE

PINE HILL ROAD

SITE BOUNDARY

GATE

SITE BOUNDARY

ORANGE COUNTY
PROPERTY

WOODS ROAD

PUMP
HOUSE

GLENMERE EXTENSION

BUILDING
REMAINS

BUILDING
REMAINS

OPEN FIELD

DAM

DIRT
DRIVE

FOUNDATION
REMAINS

BEAVER
LODGE

WOODS ROAD

GLENMERE
LAKE

EDGE OF SHORE

SITE AREA=9.9076 ACRES
AREA=431,576 S.F.

DUMPING
GROUND

EDGE OF SHORE

EDGE OF SHORE

GLENMERE
LAKE

SOURCE: ALTA / ACSM LAND TITLE SURVEY, WILLIAM D. YOUNGBLOOD LAND SURVEYING , P.C, APRIL 21, 2008

F:\2777\2777-PL\2.dwg, FIG 2-1, 10/13/2008 8:56:43 AM, DBCadd

Dvirka and Bartilucci Consulting Engineers
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GLENMERE LAKE ENVIRONMENTAL SITE RESTORATION
ORANGE COUNTY DEPARTMENT OF PARKS, RECREATION AND CONSERVATION

SCALE: 1"=60'

SITE PLAN

FIGURE 2-1

acquired the estate for back taxes. Portions of the estate were later sold, including the mansion parcel, leaving the reservoir and other lands, including the 9.9-acre site, in the County's ownership.

The 9.9-acre site is currently overgrown and hosts four dilapidated buildings encompassing an estimated 20,000 square feet in floor area that have been abandoned for nearly 30 years. The buildings include a house, a milk barn and two connected structures with another barn area and a garage area with below-grade stairs. In addition, a former concrete pump house and an uncontrolled dumping ground containing asbestos shingles are present at the site. There is evidence of unauthorized use of the site over the years such as the dumping of various debris and empty chemical storage drums.

Asbestos appears to be present on the piping, vessels and boilers associated with the buildings, and in the deteriorated exterior stucco of the buildings. Due to the structural collapse of the buildings, the stucco plaster is now in contact with the soil. A 6 by 9-foot pile of asbestos shingles, directly in contact with the soil, is present in the uncontrolled dumping area.

Evidence of automotive repair activities is located in the garage structure. Antifreeze containers and car batteries are also present in the dumping area.

Evidence exists that as many as six aboveground storage tanks (ASTs) are present on-site. In addition, as many as five suspected underground storage tanks (USTs) are present on-site. The condition and spill history of the tanks is unknown.

Several rusted 55-gallon drums are visible inside the buildings and around the site. The structural instability of the buildings restricts anything more than a visual assessment of the drums. Four empty 55-gallon drums marked "perchloroethylene" were removed from the perimeter of one of the buildings.

Past agricultural and golf course uses may have also involved potential contaminants, such as pesticides and herbicides.

2.3 Northern Cricket Frog Survey

Glenmere Lake contains one of the largest known populations of the Northern Cricket Frog *(Acris crepitans)* in Orange County and possibly in the state of New York. In order to ensure that the planned investigation and remediation of the site did not harm the frogs or their habitat, an intensive spring migration study was completed in April and May 2008. The objective of the study was to determine if the cricket frogs were wintering on the site or if the site was utilized as a migration route back to Glenmere Lake as the frogs emerged from winter hibernation, and provide recommendations for protecting the frogs during the planned ERP project.

The study involved the construction of drift fences around the site designed to funnel any wildlife attempting to enter or exit the site to hide boxes and traps. The hide boxes were opened and inspected twice daily. All frogs and other animals were identified, counted and released on the lake side of the drift fences. While cricket frogs were observed on the easternmost portion of the site, no cricket frogs were observed or captured in the western portion of the site or in the vicinity of the dilapidated buildings. Additional details of the study are available in the June 2008 report entitled, "Results of a Northern Cricket Frog Drift Fence Survey at Glenmere Lake, Orange County, New York," prepared by Herpetological Associates, Inc.

2.4 Site Geology, Hydrogeology and Subsurface Characteristics

According to United States Geological Survey (USGS) Water-Supply Paper 1985, stratigraphy in this region of Orange County generally consists of native unconsolidated glacial deposits overlying bedrock. These glacial deposits consist of Pleistocene-aged till and are composed of an unsorted mix of boulders, gravel, sand, silt and clay. Regionally, the glacial deposits are approximately 20 feet thick on average. However, site-specific thicknesses may vary significantly depending on irregularities of the underlying bedrock surface. In fact, bedrock is observed to outcrop in the northern portion of the site. According to USGS regional bedrock maps, the bedrock consists of Precambrian and Paleozoic-aged folded shale and sandstone.

The site generally slopes from northeast to southwest toward Glenmere Lake, from a maximum elevation of approximately 565 feet above mean sea level (msl) along Pine Hill Road to a minimum elevation at Glenmere Lake of approximately 532 feet msl. Depth to groundwater is expected to vary due to the irregular topography, but may be as deep as 25 feet along the northern limits of the site to as shallow as 5 feet or less along Glenmere Lake to the south. Based on the topography, groundwater is estimated to flow to the south/southwest toward Glenmere Lake.

Given the fact that bedrock is likely present at shallow depths at the site, the water table may be present within the bedrock. The upper portion of the bedrock is likely highly to moderately weathered. Highly weathered bedrock will bear and transmit water similar to unconsolidated deposits. If groundwater is present deeper in the bedrock in a more competent zone, then groundwater occurrence and flow will be controlled by major fractures or bedding planes in the bedrock.

Please note that the preceding summary is based largely on regional data. Site-specific geology and hydrogeology may differ from this regional summary.

2.5 Areas of Concern

Based on currently available information, the following environmental concerns will be investigated during the site investigation:

- The dilapidated buildings are suspected of containing asbestos and lead-containing building materials. Given the poor condition of the buildings, it is very possible that these contaminants of concern have impacted soil quality.
- The site was used for agricultural purposes, and as a result, it is possible that residual agricultural chemicals such as pesticides or herbicides are present due to utilization on the site or perhaps that were improperly disposed of on-site.
- Four empty 55-gallon drums labeled as containing tetrachloroethylene (PCE) were discovered on-site. However, the drums were removed from the site. There was no evidence that the drum contents were discharged on-site. In addition, at least six

areas scattered around the site were observed to contain rusted 55-gallon drums. Two of these areas are located inside the dilapidated buildings.

- Up to six ASTs for petroleum storage may be present on-site. In addition, as many as five suspected USTs for petroleum storage are present at the site.

- Miscellaneous debris and equipment has been dumped on-site, including wrecked automobiles. This dumping could have resulted in the contamination of site soil and groundwater by petroleum products and other related contaminants.

- A former concrete pump house with a lower level is present adjacent to Glenmere Lake on the northeast portion of the site. The pump house is associated with at least one suspected UST. It is unknown if any oil-containing equipment has been or is currently present within the pump house.

While not a direct environmental concern with the site, the planned investigation and remediation of the property takes into consideration the following site specific conditions:

- The 9.9-acre property comprises the northernmost shoreline of Glenmere Lake, which serves as the Village of Florida's public water supply.

- Glenmere Lake contains sensitive habitat, including freshwater wetlands that are home to an endangered species of amphibian commonly referred to as the Northern Cricket Frog.

Section 3

3.0 SCOPE OF WORK

The planned scope of work for the site investigation of the Glenmere Lake Property is based on D&B's review of the background information and the identified AOCs as summarized in Section 2.0 and is designed to satisfy the project objectives outlined in Section 1.2. The scope of work presented below will include geophysical surveys, surface soil sampling, subsurface soil sampling, and sediment sampling. As described below in Sections 3.5 and 3.6, groundwater probe and monitoring well installation/sampling may also be conducted based on the soil sampling results. A proposed sample location map (Drawing 1) has been prepared and is provided in a map pocket at the end of this section. Additionally, Table 3-1 provides a summary of sample location rationale, estimated sample depths and sample analysis.

Based on site visits and discussions with Orange County, there are areas on-site where aboveground storage tanks, underground storage tanks and drums have been observed or are suspected to exist. These areas have been indicated by colored shading on Drawing 1, and sample locations have been placed to investigate them. Due to safety concerns associated with the dilapidated state of the site buildings, all sample locations are outside the limits of the buildings. In addition, the proposed sample location map depicts approximate sampling locations, which may be adjusted due to site conditions, safety concerns and/or equipment access.

3.1 Underground Utility Clearance

Based on discussions with Orange County, underground utilities are not present on the site. However, prior to implementing any intrusive activities, a utility clearance will be conducted. The drilling contractor will request utility markouts through the Code 753/Dig Safe System. The markouts will be limited to public right-of-ways.

Table 3-1
Orange County Department of Parks, Recreation and Conservation

Environmental Restoration Program Project
Glenmere Lake Property

Proposed Sample Location Summary and Rationale

Potential Area of Concern	Rationale for Proposed Investigation	Suspected Contaminants of Concern	Investigation Recommended as part of the Proposed Scope of Work			
			Soil Characterization	Groundwater Characterization	Geophysical Survey	Analyses[1]
Residual Lead and Asbestos from Former Buildings	Dilapidated buildings could have impacted surficial soil quality.	Asbestos and Lead	Collect 24 surface soil samples from 0-2 in. **(SS-01 through SS-24)**	Not warranted at this time based on current knowledge.	Not warranted at this time based on current knowledge.	Asbestos and Lead
Agricultural Chemical Use	Property included horse stables and other agricultural uses	Pesticides and Herbicides	Collect 4 surface soil samples from 0-2 in. **(SS-25 through SS-28)**	Not warranted at this time based on current knowledge.	Not warranted at this time based on current knowledge.	TCL Pesticides and Herbicides
Miscellaneous Drums[2]	At least six areas scattered around the site were observed to contain rusted 55-gallon drums. Two of these areas are located inside the dilapidated buildings. Former contents and spill history is unknown.	Petroleum, VOCs, SVOCs, Metals	Collect 6 surface soil samples from 0-2 in. **(SS-29 through SS-34)**	Not warranted at this time based on current knowledge.	Not warranted at this time based on current knowledge.	TCL VOCs, TCL SVOCs, TCL Pesticides, PCBs and TAL Metals
Background[2]	Collect samples off-site to determine if concentrations detected on-site are typical of the area.	N/A	Collect 2 surface soil samples from 0-2 in. **(SS-35 and SS-36)**	Not warranted at this time based on current knowledge.	Not warranted at this time based on current knowledge.	SS-35: TCL VOCs, TCL SVOCs, TCL Pesticides, PCBs and TAL Metals SS-36: Asbestos and Lead
Four Empty 55-Gallon Drums, Labeled Tetrachloroethylene (PCE)	Determine if PCE was discharged to soil	Chlorinated VOCs	Complete 4 soil borings to water table or bedrock refusal, collect up to 1 sample per boring for chemical analysis. **(SB-01 through SB-04)**	If impacted soil is encountered at drum location, collect up to 2 groundwater probe samples at the water table downgradient of impacted area.	Not warranted at this time based on current knowledge.	Chlorinated VOCs
Above Ground and Underground Storage Tanks	At least six aboveground and five underground petroleum storage tanks may be present on-site. Condition and spill history is unknown. The six aboveground tanks are concentrated in three areas.	Petroleum	Complete 1 soil boring per tank area to water table or bedrock refusal, collect up to 1 sample per boring for chemical analysis. **(SB-05 through SB-11)**	If impacted soil is encountered at tank location, install up to 3 permanent monitoring wells.	Conduct geophysical survey (including electromagnetics and GPR) to locate suspected USTs and help place appropriate boring locations.	BTEX, PAHs and TPHs
Uncontrolled Dump Area	Unknown if hazardous or petroleum wastes were discharged to area.	Petroleum, VOCs, SVOCs, PCBs, Metals and Asbestos	Complete 2 soil borings to water table or bedrock refusal, collect up to 1 sample per boring for chemical analysis. **(SB-12 and SB-13)**	If impacted soil is encountered above bedrock, collect 1 groundwater probe sample at the water table downgradient of the impacted area.	Conduct geophysical survey (including electromagnetics and GPR) to determine if any buried waste is present in dump area and help place appropriate boring locations.	TCL VOCs, TCL SVOCs, TPHs, PCBs, TAL Metals and Asbestos
Pump House[2]	At least one suspected underground petroleum storage tank and one buried drum is associated with the Pump House. Condition and spill history is unknown. Pump House may have or had oil-containing equipment.	Petroleum	Complete 1 soil boring per tank/buried drum location to water table or bedrock refusal, collect up to 1 sample per boring for chemical analysis. **(SB-14 and SB-15)** Collect 2 sediment samples (0-6 in.) downgradient of Pump House at lake edge. **(SED-01 and SED-02)**	If impacted soil is encountered at tank/buried drum location, install up to 3 permanent monitoring wells.	Conduct geophysical survey (including electromagnetics and GPR) to locate suspected UST and help place appropriate boring locations.	BTEX, PAHs and TPHs

Notes:
[1]: Analyses will be completed on standard laboratory turnaround time
[2]: AOC added to scope of work based on May 2008 Site Visit with NYSDEC.
Target Compound List (TCL) Volatile Organic Compounds (VOCs), chlorinated VOCs and BTEX by EPA Method 8260.
TCL Semivolatile Organic Compounds (SVOCs) and Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270.
Polychlorinated Biphenyls (PCBs) by EPA Method 8082. Target Analyte List (TAL) Metals and Lead by EPA Method 6010.
Total Petroleum Hydrocarbons (TPHs) by EPA Method 8015. Asbestos by Polarized Light Microscopy (PLM).
TCL Pesticides by EPA Method 8081. TCL Herbicides by EPA Method 8151.

3.2 Geophysical Surveys

Geophysical surveys will be conducted by Geovation Engineering in order to locate any suspected USTs. In addition, geophysical methods are ideally suited for the identification of filled areas, and will help determine if any buried waste is present in the dumping area. The results of the surveys will help refine the placement of appropriate sample locations. Therefore, Geovation Engineering will utilize terrain conductivity and electromagnetic methods, along with ground penetrating radar (GPR) as part of the site investigation.

3.3 Surface Soil Sampling

A total of thirty-six surface soil samples will be collected from the site. Twenty-four samples will be collected within the vicinity of the former buildings to determine if surface soil has been impacted by asbestos and lead. Four surface soil samples will be collected around the site to determine if historic agricultural uses have resulted in impacts to surface soil from pesticides and herbicides. Six surface soil samples will be collected in areas where rusted 55-gallon drums have been observed. In addition, two samples will be collected on the Orange County property to the east of the site to determine background conditions. The proposed surface soil sampling locations are depicted on Drawing 1. The rationale, as well as the analytical parameters for each sample, is presented in Table 3-1. Sample locations will be biased in the field toward suspected areas of impact, such as stained areas, areas containing drums, dumping areas, areas of stressed vegetation and/or areas of malodorous odor. The surface soil samples will be collected at a depth of 0 to 2 inches below ground surface using a disposable polyethylene scoop.

3.4 Soil Probe and Subsurface Soil Sampling

Fifteen soil probes will be completed in areas suspected of being contaminated, including seven in the location of storage tank areas, four in the former location of the drums labeled as containing PCE, two in the location of the dumping area, and two around the former pump house. The purpose of the probes is to characterize subsurface soil and possible contamination, obtain a better understanding of site stratigraphy and to collect soil samples for laboratory

analysis. The proposed soil probe locations are depicted on Drawing 1. The rationale is presented on Table 3-1.

It is anticipated that subsurface soil samples will be collected using direct push sampling techniques (i.e., Geoprobe). An all-terrain vehicle (ATV)-mounted Geoprobe unit will be utilized that will enable the sample collection team to reach sample locations that might otherwise be inaccessible by truck-mounted equipment. Direct push sampling techniques will allow for the relatively rapid collection of soil samples with minimal disturbance of the ground surface and generation of soil cuttings and investigation-derived waste (IDW). The probes will be installed utilizing a decontaminated macro core soil sampler fitted with a disposable 4-foot acetate liner.

Soil probes will be completed to the water table or bedrock refusal, whichever is encountered first. It is estimated that soil probes will be completed to depths of less than 20 feet. Soil samples will be collected continuously. All soil samples will be described by the field geologist in accordance with the Unified Soil Classification System. The field geologist will describe any evidence of contamination (e.g., staining, sheens, odors) and screen for organic vapors using a photoionization detector (PID).

One soil sample will be collected for analysis from each soil probe from the zone with the highest PID readings or visual impacts. Additional samples may be collected in order to define the vertical extent of observed contamination. If necessary, rock drilling will be performed to obtain required environmental data. If no impacts are observed, one sample will be collected from the base of the probe.

Analysis of each sample will depend on the location of the soil probe, and the type of contamination anticipated to be present at that location. Analytical parameters for each soil probe location are listed in Table 3-1. It is anticipated that the relatively small amount of soil cuttings will be placed back into the probe hole or spread on-site. However, if impacts are observed, the IDW will be handled as described in Section 3.10.

All non-dedicated sampling equipment will be decontaminated between sampling locations as described in Section 3.11. Each probe will be grouted with bentonite-cement slurry upon completion. Soil probe locations will be staked/marked for identification during follow-up survey work. The locations of each probe will be documented in the report.

3.5 Groundwater Probe Sampling

Following subsurface soil sampling at the former PCE drum and uncontrolled dump area AOCs, a determination will be made regarding the need for the collection of groundwater probe samples. Groundwater probes may be installed to collect groundwater samples only if significant visual evidence of contamination is observed (i.e., staining, high PID readings, etc.) during the soil probes and/or the analytical results related to soil samples identify any contaminants exceeding the NYSDEC Subpart 375 unrestricted use soil cleanup objectives.

Direct push sampling techniques will be utilized to collect groundwater probe samples. Groundwater probes will be installed utilizing a decontaminated screened sampler. The decontaminated probe and rods will be driven until the sampler tip is approximately 1-foot below the target sampling depth. Once that depth has been reached, the expandable drive point will be disengaged and the rods pulled back a distance of about 2 feet to expose the screened sampler. Disposable polyethylene tubing, equipped with a bottom check valve, will be used to convey groundwater to the surface for collection. Each sample, upon retrieval, will be analyzed in the field for pH, conductivity, turbidity and temperature.

Groundwater sample analysis will depend on the type of contaminants identified during soil sampling. For any samples analyzed for metals, one sample will be collected for total metals analyses. If turbidity is greater than 50 NTUs (nephelometric turbidity units), a filtered sample will also be collected and analyses performed for both filtered and unfiltered aliquots.

3.6 Monitoring Well Installation and Development

Following subsurface soil sampling at the suspected above ground and underground storage tanks and pump house AOCs, a determination will be made regarding the need for

permanent monitoring wells to sufficiently characterize groundwater quality and groundwater flow. Monitoring wells may be installed if significant visual evidence of contamination is observed (i.e., staining, high PID readings, etc.) during the soil probes and/or the analytical results related to soil samples identify any contaminants exceeding the NYSDEC Subpart 375 unrestricted use soil cleanup objectives.

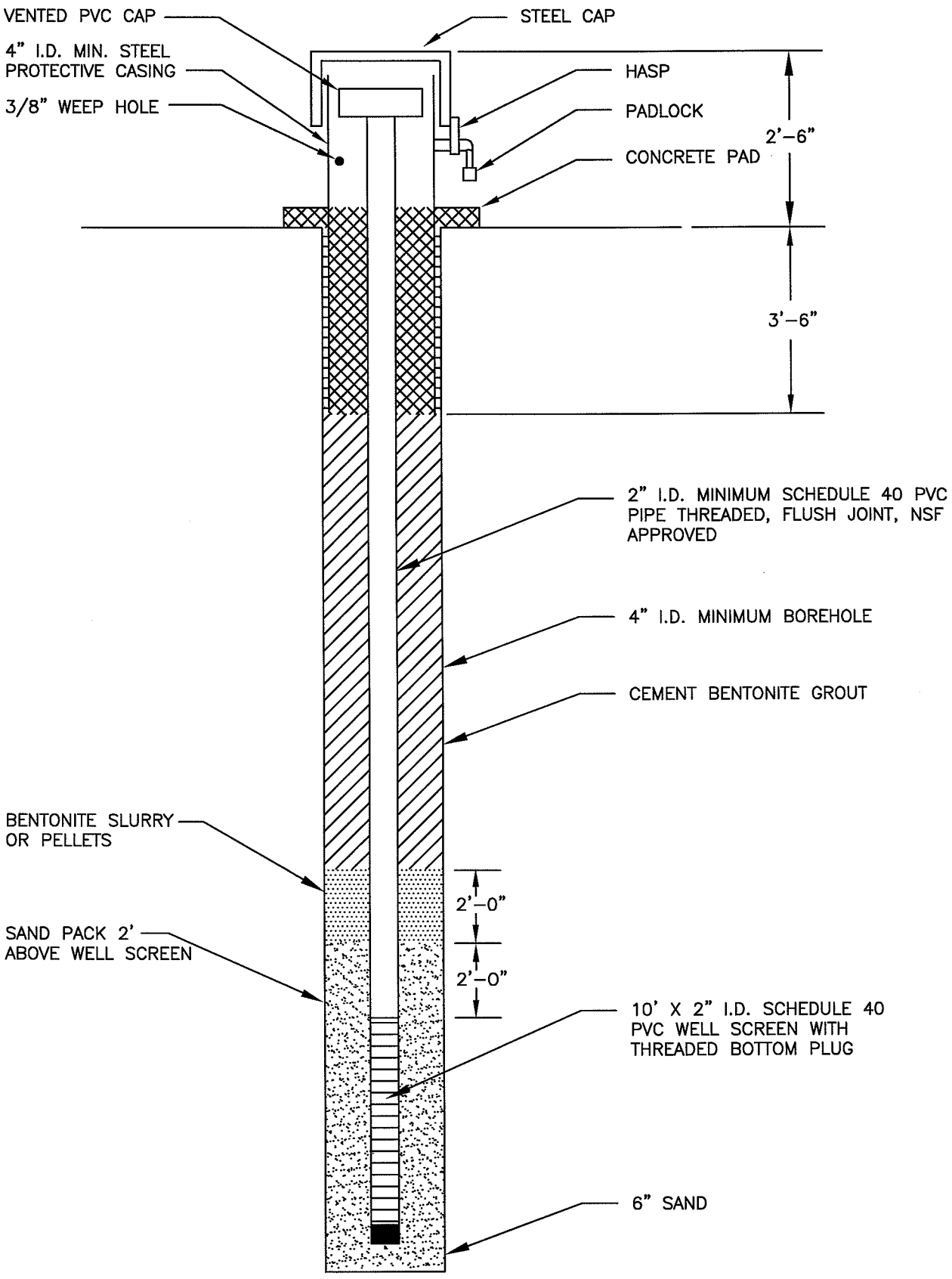
In such cases, monitoring wells will be installed using decontaminated 4 1/4-inch ID hollow stem augers. Given the depth to groundwater is likely to be less than 25 feet throughout the property, all shallow monitoring wells will be installed in unconsolidated sediment using the Geoprobe track-mounted ATV Model 6610 DT. This Geoprobe unit has the capability to advance hollow stem augers to depths of up to 40 feet and install standard 2-inch monitoring wells. A construction detail for a typical well is provided as Figure 3-1.

