DRAFT

REMEDIAL INVESTIGATION
FIELD SAMPLING PLAN
FORMER SCHENECTADY ARMY DEPOT-VOORHEESVILLE AREA
GUILDERLAND, NEW YORK

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
Huntsville Center

Contract No. DACA87 - 95 - D - 0018

Delivery Order No. 0051

PREPARED BY:

PARSONS ENGINEERING SCIENCE, INC.

PARSONS

OCTOBER 1999

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LIST OF ACRONYMS

ACEMC	-	Albany County Environmental Management Council
AMSL	-	above mean sea level
AOCs	-	areas of concern
ASP	-	Analytical Services Protocol
C&D	-	construction and demolition
CERCLA	-	Comprehensive Environmental Restoration, Compensation, and Liability Act
Cfs	-	cubic feet per second
CSM	-	conceptual site model
DERP-FUDS	-	Defense Environmental Restoration Program for Formerly Used Defense Sites
DLA	-	Defense Logistics Agency
DNSC	-	Defense National Stockpile Center
DLA/DNSC	-	Defense Logistics Agency/Defense National Stockpile Center
DOA	-	Department of the Army
DoD	-	Department of Defense
DOH	-	Department of Health
EM	-	electromagnetic
EP	-	extraction procedure
ESS	-	Engineer Supply Section
FS	-	Feasibility Study
Gpm	-	gallons per minute
HASP	-	Health and Safety Plan
IFP	-	interface probe
LRI/FS	-	Limited Remedial Investigation/Feasibility Study
MCL	-	maximum contaminant level
MPI	-	Malcolm Pirnie, Inc.
MS/MSD	-	matrix spike duplicate samples
MSDS	-	Material Data Safety Sheets
NEIP	-	Northeastern Industrial Park
NOAA	-	National Oceanic and Atmospheric Administration
NRC	-	Nuclear Regulatory Commission

NYCRR	-	New York Central Railroad
NYSDEC	-	New York State Department of Environmental Conservation
OSA	-	open storage area
PA	-	Peliminary Assessment
PAHs	-	polycyclic aromatic hydrocarbons
PCBs	-	polychlorinated biphenyls
Ppm	-	part per million
QA/QC	-	quality assurance/ quality control
QMS	-	Quartermaster Supply Section
RI	-	Remedial investigation
SADVA	-	Schenectady Army Depot – Voorheesville Area
SARA	-	Superfund Amendments and Reauthorization Act
	-	
STARS	-	Spill Technology And Remediation Series
SVOC	-	semivolatile organic compounds
TAGM	-	Technical and Administrative Guidance Memorandum
TCE	-	trichloroethene
TOC	-	total organic carbon
TOGS	-	Technical & Operational Guidance Series
TPHs	-	total petroleum hydrocarbons
TRPHs	-	total recoverable petroleum hydrocarbons
URA	-	Urban Renewal Agency
URS	-	URS Consultatns, Inc.
USACE	-	U.S. Army Corps of Engineers
USEPA	-	United States Environmental Protection Agency
USTs	-	underground storage tanks
VOCs	-	volatile organic compounds
WWTP	-	wastewater treatment plant

SECTION 1

INTRODUCTION

1.1 PURPOSE

1.1.1 The purpose of this remedial investigation (RI) is to adequately characterize the nature and extent of contamination at the areas of concern (AOCs) which have been identified at the former Schenectady Army Depot – Voorheesville Area (SADVA) in the Town of Guilderland, New York (Figure 1). The AOCs proposed for investigation include AOC 1-U.S. Army Southern Landfill, AOC 2-Bivouac Area, AOC 3-Burn Pit Area, AOC 6-Wastewater Treatment Plant Area, AOC 7-Triangular Disposal Area, AOC 8-Black Creek, and AOC 9-Building 60 Area (Figure 2). The AOC proposed for no further action is AOC 4-Construction and Demolition Landfill. In addition, the Voorheesville Depot (designated AOC 5 for the purposes of this work plan) will be included in this RI; however, it is covered under a separate funding program and contract task order.