Monitoring wells would be developed by pumping and surging for 2 hours, or until the turbidity of the groundwater achieves a reading of 50 NTUs or less. Well development would be supplemented by measurements of field parameters, including temperature, pH and specific conductance. Development would continue until the field parameters stabilize for a minimum of three consecutive readings of 10 percent variability or less.

It is anticipated that drill cuttings will be spread on-site and development water discharged to the ground adjacent to each well. However, if impacts are observed, the IDW will be handled as described in Section 3.10. All sampling equipment (e.g., augers) will be decontaminated between sampling locations as described in Section 3.11.

3.7 Monitoring Well Sampling

Monitoring well sampling will be performed a minimum of seven days after the development of all monitoring wells. Prior to collecting the samples, the depth to groundwater will be measured in the wells using a water interface probe attached to a measuring tape accurate to 0.01 foot.



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GLENMERE LAKE PROPERTY
ORANGE COUNTY, NEW YORK

TYPICAL MONITORING WELL CONSTRUCTION

FIGURE 3-1

F:\2777\2777 FIG 3-1.dwg, FIG 1-2, 6/3/2008 10:38:33 AM, AStrauss

The water level data, well diameter, and depth will be used to calculate the volume of water in each well. The wells will then be purged using low-flow purging techniques. Groundwater samples will be collected using a bladder pump equipped with clean, disposable tubing and transferred from the tubing on the outlet of the pump directly into clean laboratory-supplied sample bottles containing appropriate preserving agents. Groundwater sample analysis will depend on the type of contamination identified during soil probe sampling.

Purge water will be discharged to the ground adjacent to each well. If impacts are observed, the IDW will be handled as described in Section 3.10. All nondedicated sampling equipment (e.g., submersible pumps and water interface probe) will be decontaminated between sampling locations as described in Section 3.11.

3.8 Sediment Sampling

Given the proximity of the former Pump House to Glenmere Lake, two sediment samples will be collected for chemical analysis in order to demonstrate that Glenmere Lake has not been impacted by any contamination that may be associated with the former Pump House. The proposed sample locations are depicted on Drawing 1. The rationale is presented in Table 3-1. The sediment samples will be collected adjacent to the property shoreline, downgradient of the former Pump House. Sediment samples will be collected from the upper 6 inches of sediment using disposable scoops. Upon retrieval, each sample will be screened for volatile organic compounds (VOCs) using a PID and logged for indications of contamination such as odors or staining. Sample analysis is described in Table 3-1.

3.9 Air Screening

Ambient air monitoring will be conducted throughout the field program undertaken in support of the investigation using a PID to detect VOCs. The results of the PID screening will be used to determine the necessary levels of personal protective equipment, as well as to provide data on contaminant concentrations in the background ambient air during investigation activities. In addition, the PID will be used to screen soil and groundwater samples for the presence of

VOCs. The field screening of the soil will also be used in the selection of soil samples for chemical analysis.

3.10 Management of Investigation Derived Waste

It is anticipated that IDW (i.e., drill cuttings, development water and purge water) can be returned to the probe hole, spread on-site or discharged to the ground. However, if visibly-impacted IDW is generated, it will be containerized in DOT-approved 55-gallon drums. The drums will be sealed at the end of each workday and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, development water or purge water) and the name of a point-of-contact. Soil samples collected from soil probes will be used for waste characterization of soils, since such data would be biased towards areas that are expected to be most contaminated. Notwithstanding, additional waste characterization soil samples will be collected, if warranted. Grab samples will be collected from drums and/or holding tanks containing well development and purge water for waste characterization of liquids. The samples will be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, PCBs, total petroleum hydrocarbons (TPHs), ignitability, corrosivity, reactivity, and total cyanide. All drums will be labeled "pending analysis" until laboratory data is available. All IDW will be disposed of or treated according to applicable local, state and federal regulations.

3.11 Equipment Decontamination

Whenever possible, all field sampling equipment should be sterile/disposable and dedicated to a particular sampling point. In instances where this is not possible, a field cleaning/ decontamination procedure will be used in order to mitigate cross contamination between sample locations. In addition, drilling equipment should be decontaminated before use and between sample locations. A decontamination station/pad will be established for all field activities. This will be an area located away from the source of contamination so as not to adversely impact the decontamination procedure, but close enough to the sampling locations to keep equipment transport handling to a minimum after decontamination. Specific decontamination procedures for drilling equipment and sampling equipment are described in Section 6.0 of the QA/QC plan,

provided in Appendix A.

3.12 Site Survey

At the completion of installation activities, the location and elevation of all soil probes, groundwater probes and monitoring wells will be surveyed by a New York State-licensed surveyor for placement on the base map. Two elevation measurements, including the elevation on the rim of the flush-mounted manhole and the elevation of the top of PVC well casing, will be taken at each monitoring well location to assist in the determination of the site-specific shallow groundwater flow direction. The survey elevations will be measured to an accuracy of 0.01 foot above the National Geodetic Vertical Datum of 1929 (an approximation of mean sea level).

3.13 Data Reduction

Data validation will be performed by a USEPA and NYSDEC-approved data validator in order to verify and document acceptable quality of analytical data. The analytical and validation processes will be conducted in conformance with the USEPA 5/99 and 1/00 SOWs and/or NYSDEC 6/00 ASP (or latest version) and ensure that all analytical requirements of the QAPP and SI/RA work plan are followed. Each data package will be checked for completeness and technical adequacy of the data. The review procedures will address validation of routine analytical services based on the TCL and TAL for standard sample matrices.

Data validation procedures will include:

- Checklisting - The data package will be checked for correct submission of the contract-required deliverables, correct transcription from the raw data to the required deliverable summary forms and proper calculation of a number of parameters.

- Analytical Quality Review - The data package will be closely examined to recreate the analytical process and verify that proper and acceptable analytical techniques have been performed. Additionally, overall data quality and laboratory performance will be evaluated by applying the appropriate data quality criteria to the data to reflect conformance with the specified, accepted QA/QC standards and contractual requirements.

At the completion of the data validation, a Data Usability Summary Report section will be prepared and included in the SI/RA report.

3.14 Exposure Assessment

A human health and environmental exposure assessment will be performed. The exposure assessment will address the potential exposure routes for identified contaminants and potentially affected on-site and off-site receptors. Specific emphasis will be placed on the fact that the property is located in close proximity to Glenmere Lake, which is a source of drinking water for the Village of Florida, as well as the fact that Orange County may wish to consider utilizing the property as a passive park in the future. The goal of the human health exposure assessment is to provide qualitative analysis of human health risks under current site conditions, including identification of contaminant migration pathways and potential receptors and provide a basis for determining contamination that can remain on-site while providing adequate protection of human health and the environment.

The approach to be used to perform the risk assessment will be to identify contaminants and media of concern at the site based on a comparison to standards, criteria and guidance (SCG) selected for the site. The routes of exposure for these contaminants and media will be defined, potential receptors identified and a determination will be made as to whether the pathways are complete or incomplete. The findings of the exposure assessment will be presented in the SI/RA Report.

3.15 Site Investigation/Remedial Alternatives (SI/RA) Report

The SI/RA Report prepared as part of this assignment will provide background information regarding the site, a description of field investigation activities performed, investigation/test results, a data validation/usability evaluation, identification and location of contaminants, comparison of contaminant concentrations to NYSDEC standards and guidelines, assessment of potential contaminant migration pathways, impact on human and environmental receptors/exposure assessment, conclusions regarding the significance of the findings and

recommendations for remediation based on the anticipated use of the site, with emphasis on the integration of remediation, if necessary, with site development.

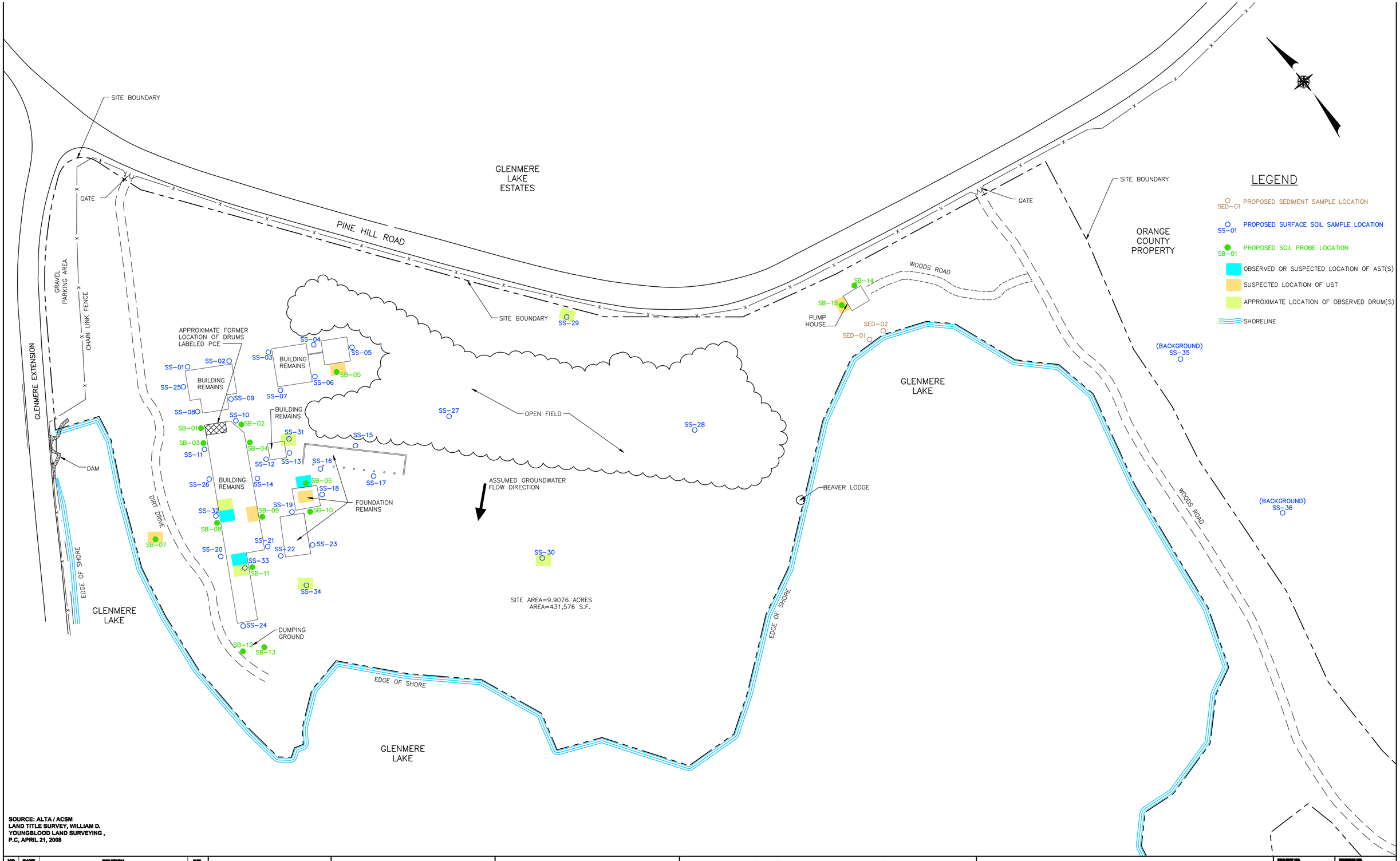
Based on the contaminants of concern and extent of identified contamination, potential remedial action alternatives will be developed and evaluated. The potential alternatives will be evaluated based on seven criteria:

- Overall protection of human health and the environment;
- Compliance with NYSDEC standards and guidelines;
- Short-term effectiveness;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility and volume;
- Feasibility; and
- Community acceptance.

Based on the evaluation of the potential alternatives against these criteria, as well as relative cost, a recommendation will be made regarding the remedial alternative to be implemented at the site.

The following report deliverables will be provided to Orange County:

- D&B will provide four copies of the preliminary draft report to Orange County for review and comment.
- D&B will revise the draft report in accordance with Orange County's comments and provide ten copies of the revised draft report to Orange County for distribution to the NYSDEC and NYSDOH. An electronic version of the report in Microsoft Word will also be provided.
- D&B will revise the draft report to incorporate regulatory agency comments and provide ten bound copies of the final report to Orange County for distribution to regulatory agencies. An electronic version of the report in Microsoft Word will also be provided.



SOURCE: ALTA / ACSM
LAND TITLE SURVEY, WILLIAM D. YOUNGBLOOD LAND SURVEYING , P.C, APRIL 21, 2008

NO.	DATE	REVISION	INT.

PROJECT ENGINEER: T.F. | DRAWN BY: A.R.S.
DESIGNED BY: A.C. | CHECKED BY: T.F.

Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

ORANGE COUNTY DEPARTMENT OF PARKS RECREATION AND CONSERVATION
ORANGE COUNTY NEW YORK

GLENMERE LAKE PROPERTY

SAMPLE LOCATION MAP

PROJECT NO. 2777
DATE 022706
SCALE 1"=40'
DRAWING NO. 1

P:\2777\2777-PL02.dwg, 3/4/26, 10/13/2006 8:06:13 AM, DBOard

Section 4

4.0 PROJECT PERSONNEL AND SCHEDULE

4.1 Personnel

The site investigation will be completed for Orange County by Dvirka and Bartilucci Consulting Engineers (D&B) with local support by subconsultant Geovation Engineering. Key members of the project team and their responsibilities are described below.

Key Position	Contact Name	Responsibilities
Project Manager	Mr. Thomas P. Fox, P.G. Dvirka and Bartilucci Consulting Engineers Telephone: (516) 364-9890 Fax: (516) 364-9045 e-mail: tfox@db-eng.com	The Project Manager is responsible for maintaining the project schedule, keeping the project within budget and ensuring the technical adequacy of the work performed. The Project Manager will be the primary contact with Orange County on all technical, scheduling and budget issues.
Field Operations Manager	Mr. Matthew Mordas Geovation Engineering Telephone: (845) 651-4141 Fax: (845) 651-0040 e-mail: mmordas@geovation.com	The Field Operations Manager will be responsible for working with the Project Manager to coordinate, oversee and ensure that all requirements are strictly adhered to on field activities.
Technical Director	Ms. Robbin Petrella Dvirka and Bartilucci Consulting Engineers Telephone: (516) 364-9890 Fax: (516) 364-9045 e-mail: rpetrella@db-eng.com	The Technical Director will provide technical support and overall quality assurance for the project. The primary objective of the Technical Director is to ensure compliance with all regulatory guidance and regulations.
Health and Safety Coordinator	Mr. Stephen Tauss Dvirka and Bartilucci Consulting Engineers Telephone: (516) 364-9890 Fax: (516) 364-9045 e-mail: stauss@db-eng.com	The Health and Safety Coordinator will ensure that the health and safety plan is properly implemented and that all personnel and subconsultant/ subcontractor site personnel are trained in the site-specific project health and safety requirements.

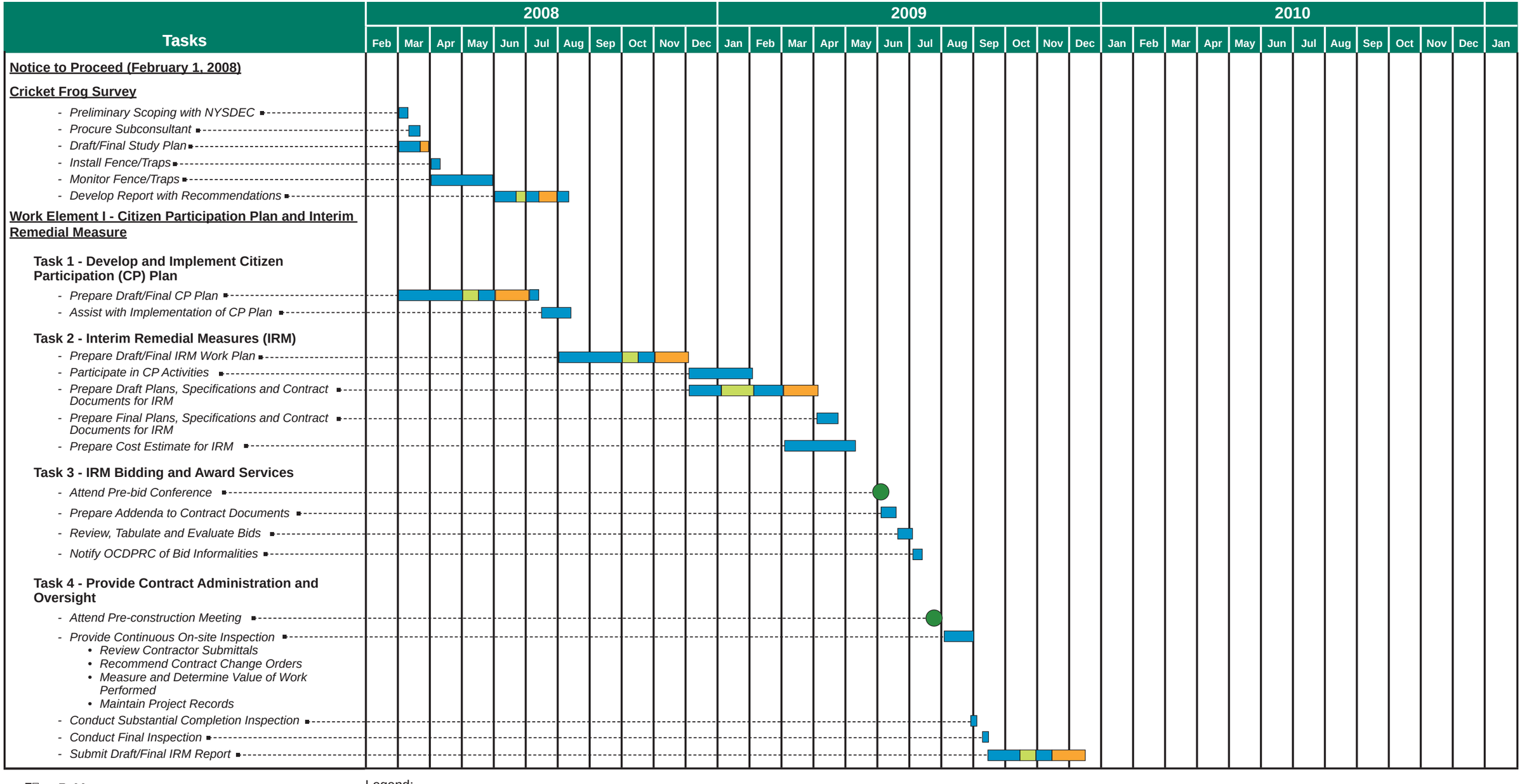
4.2 Schedule

The overall project schedule is provided in Table 4-1. The schedule for implementing the Site Investigation/Remedial Alternatives Work Plan is provided as Work Element II in Table 4-1.

Orange County Department of Parks, Recreation and Conservation

Project Schedule

Environmental Restoration Project Site Investigation/Remedial Alternatives Report; Interim Remedial Measures Design and Oversight; Remediation Design & Oversight for the Glenmere Lake Property, NYSDEC ERP SIte No. E3036-071



Legend:

- D&B Activity
- OCDPRC Activity
- NYSDEC Review
- Meeting

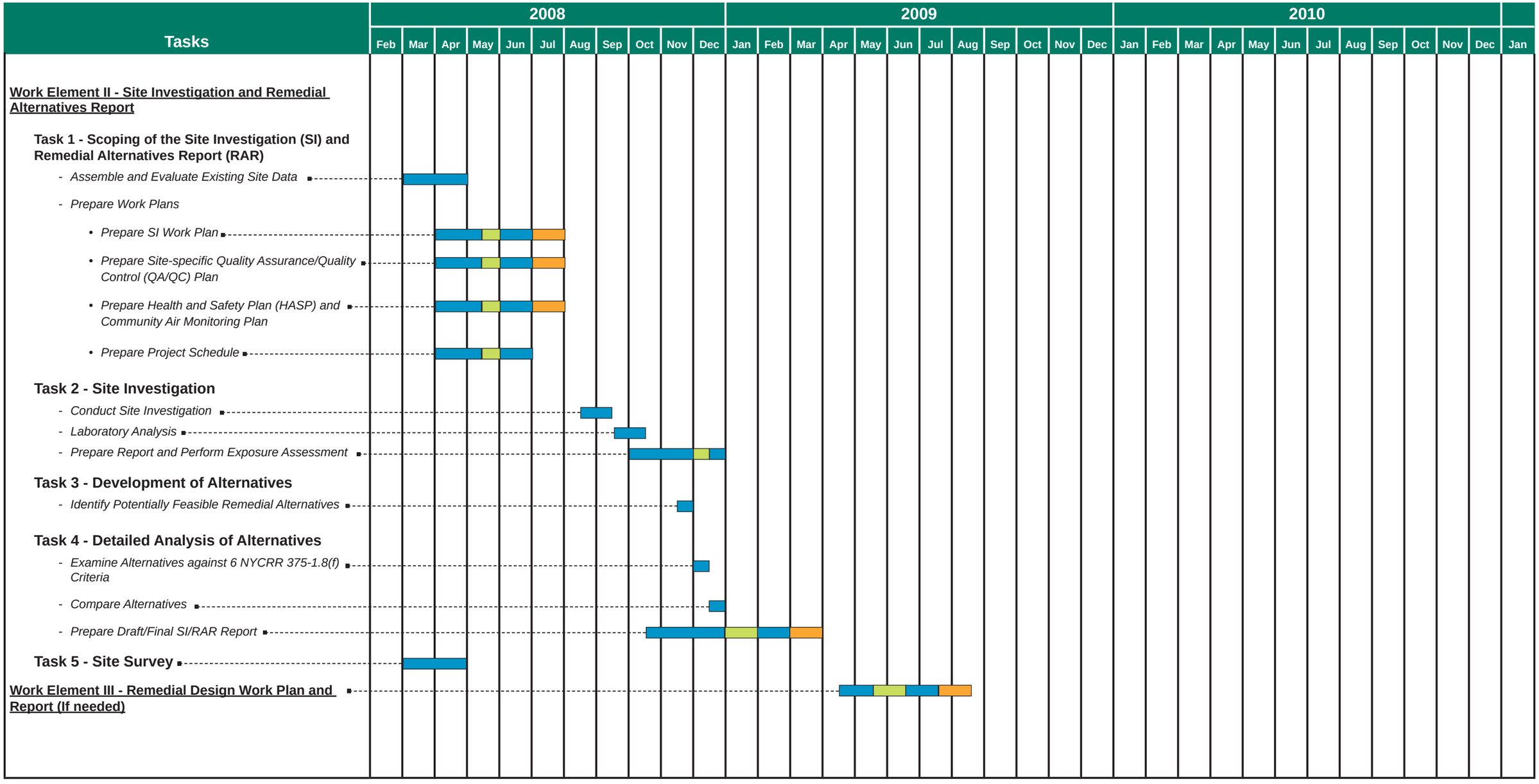
Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

RLA/PW4729 OCDPRC Schedule.indd (04/17/2008)

Orange County Department of Parks, Recreation and Conservation

Proposed Project Schedule

Environmental Restoration Project Site Investigation/Remedial Alternatives Report; Interim Remedial Measures Design and Oversight; Remediation Design & Oversight for the Glenmere Lake Property, NYSDEC ERP SIte No. E3036-071



Legend:

- D&B Activity
- OCDPRC Activity
- NYSDEC Review
- Meeting

Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

RLA/PW4729 OCDPRC Schedule.indd (04/17/2008)

Appendix A

APPENDIX A

SITE-SPECIFIC QUALITY ASSURANCE/ QUALITY CONTROL PLAN

QUALITY ASSURANCE / QUALITY CONTROL PLAN

SITE INVESTIGATION
GLENMERE LAKE PROPERTY
ORANGE COUNTY, NEW YORK

NYSDEC ERP SITE NO. E3-36-071

Prepared for:

ORANGE COUNTY DEPARTMENT OF PARKS,
RECREATION AND CONSERVATION

Prepared by:

DVIRKA AND BARTILUCCI CONSULTING ENGINEERS
WOODBURY, NEW YORK

JULY 2008

QUALITY ASSURANCE / QUALITY CONTROL PLAN
SITE INVESTIGATION
GLENMERE LAKE PROPERTY
ORANGE COUNTY, NEW YORK

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1.0 INTRODUCTION

The purpose of this Quality Assurance/Quality Control (QA/QC) Plan is to describe the detailed sample collection and analytical procedures that will ensure high quality, valid data for use in the site investigation conducted at the Glenmere Lake property (i.e., the site) located in Orange County, New York.

The data generated from the sampling program will be used to determine the nature, extent and source(s) of any impacted soil and groundwater at the site, prepare a public health exposure assessment, and identify, evaluate and recommend a cost-effective, environmentally sound, long-term remedial action plan. The data will also be utilized to monitor for the health and safety of workers at the site and potential receptors off site.

2.0 SAMPLING PROGRAM DESIGN AND RATIONALE

The following presents a general discussion of the sampling that may be conducted in support of the site investigation.

- Sediment - Sediment samples will be collected from Glenmere Lake, downgradient of the former pump house, to determine if surface water sediment has been impacted by on-site contamination, if any.
- Surface Soil - Surface soil samples will be collected on-site to determine the extent of impacted surface soil, if any.
- Subsurface Soil - Subsurface soil samples will be collected on-site to determine the extent of impacted subsurface soil, if any.
- Groundwater - Groundwater samples may be obtained from monitoring wells and/or groundwater probes which may be installed as part of the site investigation. Groundwater samples would be collected to characterize groundwater quality.

For a detailed discussion of the sampling program, see the Work Plan.

3.0 ANALYTICAL PARAMETERS

Depending on their location, surface soil, subsurface soil and sediment samples collected from the site will be analyzed for any or all of the following: Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), Target Analyte List (TAL) metals, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPHs), TCL pesticides, TCL herbicides and asbestos. Samples may also be analyzed for subsets of the above parameters, such as chlorinated VOCs and benzene, toluene, ethylbenzene and xylenes (BTEX), which are subsets of VOCs, and polycyclic aromatic hydrocarbons (PAHs), which are a subset of SVOCs. Groundwater samples, if collected, may also be analyzed for the above listed constituents. For a detailed discussion of the sampling program, see the Work Plan.

Table 1 presents a summary of the parameters/sample fraction together with the typical sample location, type of sample, sample matrix, type of sample container, method of sample preservation, holding time and analytical method.

4.0 DATA QUALITY REQUIREMENTS

Data quality requirements and assessments are provided in the 6/00 NYSDEC ASP, which includes the detection limit for each parameter and sample matrix. Note that quantification limits, estimated accuracy, accuracy protocol estimate precision and precision protocol are determined by the laboratory and will be in conformance with the requirements of the 6/00 NYSDEC ASP, where applicable. Table 2 presents a summary of the data quality requirements.

The methods of analysis will be in accordance with SW-846 and 6/00 NYSDEC ASP. Specific analytical procedures and laboratory QA/QC descriptions are not included in this QA/QC Plan, but will be available upon request from the laboratory selected to perform the analyses. The laboratory will be New York State Department of (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified for organic and inorganic analyses

Table 1

SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Surface Soil, Soil Probe and Sediment Sampling	Grab	Soil/Sediment	VOCs, chlorinated VOCs, BTEX	Glass, clear/2 oz./2 ICHEM 200 series or equivalent	Cool to 4°C	10 days after VTSR	6/00 NYSDEC ASP, Method 8260b
	Grab or Composite	Soil/Sediment	SVOCs, PAHs	Glass, clear/8 oz./1 ICHEM 200 series or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	6/00 NYSDEC ASP, Method 8270c
	Grab or Composite	Soil/Sediment	PCBs	Glass, clear/8 oz./1 ICHEM 200 series o equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	6/00 NYSDEC ASP, Method 8082
	Grab or Composite	Soil/Sediment	TAL Metals, Lead	Glass, clear/8 oz./1 ICHEM 200 series or equivalent	Cool to 4°C	26 days after VTSR for mercury analysis, 6 months for all other metals	6/00 NYSDEC ASP, Method 6010b/7471a
	Grab or Composite	Soil/Sediment	TPHs	Glass, clear/4 oz./1 ICHEM 200 series or equivalent	Cool to 4°C	14 days after VTSR for analysis	6/00 NYSDEC ASP, Method 8015b
	Grab or Composite	Soil/Sediment	Pesticides	Glass, clear/8 oz./1 ICHEM 200 series or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	6/00 NYSDEC ASP, Method 8081
	Grab or Composite	Soil/Sediment	Herbicides	Glass, clear/8 oz./1 ICHEM 200 series or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	6/00 NYSDEC ASP, Method 8151A
	Grab or Composite	Soil/Sediment	Asbestos	Glass, clear/8 oz./1 ICHEM 200 series or equivalent	Cool to 4°C	N/A	NIST Polarized Light Microscopy (PLM)

VTSR - Verified time of sample receipt at the laboratory.

N/A - Not Applicable

Table 1 (continued)

SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Monitoring Wells/ Groundwater Probes	Grab	Groundwater	VOCs, chlorinated VOCs, BTEX	Glass, clear/40 ml/3 ICHEM 300 series or equivalent	Cool to 4°C	7 days after VTSR for analysis	6/00 NYSDEC ASP, Method 8260b
	Grab	Groundwater	SVOCs, PAHs	Glass, amber/1 L/2 ICHEM 300 Series or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	6/00 NYSDEC ASP, Method 8270C
	Grab	Groundwater	TPHs	Glass, amber/1 L/2 ICHEM 300 Series or equivalent	Cool to 4°C	14 days after VTSR for analysis.	6/00 NYSDEC ASP, Method 8015C
	Grab	Groundwater	PCBs	Glass, amber/1 L/2 ICHEM 300 Series or equivalent	Cool to 4°C	5 days after VTSR for extraction, 40 days after extraction for analysis	6/00 NYSDEC ASP, Method 8082
	Grab	Groundwater	TAL Metals (total)	Plastic/1 L/2 ICHEM 300 series or equivalent	HNO_3 to pH <2 Cool to 4°C	26 days after VTSR for mercury analysis, 6 months for all others	6/00 NYSDEC ASP, Method 6010b/7470a
	Grab	Groundwater	TAL Metals (dissolved)	Plastic/1 L/2 ICHEM 300 series or equivalent	Cool to 4°C*	26 days after VTSR for mercury analysis, 6 months for all others	6/00 NYSDEC ASP, Method 6010b/7470a

*Sample will be filtered in the laboratory, then preserved.

VTSR - Verified time of sample receipt at the laboratory.

Table 1 (continued)

SUMMARY OF ANALYTICAL PARAMETERS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Site	Trip Blank	Water	VOCs	Glass, clear/40 ml/1 ICHEM 300 series or equivalent	Cool to 4°C	7 days after VTSR for analysis	6/00 NYSDEC ASP, Method 8260b

VTSR - Verified time of sample receipt at the laboratory.

Table 2

DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION, ACCURACY AND COMPLETENESS

Parameter	Sample Matrix	CRDL* (ug/l)	Estimated Accuracy	Accuracy Protocol	Estimated Precision	Precision Protocol
Volatile Organics	Liquid Solid	5-10 5-10	0.87 - 2.48 ug/l	Vol. IB, Chapter 4, Method 8260b, Table 7	0.11 - 4.00 ug/l	Vol. IB, Chapter 4, Method 8260b, Table 7
Base Neutrals	Liquid Solid	10-50 330-1600	0.29 - 1.23 ug/l	Vol. IB, Chapter 4, Method 8270c, Table 7	0.13 - 1.05 ug/l	Vol. IB, Chapter 4, Method 8270c, Table 7
Acid Extractables	Liquid Solid	10-50 330-1600	0.29 - 1.23 ug/l	Vol. IB, Chapter 4, Method 8270c, Table 7	0.13 - 1.055 ug/l	Vol. IB, Chapter 4, Method 8270c, Table 7
Pesticides/PCBs	Liquid Solid	0.5-1.0 8.0-160	0.69 - 10.79 ug/l	Vol. IB, Chapter 4, Method 8082, Table 4	0.16 - 3.50 ug/l	Vol. IB, Chapter 4, Method 8082, Table 4
Metals	Liquid Solid	0.2-5000 0.2-5000	--	Vol. IA, Chapter 3, Method 6010b**, Table 4	--	Vol. IA, Chapter 3, Method 6010b**, Table 4

*Contract Required Detection Limits

**and SW-846 Methods for: Mercury 7470a–Liquid
7471a–Solid

Table 2 (continued)

DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION, ACCURACY AND COMPLETENESS

Matrix/Parameter	Precision (%)	Accuracy (%)
Soils		
VOCs[(a)]	See Table 2a	See Table 2a
Extractables[(a)]	See Table 2b	See Table 2b
Pesticides/PCBs[(a)]	See Table 2c	See Table 2c
Metals[(b)/(c)]	± 25	75-125
Groundwater		
VOCs[(a)]	See Table 2a	See Table 2a
Extractables[(a)]	See Table 2b	See Table 2b
Pesticides/PCBs[(a)]	See Table 2c	See Table 2c
Metals[(b)/(c)]	± 25%	75-125

NOTES:

(a) Accuracy will be determined as percent recovery of surrogate spike compounds and matrix spike compounds. Surrogate and matrix spike compounds for VOCs, extractables, and pesticides/PCBs are listed in Tables 2a, 2b and 2c, respectively. Precision will be estimated as the relative standard deviation of the percent recoveries per matrix.

(b) Accuracy will be determined as percent recovery of matrix spikes when appropriate or the percent recovery of a QC sample if spiking is inappropriate. Precision will be determined as relative percent difference of matrix spike duplicate samples, or duplicate samples if spiking is inappropriate.

(c) Precision will be determined as the average percent difference for replicate samples. Accuracy will be determined as the percent recovery of matrix spike samples or laboratory control samples, as appropriate.

Source: NYSDEC ASP

Table 2a

DATA QUALITY REQUIREMENTS
ACCURACY REQUIREMENTS FOR VOCs

	Spike Recovery Limits (%)	
	Water	Low/Medium Soil
Surrogate Compound		
Toluene-d8	88-110	84-138
4-Bromofluorobenzene	86-115	59-113
1,2-Dichloroethane-d4	76-114	70-121
Matrix Spike Compound		
1,1-Dichloroethene	61-145	59-172
Trichloroethane	71-120	62-137
Chlorobenzene	75-130	60-133
Toluene	76-125	59-139
Benzene	76-127	66-142

Source: NYSDEC ASP

Table 2b

DATA QUALITY REQUIREMENTS OBJECTIVES FOR PRECISION AND ACCURACY OF EXTRACTABLE COMPOUNDS BASED UPON RECOVERY OF SURROGATE AND MATRIX SPIKE COMPOUNDS*

Surrogate Compounds	Matrix	Precision	Accuracy %
d5-Nitrobenzene	Water	≤ 20	35-114
	Solid	≤ 25	23-120
2-Fluorobiphenyl	Water	≤ 20	43-116
	Solid	≤ 25	30-115
d14-Terphenyl	Water	≤ 20	33-141
	Solid	≤ 25	18-137
d5-Phenol	Water	≤ 20	10-110
	Solid	≤ 25	24-113
2-Fluorophenol	Water	≤ 20	21-110
	Solid	≤ 25	25-121
2,4,6-Tribromophenol	Water	≤ 20	10-123
	Solid	≤ 25	19-122
2-Chlorophenol-d4 (Advisory)	Water	≤ 20	33-110
	Solid	≤ 25	20-130
1,2-Dichlorobenzene-d4 (Advisory)	Water	≤ 20	16-110
	Solid	≤ 25	20-130

Table 2b (continued)

DATA QUALITY REQUIREMENTS OBJECTIVES FOR PRECISION AND ACCURACY OF EXTRACTABLE COMPOUNDS BASED UPON RECOVERY OF SURROGATE AND MATRIX SPIKE COMPOUNDS*

	Matrix	Precision	Accuracy %
Matrix Spike Compounds			
1,2,4-Trichlorobenzene	Water	≤ 20	39-98
	Solid	≤ 25	38-107
Acenaphthene	Water	≤ 20	46-118
	Solid	≤ 25	31-137
2,4-Dinitrotoluene	Water	≤ 20	24-96
	Solid	≤ 25	28-89
Pyrene	Water	≤ 20	26-127
	Solid	≤ 25	35-142
N-Nitroso-Di-n-Propylamine	Water	≤ 20	41-116
	Solid	≤ 25	41-126
1,4-Dichlorobenzene	Water	≤ 20	36-97
	Solid	≤ 25	28-104
Pentachlorophenol	Water	≤ 20	9-103
	Solid	≤ 25	17-109
Phenol	Water	≤ 20	12-110
	Solid	≤ 25	26-90

Table 2b (continued)

DATA QUALITY REQUIREMENTS OBJECTIVES FOR PRECISION AND ACCURACY OF EXTRACTABLE COMPOUNDS BASED UPON RECOVERY OF SURROGATE AND MATRIX SPIKE COMPOUNDS*

	Matrix	Precision	Accuracy %
Matrix Spike Compounds (continued)			
2-Chlorophenol	Water	≤ 20	27-123
	Solid	≤ 25	25-102
4-Chloro-3-methylphenol	Water	≤ 20	23-97
	Solid	≤ 25	26-103
4-Nitrophenol	Water	≤ 20	10-80
	Solid	≤ 25	11-114

*Accuracy will be determined as percent recovery of these compounds. Precision will be estimated as the relative standard deviation of the percent recoveries per matrix.

Source: NYSDEC ASP

Table 2c

DATA QUALITY REQUIREMENTS

ADVISORY RECOVERY LIMITS
SURROGATE AND MATRIX SPIKE COMPOUNDS
FOR PESTICIDES/PCBs*

	Advisory Recovery Limits (%)	
	Water	Soil/Sediment
Surrogate Compound		
Decachlorobiphenyl	60-150	60-150
Tetrachloro-m-xylene	60-150	60-150
Matrix Spike Compound		
Lindane	56-123	46-127
Heptachlor	40-131	35-130
Aldrin	40-120	34-132
Dieldrin	52-126	31-134
Endrin	56-121	42-139
4,4'-DDT	38-127	23-134

*Samples do not have to be reanalyzed if these recovery limits are not met.

Source: NYSDEC ASP

and also be NYSDOH Contract Laboratory Protocol (CLP) certified.

4.1 Data Representativeness

Representative samples will be collected as follows:

- Sediment (Surface Water) - Samples will be collected from the upper 6 inches of sediment. Samples will be collected with a disposable polyethylene scoop.
- Surface Soil - Samples will be collected at a depth of 0 to 2 inches using a disposable polyethylene scoop.
- Subsurface Soil (Probe) - Samples will be collected using a decontaminated macro core soil sampler fitted with a disposable 4-foot acetate tube liner.
- Groundwater (Probe) - Samples will be collected upon installation of the probe using dedicated polyethylene tubing equipped with a bottom check valve in order to purge the standing water and collect a representative groundwater sample.
- Groundwater (Monitoring Well) - Samples will be collected using a bladder pump equipped with clean, disposable tubing. Samples will be collected after the monitoring well has been purged using low-flow purging techniques and until field measurements for pH, conductivity, temperature and turbidity have stabilized, or until the well is purged dry (whichever comes first) and the well has been allowed to recharge.
- Equipment Calibration - Field equipment used for air monitoring will be calibrated daily before use according to the manufacturer's procedures.
- Equipment Decontamination - Nondedicated sampling equipment will be decontaminated prior to use at each location according to the procedures described in Section 6.0.

4.2 Data Comparability

All data will be presented in the units designated by the methods specified by a NYSDOH ELAP and CLP certified laboratory, and the 6/00 NYSDEC ASP. In addition, sample locations, collection procedures and analytical methods from earlier studies will be evaluated for comparability with current procedures/methods.

4.3 Data Completeness

The acceptability of 100% of the data is desired as a goal for this project. The acceptability of less than 100% complete data, meeting all laboratory QA/QC protocols/standards, will be evaluated on a case-by-case basis.

5.0 DETAILED SAMPLING PROCEDURES

Environmental samples will be collected as part of the site investigation of the Glenmere Lake property. These may include groundwater, sediment, subsurface soil, and surface soil samples. Sample locations may consist of surface soil samples, soil probe locations, groundwater probe locations, and monitoring wells. Actual locations are described in the Site-Specific Work Plan.

General sampling approaches and equipment are described in this section. A summary of the sampling program, including sample media, depths, equipment, rationale and analytical parameters is provided in the Work Plan.

When taking soil samples, an attempt will be made to maintain sample integrity by preserving its physical form and chemical composition to as great an extent as possible. An appropriate sampling device (i.e., decontaminated or dedicated equipment) will be utilized to transfer the sample into the sample container. Every effort will be made to ensure that the sample is a proper representation of the matrix from which it was collected. The sample will be transferred into the sample bottle as quickly as possible, with no mixing, to ensure that the volatile fraction is not lost.

The materials involved in groundwater sampling are critical to the collection of high quality monitoring information, particularly where the analyses of volatile, pH sensitive or reduced chemical constituents are of interest. The materials for bailers and pump parts will be PTFE (e.g., Teflon^{R}) stainless steel and/or polyethylene.

There will be several steps taken after the transfer of the soil or water sample into the sample container that are necessary to properly complete collection activities. Once the sample is transferred into the appropriate container, the container will be capped and, if necessary, the outside of the container will be wiped with a clean paper towel to remove excess sampling material. The container will not be submerged in water in an effort to clean it. Rather, if necessary, a clean paper towel moistened with distilled/deionized water will be used.

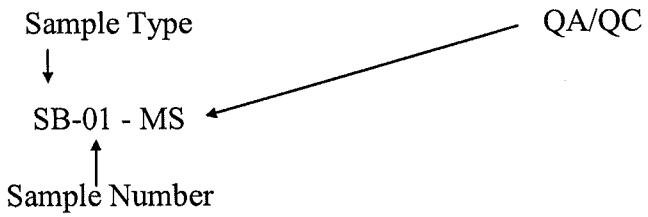
The sample container will then be properly labeled. Information such as sample number, location, collection time and sample description will be recorded in the field log book. Associated paper work (e.g., Chain of Custody forms) will then be completed and will stay with the sample. The samples will be packaged in a manner that will allow the appropriate storage temperature to be maintained during shipment to the laboratory. Samples will be delivered to the laboratory within 48 hours of collection.

5.1 Sample Identification

All samples collected will be labeled with a sample identification code. The code will identify the sample location, sample matrix and series numbers for sample locations with more than one sample. Samples will be labeled according to the following system:

- Sample Type:
  - Surface Water Sediment "SED"
  - Surface Soil "SS"
  - Soil Boring or Probe "SB"
  - Monitoring Well "MW"
  - Groundwater Probe "GP"
- Sample Number:
  - For circumstances where more than one sample of the same type and/or from the same location will be collected, a consecutive sample number will be assigned. When more than one sample is collected from a borehole in a sampling round at different depths, the depth will be indicated on the sample container and in the field log book.
- Quality Assurance/ Quality Control (QA/QC):
  - Matrix Spike "MS"
  - Matrix Spike Duplicate "MSD"
  - Field Blank "FB"
  - Trip Blank "TB"

Based upon the above sample identification procedures, an example of a sample label may be:



5.2 Sample Handling, Packaging and Shipping

All samples will be placed in the appropriate containers as specified in the 6/00 NYSDEC ASP. The holding time criteria identified in the ASP will be followed as specified in Table 1.

Prior to packaging any samples for shipment, the sample containers will be checked for proper identification and compared to the field log book for accuracy. The samples will then be wrapped with a cushioning material and placed in a cooler (or laboratory shuttle) with a sufficient amount of bagged ice or "blue ice" packs in order to keep the samples at 4°C until arrival at the laboratory.

All necessary documentation required to accompany the sample during shipment will be placed in a sealed plastic bag and taped to the underside of the cooler lid. The cooler will then be sealed with fiber (duct) or clear packing tape, and custody seals will be placed in such a manner that any opening of the cooler prior to arrival at the laboratory can be detected.

All samples will be shipped to ensure laboratory receipt within 48 hours of sample collection in accordance with NYSDEC requirements. The laboratory will be notified prior to the shipment of the samples.

5.3 Surface Water Sediment

1. Be certain that the sample location is noted on Location Sketch.

2. Unless using disposable equipment, be certain that the sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.0.

3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker, fill out Sample Information Record and Chain of Custody Form.

4. Wear disposable gloves and boots if it is necessary to enter the water.

5. Insert scoop slowly at 0 to 6 inches into the sediment and remove sample. Obtain an organic vapor measurement with a PID.

6. With a disposable scoop or sterile wooden tongue depressor, transfer the sample into the open sample container taking care not to spill sample on the outside of the container or overfill container and replace cover on the sample container.

7. Return sample container to cooler.

8. If reusable, decontaminate the sampling equipment according to the procedures outlined in Section 6.0.

9. Place all disposable PPE and sampling equipment in a large plastic bag for proper disposal.

5.4 Soil (Surface)

1. Be certain that the sample location is noted on Location Sketch.

2. If a dedicated sampling device is not used, be certain that the sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.0.

3. Remove laboratory precleaned sample container from sample cooler, label container with an indelible marker, fill out Sample Information Record and Chain of Custody Form.

4. At the sample location, clear surface debris (e.g., vegetation, rocks, twigs, etc.). Collect an adequate amount of soil from a depth of 0 to 2 inches using a disposable scoop. Transfer the sample directly into the sample container.

5. Return the sample container to the cooler.

6. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.0.