1.1.2 After the AOCs are characterized during the RI, the U.S. Army Corps of Engineers (USACE) and the New York State Department of Environmental Conservation (NYSDEC) will work together to identify the primary human health and environmental concerns. USACE will then conduct a Feasibility Study (FS) to evaluate various site clean-up options. USACE and NYSDEC will then decide on an appropriate site clean-up remedy, if necessary. Once the clean-up remedy is established, USACE will prepare a remedial design for the clean-up action, and complete the clean-up.

1.1.3 This investigation comes under the authority of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) program. Authority for the DERP-FUDS program is derived from the following laws: the Comprehensive Environmental Restoration, Compensation, and Liability Act of 1980 (CERCLA); PL 96-510 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986; PL 99-499 (codified as 42 U.S.C. 9601-9675); and Environmental Restoration Program, 10 U.S.C.2701-2707. The Northeastern Industrial Park DERP-FUDS site number (the current name of the former SADVA site) is C02NY0002.

1.1.4 Under the DERP-FUDS program, only those conditions attributable to the former Department of Defense (DoD) activities can be investigated. Conditions which have been caused by post-DoD use of the site cannot be investigated or remediated under the DERP-FUDS program. SADVA was closed in 1969 and the property was subsequently sold. Since that time, the property has been used as an industrial park, and is now known as the Northeastern Industrial Park (NEIP). In planning this RI, the focus has been on identifying land use over time to differentiate site conditions caused by DoD-related activities from conditions caused by post-DoD activities. Only those site conditions which are attributable to DoD activities will be investigated during this RI.

Figure 1 Site Vicinity Map

Figure 2 Site Plan

1.1.5 The investigation of AOC 5-Voorheesville Depot is under the authority of a separate contract with the USACE and is being conducted for the Defense Logistics Agency, who operates the Depot. AOC 5 is an active supply depot used to store strategic natural resources critical to national defense. AOC 5 is not part of the DERP-FUDS program because it is an active facility; it is the only portion of the former SADVA that is presently owned and operated by the Federal government.

1.2 RI FIELD SAMPLING PLAN ORGANIZATION

This introductory section includes subsections on site history and site setting. Section 2 provides details of the history, RI project objectives, and RI sampling strategy for each AOC. Most of the text in Sections 1 and 2 has been taken from a draft work plan for SADVA prepared by the USACE (USACE, 1999). Section 3 presents the list of references cited in this document. Appendix A presents the Global Field Sampling Plan, which contains detailed quality assurance/ quality control (QA/QC) and field data collection procedures and requirements. That document is considered a "global" document because it provides site investigation methods and procedures for site investigations being conducted by Parsons ES at 13 other depots across the country for the USACE. As such, the plan contains methods and procedures for all investigations at all the depots, and not only for the RI at the SADVA. Therefore, the global plan contains some methods and procedures that will not be applicable to the SADVA RI. Appendix B presents the Health and Safety Plan (HASP) under which the RI will be conducted. Similarly, the General Health and Safety Plan covers all investigations at all depots. A site-specific HASP is provided at the beginning of Appendix B with information specific to the RI at the SADVA. Appendix C provides equipment requirements and procedures for the aquifer testing which is part of the RI scope of work.

1.3 SITE LOCATION

SADVA is located south of NYS Route 146 and east of County Route 201, approximately one-quarter mile southeast of the Village of Guilderland Center, New York. The site is approximately 3 miles north of Voorheesville and 3 miles west of Guilderland (see Figure 1).

1.4 SITE HISTORY

1.4.1 The DoD held ownership of the approximately 650-acre SADVA property from 1941 until 1969. The site was originally constructed as a regulating station and a holding and reconsignment point in 1941, and later it became a general Army depot. The principal mission of the installation was the receipt, storage, maintenance, and distribution of supply items for the Department of the Army (DOA).