7. Place all disposable PPE and sampling equipment in a large plastic bag for proper disposal.

5.5 Soil (Probe)

1. Be certain that the sample location is noted on Location Sketch.

2. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker, fill out Sample Information Record and Chain of Custody Form.

3. Drive the probe to the desired sampling depth.

4. Retrieve the soil probe and immediately after opening it, obtain an organic vapor measurement with a PID.

5. Remove a sample aliquot from the soil probe using a disposable scoop or sterile wooden tongue depressor, place into the open sample container and replace the container cover.

6. Return the sample container to the cooler.

7. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.0.

8. Place all disposable PPE and sampling equipment in a large plastic bag for proper disposal.

5.6 Groundwater (Probe)

1. Be certain sample location is noted on Location Sketch.

2. Remove the laboratory precleaned sample containers from sample cooler, label container with an indelible marker, fill out Sample Information Record and Chain of Custody Form.

3. Obtain a sample by using a dedicated polyethylene tubing equipped with a bottom check valve.

4. Gently pour the sample into the sample container taking care not to spill on the outside of the container or overfill container and replace cover on the sample container. Samples for volatile organic analyses will have no air space in the sample vial prior to sealing. This is done by filling the vial such that there is a meniscus on top. Carefully slide the septum, Teflon side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove the septum and add more sample (or

resample). Replace the septum, recap and check for bubbles. Continue until vial is bubble-free.

5. After sample collection, obtain field measurements including pH, conductivity, temperature and turbidity.

6. If a sample is to be collected for metals analysis, the turbidity must be less than 50 NTUs. If the turbidity cannot be reduced to less than 50 NTUs, the sample will be filtered in the field or by the laboratory. Both the filtered and unfiltered portion of the sample will be analyzed.

7. Return sample containers to sample cooler.

8. Place all disposable PPE and sampling equipment in a large plastic bag for proper disposal.

5.7 Groundwater (Monitoring Well)

1. Groundwater sampling following this procedure shall be performed using nondedicated bladder pumps fitted with disposable polyethylene discharge tubing.

2. The sample pump intake shall be positioned within the well's screened section. For wells screened across the water table, the pump should be set in the lower one-third of the screened interval.

3. New, clean, disposable gloves shall be worn when handling any dedicated or decontaminated sampling equipment, sample containers, and during the collection of samples.

4. All nondedicated sampling and measuring equipment must be decontaminated before use. At a minimum, equipment should be disassembled (when appropriate) and scrubbed in a nonphosphate, laboratory-grade detergent and distilled water solution, then rinsed with copious amounts of distilled water.

5. All sample vials and containers shall be stored in a clean carrying case. Remove the sample containers only when needed.

6. Field analysis equipment used for the measurement of field parameters, including pH, conductivity, temperature, turbidity and dissolved oxygen probes, shall be calibrated in accordance with the manufacturer's procedures. All calibration methods, procedures and results shall be documented in the calibration log and field notebook.

7. Document the date, well identification and any unusual occurrences in the field logbook and on the Sample Information Record. Document all field measurements on the Sample Information Record.

8. Inspect the protective casing and general well condition and document any items of concern in the appropriate area on the Sample Information Record.

9. Unlock the protective casing. Refer to the appropriate Health and Safety Plan for air monitoring or other health and safety requirements.

10. Measure the depth to water (DTW) and depth to bottom of the well (DTB) from the measuring point (MP) located on the well (inner) casing using an electronic fluid-level measuring device. Record the DTW DTB measurements on the Sample Information Record. As required, the water level measuring device can be left to monitor changes in DTW during well purging.

11. Prior to purging, use a clean, disposable polyethylene bailer to collect a groundwater grab sample. Transfer the groundwater directly from the bailer to a clean, decontaminated or dedicated sample container. Measure the initial field parameters, dissolved oxygen, pH temperature, turbidity and specific conductance to establish pre-purge water quality.

12. Purge Volume Determination:

    - Minimum Purge Volume: A minimum of two times the volume of the discharge tubing shall be purged prior to the sampling of the well. The calculation for determining this volume of water to be removed from the pump and tubing is as follows:

      $$PV_{min} = (TL \times TF) \times 2$$

      where:

      PV_{min} = The minimum volume of water to be purged from a well
      TL = Tubing Length
      TF = Tubing Factor which is 0.0102 gal/ft (39 ml/ft for tubing diameter of 3/8 inch) or 0.0159 gal/ft (60 ml/ft for tubing diameter of 5/8 inch)

    - Maximum Purge Volume: The maximum purge volume for most wells will be 0.25 (1/4) of one well casing volume. For some shallow wells, the PV_{min} may be greater than 0.25 casing volume. In these cases, the PV_{min} shall be purged followed by the measurement of field water quality parameters and collection of samples. The maximum purge volume (Pv_{max}) is calculated as follows:

      $$PV_{max} = (DTB - DTW_{LS}) F_c \times 0.25$$

where:

PV_{max} = One quarter of one well casing volume (gal)
DTBLS = Depth to Bottom from Land Surface (feet)
DTWLS = Depth to Water from Land Surface (feet)
Fc = Casing factor, see Table 1 (gal/ft)

13. Begin purging the well according to the manufacturer's instructions for operating the pump. The purge rate should be kept to less than 500 milliliters per minute (ml/m). Variation of the purge rate should be minimized. Note: Purged water will be discharged to the ground in the vicinity of the well.

14. Following the removal of the minimum purge volume, begin monitoring the field water-quality indicator parameters (i.e., temperature, conductivity, pH, dissolved oxygen and turbidity). It is recommended that the water quality meter be attached to a flow-through cell to allow for continuous readings. Monitor the indicator parameters approximately once every 5 minutes and record the results on the Sample Information Record. (Note: A minimum of 500 ml of purge water is required to fully exchange the water in the flow-through cell between measurements.) The well shall be considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings.

    If one or more key indicator parameters fail to stabilize after purging 0.25 well casing volume (the maximum purge volume), purging will be discontinued, and sampling will be initiated. In cases where the calculated minimum purge volume is greater than 0.25 casing volume, monitor the indicator parameters following the removal of PV_{min} approximately every 2 minutes (approximately every 0.5 gallon) for a maximum of 6 minutes (i.e., three sets of readings). Any parameters that fail to achieve stabilization should be noted on the Sample Information Record. Turbidity should be less than 50 NTUs prior to collection of a sample for metals analysis.

15. Turn pump off and disconnect the flow through cell. Turn pump on and reduce the pump discharge rate to the minimum capabilities of the pump (approximately 100 milliliters per minute or less). Collect the appropriate samples from the pump discharge hose. Label all sample containers and immediately place samples in a laboratory-supplied cooler with bagged ice sufficient to cool samples to 4°C.

16. If the turbidity of the sample is greater than 50 NTUs, the metals portion of the sample will be filtered in the field or by the laboratory. Both the filtered and unfiltered portion of the sample will be analyzed.

17. Upon the completion of sampling, decontaminate all nondedicated sampling and measuring equipment. Properly discard all non-cleanable materials such as gloves, hoses and rope.

18. Secure and lock the well.

19. Deliver samples to the appropriate analytical laboratory. Record all final field water quality data on the Sample Information Record. A copy of the Chain of Custody and the Sample Information Record should be sent to the office for data entry.

6.0 DECONTAMINATION PROCEDURES

Whenever possible, all field sampling equipment should be sterile/disposable and dedicated to a particular sampling point. In instances where this is not possible, a field cleaning/ decontamination procedure will be used in order to mitigate cross contamination between sample locations. A decontamination station/pad will be established for all field activities. This will be an area located away from the source of contamination so as not to adversely impact the decontamination procedure, but close enough to the sampling locations to keep equipment transport handling to a minimum after decontamination.

6.1 Field Decontamination Procedures

All nondisposable equipment will be decontaminated at appropriate intervals (e.g., prior to initial use, prior to moving to a new sampling location and prior to leaving the site). Different decontamination procedures are used for various types of equipment that are used to collect samples. When using field decontamination, sampling should commence in the area of the site with the lowest contamination, if known or probable, and proceed through to the areas of highest contamination.

6.2 Decontamination Procedure for Drilling/Probing Equipment

All equipment such as drill rigs and other mobile equipment will receive an initial cleaning prior to use at the site. The frequency of subsequent cleanings while on-site will depend on how the equipment is actually used in relation to collecting environmental samples. All wash/rinse solutions will be recharged on-site, if possible. If an appropriate location for on-site recharge is not available, the next preferable option is to discharge to a municipal sewer system. Until an appropriate discharge alternative is determined, all wash/rinse solutions will be collected and contained on-site in DOT-approved 55-gallon drums.

After the initial decontamination, cleaning may be reduced to those areas that are in close proximity to materials being sampled. Drill rig/probe items such as augers, drill/probe rods and drill bits will be cleaned in between sample locations.

Drilling/probing equipment will be decontaminated in the following manner:

- Wash thoroughly with nonresidual detergent (alconox) and tap water using a brush to remove particulate matter or surface film. Pressure washing will be utilized, if necessary, to remove any oil and/or tar accumulations on the back of the rig, auger flights, drill rods, drilling head, etc. Any loose paint chips, paint flakes and rust must also be removed;
- Steam clean (212°F); and
- Once decontaminated, remove all items from the decontamination area.

Also, following the general cleaning procedures described above, all downhole/drilling items, such as split spoon samplers, Shelby tubes, rock corers, or any other item of equipment which will come in direct contact with a sample during drilling, will be decontaminated by pressure washing and/or steam cleaning.

6.3 Decontamination Procedure for Sampling Equipment

Teflon, PVC, polyethylene and stainless steel sampling equipment decontamination procedures will be the following:

- Wash thoroughly with nonresidual detergent (alconox) and clean potable tap water using a brush to remove particulate matter or surface film;
- Steam clean (if necessary);
- Rinse thoroughly with tap water;
- Rinse thoroughly with distilled water;
- Rinse in a well ventilated area with methanol (pesticide grade) and air dry;

- Rinse thoroughly with distilled water and air dry;
- Wrap completely in clean aluminum foil with dull side against the equipment. For small sampling items, such as scoops, decontamination will take place over a DOT-approved 55-gallon drum specifically used for this purpose;

The first step, a soap and water wash, will be performed to remove all visible particulate matter and residual oil, grease and tar. Pressure washing will be utilized followed by steam cleaning, if necessary. This step will be followed by a tap water rinse and a distilled/deionized water rinse to remove the detergent. Next, a high purity solvent rinse will be used for trace organics removal. Methanol has been chosen because it is not an analyte of concern on the Target Compound List. The solvent will be allowed to evaporate and then a final distilled/deionized water rinse will be performed. This rinse removes any residual traces of the solvent. The aluminum wrap will protect the equipment and keep it clean until it is used at another sampling location.

6.4 Decontamination Procedure for Well Casing and Development Equipment

Field cleaning of well casings will consist of a manual scrubbing to remove foreign material and steam cleaning, inside and out, until all traces of oil, grease and tar are removed. This material will then be stored in such a manner so as to preserve it in this condition. Special attention to threaded joints will be necessary to remove cutting oil or weld burn residues, if necessary.

Materials and equipment that will be used for the purposes of well development will also be decontaminated by steam cleaning. An additional step will involve flushing the interior of any hose, pump, etc. with a nonphosphate detergent solution and potable water rinse prior to the development of the next well. This liquid waste will be disposed of on-site.

7.0 LABORATORY SAMPLE CUSTODY PROCEDURES

A NYSDOH ELAP and CLP certified laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical

equipment, will be used to analyze collected samples. The selected laboratory's Standard Operating Procedures will be made available upon request.

8.0 FIELD MANAGEMENT DOCUMENTATION

Proper management and documentation of field activities is essential to ensure that all necessary work is conducted in accordance with the sampling plan and QA/QC Plan in an efficient and high quality manner. Field management procedures will include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if required); preparing a Location Sketch; completing Sample Information Records, Chain of Custody Forms, and Test Pit, Boring, Drilling and Well Construction Logs; maintaining a daily Field Log Book; completing Daily Equipment Calibration Logs; preparing Daily Field Activity Reports; and completing Field Change Forms. Copies of each of these forms are provided in Attachment A. Proper completion of these forms and the field log book are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were collected and handled properly.

8.1 Location Sketch

For each sampling point, a Location Sketch will be completed using permanent references and distances to the sampling point noted, if possible.

8.2 Sample Information Record

At each sampling location, a Sample Information Record Form is filled out including, but not limited to, the following information:

- Site name;
- Sample crew;
- Sample location;

- Field sample identification number;
- Date;
- Time of sample collection;
- Weather conditions;
- Temperature;
- Sample matrix;
- Method of sample collection and any factor that may affect its quality adversely;
- Well information (groundwater only);
- Field test results;
- Analysis to be performed; and
- Remarks.

8.3 Chain of Custody

The Chain of Custody Form will be completed and is initiated at the laboratory with container preparation and shipment to the site. The form remains with the sample at all times and bears the name of the person assuming responsibility for the samples. This person is tasked with ensuring secure and appropriate handling of the containers and samples. When the form is complete, it will indicate that there was no lapse in sample accountability.

A sample is considered to be in an individual's custody if any of the following conditions are met:

- It is in the individual's physical possession; or
- It is in the individual's view after being in his or her physical possession; or
- It is secured by the individual so that no one can tamper with it; or
- The individual puts it in a designated and identified secure area.

In general, Chain of Custody Forms are provided by the laboratory selected to perform the analytical services. At a minimum, the following information will be provided on these forms:

- Project name and address;
- Project number;
- Sample identification number;
- Date;
- Time;
- Sample location;
- Sample type;
- Analysis requested;
- Number of containers and volume taken;
- Remarks;
- Type of waste;
- Sampler(s) name(s) and signature(s); and
- Spaces for relinquished by/received by signature and date/time.

For this particular study, forms provided by the laboratory will be utilized.

The Chain of Custody Form will be filled out and signed by the person performing the sampling. The original of the form will travel with the sample and will be signed and dated each time the sample is relinquished to another party, until it reaches the laboratory or analysis is completed. The field sampler will keep one copy and a copy will be retained for the project file. The sample bottle will also be labeled with an indelible marker with a minimum of the following information:

- Sample number;
- Analysis to be performed; and
- Date of collection.

A copy of the completed form will be returned by the laboratory with the analytical results.

8.4 Split Samples

Whenever samples are being split with another party, a Receipt for Samples Form will be completed and signed. A copy of the Chain of Custody Form will accompany this form.

8.5 Field Log Book

Field log books will be bound and have consecutively numbered, water resistant pages. All pertinent information regarding the site and sampling procedures will be documented. Notations will be made in log book fashion, noting the time and date of all entries. Information recorded in this notebook will include, but not be limited to, the following:

The first page of the log will contain the following information:

- Project name and address;
- Name, address and phone number of field contact;
- Waste generator and address, if different from above;
- Type of process (if known), generating waste;
- Type of waste; and
- Suspected waste composition, including concentrations.

Daily entries will be made for the following information:

- Purpose of sampling;
- Location of sampling point;
- Number(s) and volume(s) of sample(s) taken;
- Description of sampling point and sampling methodology;
- Date and time of collection, arrival and departure;
- Collector's sample identification number(s);
- Sample distribution and method of storage and transportation;
- References, such as sketches of the sampling site or photographs of sample collection;
- Field observations, including results of field analyses (e.g., pH, temperature, specific conductance), water levels, drilling logs, and organic vapor and dust readings; and
- Signature of personnel responsible for completing log entries.

8.6 Daily Field Activity Report

At the end of each day of field work, the Field Operations Manager, or designee, will complete this form noting personnel on-site and summarizing the work performed that day, equipment, materials and supplies used, results of field analyses, problems and resolutions. This form will be signed and subject to review.

8.7 Field Changes and Corrective Actions

Whenever there is a required or recommended investigation/sampling change or correction, a Field Change Form will be completed by the Field Operations Manager, and approved by an Orange County representative and the NYSDEC Project Manager, if required.

9.0 CALIBRATION PROCEDURES AND PREVENTIVE MAINTENANCE

The following information regarding equipment will be maintained at the project site:

1. Equipment calibration and operating procedures which will include provisions for documentation of frequency, conditions, standards and records reflecting the calibration procedures, methods of usage and repair history of the measurement system. Calibration of field equipment will be performed daily at the sampling site so that any background contamination can be taken into consideration and the instrument calibrated accordingly.

2. A schedule of preventive maintenance tasks, consistent with the instrument manufacturer's specific operation manuals, that will be carried out to minimize down time of the equipment.

3. Critical spare parts, necessary tools and manuals will be on hand to facilitate equipment maintenance and repair.

Calibration procedures and preventive maintenance, in accordance with the NYSDEC 6/00 ASP, for laboratory equipment, will be contained in the laboratory's standard operating procedures (SOP) which will be available upon request.

10.0 PERFORMANCE OF FIELD AUDITS

During field activities, the QA/QC officer will accompany sampling personnel into the field, in particular in the initial phase of the field program, to verify that the site sampling program is being properly conducted, and to detect and define problems so that corrective action can be taken early in the field program. All findings will be documented and provided to the Field Operations Manager.

11.0 CONTROL AND DISPOSAL OF CONTAMINATED MATERIAL

During construction and sampling of the monitoring wells and soil borings, it is possible contaminated waste, soil and water may be generated from drill cuttings, drilling fluids, decontamination water, development water and purge water. Unless otherwise indicated by

visual observation, all soil cuttings that are generated will be assumed to be non-contaminated and returned to the hole or spread on-site. All water generated during the investigation, including decontamination water, drill water and purge water, will be recharged on-site. The Site-Specific Work Plan will provide detailed information on the disposal of water generated during the investigation. If it is not possible to recharge water on-site, the next preferred option is discharge of the water to a municipal sewer system.

Visibly contaminated soil and water will be containerized in Department of Transportation approved 55-gallon drums. The drums will be marked, labeled with a description of the contents and from what location they were collected. All drums will be sealed and stored on-site in a secure area for characterization and proper disposal.

12.0 DOCUMENTATION, DATA REDUCTION AND REPORTING

Chemtech Environmental Laboratory, Inc., a NYSDOH ELAP and CLP certified laboratory meeting the New York State requirements for documentation, data reduction and reporting will be used for all laboratory analysis. All data will be cataloged according to sampling locations and sample identification nomenclature that is described in this QA/QC plan. The laboratory analysis will be reported in the NYSDEC ASP Category B deliverables format.

13.0 DATA VALIDATION

As described in Section 12.0 above, summary documentation regarding data validation will be completed by the laboratory using NYSDEC forms contained in the 6/00 NYSDEC ASP and submitted with the data package.

A Data Validation Summary Report (DUSR) will be prepared in lieu of a full data validation. The analytical and usability processes will be conducted in conformance with the NYSDEC ASP dated June 2000 and NYSDEC Guidance for the Development of Data Usability Summary Reports.

The DUSR will be prepared by reviewing and evaluating the analytical data. The parameters to be evaluated in reference to compliance with analytical method protocols include all chain-of-custody forms, holding times, raw data (instrument print out data and chromatograms), calibrations, blanks, spikes, controls, surrogate recoveries, duplicates and sample data. If available, field sampling notes will also be reviewed and any quality control problems will be evaluated as to their effect on the usability of the sample data.

The DUSR will describe the samples and analysis parameters reviewed. Data deficiencies, analytical protocol deviations and quality control problems will be described and their effect on the data discussed. Re-sampling and re-analysis recommendations will be made, if necessary.

The DUSR shall be prepared by our company QA/QC officer, Ms. Robbin Petrella. Ms. Petrella meets the personnel requirements listed in the DUSR Guidance Document. A copy of her résumé is included in Attachment B.

14.0 PERFORMANCE AND SYSTEM AUDITS

Chemtech Environmental Laboratory, a NYSDOH ELAP and CLP certified laboratory which has satisfactorily completed performance audits and performance evaluation samples will be used to perform sample analyses for the Glenmere Lake property site investigation.

15.0 CORRECTIVE ACTION

A NYSDOH ELAP and CLP certified laboratory will meet the requirements for corrective action protocols, including sample "clean up" to attempt to eliminate/mitigate matrix interference.

The 6/00 NYSDEC ASP protocol includes both mandatory and optional sample cleanup and extraction methods. Cleanup is required by the 6/00 NYSDEC ASP in order to meet contract required detection limits. There are several optional cleanup and extraction methods noted in the

6/00 NYSDEC ASP protocol. These include florisil column cleanup, silica gel column cleanup, acid-base partition, steam distillation and sulfuric acid cleanup for PCB analysis.

High levels of matrix interference may be present in waste, soil and sediment samples. This interference may prevent the achievement of ASP detection limits if no target compounds are found. In order to avoid unnecessary dilutions, the optional cleanup methods noted in the 6/00 NYSDEC ASP will be required to be performed by the laboratory as necessary.

16.0 TRIP BLANKS

The primary purpose of a trip blank is to detect other sources of contamination that might potentially influence contaminant values reported in actual samples, both quantitatively and qualitatively. The following have been identified as potential sources of contamination:

- Laboratory reagent water;
- Sample containers;
- Cross contamination in shipment;
- Ambient air or contact with analytical instrumentation during preparation and analysis at the laboratory; and
- Laboratory reagents used in analytical procedures.

A trip blank will consist of a set of 40 ml sample vials filled at the laboratory with laboratory demonstrated analyte free water. Trip blanks will be handled, transported and analyzed in the same manner as the samples acquired that day, except that the sample containers themselves are not opened in the field. Rather, these sample containers only travel with the sample cooler. The temperature of the trip blanks will be maintained at 4°C while on-site and during shipment. Trip blanks will return to the laboratory with the same set of bottles they accompanied in the field.

The purpose of a trip blank is to control sample bottle preparation and blank water quality as well as sample handling. Thus, the trip blank will travel to the site with the empty sample bottles and back from the site with the collected samples in an effort to simulate sample handling conditions. Contaminated trip blanks may indicate inadequate bottle cleaning or blank water of questionable quality. Trip blanks will be implemented only when collecting water samples, including field blanks, and analyzed for volatile organic compounds only.

17.0 METHOD BLANKS/HOLDING BLANKS

A method blank is an aliquot of laboratory water or soil which is spiked with the same internal and surrogate compounds as the samples. The purpose of the method blank is to define and determine the level of laboratory background contamination. Frequency, procedure and maximum laboratory containment concentration limits are specified in the 6/00 NYSDEC ASP. A holding blank is an aliquot of analyte-free water that is stored with the environmental samples in order to demonstrate that the samples have not been contaminated during laboratory storage. This blank will be analyzed using the same analytical procedure as the samples.

18.0 MATRIX SPIKES/ MATRIX SPIKE DUPLICATES AND SPIKED BLANKS

Matrix spike samples are quality control procedures, consistent with 6/00 NYSDEC ASP specifications, used by the laboratory as part of its internal Quality Assurance/Quality Control program. The matrix spikes (MS) and matrix spike duplicates (MSD) will be aliquots of a designated sample (water or soil) which are spiked with known quantities of specified compounds. These QA/QC samples will be used to evaluate the matrix effect of the sample upon the analytical methodology, as well as to determine the precision of the analytical method used. A matrix spike blank will be an aliquot of analyte-free water, prepared in the laboratory, and spiked with the same solution used to spike the MS and MSD. The matrix spike blank (MSB) will be subjected to the same analytical procedure as the MS/MSD and used to indicate the appropriateness of the spiking solution by calculating the spike compound recoveries. The procedure and frequency regarding the MS, MSD and MSB samples are defined in the 6/00 NYSDEC ASP.

19.0 FIELD BLANK (FIELD RINSATE BLANK)/EQUIPMENT BLANK

The field blank will consist of an aliquot of analyte-free water, supplied by the laboratory, which is opened in the field and is generally poured over or through a sample collection device after it is decontaminated, collected in a sample container and returned to the laboratory as a sample for analysis. It is a check on sampling procedures and cleanliness (decontamination) of sampling devices. Generally, a field blank will be collected daily or for a "batch" of sample matrices collected in the same manner (such as water and soil/sediment) up to a maximum of 20 samples. Field blanks will be analyzed for the suite of chemicals analyzed for in the environmental samples collected in that "batch." Field blanks will not be analyzed when using dedicated or disposable (one use only) sampling equipment unless directed otherwise.

ATTACHMENT A

FIELD FORMS

EXHIBIT 1

LOCATION SKETCH

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Date: _____

LOCATION SKETCH

Project _____ Sample Crew _____

Sample(s) Locations(s) _____

Sample(s) and/or Well Number(s) _____

_____

Location of sample points, wells, borings, etc., with reference to three permanent reference points.
Measure all distances, clearly label roads, wells and permanent features.

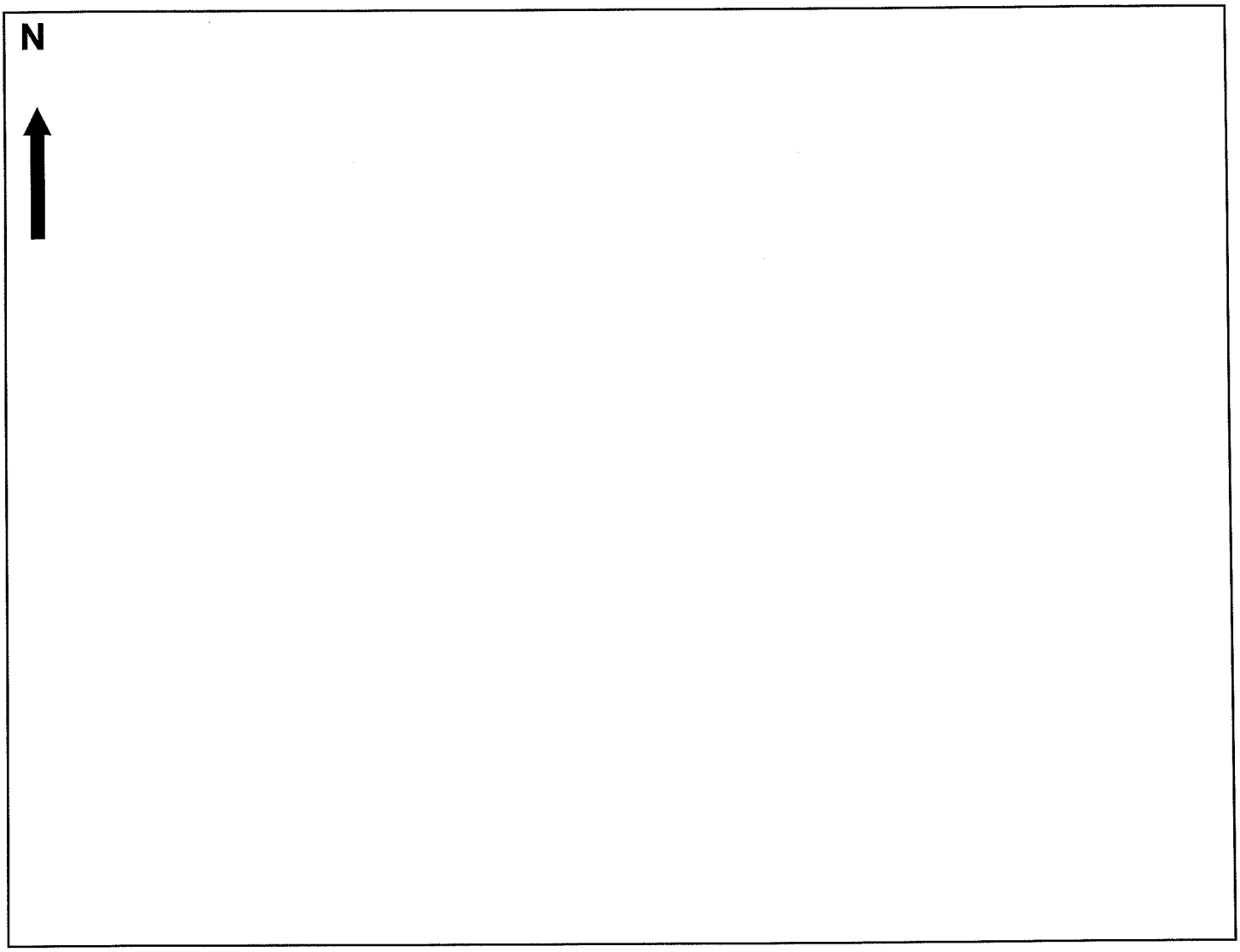


EXHIBIT 2

SAMPLE INFORMATION RECORDS

Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Date: _____

SAMPLE INFORMATION RECORD

Site: _____ **Sample Crew:** _____

Sample Location/Well No. _____

Field Sample I.D. Number _____ **Time** _____

Weather _____ **Temperature** _____

Sample Type:

Groundwater _____ **Sediment** _____

Surface Water/Stream _____ **Air** _____

Soil _____ **Other (describe, i.e. water, septage, etc.)** _____

Well Information (fill out for groundwater samples)

Depth to Water _____ **Measurement Method** _____

Depth of Well _____ **Measurement Method** _____

Volume Removed _____ **Removal Method** _____

Field Test Results

Color _____ **pH** _____ **Odor** _____

Temperature (°F) _____ **Specific Conductance (umhos/cm)** _____

Other (OVA, Methane Meter, etc. _____

_____

Constituents Sampled

_____ _____ _____ _____

_____ _____ _____ _____

Remarks:

_____

_____

_____

Well Casing Volumes

GAL/FT	**1¼" = 0.077**	**2" = 0.16**	**3" = 0.37**	**4" = 0.65**
	1½ =0.10	**2½ " = 0.24**	**3½ = 0.50**	**6" = 1.46**

D&B_SIR/kb

Rev. 03/09/98

EXHIBIT 3

CHAIN OF CUSTODY FORM

CHAIN OF CUSTODY RECORD

PAGE OF | NO.

JOB #:

CLIENT:

PROJECT ID:

PROJECT MGR:

RUSH ☐ YES ☐ NO | DUE DATE

TESTS

BOTTLE TYPE AND PRESERVATION

GENERAL REMARKS

BOTTLE SET #	CLIENT SAMPLE ID	DATE / TIME SAMPLED	MATRIX	LAB ID	QC Y / N	FIELD FILTERED - CIRCLE Y or N								SAMPLE REMARKS
						Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	

MATRIX CODES

A - AIR
AQ - AQUEOUS
C - COMPLEX
D - DRUM WASTE
OI - OIL
S - SOIL
SL - SLUDGE
W - WIPE
O - OTHER
FB - FIELD BLANK
TB - TRIP BLANK

BOTTLES PREPARED BY — DATE / TIME

SIGNATURE

SAMPLES COLLECTED BY — DATE / TIME

SIGNATURE

BOTTLES REC'D BY — DATE / TIME

SIGNATURE

RECEIVED IN LAB BY — DATE / TIME

SIGNATURE

REMARKS ON SAMPLE RECEIPT

☐ BOTTLES INTACT ☐ CUSTOD / SEALS
☐ PRESERVED ☐ SEALS INTACT
☐ CHILLED ☐ SEE REMARKS

LABORATORY COPY

EXHIBIT 4

RECEIPT OF SAMPLES FORM

DVIRKA
AND
BARTILUCCI

Receipt for Samples

Project Name: _____

Project Address: _____

Project Number: _____

Field Log Book Reference Number: _____

Sampled By: _____

Split With: _____

SAMPLE NUMBERS	DATE	TIME	COMP	GRAB	SPLIT SAMPLES	LOG BOOK PAGE NO.	TAG NUMBERS	SAMPLE LOCATION	NO. OF CONTAINERS	REMARKS

Transferred by (Signature)

Date

Time

Received by (Signature)

Telephone

Title

Date

Time

EXHIBIT 5

TEST PIT LOG FORM

Dvirka and Bartilucci CONSULTING ENGINEERS A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.	Project No.: Project Name:	Test Pit No.: Sheet of By:
Contractor: Operator: Equipment:	Geologist: Test Pit Method: Date Started: Date Completed:	Test Pit Completion Depth: Ground Surface Elevation: Test Pit Dimension(s):

Weather Conditions:

Depth *(ft.)*	OVA *(ppm)*	PID *(ppm)*	Description of Materials	Remarks
-0-				
-1-				
-2-				
-3-				
-4-				
-5-				
-6-				
-7-				
-8-				
-9-				
-10-				

NOTES:

EXHIBIT 6

BORING LOG FORM

Dvirka and Bartilucci CONSULTING ENGINEERS A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.	Project No.: Project Name:	Boring No.: Sheet ___ of ___ . By:
Drilling Contractor: . Driller: Drill Rig: Date Started:	Geologist: Drilling Method: Drive Hammer Weight: Date Completed:	Boring Completion Depth: " Ground Surface Elevation: Boring Diameter:

Depth (ft.)	Soil Sample				Headspace Analysis			Sample Description	USCS
	No.	Type	Blows Per 6"	Rec	FID ppm	PID ppm	CH4 ppm		
-0-									
-1.5'-									
-2-									
-3-									
-4-									
-5-									
-6-									
-7-									
-8-									
-9-									
-10-									

Sample Types:
SS =
ST =
D&M =
UC = Undisturbed Core (Dennison Type)

NOTES:

EXHIBIT 7

DRILLING LOG FORM

DVIRKA
AND
BARTILUCCI

DRILLING LOG

DRILLING CONTRACTOR
Driller _____
Inspector _____
Rig Type _____
Drilling Method _____
Drive Hammer Weight _____

PROJECT NAME _____
PROJECT # _____
Location/Address _____

BORING NUMBER _____
Sheet _____ of _____
Boring Location _____

GROUNDWATER OBSERVATIONS

Water Level			
Time			
Date			
Casing Depth			

Weather _____
Date/Time Start _____
Date/Time Finish _____

Plot Plan

Sample Depth	Sample Number	SPT	PID/FID Reading	FIELD IDENTIFICATION OF MATERIAL	WELL SCHEMATIC	COMMENTS

SPT = STANDARD PENETRATION TEST

Soil Stratigraphy Summary _____

EXHIBIT 8

WELL CONSTRUCTION LOG FORM

Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Well Construction Log

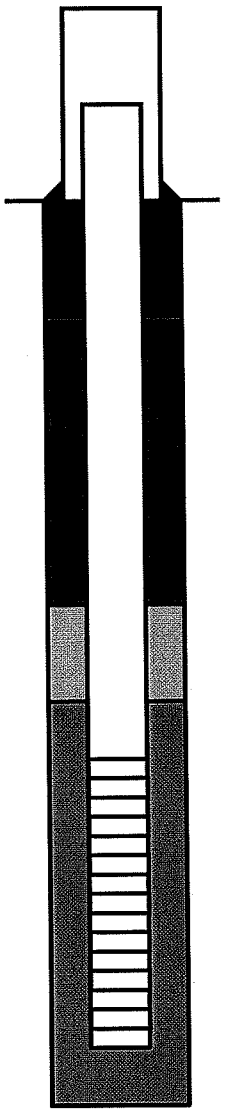
Site _____ Job No. _____ Well No. _____

Total Depth _____ Surface Elevation _____ Top Riser Elevation _____

Water Levels (Depth, Date, Time) _____ Date Installed _____

Riser	Dia. _____	Material _____	Length _____		
Screen	Dia. _____	Material _____	Length _____	Slot Size	_____
Protective Casing	Dia. _____	Material _____	Length _____		

SCHEMATIC



_____ Protective Casing Stickup

_____ Riser Stickup

Ground Surface

Surface Seal Type _____

_____ Bottom Surface Seal

Grout Type _____

_____ Top Seal

Seal Type _____

_____ Top Sand Pack

_____ Top Screen

Sand Pack Type _____

Size _____

_____ Bottom Screen

_____ Total Depth of Boring

Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Well Construction Log

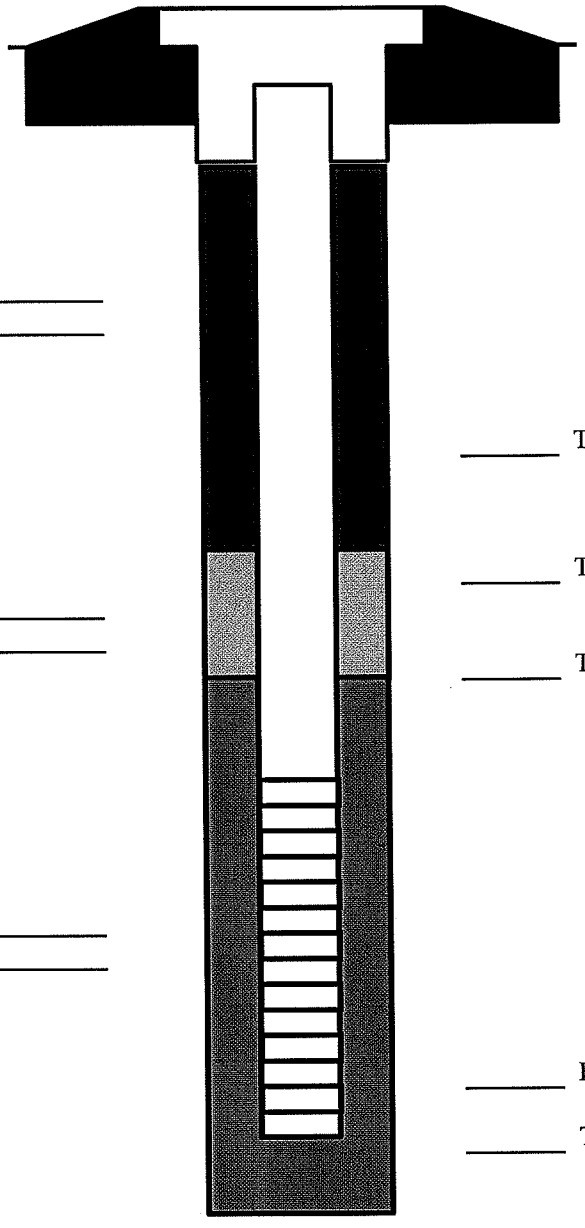
Site _____ Job No. _____ Well No. _____

Total Depth _____ Surface Elevation _____ Top Riser Elevation _____

Water Levels (Depth, Date, Time) _____ Date Installed _____

Riser Dia. _____ Material _____ Length _____
Screen Dia. _____ Material _____ Length _____ Slot Size _____

SCHEMATIC



Surface Seal Type _____

Ground Surface
_____ Riser Elevation
_____ Bottom Surface Seal

Grout Type _____

_____ Top Seal

_____ Top Sand Pack

Seal Type _____

_____ Top Screen

Sand Pack Type _____
Size _____

_____ Bottom Screen

_____ Total Depth of Boring

EXHIBIT 9

DAILY EQUIPMENT CALIBRATION LOG FORM

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Date: _____

DAILY EQUIPMENT CALIBRATION LOG

Project Name: _____

Project Number: _____ Calibrated by: _____

Instrument Name and Model Number	Calibration Method	Time	Readings and Observations

EXHIBIT 10

DAILY FIELD ACTIVITY REPORT

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Date: _____

DAILY FIELD ACTIVITY REPORT

Report Number: _____ Project Number: _____

Field Log Book Page Number: _____

Project: _____

Address: _____

Weather: (AM) _____ Rainfall: (AM) _____ Inches

(PM) _____ (PM) _____ Inches

Temperature: (AM) _____ °F Wind Speed: (AM) _____ MPH Wind Direction: (AM) _____

(PM) _____ °F (PM) _____ MPH (PM) _____

Site Condition: _____

Personnel On Site:	Name	Affiliation	Arrival Time	Departure Time

Subcontractor Work Commencement: (AM) _____ (PM) _____

Subcontractor Work Completion: (AM) _____ (PM) _____

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Date: _____

DAILY FIELD ACTIVITY REPORT

Work Performed by subcontractor(s) (includes equipment and labor breakdown):

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Date: _____

DAILY FIELD ACTIVITY REPORT

General work performed today by D&B Engineers:

_____

_____

_____

_____

_____

List specific inspection(s) performed and results (include problems and corrective actions):

_____

_____

_____

_____

_____

List type and location of tests performed and results (include equipment used and monitoring results):

_____

_____

_____

_____

_____

Verbal comments received from subcontractor (include construction and testing problems, and recommendations/resulting actions):

_____

_____

_____

_____

_____

Prepared by: _____ Reviewed by: _____

EXHIBIT 11

FIELD CHANGE FORM

DVIRKA
AND
BARTILUCCI

FIELD CHANGE FORM

Project Name: _____

Project Number: _____ Field Change Number: _____

Location: _____ Date: _____

Field Activity Description: _____

Reason for Change: _____

Recommended Disposition: _____

_____ _____

Field Operations Officer (D&B Consulting Engineers) (Signature) Date

Disposition: _____

_____ _____

On-site Supervisor (NYSDEC) (Signature) Date

Distribution: Project Manager (D&B)
Project Manager (NYSDEC)
Field Operations Officer
On-site Supervisor (NYSDEC)

Others as Required: _____
_____
_____
_____

DB-FCF

EXHIBIT 12

FIELD AUDIT FORM

DVIRKA
AND
BARTILUCCI

FIELD AUDIT FORM

Site: _____ Date: _____

Persons On-site: _____ QA/QC Officer Conducting Audit: _____

_____ Project: _____

_____

1. Is safety equipment in use (hardhats, respirators, gloves etc.): YES NO

2. Is a decontamination station, equipment and supplies on site and in working order:

Methanol	YES	NO
Alconox	YES	NO
D.I. Water	YES	NO
Scrub Brushes	YES	NO
Steam Cleaner	YES	NO

Comments: _____

_____

_____

3. Is the decontamination pad set up so water is contained: YES NO

Comments: _____

_____

_____

4. Is the site/investigation areas secured (fence, markers, etc.) or otherwise in accordance with project requirements: YES NO

Comments: _____

_____

_____

DVIRKA
AND
BARTILUCCI

FIELD AUDIT FORM
(continued)

5. Is contaminated material properly stored and in a secure area or otherwise in accordance with project requirements: YES NO
   Are the drums of waste (water, soil, ppe) labeled properly: YES NO

   Comments: _____

   _____

   _____

6. Are field forms filled out properly, legibly and timely:

Field Log Book	YES	NO
Chain of Custody	YES	NO
Equipment Calibration Log	YES	NO
Daily Field Activity Report	YES	NO
Location Sketch	YES	NO
Sample Information Record	YES	NO
Equipment Usage Form	YES	NO
Boring Logs	YES	NO

   Comments: _____

   _____

   _____

7. Is the proper sampling and field measurement equipment, including calibration supplies on site: YES NO

   Comments: _____

   _____

   _____

DVIRKA
AND
BARTILUCCI

FIELD AUDIT FORM
(continued)

8. Are there adequate sample containers, including deionized water for QA/QC:
   - Field Blanks — YES NO
   - Trip Blanks — YES NO

   Comments: _____

9. Is the equipment decontaminated in accordance with project requirements:
   - Sampling equipment — YES NO
   - Construction equipment — YES NO

   Comments: _____

10. Is field measurement equipment calibrated:
    - Daily — YES NO
    - Properly — YES NO

    Comments: _____

11. Are samples collected and labeled properly: YES NO

    Comments: _____

DVIRKA
AND
BARTILUCCI

FIELD AUDIT FORM
(continued)

12. Are samples stored at 4°C: YES NO

Comments: _____

_____

_____

13. Are coolers properly sealed and packed for shipment including Chain of Custody taped to underside of lid: YES NO

Comments: _____

_____

_____

14. Is a copy of the Field Investigation Work Plan available on site: YES NO

Comments: _____

_____

_____

15. Is a copy of each equipment manual on-site: YES NO

Comments: _____

_____

_____

16. Is a copy of the QA/QC Plan available on site: YES NO

Comments: _____

_____

_____

DVIRKA
AND
BARTILUCCI

FIELD AUDIT FORM
(continued)

17. Are investigation personnel familiar with the Work Plan and QA/QC Plan: YES NO

Comments: _____

_____

_____

18. Are quality control samples taken:

Trip Blanks	YES	NO
Field Blanks	YES	NO

Comments: _____

_____

_____

19. Are samples shipped in a timely and appropriate manner: YES NO

Comments: _____

_____

_____

20. Has the laboratory been contacted regarding planned shipment of samples: YES NO

Comments: _____

_____

_____

21. Certification - Based upon my audit at the above project, I hereby certify/do not certify compliance with QA/QC requirements for the project:

_____ _____

Dated Signed

DVIRKA
AND
BARTILUCCI

FIELD AUDIT FORM
(continued)

General Comments: _____

_____

_____

_____

EXHIBIT 13

NYSDEC SAMPLE IDENTIFICATION, PREPARATION AND ANALYSIS SUMMARY FORMS

To be included with all lab data and with each workplan

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE IDENTIFICATION AND ANALYTICAL REQUIREMENT SUMMARY

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC/MS Method #	*BNA GC/MS Method #	*VOA GC Method #	*Pest PCBs Method #	*Metals	*Other

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
SEMIVOLATILE (BNA)
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
VOLATILE (VOA)
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
PESTICIDE/PCB
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
SEMIVOLATILE (BNA)
ANALYSES

Laboratory Sample ID	Matrix	Analytical Protocol	Extraction Method	Auxiliary Cleanup	Dil/Conc Factor

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
INORGANIC ANALYSES

Laboratory Sample ID	Matrix	Metals Requested	Date Rec'd at Lab	Date Analyzed

ATTACHMENT B

RÉSUMÉ OF QA/QC OFFICER

ROBBIN A. PETRELLA

QUALITY ASSURANCE OFFICER

EDUCATION

SUNY at Buffalo, B.S. (Chemical Engineering) - 1986

PROFESSIONAL EXPERIENCE

Ms. Petrella's professional quality assurance/quality control (QA/QC) experience spans 18 years. During this time, she served as a Sample and Data Analyst for two large environmental laboratories. Ms. Petrella was responsible, as Data Review Group Leader, for supervision of data validation and QA/QC coordination between the laboratory and its clients. Her technical experience includes both the analysis and review of environmental samples using numerous protocols, including those developed by the United States Environmental Protection Agency (USEPA), New York State Department of Environmental Conservation (NYSDEC), and New Jersey Department of Environmental Protection (NJDEP).