1.4.2 Initial construction consisted of six large warehouses totaling 1,000,000 square feet and 18 open storage areas totaling 3,363,000 square feet. SADVA had its own water supply, sewage treatment, steam heating (using coal and later oil as fuel), storm water, and electrical systems. There was also a fire department, infirmary, security force, kennels for dogs, and stables for horses. SADVA had more than 30 miles of government-owned railroad tracks connecting to New York Central Railroad (NYCRR) tracks, and more than 12 miles of paved roads.

1.4.3 In 1943, SADVA employed more than 1,000 people, and organizational units present included: Post Engineer, Motor Transport, Operations Division, Personnel Division, Military Intelligence, Ordnance Supply Division, Transportation Division, Quartermaster Supply Section (QMS), Depot Division, and Engineer Supply Section (ESS). During World War II (WWII) the workforce at SADVA grew to more than 1,500 civilian employees and 100 military personnel.

1.4.4 In 1946, the ESS handled approximately 3,558 tons of material per week including items from nails to bulldozers. Between 1946 and 1952, activities at SADVA included additional construction (five warehouses, two sheds, and two inflammable storage buildings), the disposal of surplus buildings, surplus property sales, and the processing and storage of materials returned from overseas.

1.4.5 The main operation occurring at SADVA throughout its period of DoD use was the storage and distribution of materials. Ancillary operations included maintenance of materials stored and used at SADVA, surplus and salvage operations, fire fighting, and security.

1.4.6 Some materials stored in the warehouses and open storage areas (OSAs) included: tanks, cranes, pallets, chain ladders, hand trucks, cargo nets, acetylene gas, railroad car parts, scrap metal, small arms and ammunition, canned foods, mobile antiaircraft units, marine supplies, wire and cable, rope, furniture, bathroom fixtures, brooms/brushes, wood products, acids/chemicals, and paints. SADVA was also used for the storage of strategic and critical materials (aluminum, copper, ferrochrome, lead, zinc, etc.). Materials and equipment were preserved in the C&P facility where they were cleaned, painted, and wrapped or in some other way protected against the weather (i.e., chemically coated).

1.4.7 In April 1948, a 15.5-acre portion of SADVA used as a gravel pit was sold to a private owner. In 1963, approximately 40 acres were sold to a private party for use as a residence. This parcel has been designated AOC 2 (Figure 2). In 1969 SADVA was closed, and 35.5 acres were transferred to the U.S. General Services Administration; this parcel (referred to as the Offsite Storage Area) is the active Defense Logistics Agency/Defense National Stockpile Center (DLA/DNSC) Voorheesville Depot (AOC 5) located adjacent to the southwest portion of the former SADVA (Figure 2). The rest of the SADVA property was sold to the Town of Guilderland Urban Renewal Agency (URA). URA, in turn, leased the property to the Galesi Group, Inc., which established the North-east Industrial Park, or NEIP. NEIP has been operated as an industrial park since 1969; various open spaces and buildings are leased out to tenants. The majority of the tenants (approximately 95 percent) have used the leased space for storage of goods. About 5 percent of the tenants have performed manufacturing operations in their leased space. There have also been several mainten-ance/repair shops at NEIP. Galesi Group has constructed several structures at the former SADVA since 1969. Galesi took ownership of the NEIP property in 1993. A comprehensive account of property ownership is documented in the Revised Draft Archival Search Report (EAEST, 1999).

1.5 SITE GEOLOGY AND HYDROLOGY

1.5.1 The project site overlies bedrock belonging to the upper Middle Ordovician Schenectady Formation. The Schenectady Formation consists of black and gray argillaceous (clayey) shales interbedded with greywackes (clayey sandstone) and sandstones of variable texture. During Middle Ordovician time, Albany County was covered by a deep sea in which a great mass of alternating sands and muds was deposited. As a result of the crustal deformation during the Taconic and Appalachian orogenies, the rocks in Albany County have been faulted and folded in varying degrees. The folding gradually dies out toward the west and disappears near a thrust fault (low angle reverse fault) which marks the boundary between the Snake Hill and Schenectady Formations.