Since joining the firm, Ms. Petrella has been responsible for preparing Quality Assurance/Quality Control Plans and Waste Analysis Plans for a number of large private sector clients. These include Chemical Waste Disposal Corporation, the International Business Machines Corporation and Northrop Grumman Corporation. She also has prepared overall QA/QC programs for Northrop Grumman's on-site laboratories.

Ms. Petrella has prepared QA/QC Plans and data validation/usability reports for remedial investigation and feasibility studies conducted at numerous New York State Registry Sites, including those in the Towns of Cheektowaga, Schodack, and North Tonawanda, as well as the Villages of Croton-on-Hudson and Brentwood, New York. These tasks involved evaluation of the laboratory data to determine compliance with NYSDEC Analytical Services Protocols (ASP), as well as to determine the usability of the data particularly if it was not consistent with ASP requirements.

Ms. Petrella has assisted in the preparation and performance of air sampling programs for remedial investigation/feasibility studies (RI/FS) conducted at landfill/Superfund sites in Wallkill, New York and East Northport, New York. She has also performed water supply sampling for an RI/FS in Rensselaer County, New York, and a surface and subsurface water and soil sampling program as part of an RI/FS in Elmira, New York.

Ms. Petrella has acted as the QA/QC officer, and prepared and performed field audits for Superfund site investigations in Tonawanda, New York; Owego, New York; Brookhaven, New York; and Hornell, New York, and for a major railroad facility in New York City. She also has assisted in the preparation of laboratory contracts for analytical services for hazardous waste studies in Schodack, New York; Jamaica, New York; and the New York State Superfund Standby contract.

Ms. Petrella is responsible for performing laboratory audits on all laboratories having contracts with the firm as part of the New York State Superfund Program. She has been certified by the USEPA in both organic and inorganic data validation by successfully completing courses authorized by the USEPA. These certifications have also been accepted by the NYSDEC.

Ms. Petrella is responsible for the data validation of all data packages from ongoing hydrogeologic investigation and landfill closure investigations in Brookhaven and Hauppauge, New York. She also is responsible

for validation of all data collected during field investigations for a large aerospace corporation, a major utility on Long Island, and manufactured gas plants across Long Island.

Ms. Petrella has acted as Project Manager for a standby project with the NYSDEC and a groundwater treatment project located in New Jersey.

Ms. Petrella has been instrumental in the design and implementation of the firm's GIS\Key Database system. In that role, she is responsible for the maintenance of the system and training of personnel in its use. She also is responsible for all updates to the GIS\Key program and communicates on a regular basis with the GIS\Key venders with regard to system improvements and network administration. Currently, there are seven ongoing projects that use GIS\Key, five of which are MGP sites. Ms. Petrella is responsible for entering and reporting of all chemistry data from GIS\Key.

Ms. Petrella also has conducted indoor and outdoor air sampling programs as part of MGP site field investigations. She has conducted interviews with homeowners as part of the air sampling program. She also is responsible for data validation of all the data from the air sampling programs.

Ms. Petrella has performed multimedia compliance audits for several hospitals in both New York and New Jersey. She also has prepared audit reports and EPA disclosure reports based on the compliance audits

Ms. Petrella presently is the Quality Assurance/Quality Control officer for the firm and responsible for reviewing all work relating to Quality Assurance/Quality Control for hazardous waste, hazardous substance, manufactured gas plant and solid waste projects undertaken by the firm. She also is responsible for preparation and maintenance of the Corporate Quality Assurance Manual, and for inventory and maintenance of the firm's field/sampling and monitoring equipment. As the QA/QC Officer, she reports directly to the Principal-in-Charge of the Environmental Remediation Division.

Appendix B

APPENDIX B

SITE-SPECIFIC HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

SITE INVESTIGATION
GLENMERE LAKE PROPERTY
ORANGE COUNTY, NEW YORK

NYSDEC ERP SITE NO. E3-36-071

Prepared for:

ORANGE COUNTY DEPARTMENT OF PARKS,
RECREATION AND CONSERVATION

Prepared by:

DVIRKA AND BARTILUCCI CONSULTING ENGINEERS
WOODBURY, NEW YORK

JULY 2008

HEALTH AND SAFETY PLAN
SITE INVESTIGATION
GLENMERE LAKE PROPERTY
ORANGE COUNTY, NEW YORK

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1.0 INTRODUCTION

This Site-Specific Health and Safety Plan (HASP) was developed for safe completion of the site investigation to be completed at the Glenmere Lake Property located in Orange County, New York. This plan must be re-evaluated should the project conditions change from those that are discussed below.

The procedures and protocols presented in this plan have been established to ensure that a mechanism is in place to assist project personnel in the event that hazards from site contamination are encountered. This plan addresses on-site activities such as surveying, soil boring, soil and groundwater sampling, sediment sampling, monitoring well installation and associated activities that may be completed by Dvirka and Bartilucci Consulting Engineers (D&B) and its subconsultants and subcontractors. This HASP is not designed to address each and every health and safety scenario that could be encountered during the implementation of a typical project. However, this HASP addresses the specific health and safety situations resulting from actual or potential contact with contaminated materials consistent with the requirements pursuant to OSHA 1910 General Industry Standards, OSHA 1926 Construction Standards, and specifically, the OSHA Standard for Hazardous Waste Operations and Emergency Response (29 CFR 1910.120), where applicable.

Compliance with this HASP is required from all authorized D&B project personnel, project support personnel and visitors who enter the work areas of this project. Under no circumstances will any person enter an established restricted area or exclusion zone without first complying with the requirements of this HASP.

The contents of this HASP may change or undergo revision based upon field monitoring results, modifications to the technical scope of work or additional information made available to health and safety personnel. Any proposed changes must be reviewed and approved by Orange County and the New York State Department of Environmental Conservation (NYSDEC), and reviewed by designated D&B personnel.

1.1 Project Location

SITE NAME: *Glenmere Lake Property*

SITE LOCATION: *Orange County, New York*

1.2 Project Personnel

This section specifically refers to D&B operations personnel, project management personnel, and project support personnel. Project Personnel are divided into three categories including Contact Project Personnel, Non-Contact Project Personnel and Project Support Personnel.

Contact Project Personnel - Refers to project personnel who have a reasonable potential to come into contact with contaminated soil, water or soil gas and vapors. The specific job tasks will be evaluated to determine personnel classifications. The Health and Safety Coordinator (HSC) or his/her designee (i.e., Field Operations Manager [FOM]), will assist with this determination.

Non-Contact Project Personnel - Refers to Project Personnel who are not reasonably expected to come into contact with contaminated soil, water or soil gas and vapors. The specific job tasks will be evaluated to determine personnel classifications. The HSC or his/her designee (i.e., FOM), will assist with this determination.

Project Support Personnel - Refers to all other persons who may enter the project work zone such as truck drivers, utility workers, and emergency crews (police, fire, ambulance) as well as any other personnel designated as a project visitor by D&B.

Project Personnel Assignments

Orange County

Title	Name	Phone number
Deputy Commissioner, Department of Parks, Recreation and Conservation	Michael F. Amodio, Jr.	845-457-4912

Environmental Services
Dvirka and Bartilucci Consulting Engineers and Geovation Engineering

Title	Company	Name	Phone number
Project Director	D&B	Richard M. Walka	516-364-9890
Project Manager	D&B	Thomas Fox	516-364-9890
Field Operations Manager	Geovation	Matthew Mordas	845-651-4141
Corporate Health and Safety Coordinator	D&B	Stephen Tauss	516-364-9890
On-Site Health and Safety Representative	Geovation	Matthew Mordas	845-651-4141

Other Project Support Organizations

Health and Safety Consultant		
Emilcott Associates	Bruce Groves, President	973-765-0991
Geoprobe/Drilling Contractor		
Zebra Environmental, Inc.	Shawn Tibbets	516-596-6300
Laboratory Services		
Chemtech Environmental Laboratory	Joseph Dockery	908-789-8900
Corporate Physician		
Plainview Medical Group, P.C.	Dr. Schoenfeld	516-822-2541

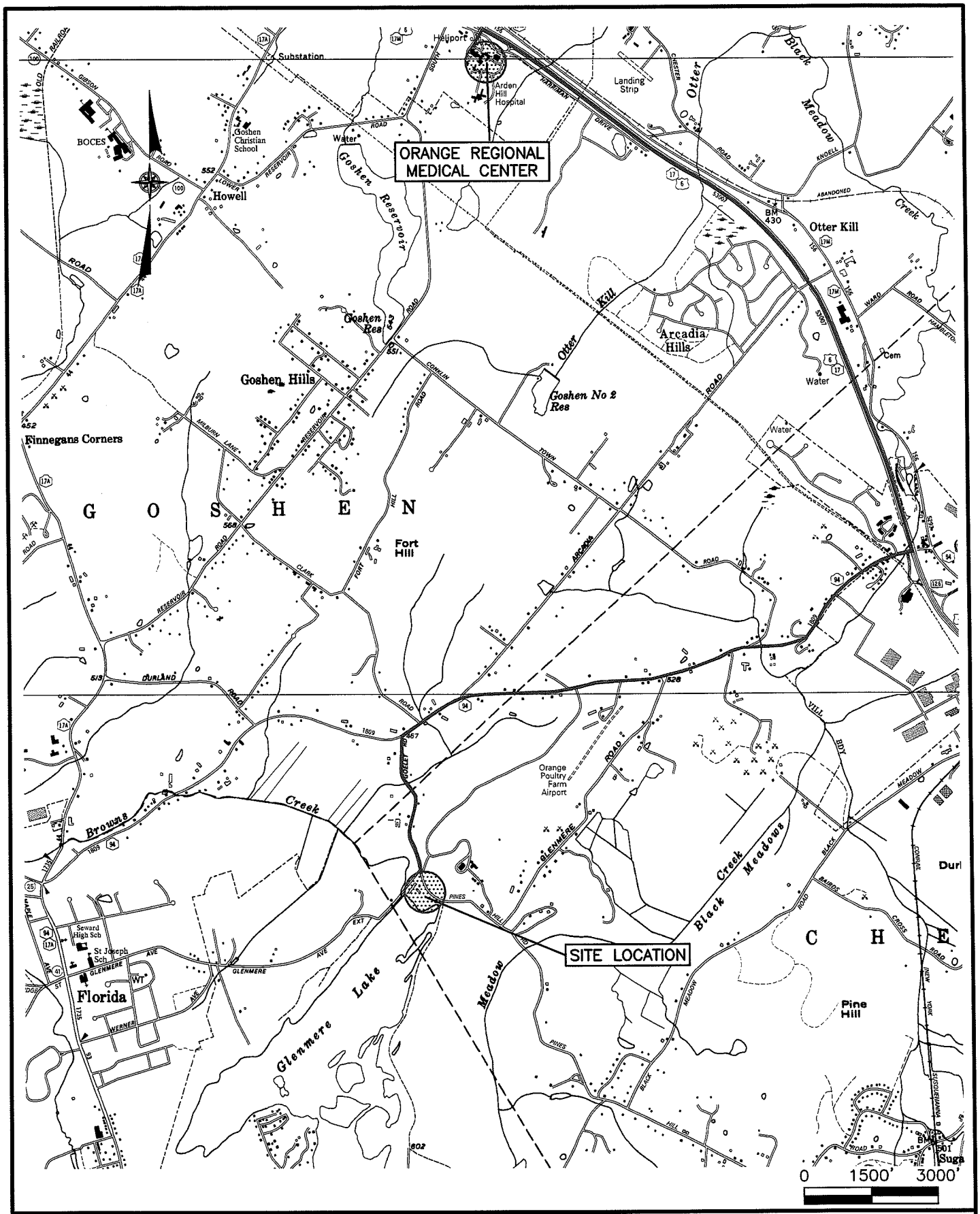
1.3 Emergency Phone Numbers

Fire Department:	Town of Chester Fire Department	911 or 845-469-4100 (Fire Chief)
Police Department:	Town of Chester Police Department	911 or 845-469-9311
Sheriff's Office	Orange County Sheriff's Office	911 or 845-291-4033
Ambulance:	Town of Chester Volunteer Ambulance	911 or 845-469-2721
Hospital:	Orange Regional Medical Center Arden Hill Campus 4 Harriman Drive Goshen, NY 10924	845-294-5441
Poison Control Center:		800-222-1222
USEPA Region 2 Hotline:		800-424-8802
National Response Center (NRC) for Oil/Chemical Spills:		800-424-8802

1.4 Hospital Route

From project location, turn left onto Pine Hill Road and proceed north on Goelet Road. Turn right onto Route 94 and proceed east for 2.5 miles. Merge onto Route 17 west. After approximately 3 miles, take exit 125 toward South Street. Turn left onto South Street and then left onto Harriman Drive. The hospital is on the right. Estimated travel time is 10 to 15 minutes.

A map depicting the route to the hospital is provided in Figure 1-1.



Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

GLENMERE LAKE PROPERTY
ORANGE COUNTY, NEW YORK

ROUTE TO HOSPITAL

FIGURE 1-1

F:\2777\1234orange county.dwg, Route to Hospital, 5/29/2008 7:28:28 AM, AStrauss

2.0 HEALTH AND SAFETY PERSONNEL

The following briefly describes the health and safety designations and general responsibilities for this project.

2.1 Project Director - D&B

The Project Director (PD) has overall executive responsibility for all activities and personnel on the site during all project activities described in this HASP.

2.2 Corporate Health and Safety Coordinator - D&B

The D&B Corporate Health and Safety Coordinator (HSC) or designee has overall responsibility for the development, implementation and enforcement of this HASP. He/she will also approve any changes to this plan due to modification of procedures or newly proposed site activities.

The HSC or designee is responsible for the development of safety protocols and procedures, consistent with the hazardous waste aspects of this project, and will also be responsible for the resolution of any outstanding health and safety issues that arise during the conduct of site work. Health and safety-related duties and responsibilities will be assigned only to qualified individuals by the HSC.

The HSC or designee will provide technical assistance for high hazard or other project tasks as required. He/she may periodically conduct audits of the health and safety procedures implemented on site. Before personnel may work in designated exclusion zones, status of medical clearance and applicable health and safety training must be presented to the HSC or designee, pursuant to those requirements specified in 29 CFR 1910.120.

2.3 Health and Safety Representative – Geovation

The Health and Safety Representative (HSR) or designee will be on-site for all site activities that have the reasonable potential for bringing workers into contact with contaminated materials. The HSR will obtain and review applicable health and safety training and medical surveillance documents for personnel who may work in designated exclusion zones. The HSR has "stop-work authorization," which will be executed upon determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation, such as extreme weather conditions. Authorization to proceed with work will be issued by the HSR after such action. The HSR or designee will initiate and execute all contact with support facilities, such as hospitals, NYSDEC representatives and emergency response organizations.

2.4 Health and Safety Consultant

D&B's Health and Safety Consultant, Emilcott Associates, Inc., will be available to provide health and safety consulting services as needed for this project.

3.0 HAZARD ASSESSMENT

3.1 Introduction

At this project location there may be areas where contaminated soil or groundwater are encountered. The probability of worker exposure to a chemical hazard varies with the job task. Site workers may be exposed to chemicals by inhalation, ingestion, and/or dermal contact. To protect potentially exposed personnel, the work zone may be divided into zones by a degree of contamination. Dust control measures may be implemented, respirators and personal protective equipment may be worn, real-time and instantaneous air monitoring may be conducted and proper decontamination procedures will be followed.

3.2 Task-Specific Hazard Assessment

At this site, potential exposure to contamination is dependent principally on the type of activity being undertaken. Those work tasks that involve significant disturbance and contact with subsurface soil and groundwater (e.g., soil and groundwater probe advancement and groundwater sampling) have the highest project personnel exposure potential. As such, this plan has established two categories of work tasks based on worker exposure to potential site contaminants:

- Non-Contact - Work activities that have little or no reasonable potential for contact or exposure to hazardous site contaminants.
- Contact - Work activities that have some reasonable potential for contact or exposure to hazardous site contaminants.

3.2.1 Non-Contact Personnel

It is anticipated that the following activities involve minimal soil and groundwater contact, and should not result in contact with potentially contaminated soil, groundwater or soil gas and vapors. These tasks will include:

- site preparation;
- aboveground installation activities;
- surface restoration;
- air monitoring activities; and
- project administration.

Potential exposure to contaminated soil or groundwater is not anticipated; however, the operations will be evaluated and monitored as necessary. In the event that contaminated materials are encountered, all project personnel involved in such areas will stop work until further instructions from the HSC.

Initially, exclusion zones will not be established for such activities. However, exclusion zones will be established if visual evidence of contamination is observed, and/or instrument readings exceed the action levels detailed in Section 6.0. In the event that non-contract personnel must enter the exclusion zone, all intrusive work will be halted and will not continue until all non-contract personnel have exited the exclusion zone.

3.2.2 Contact Personnel

It is anticipated that personnel performing the following tasks have some reasonable potential to come into contact with contaminated soil, groundwater, soil gas and vapors:

- advancement of soil and groundwater probes;
- well construction and development;
- handling of drill cuttings and fluids;
- equipment and personnel decontamination;
- liquid transfer activities; and
- material handling.

These activities will be evaluated and monitored by the HSR or designee. Construction exclusion zones will be established as required.

A hazard analysis was developed for the work activities that involved potential exposure to contamination at the site (contact work). The analysis was based on the potential for the hazard regardless of the contaminant concentrations. For example, the potential for an individual to come in contact with liquids or sediments during equipment decontamination is moderate to high. However, the actual hazard may be low if the liquids or sediments are not contaminated. Table 3-1 outlines the hazard analysis for the Contact Work Activities.

The following is a general discussion of the hazards that may be encountered on site. Additional information on any contaminants encountered during this project may be found in standard health and safety references, such as the NIOSH "Pocket Guide to Chemical Hazards."

3.3 Chemical Hazards

Activities associated with the advancement of soil and groundwater probes, and soil and groundwater handling for sampling or disposal present a potential for personnel chemical exposure. Precautions should be taken to continuously assess the workplace environment by observation and use of direct-reading instruments during site operations where there exists a potential for contact with contaminants. Measures must be taken to prevent an uncontrolled release or exposure to vapor, liquid or solid contaminants by workers and/or the general public. Assessment and prevention strategies are discussed below and must be practiced on a continual basis by all on-site personnel throughout this project.

The presence of specific contaminants has not been established at this site. However, based on available information, potential contaminants that may be encountered while conducting intrusive activities at the site include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals, pesticides, herbicides and asbestos.

Table 3-1

HAZARD ANALYSIS

Potential Hazard	Soil and Groundwater Probes	Well Installation	Sample Collection	Waste Handling (soil, groundwater)	Equipment Decontamination
Inhalation of volatiles	low to moderate	low to moderate	low to moderate	low to moderate	low
Skin and eye contact	moderate	moderate	moderate to high	moderate to high	moderate to high
Ingestion	low	low	low	low	low to moderate
Inhalation of dust	low	low	low	low	low to moderate
Heat stress	depends on temperature	depends on temperature	depends on temperature	depends on temperature	depends on temperature
Cold stress	depends on temperature	depends on temperature	depends on temperature	depends on temperature	depends on temperature
Confined Space	not expected/ not allowed	not expected/ not allowed	not expected/ not allowed	not expected/not allowed	not expected/not allowed
Heavy equipment	moderate to high	moderate to high	low	low	low to moderate
Noise	moderate	moderate	low	low	moderate
Tripping	low	low	low	low	low
PPE	low	low	low	low	low to moderate
Utilities	high	high	low	low	low
Other Physical hazards	moderate	moderate	moderate	moderate	moderate
Biological hazards	low	low	low	low	low
Flammable hazards	low	low	low	low	low

The primary potential chemical health hazards of concern to workers are from the inhalation of volatile and semivolatile organic vapors, inhalation of asbestos fibers, and skin exposure to metal compounds. Potential for these exposures would exist during advancement of soil and groundwater probes, drilling of groundwater monitoring wells, and sampling of soil and groundwater. OSHA Permissible Exposure Limits (PEL) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) may be exceeded during certain investigation activities. These activities will be closely monitored and evaluated to determine potential for exceeding standards and the need to implement control measures to protect personnel and the environment. Potential exposures can be mitigated through appropriate investigation procedures, work practices, air monitoring and personal protective equipment. Duration and frequency of exposure will be short and intermittent over a period of several weeks. All personnel related to the investigation should keep upwind of all soil disturbances and sampling activities at all times when possible.

Table 3-2 lists the Permissible Exposure Levels (PEL) for selected potential contaminants of concern and their primary health hazards.

A brief discussion of potential pathways of exposure and exposure control methods is presented below.

Inhalation - An inhalation exposure to volatile organic compounds and other gases and vapors would typically occur from exposure to gases/vapors present in the interstitial soil via the installation of boreholes and excavations.

Contact with Skin and Eyes - Contaminated groundwater, soil and sediments may come into contact with skin and eyes during work activities. Cotton coveralls, work gloves, and eye protection will be used, as necessary, to minimize and/or prevent skin and eye exposures.

Ingestion - Ingestion of contaminated materials may occur as a result of a hand-to-mouth contact (eating, drinking, and smoking) in contaminated areas or prior to appropriate personal

Table 3-2

PERMISSIBLE EXPOSURE LIMITS AND HEALTH HAZARDS OF CONTAMINANTS OF CONCERN

Chemical Hazard	Exposure Limits	Primary Health Hazard (Target Organs)
Arsenic (inorganic compounds, as As)	OSHA: 0.01 mg/m^3 NIOSH (Ca)(C): 0.002 mg/m^3 IDLH (Ca): 5 mg/m^3 (as As)	Liver, kidneys, skin, lungs, lymphatic system
Asbestos (fibers)	OSHA: 100,000 $fibers/m^3$ NIOSH: 100,000 $fibers/m^3$	Respiratory system (lung cancer), eyes
Benzene	OSHA: 1 ppm (3.19 mg/m^3) NIOSH: 0.1 ppm (0.319 mg/m^3) IDLH: 500 ppm (1,595 mg/m^3)	Eyes, skin, respiratory system, blood, central nervous system (CNS), bone marrow
Cadmium	OSHA: 0.005 mg/m^3 IDLH (Ca): 9 mg/m^3	Respiratory system, kidneys, prostate, blood
Chromium (metal)	OSHA: 1 mg/m^3 NIOSH: 0.5 mg/m^3 IDLH: 250 mg/m^3	Eyes, skin, respiratory system
Ethylbenzene	OSHA: 100 ppm (435 mg/m^3) NIOSH: 100 ppm (435 mg/m^3) (ST) 125 ppm (545 mg/m^3)	Eyes, skin, respiratory system, CNS
Lead	OSHA: 0.050 mg/m^3 NIOSH: 0.050 mg/m^3 IDLH: 100 mg/m^3	Eyes, gastrointestinal (GI) tract, CNS, kidneys, blood, gingival tissue
Mercury (Metal) (except organo alkyls)	OSHA (C): 0.1 mg/m^3 IDLH: 10 mg/m^3 NIOSH: Hg Vapor 0.05 mg/m^3 (skin) Hg Other (C) 0.1 mg/m^3 (skin)	Eyes, skin, respiratory system, CNS, kidneys
Mercury (organo) alkyl compounds (as Hg)	OSHA: 0.01 mg/m^3 OSHA (C): 0.04 mg/m^3 NIOSH: 0.01 mg/m^3 NIOSH (ST): 0.03 mg/m^3 IDLH: 2 mg/m^3	Eyes, skin, CNS, peripheral nervous system (PNS), kidneys
Naphthalene	OSHA: 10 ppm (50 mg/m^3) NIOSH: 10 ppm (50 mg/m^3) (ST) 15 ppm (75 mg/m^3)	Eyes, skin, blood, liver, kidneys, CNS
Polycyclic Aromatic Hydrocarbons (PAHs)	OSHA: 0.2 mg/m^3 NIOSH (Ca): 0.1 mg/m^3	Respiratory system, skin, bladder, kidneys

Table 3-2 (continued)

PERMISSIBLE EXPOSURE LIMITS AND HEALTH HAZARDS OF CONTAMINANTS OF CONCERN

Chemical Hazard	Exposure Limits	Primary Health Hazard (Target Organs)
Tetrachloroethylene (PCE)	OSHA: 100 ppm (678 mg/m^3) IDLH: 150 ppm (1,017 mg/m^3)	Eyes, skin, respiratory system, liver, kidneys, CNS
Toluene	OSHA: 200 ppm (754 mg/m^3) NIOSH: 100 ppm (375 mg/m^3) IDLH: 500 ppm (1,885 mg/m^3)	Eyes, skin, respiratory system, CNS, liver, kidneys
m,o,p-Xylene	OSHA: 100 ppm (435 mg/m^3) NIOSH: 100 ppm (435 mg/m^3) (ST) 150 ppm (655 mg/m^3)	Eyes, skin, respiratory system, CNS, GI tract, blood, liver, kidneys

Notes:

mg/m^3 - milligrams per cubic meter

CA - Carcinogenic

C - Ceiling limit

ppm - Parts per million

ST - Short-term exposure limit

decontamination. Frequent and thorough washing of hands and face, prohibiting eating and smoking in the work area, proper use of work clothing and personal decontamination will control the potential for ingestion of contaminated soils.

3.4 Biological Hazards

Biological hazards may include poison ivy, poison oak, ticks, fleas, mosquitoes, wasps, spiders and other animals and rodents that may inhabit the site. Personnel shall avoid contact with poisonous plants, cover arms and hands, and frequently wash potentially exposed skin. Mosquito and tick repellant should be used in infested areas, and pant legs should be tucked into boots.

3.5 Physical Hazard Analysis

Potential hazards that are most likely to be encountered at the Glenmere Lake property during field operations include, but are not limited to:

- Weather conditions (lightning, rain, excessive heat, excessive cold, and high winds, etc.);
- Slips, trips, falls on uneven/overgrown surfaces;
- Heavy equipment traffic;
- Striking and struck-by (heavy equipment);
- Moving or rotating machinery;
- Flying debris from drilling;

Below is a summary of guidelines that may be used to eliminate/reduce the potential risk of physical hazards.

3.5.1 Weather

If severe weather occurs that may affect the safety of site workers, the HSC or designee shall stop affected field operations. The HSC or designee will resume operations when weather conditions improve.

3.5.2 Heat and Cold Stress

Depending on the time of year and weather conditions, cold or heat stress may present a potential concern. The HSC or HSR will ensure that the heat and cold stress programs are implemented and that adequate rest breaks and liquid consumption is maintained.

Proposed work/rest schedules will be dependent upon the weather conditions encountered and the level of personal protective equipment being utilized by on-site personnel. The HSC will use his judgment to establish and adjust work/rest schedules.

3.5.3 Noise

Excessive noise can be a problem during certain activities on site, such as probe advancement or the use of loading machinery. If necessary, as designated by the HSC, earplugs or other hearing protection equipment will be made available for personnel use.

3.5.4 Illumination

If work activities occur before sunrise and/or after sunset, lighting will be provided at each work area to meet the requirements of 29 CFR 1910.120(m). This standard states that while any work is in progress, the general site areas shall be lighted to not less than 5 foot-candles[1]. In addition, any areas of excavation, waste management areas, access ways, active storage areas, loading platforms, and field maintenance areas shall be lighted to not less than 3 foot-candles. First aid areas should be lighted to not less than 30 foot-candle.

[1]One foot-candle equals 10.764 lux ($E=I/D^2$).

3.5.5 Slip, Trip and Fall Hazards

As in any work area, it is expected that the ground may be uneven, the surface may be unreliable due to settling, surface debris may be present, and wet or muddy areas may exist. Therefore, the potential for slipping, tripping and falling is present, especially considering the safety equipment that may be used which can impede vision. Severe trip hazards will be identified in site meetings and demarcated by flags or caution tape.

3.5.6 Excavations

It is not anticipated that excavations will be performed during the site investigation. However, the following describes the safety requirements for excavations. The safety requirements for each excavation must be determined by a competent person who is capable of identifying existing and predictable hazards and work conditions that are hazardous, or dangerous to employees. The competent person must also have the authorization to take prompt corrective measures to eliminate unsatisfactory conditions.

Under no circumstances will anyone enter an excavation. All samples associated with open excavations will be collected from outside the excavation with hand tools.

The following are general requirements for work activities in and around excavations:

- Prior to initiation of any excavation activity, the location of underground utilities will be determined through One-Call utility mark outs. The one-call center will be contacted by the contractor a minimum of 72 hours prior to excavation activities.
- All excavations will be inspected daily and documented by the competent person prior to commencement of work activities. Evidence of cave-ins, slides, sloughing, or surface cracks or excavations will be cause for work to cease until necessary precautions are taken to safeguard employees.
- Materials or equipment that could fall or roll into the excavation shall be placed at least 5 feet from the edge of open excavations.

3.5.7 Odor Control

Odors are not expected to be a significant issue during site investigation activities; however, in the event that odors of significance are detected, work activities will be halted temporarily and air monitoring will be performed. Work will continue in another area. The area identified as emanating the odors of significance will be temporarily covered with plastic, and air monitoring will be performed as per Section 6.0. In the event that air monitoring action levels are exceeded, appropriate actions will be taken. Work will resume in this area after the air monitoring levels indicate acceptable conditions, and any odors of significance are mitigated via work method changes and/or the application of foaming agents.

4.0 SITE CONTROLS

A Site Control Plan has been established to restrict access to work areas where potential contamination may be present, to select appropriate Personal Protective Equipment (PPE) for personnel working in each control zone and to prevent the accidental spread of contaminated material. As part of this plan, a number of separate zones may be used at this site. These zones are identified as: (1) the Work Zone (WZ); (2) the Exclusion Zone (EZ); (3) the Contamination Reduction Zone (CRZ); and (4) the Support Zone (SZ). Zone classifications may change as circumstances warrant. The WZ is the project work area. The EZ will be established within the WZ if the air monitoring action levels exceed the levels established for this project (refer to Section 6.0). The CRZ will be established within the WZ between the EZ and the SZ as determined by the HSR.

For more detailed procedures on work zones and site control refer to SOP #HW002 provided in Attachment A.

4.1 Work Zone

The Work Zone (WZ) is the project work area. All physical project work activities will be conducted within the WZ. This zone is restricted to project (contact and non-contact) personnel, project support personnel and visitors as defined in this document. Access to the site will be controlled by fencing, and/or caution tape and safety cones around the equipment and work area. In addition, equipment will be secured, covers will be placed over any open borings and staged soil will be covered at the end of each work day and when not in use. Only authorized personnel will be permitted to enter the WZ.

All personnel entering the WZ will be briefed by the HSC or HSR prior to their initial entry. All Contact Project Personnel entering the WZ must meet the training and medical requirements as outlined below. Appropriate work clothing and equipment will be worn. All Contact Project Personnel and equipment exiting the WZ must be adequately cleaned before

leaving the site or as required by the HSC or HSR or his/her designee. The HSR will monitor non-contact activities performed within the WZ.

4.2 Exclusion Zone

An Exclusion Zone (EZ) will be established at active work sites where contamination is anticipated, observed or measured. The HSR will make the determination to establish an EZ based upon work activities, work conditions, visual evidence of contamination, air monitoring or sample results and/or other knowledge of the site that indicates an increase in the probability of worker exposure.

Typically, the EZ will consist of an area with a 15 to 20 foot buffer area around the work area. However, the HSR will determine the extent of the EZ, depending on the potential hazards and site activities. The area will be marked using a physical barrier (flagging tape, e.g.) or other means to readily identify the boundary of the zone.

Access to the EZ will be limited to contact project personnel that meet the training and medical requirements as outlined below. All contact project personnel entering the EZ will be briefed by the HSR prior to initial entry.

Appropriate protective work clothing and equipment will be worn in the EZ. All personnel and equipment exiting the EZ will be decontaminated in the CRZ or as the HSC or HSR determines is necessary. Once the operations have been completed, the EZ will be removed by the HSR.

4.3 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is the area just outside of the EZ where Contact Project Personnel undergo decontamination. This zone will be contiguous with the EZ. The area will be marked using flagging tape or other means to readily identify the boundary of the zone. Access to this zone will be limited to Contact Project Personnel exiting the EZ and

personnel assisting with decontamination. A separate equipment decontamination area will be established as determined by the HSC, HSR or designee.

4.4 Support Zone

The Support Zone (SZ) is the area in which administrative and other support functions essential to site operations are conducted. Any function that need not or cannot be performed in a hazardous or potentially hazardous area is performed here. Personnel may wear normal work clothes within this zone because any potentially contaminated clothing, equipment, and samples must remain in the CRZ until decontaminated.

5.0 WORK CLOTHING AND LEVELS OF PROTECTION

5.1 Work Clothing

The HSC or HSR will recommend appropriate levels of protective clothing to be worn in the event that hazardous materials are encountered. The levels of protection planned for this project are identified in Table 5-1. In general, typical work clothing will be worn on this project.

5.2 Levels of Protection

The level of protection to be worn by field personnel will be defined and controlled by the HSC or HSR. Table 5-1 below contains a list of tasks and the respective levels of protection when working inside a project exclusion zone.

Definition of Levels of Protection:

Respirators:

Level D: A respirator is not required.

Level C: Full-face or half-face Air Purifying Respirator (APR) with combination HEPA - P,O,N 100 series (dusts, fumes, aerosols) and organic vapor cartridges (yellow).

PPE:

Level D: Long sleeve shirt and long pants and/or work coveralls/uncoated tyvek

Gloves

Appropriate steel-toe work boots

Hardhat

Safety glasses with side shields as needed

Table 5-1

PERSONAL PROTECTION LEVELS

Task	Level of Protection			
	Respirators		PPE	
	Initial	Contingent	Initial	Contingent
Probe Advancement and Well Construction	D	C	D	C
Sample Collection	D	C	D	C
Waste Handling	D	C	D	C
Decontamination	D	C	D	C
Groundwater Sampling	D	C	D	C

Level C: Poly-coated Tyvek disposable coveralls or equal substitute vinyl, neoprene, nitrile rubber or butyl rubber outer gloves

Nitrile inner gloves

Appropriate leatherwork boots with chemically resistant outer boots or chemically resistant rubber boots

Hardhat

Safety glasses with side shields as needed

Note: Modified Level D is used in this plan to refer to personnel using Level C PPE with no respirator.

5.3 Donning and Doffing

Manufacturers recommended procedures for donning and doffing of PPE ensembles will be followed in order to prevent damage to PPE, reduce or eliminate migration of contaminants from the work area and reduce or eliminate transfer of contaminants to the wearer or others.

5.4 Storage and Inspection

Since storage facilities will not be readily available, only minimal quantities of protective equipment will be maintained on site. Items such as gloves, protective suits, and hearing protection will be kept within a suitable storage area. Respirators will be stored in plastic bags when not in use.

Employees are responsible for inspecting personal protective equipment prior to donning, during use and at the end of the shift. Defective equipment shall be removed from service and reported to the HSC or HSR. All reusable equipment will be maintained in a sanitary condition, in accordance with the manufacturer's recommendations.

6.0 AIR MONITORING PROCEDURES

6.1 Air Monitoring During Site Operations

Air monitoring results will be used by the HSR to evaluate the need for establishing additional site controls/work zones, and upgrading levels of personal protective equipment. For each instrument there are site-specific action level criteria that are used by the HSR as guidelines in making field health and safety determinations. Other data, such as the visible presence of contamination or odors are used by the HSR in making field health and safety decisions. Therefore, it is possible that the HSC and HSR may establish Exclusion Zones or require the use of a respirator even though atmospheric air contaminant concentrations are below established action levels.

The HSR or designee will perform the air monitoring. Air monitoring will include the use of a photoionization detector (PID) to detect VOCs during all intrusive activities. Ambient air monitoring will be conducted in all site work areas to monitor the breathing zone and possible migration of harmful substances to off site locations. Personal air sampling for specific airborne contaminants may be performed at the direction of and under the supervision of the HSC.

The frequency of monitoring for VOCs will be determined by the HSC and/or according to the task being conducted and whether potentially contaminated soil or groundwater will be contacted or disturbed. The HSR will determine the need to implement engineering controls in order to reduce worker exposure potential to contaminants. Action levels are discussed below in Section 6.2.

In addition, the PID will be used to screen sediment, soil and groundwater samples for the presence of VOCs.

6.2 Instantaneous Air Monitoring and Action Levels

As described above, instantaneous air monitoring of VOCs utilizing a PID will be

performed. The HSR or designee will periodically conduct instantaneous air monitoring within the work zone (breathing zone) and immediately downwind of the work zone. If instantaneous VOC concentrations exceed 5 ppm above background, the HSR or designee will advise the HSC, Orange County and the drilling contractor, and the HSR or designee will take appropriate actions, which may include:

- donning respiratory protection;
- construct zone boundaries; and
- stopping work until acceptable levels are recorded.

6.3 Background Air Monitoring

Background monitoring for VOCs will occur at a location upwind of the work zone prior to the initiation of work. Background levels will be established prior to conducting air monitoring in any work area.

6.4 Instrument Calibration and Maintenance

All air monitoring equipment will be calibrated at the beginning of each workday and as needed during the day, if applicable. All calibration results will be recorded. Monitoring equipment will be maintained on a schedule corresponding to the manufacturer's suggested maintenance schedule.

7.0 TRAINING

7.1 Hazard Communication

The HSC or HSR is responsible for site specific training and notifying employees and contractors of the hazards associated with non-routine tasks. The HSC shall inform on-site personnel of the potential hazards that may be encountered in the area where he/she will be working, should the HSC have such knowledge of these hazards.

Reference D&B SOP # C002 provided in Attachment A for more detailed requirements and procedures regarding hazard communication.

7.2 Initial Site Training

The initial site briefing will be provided on-site by the HSC or his/her designee for all Project Personnel (Contact and Non-Contact) and Project Support Personnel prior to initial entry into the Work Zone of the site. Site training will also be provided as needed to address the specific activities, procedures, monitoring, and equipment for the site operations. Such training will include site and facility layout, potential and recognized hazards, and emergency services at the site, and will detail all provisions contained within this HASP. This training will be documented.

7.3 Contact Project Personnel Training

All Contact Project Personnel designated to work in the Exclusion Zone are required to have successfully met the initial and refresher training requirements pursuant to 29 CFR 1910.120(e).

8.0 MEDICAL SURVEILLANCE

All Contact Project Personnel engaged in on-site activities associated with this project must have baseline physical examinations and participate in their employer's medical surveillance program. This program must meet the requirements of 29 CFR 1910.120(f). Medical procedures beyond baseline physical and routine medical surveillance are not planned for this project. Medical records for employees are maintained at the corporate office and by the company's medical group. Medical records are maintained in accordance with the record keeping requirements of 29 CFR 1910.120. In addition, any employee required to wear a respirator for Level C PPE will be approved by a licensed health care provider for respirator use as defined in the OSHA Respiratory Standard 29 CFR 1910.134.

In the unlikely event of an exposure, the affected employee will be sent for any evaluation and treatment that may be needed to either the Corporate physician, or to the designated hospital. See Figure 1-1 for a route map and Section 1.4 for written directions to the designated hospital.

9.0 COMMUNICATIONS

A means of communication will be provided at the project site. This may include two-way radios, portable telephones, or existing nearby telephones. Project personnel will be informed of the communication procedures during site briefings.

10.0 DECONTAMINATION PROCEDURES

10.1 General

All personnel and equipment that have been within established exclusion zones shall be decontaminated. Decontamination activities may also occur for operations outside of the established exclusion zones. Such decontamination is part of typical monitoring and sampling, construction, and other support operations.

10.2 Personnel Decontamination

Personnel field decontamination will take place in the contamination reduction zones (CRZs). Based on the extent of personnel contamination, the HSR will establish site-specific decontamination procedures. Based on the expected activities, it is anticipated that limited personnel decontamination will be necessary.

Full field decontamination procedures, if utilized, would require all personnel exiting exclusion zones to undergo a wash and a rinse process and remove their PPE. This will consist minimally of two tubs: one wash tub and one rinse tub, placed on plastic sheeting. Personnel exiting the exclusion zone(s) will be required to wash their outer boots, outer gloves and protective clothing. This will be accomplished with an alconox/water solution and scrub brushes in the first tub. Personnel will then proceed to the next tub, which will consist of a clean water rinse and subsequent spray-down with clean water. Personnel will stand in the tub and spray off their gloves, boots, and protective clothing with clean water from the sprayer. After the rinse, personnel will then remove their outer boots, outer gloves, protective clothing and respiratory protection, if worn.

Once removed, disposable PPE will be collected at the field decontamination site in a large plastic bag. The plastic bag will be secured in order to prevent the accidental spread of contamination. Disposable PPE that has been worn in an exclusion zone must be removed and placed in the disposal container before leaving the CRZ. Disposable PPE may not be re-used.

10.3 Instrument Decontamination

Instruments will be decontaminated whenever they have come into contact with soil or dust. Instrument decontamination will occur in the same area for personnel decontamination and will consist of the removal of any dust or soil from the surface of the instruments.

10.4 Equipment Decontamination

Equipment utilized for this project may include:

- Support trucks for intrusive activities;
- Geoprobe rigs;
- Pumps; and
- Drill rigs.

Equipment decontamination will take place prior to use and between sample locations. Decontamination water will be disposed of on-site unless there is reason to believe it is contaminated. Such water will be stored in DOT-approved 55-gallon drums for characterization and proper disposal. All field equipment that has been contaminated will be decontaminated before leaving the project site. The HSC, HSR or designee will be responsible for ensuring that equipment is decontaminated as needed.

Refer to SOP #HW005 provided in Attachment A for more detailed containment and disposal procedures.

11.0 EMERGENCY PLAN

Emergency situations can be characterized as a fire or explosion, environmental release, or accident or injury to the field personnel. For incidents other than minor injuries to on site personnel, work will be halted and the situation will be evaluated. Emergency procedures appropriate to the situation will be implemented. The HSC will be notified immediately in the event of an evacuation.

Emergency telephone numbers and directions to the designated hospital are listed in Sections 1.3 and 1.4, respectfully, and a route to hospital map is included as Figure 1-1. This information will be available to all workers on site.

It is important to insure the rapid and accurate transfer of information to appropriate personnel in the event of an emergency situation. To simplify the procedure, emergency situations can be reported by dialing 911. This includes incidents requiring police, fire department, or medical assistance. In the event that such an emergency occurs, Orange County will be notified immediately following the report to 911.

Be sure to provide the following information to the dispatcher:

1. Caller's full name;
2. The nature of the incident ("Fire," e.g.)
3. The location of the incident. The more specific the better;
4. What you need ("Fire Department and First Aid," e.g.);
5. If you are able, where you will meet emergency responders (at entrance of site along Pine Hill Road);
6. If applicable, your cell phone number ("I'll be at the scene; my cell phone number is 123-4567," e.g.);
7. Status of the situation. (e.g., is the situation stabilized; or "I have the fire under control," e.g.);

8. If anyone is injured or in need of emergency assistance ("A mechanic working on a pump was burned," e.g.)

11.1 Evacuation

In the event of an emergency situation, all personnel will evacuate and assemble at a designated meeting area. For efficient and safe area evacuation and assessment of the emergency situation, the HSC, HSR or FOM will have the authority to initiate proper action if outside services are required. The access to emergency equipment will be provided and all combustion apparatus (e.g., operating machinery) will be shut down once an emergency situation has been identified.

11.2 Personnel Injury

In the event of an emergency situation, the local emergency response group will be called. Emergency first aid may be applied on-site as deemed necessary. If possible, the individual should be decontaminated and then transported to the nearest medical facility if needed.

The local rescue squad shall be contacted for transport as necessary in an emergency. Since some situations may require transport of an injured party by other means, transportation by automobile may be required.

11.3 Personnel Exposure

Skin Contact:	Use copious amounts of soap and water. Wash and/or rinse affected area thoroughly, then provide appropriate medical attention. Eyes should be thoroughly rinsed with water for at least 15 minutes.
Inhalation:	Move to fresh air and, if necessary, decontaminate and transport to emergency medical facility.
Ingestion:	Decontaminate and transport to emergency medical facility.

Puncture Wound or Laceration:	Decontaminate, if possible, and transport to emergency medical facility.

11.4 Safety Equipment

Basic emergency and first aid equipment will be made available at the Project Work Zone and/or the CRZ, as appropriate. This shall include a first aid kit, an eye wash station and a fire extinguisher.

12.0 RECORD KEEPING

The HSC, HSR or designee will maintain health and safety information records for the site. The following information will be recorded as needed:

- Weather conditions (temperature, wind speed and direction);
- Air monitoring equipment calibration records;
- Air monitoring results (date, time, location, data, instrument, person conducting sampling);
- Training records;
- Medical surveillance records;
- Health and Safety audit records;
- Description of operation(s);
- Description of accident(s), if any;
- Non-compliance with the HASP, if any.

13.0 AUTHORIZATIONS

The HSC, HSR or designee must approve all personnel authorized to enter the project work zones and exclusion zones at the site. Authorization will involve completion of appropriate training courses and medical examination requirements as outlined by this HASP, as well as the signature of the individual on the Acknowledgement Form recognizing a complete understanding of this HASP. The form is provided in Attachment B.

14.0 APPROVALS

The undersigned certify that this Site Health and Safety Plan (HASP) is approved and will be utilized by Dvirka and Bartilucci Consulting Engineers and Geovation Engineers, for the Glenmere Lake property, located in Orange County, New York.

For Dvirka and Bartilucci Consulting Engineers and Geovation Engineers:

Title	Name	Signature	Date
Project Manager	Thomas Fox, D&B		
Corporate Health and Safety Coordinator	Stephen Tauss, D&B		
Site Field Operations Manager	Matthew Mordas, Geovation		

ATTACHMENT A

DVIRKA AND BARTILUCCI CONSULTING ENGINEERS
CORPORATE STANDARD OPERATING PROCEDURES

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1.0 PURPOSE

The purpose of these guidelines is to provide general reference information regarding the establishment of site control procedures and work zones for hazardous waste sites.

2.0 SCOPE

These guidelines are applicable to D&B/WFC activities at hazardous waste sites. Additional precautions may be identified during the development of the site-specific HASP.

3.0 DEFINITIONS

Contaminated Materials - Contaminated materials are defined as any by-products of a field investigation that are suspected or known to be contaminated with hazardous substances. These by-products include such materials as decontamination solutions, disposable equipment and clothing, drilling muds, well-development fluids and spill-contaminated materials.

Exclusion Zone - Zone that contains or may contain contamination.

Contamination Reduction Zone - Zone located between the exclusion zone and the support zone that provides a transition between contaminated and clean zones.

Support Zone - A non-contaminated or clean part of the site.

4.0 RESPONSIBILITIES

The *Health and Safety Coordinator (HSC)* - The HSC is responsible for ensuring that these guidelines are incorporated in the Site-Specific HASP and that training is available to D&B/WFC site personnel in delineation of work zones.

The *Health and Safety Representative (HSR)* – The HSR or a designee is responsible for implementing/enforcing/designating zones on-site.

The *Employees* – all employees working at the site and visitors must comply with the requirements of the site zones, such as proper PPE and limited personnel access, as determined by the HSC or HSR.

5.0 GUIDELINES

5.1 Work Zones

5.1.1 Introduction

To reduce the accidental spread of hazardous substances by workers from the contaminated areas to non-contaminated or clean areas, work zones for specific types of operations should be delineated, and the flow of personnel and equipment among the zones should be controlled. Established work zones will ensure that personnel and equipment are properly protected against

the hazards present in their work area(s); that work activities and contamination are confined to appropriate areas; and that the personnel can be quickly located and evacuated in an emergency. Hazardous waste sites may be divided into as many zones as needed to meet operational and safety objectives. The typical work zones found at hazardous waste site are:

- Exclusion or Hot Zone - the contaminated or potentially contaminated area
- Contaminant Reduction Zone - the area where decontamination takes place
- Support Zone - The non-contaminated area where workers should not be exposed to site contaminants.

5.1.2 Exclusion Zone

The exclusion or hot zone contains or may contain contamination. The outer boundary of the Exclusion Zone is called the Hotline. It should be established following the guidelines below:

- The location of hazardous substances and surface drainage
- The data from the initial site survey
- The results of soil and water sampling
- The physical area necessary for site operations
- Meteorological conditions and the potential for contaminants to be carried by wind from the contaminated area.

The Hotline should be clearly marked by lines, placards, hazard tape, or signs and should be enclosed by physical barriers such as chains, fences, or ropes. Access control points on the periphery of the Exclusion Zone regulate the flow of personnel and equipment from zone to zone and ensure that proper procedures for entering and exiting the site are followed. Separate entrances and exits help to segregate movement into and out of the Exclusion Zone.

The Exclusion Zone can be subdivided into different areas of contamination based on known or anticipated hazard type and degree, or on the compatibility of waste streams. Such subdivision allows flexibility in health and safety requirements, operations, decontamination procedures, and use of resources. The level of PPE required in each subdivision may vary, as may the level of PPE required for different job assignments within a subdivision. The level of protection must be

specified and posted for each job assignment with each subdivision. When appropriate, different levels of PPE within the Exclusion Zone promote flexibility, effective and cost-effective operation while maintaining a higher degree of health and safety

5.1.3 Contaminant Reduction Zone (CRZ)

The Contaminant Reduction Zone or Decontamination Zone is the transition area between the contaminated and clean areas. The distance between the Exclusion and Support Zones provided by the CRZ and the proper decontamination of workers and equipment, limit the physical transfer of hazardous substances into the clean areas.

Decontamination procedures take place in a designated area within the CRZ, called the Contamination Reduction Corridor (CRC) that begins at the Hotline. Two decontamination areas may be set up within the CRC, one for personnel and small equipment and the other for heavy equipment. Access into and out of the CRZ and to and from the Exclusion Zone is through specified Access Control Points.

The boundary between the Support Zone and the CRZ is called the Contamination Control Line. This boundary separates the possibly low contamination area from the clean or non-contaminated Support Zone. Access to the CRZ from the Support Zone can be achieved through two Access Control Points, one for personnel and one for equipment. Personnel entering the CRZ must wear personnel protective clothing and equipment, as required by the Site-Specific HASP. To reenter the Support Zone, workers should remove any protective clothing and equipment and exit through the designated Access Control Point.

The CRZ must be designed to accommodate the following activities:

- Decontamination of equipment, personnel and samples;
- Emergency response, such as transport for injured personnel (safety harness, stretcher), first-aid equipment (bandages, blankets, eye wash, splints, water, etc.), containment equipment (absorbent, fire extinguisher, etc.);
- Equipment resupply, such as air tanks, personnel protective clothing and equipment (booties, gloves, chemical suits, etc.), sampling equipment (bottles, soil augers, coolers, drum thiefs, etc.), and tools;
- Sample packaging and preparation for on-site and off-site analysis;

- Worker temporary rest area, including toilet facilities, benches, chairs, liquids, shade and/or shelter. Water and other potable liquids should be clearly marked and stored properly to ensure that all glasses and cups are clean. Wash facilities should be located near drinking facilities to allow employees to wash before drinking. Drinking, washing, and toilet facilities should be located in a safe area where protective clothing can be removed. Facilities should be cleaned and inspected regularly. Maintenance workers should take appropriate protective measures; and

- Drainage of water and other liquids used during decontamination.

5.1.4 Support Zone

The Support Zone is the location in which administrative and other support functions essential to site operations are conducted. Any function that need not or cannot be performed in a hazardous or potentially hazardous area is performed here. Personnel may wear normal work clothes within this zone because any potentially contaminated clothing, equipment, and samples must remain in the CRZ until decontaminated.

Support Zone personnel must alert the proper agency in the event of an emergency. All emergency telephone numbers, change for telephones (if necessary), evacuation route maps, hospital route maps, and vehicle keys should be kept in an accessible location within the Support Zone.

Facilities located in the Support Zone should be placed after considering factors such as:

- Accessibility (topography, open space available, location of highways and railroad tracks, ease of access for emergency vehicles)

- Resources (adequate roads, power lines, telephones, shelter, and water)

- Visibility (line-of-sight to activities in the Exclusion Zone)

- Wind direction (upwind of Exclusion Zone, if possible)

- Distance (as far from the Exclusion Zone as practical).

5.2 Site Security

Effective site security prevents the exposure of unauthorized/unprotected people to site hazards, protects against increased risk from vandals or persons illegally abandoning waste on the site, prevents theft, and promotes safe working procedures.

Site security during working hours can consist of the following:

- Maintain security in the Support Zone and at Access Control Points
- Establish an identification system to identify authorized persons and limitations to their approved activities
- Assign responsibility for enforcing authority for entry and exit requirements
- Erect a fence or other physical barrier around the site, if possible
- If the site is not fenced, post signs around and have guards patrol the perimeter. Guards must be fully apprised of the hazards involved and be trained in emergency procedures
- Approve all visitors to the site. Make sure each has a valid purpose for entering the site. Have trained site personnel accompany site visitors at all times and provide them with appropriate PPE.

Site security after hours can consist of the following:

- If possible, assign trained in-house technicians for site surveillance. They should be familiar with the site, the nature of work, the site's hazards, and respiratory protection techniques.
- If necessary, use security guards to patrol the site boundaries. Such personnel may be less expensive than trained technicians, but may require additional training in safety procedures relative to hazardous waste sites;
- Enlist public enforcement agencies, such as the local police department if the site presents a significant risk to local health and safety; and
- Secure equipment

5.3 Site Control Methods

When site hazards and/or work activities may potentially create exposure to site workers and the public, control measures should be implemented. Control measures should be initiated at any time when air monitoring indicates the potential for migration of emissions off-site or outside the immediate work area. The procedures should be designed to control emissions before off-site migration, through implementation of engineering and work practice controls as well as defensive measures. Listed below are examples of control measures.

- Limit the area of open excavation or intrusive activities
- Areas excavated are backfilled or covered with a minimum 6 mil impermeable membrane
- Working face of excavation is a moderate slope in compliance with excavation regulations
- Exposed sides of excavation or intrusive activities where work is not conducted are covered
- Use fine mist to keep down dust as well as VOC's
- Keep haul distance of excavated materials to as short a distance as possible
- Immediately cover excavated material stockpile.

6.0 REFERENCES

1. CFR 29 1910.120

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1.0 PURPOSE

To provide guidance for the implementation of a comprehensive Hazard Communication Program in order to effectively communicate the chemical hazards to be encountered at D&B/WFC office and project locations.

2.0 SCOPE

Applies to all D&B/WFC sites.

3.0 DEFINITIONS

Affected Employees - an employee who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies.

4.0 RESPONSIBILITIES

Employees - Observe label warning and adhere to established safety procedures.

Health and Safety Coordinator (HSC) - The HSC is responsible for the implementation of the Hazard Communication Program and compliance with the OSHA Hazard Communication Standards, 29 CFR 1910.1200 and 29 CFR 1926.

On-Site Health and Safety Representative (HSR) - The HSR is responsible for maintaining and updating site-specific chemical inventory list, assuring labeling is adequate, obtaining and maintaining MSDS, notifying D&B/WFC personnel of the hazards associated with specific assignments, and reviewing areas with D&B/WFC personnel where a potential hazard may be encountered.

5.0 GUIDELINES

5.1 Introduction

These guidelines should be used to communicate chemical hazards to be encountered at D&B/WFC work sites, assure personnel access to information on chemical hazards, and familiarize them with procedures for the safe handling of hazards in the workplace.

5.2 Hazard Determination

Hazard assessment of chemicals used by D&B/WFC are made by the suppliers and manufacturers of these chemicals and communicated to D&B/WFC via Material Safety Data Sheets.

5.3 Chemical Inventory List

A list of potentially hazardous materials will be included with the site-specific HASP or other applicable project documents and shall contain, at a minimum, the following:

- Product names
- Hazardous components
- Manufacturer's identification
- Location used

After the initial determination, the Hazard Communication inventory list will be updated annually. New chemicals shall be added to the list when received.

5.4 Labels

5.4.1 Incoming Products

Products arriving from chemical manufacturers and/or distributors shall be inspected by receiving personnel to assure that:

1. The labels and warnings are appropriate, legible, in English, and prominently displayed on each container.

2. The existing labels have not been removed or defaced.

The HSC or HSR must be notified if a container arrives without a label; the label is illegible; or the label does not identify the chemical, supply the name and address of the manufacturer or list hazard warnings.

This is to be completed before the product is used so that its contents may be assessed and marked appropriately.

5.4.2 Transfer Containers

When a hazardous chemical is transferred from its primary container to a new one, the transfer container must be adequately labeled.

5.5 Material Safety Data Sheets

Copies of material safety data sheets (MSDS) for all chemicals being used on each site shall be accessible to employees working at that site. Each MSDS shall be in English and will contain the following information:

1. Manufacturer's name, addresses and telephone number

2. Name and signature of sheet's preparer

3. The date of preparation or revision of the MSDS

4. Product identification using chemical, common, and trade names (must include the same name on the label)

5. Chemical Abstract Service (CAS) Number

6. Chemical formula

7. Chemical family

8. Hazardous ingredients of products as defined by OSHA according to toxicity, flammability, and reactivity. If the hazardous chemical has not been tested as a whole, the chemical and common name(s) of all ingredients which have been determined to be a health hazard, and which comprise 1% or greater of the composition shall be listed (except the chemicals identified as carcinogens shall be listed if the concentration is 0.1% or greater).

9. Physical data including vapor pressure, flash point, specific gravity, and boiling point.

10. Fire and explosion data including flammable limits in air, autoignition temperature, specific recommendations on the types of fire extinguisher(s) to be used and/or avoided, and special fire fighting procedures.

11. Health hazard information including the primary route(s) of exposure, established exposure limits (listed as the permissible exposure limit (PEL) or the threshold limit value (TLV)), potential adverse health effects of exposure, signs and symptoms of exposure, and medical conditions aggravated by exposure and whether the chemical is listed as a carcinogen by the National Toxicology Program (NTP) or the International Agency for Research on Cancer (IARC) or by OSHA.

12. Precautions for safe handling and use including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean up of spills and leaks.

13. Control measures including engineering controls, work practices and personal protective equipment.

14. Emergency and first aid procedures.

Requests for copies of MSDS by any employee will be honored within 72 hours.

5.6 Training

All D&B/WFC employees, who may be exposed to chemicals, shall be trained regarding the characteristics and safe handling of hazardous chemicals in the workplace at the time of initial assignment, periodically thereafter, prior to assignment of non-routine tasks, and whenever a new hazard is introduced into the workplace environment.

The following information shall be provided in the training course:

1. Requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200)

2. Location and availability of the D&B/WFC Hazard Communication Program

3. Details of the D&B/WFC Hazard Communication Program including:

   a. An explanation of the labeling system and how to read labels

   b. An explanation of the MSDS and how to obtain and use them to find the appropriate hazard information

   c. The location of toxic chemicals to which employees may be exposed

   d. The name(s) of toxic substances present in the work area including generic, chemical, common, and trade names

   e. The physical and chemical properties of toxic substances to which employees may be exposed

   f. Definition of terms (e.g. exposure, TLV, PEL, etc.)

   g. Short and long term health effects of exposure to the hazardous materials

   h. Symptoms of exposure

   i. Methods and observations that may be used to detect the presence or release of a hazardous chemical in the workplace (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance, or odor of hazardous materials when released)

   j. Safe handling of hazardous materials

k. Emergency procedures to follow if exposed to hazardous materials

l. How to lessen or prevent exposure to hazardous chemicals through safe work practices and personal protective equipment (PPE).

5.7 Non-Routine Tasks

In the event that an employee may be required to perform tasks that are not part of normal duties the employee will be given information about hazards involved with such activities. This information shall include:

1. Specific chemical hazards
2. Protective measures the employee can take
3. Measures that D&B/WFC has taken to lessen the hazards including ventilation, respirators, presence of another employee, and emergency procedures.

5.8 Recordkeeping

The following records must be maintained:

1. A record of Hazard Communication Employee Training Program and attendance
2. The chemical inventory list
3. MSDSs locations

5.9 Informing Contractors and Subcontractors

Each contractor and subcontractor will be provided with the following information as part of their initial contract:

1. List of hazardous substances they may encounter while on the job
2. MSDS for each chemical on the list

Each contractor and subcontractor shall be informed of:

1. Hazardous chemicals to which they may be exposed

2. Measures that may be taken to lessen the possibility of exposure

3. First aid/emergency procedures

The contractor and subcontractor will sign a statement confirming that they have reviewed the above information.

Contractors and subcontractors should provide MSDS for any chemicals brought into a D&B/WFC site and should ensure that appropriate labels are on all containers. D&B/WFC employees will be informed of any potential hazards with which they might be expected to come into contact with.

5.10 Informing Visitors

Visitor access shall be restricted. All visitors are required to check in with the appropriate authority. Visitors should be provided with any necessary PPE and the following information:

1. Hazardous chemicals to which he/she may be exposed

2. Measures the visitor may take to lessen the possibility of exposure including the proper use of the PPE

3. D&B/WFC policies and procedures to be followed to reduce the risks

4. First aid/emergency procedures.

6.0 REFERENCES

1. OSHA 29 CFR 1910.1200
2. OSHA 29 CFR 1926.59

APPENDICES

Appendix A –Contractor Sign-Off Form

Project/Name:

Date

I, _____, as an authorized representative of _____ have received a copy of the following information from the D&B/WFC project representative:

1. List of hazardous substances that may be encountered while on the job
2. MSDS sheet for each chemical on the list.

The D&B/WFC project representative has informed me of:

1. Hazardous chemicals to which we may be exposed
2. Measures I may take to lessen the possibility of exposure
3 First aid/emergency procedures.

I will ensure that the other representatives from our company receive this information before beginning work on the project.

If we bring any chemicals onto the D&B/WFC project site, we will ensure MSDS are available on site and that the appropriate labels are on all containers. We will alert any D&B/WFC employees working with us of the potential hazards if there is a chance that they will come into contact with such hazards.

Name

Title

_____

Signature

Table of Contents

1.0 PURPOSE

The objective of these guidelines is to provide general reference information regarding the control and disposal of contaminated materials generated during site investigation activities.

2.0 SCOPE

Applies to all D&B/WFC work sites.

3.0 DEFINITIONS

Contaminated Materials - Contaminated materials are defined as any by-products of field operations that are known or suspected to be contaminated with hazardous substances. These by-products include materials such as decontamination solutions, disposable equipment and clothing, drilling debris, well-development fluids and spill-contaminated materials.

4.0 RESPONSIBILITIES

Health and Safety Coordinator (HSC) is responsible for revising these guidelines to include new OSHA updates. The HSC is also responsible for ensuring that proper training is available to D&B/WFC employees regarding proper disposal procedures and that a Site-Specific HASP incorporates these guidelines.

Health and Safety Representative (HSR) or his/her designee (such as Field Operations Manager) is responsible for the correct implementation of these procedures in the field.

5.0 GUIDELINES

Field investigation activities often result in the production or movement of contaminated material that must be properly managed to protect field personnel, the public and the environment. These guidelines address the proper management of this material.

5.1 General

As a general policy, it is wise to select site investigation methods that minimize the generation of contaminated material. Until sample analysis is complete, it must be assumed that all produced material suspected to be contaminated would always require containment. The Site-Specific HASP for a site investigation activities should include control procedures for contaminated material. It should address the type of contamination, estimated amounts that would be produced, containment equipment and procedures and storage or disposal methods.

5.2 Sources of Contaminated Material and Containment Methods

5.2.1 Decontamination Solutions

All decontamination solutions and rinses must be assumed to contain hazardous chemicals associated with the site, unless there is analytical or other data to the contrary. The solution volumes could vary from a few gallons to several hundred gallons in some cases.

The decontamination solutions are typically generated from:

- Personnel decontamination
- Sampling equipment decontamination
- Large equipment decontamination.

Depending upon site conditions, contamination type and site requirements, the decontamination solutions may be allowed to be drained back into the contaminated portion of the site. In some situations the decontamination solutions must be disposed off site. The Site-Specific HASP must include whether the fluids from personnel and equipment decontamination activities should be contained and disposed of, contained and left on the site for future disposal, or allowed to be drained back into the soil.

The DOT approved drums only should be used for the transportation of decontamination fluids.

5.2.2 Disposable Equipment and Clothing

Disposable equipment that could be contaminated during the site investigation typically includes protective suits, gloves, boots, broken sample containers, paper towels, and spent respirator cartridges. These items can be temporarily stored in plastic bags and transferred to 55-gallon drums (with lids) at the end of the day. These containers shall be secured at the end of each workday.

5.2.3 Drilling Fluids and Well Development Fluids

Drilling, well development and well evacuation fluids are generated during or as a result of groundwater monitoring, well installation and sampling activities. Since these fluids are potentially contaminated they are also required to be contained for eventual treatment or disposal.

The volumes of drilling, well development and well evacuation fluids depend on the well diameter and depth, groundwater characteristics, geologic formations, and drilling methods utilized. There are no simple mathematical formulas available to accurately predict these volumes. It is best to rely on the experience of reputable well drillers familiar with local conditions and the selected well installation techniques.

Drilling fluid (mud) is stored in a container commonly referred to as a mud pit (tub). This mud pit consists of a suction section from which drilling fluid is pumped to the drill pipe and back to the settling section of the mud pit. In the settling section, the well cuttings are allowed to settle. If the mud pit is lined to prevent leaks, it can also be used to contain possibly contaminated drilling fluids. Spent drilling fluids can then be pumped directly from the mud pit to 55-gallon drums for treatment and/or disposal. The sediments that accumulate in the settling section are transferred into drums or other similar containers.

If ground pits are used, they shall not extend into the natural water table. They should be lined with a bentonite-cement mixture followed by a layer of flexible impermeable material such as plastic

sheeting compatible with the wastes. Depending on site conditions and the size of the pit, it may be advantageous to excavate the entire pit for disposal and backfill the excavation with clean fill.

When the above ground tank or the inground pit is used, a reserve tank or pit should be located at the site as a backup system in the event of leaks, spills, and overflows. In addition, surface drainage shall be planned so that any leaks, spills, and overflows can be controlled within the immediate area of the drill site.

The containment procedure for well development fluids is similar to that for drilling fluids. The volume of contaminated fluid will be determined by the method of development. Bailing a new well usually generates less fluid volume than processes using backwashing. When bailing, the removed fluids can be directly placed in drums. For backwashing, a T-section can be fitted on the well casing to direct the overflow to the drums.

5.2.4 Soil Cuttings

Contaminated soil cuttings, generated while performing field investigation activities, typically consist of cuttings from borings, test pit excavations, and discarded soils from sampling activities. These soils should be contained in drums for further treatment or disposal.

5.2.5 Spill-Contaminated Materials

A spill is always possible when a site investigation involves opening and moving containers of liquids. Contaminated sorbents and soils resulting from spills must be containerized for disposal. Small quantities of spill-contaminated materials are typically contained in drums, while larger quantities can be placed in lined pits or other impermeable structures. In some cases onsite containment may not be feasible, in which case, the immediate transport to an approved disposal site will be required.

5.3 Disposal of Contaminated Materials

Actual disposal techniques for contaminated material are the same as those for any hazardous substance: incineration, landfill, treatment, etc. All involved parties must agree on determining who is responsible for disposal before the fieldwork starts. Without any previous agreement, the contractor must provide for the disposal of wastes resulting from field activities. Therefore, the contractor is responsible for subcontracting with reputable waste transporters and for assuring compliance with RCRA requirements whenever it is necessary to containerize and remove

hazardous wastes. To expedite the disposal process the following should be completed prior to field activities:

1. Identify authorized, permitted facilities for proper treatment, storage, and/or disposal of wastes

2. Obtain generator identification numbers

3. Prepare the required manifests.

Another consideration in selecting disposal methods for contaminated materials is whether the disposal can be incorporated into subsequent site cleanup activities. In this case, the contaminated material generated during the investigation activities can be stored at the site for future disposal with other contaminated site materials. If the contaminated material will be stored onsite, then containment suitable for long-term storage must be provided. Site conditions, such as surface drainage, security and soil type as well as meteorological conditions must be considered to design proper storage.

ATTACHMENT B

FIELD SIGN-OFF FORM

FIELD SIGN-OFF FORM

Each field team member shall sign this section after the site-specific training has been completed and before being permitted to work on site.

I have read and understand this Site-Specific Health and Safety Plan. I will comply with all of its provisions.

Project: **Glenmere Lake Property Site Investigation**

Name (Print)	Signature	Date