1.5.2 During the Mesozoic and Cenozoic eras, Albany County was subjected to a long period of erosion, which lasted until the advance of the Pleistocene ice sheet. One of the larger tongues of this ice sheet moved down the Champlain-Hudson trough, depositing a great mass of debris which now covers most of Albany County. After the Pleistocene ice sheet stagnated and melted away, the present drainage pattern was established and the modern streams assumed the work of erosion and alluvial deposition that is continuing today (Arnow, 1949).

1.5.3 Previous subsurface investigations of SADVA encountered bedrock as shallow as seven feet in the southwest portion of the site and 14 feet immediately west of the industrial park. Borings drilled in the western portion of the site encountered gray shale at 20 feet. Test borings from previous studies indicate that the overburden consists of a complex sequence of glacial deposits, which were laid down during the last Wisconsin glacial episode. Borings drilled in 1988 generally showed glacial till in the south end of the site with intermittent sand and gravel lenses in the northeast portion of the site (EAEST, 1999).

1.5.4 During this RI, the local geology and various AOCs will be characterized, as will the impacts on soil quality which have resulted from past DoD activities.

1.5.5 The Technical and Administrative Guidance Memorandum (TAGM) “Determination of Soil Cleanup Objectives and Cleanup Levels” (HWR-94-4046), published January 24, 1994 by NYSDEC’s Division of Hazardous Waste Remediation, will be used for characterizing surface and subsurface soil contamination. As noted in the TAGM, background soil samples will also be analyzed for total organic carbon (TOC), which is used as a basis for determining site-specific cleanup objectives.

1.5.6 The rocks of the Schenectady Formation are dense and relatively impermeable. The bedrock may yield small amounts of water from fractures and bedding planes. Reportedly, in this part of Albany County, low-yield and dry wells characterize the bedrock aquifer. The direction of groundwater flow in the bedrock aquifer is determined locally by fracture position and size, density of joints and bedding planes, and by the interconnection with the overburden aquifer. In some locations, the presence of a dense layer of glacial till between the overburden and bedrock aquifers may hydraulically isolate the lower bedrock aquifer from the shallow overburden aquifer.

1.5.7 The groundwater flow directions at the SADVA site range from northerly to easterly, depending on the location on-site and seasonal variations (Malcolm Pirnie, 1997). The occurrence and depth to groundwater in the overburden zone varied from 3 to 20 feet, depending on the location on-site.

1.5.8 During the RI, groundwater quality at several AOCs will be characterized to assess the nature and extent of impacts caused by past DoD activities.

1.5.9 The New York State Division of Water Technical and Operational Guidance Series (1.1.1, or TOGS 1.1.1) indicates that only one classification for groundwater exists for groundwaters within the state of New York, and that is Class GA. Class GA indicates that all groundwater shall be considered as drinking water. As such, analytical results from groundwater samples will be compared to background concentrations and Class GA groundwater criteria.

1.5.10 Bottled water is used as a source of drinking water at the Depot. A water well located on-site is used to supply non-potable water to the sink and toilet. Drinking water within a four-mile radius of the Depot is obtained from surface water reservoirs and groundwater aquifers (private wells and municipal wells). The Guilderland Water District, the Village of Voorheesville, and the Village of Altamont obtain part or all of their municipal water from wells located within 2 to 4 miles of the Depot. Municipal surface water supply intakes for the Guilderland Water District and City of Watervliet are located in the Watervliet Reservoir, located approximately 8 miles downstream of the Depot. Residents in the remaining areas surrounding the site use private wells to obtain drinking water.

1.6 TOPOGRAPHY AND DRAINAGE

1.6.1 SADVA is situated in an area of generally low relief at an elevation of approximately 320 feet above mean sea level (AMSL). SADVA lies within the Normans Kill drainage basin, an area 168 square miles in size (USGS, 1992). The dominant surface water features in the vicinity are Bozen Kill, the Watervliet Reservoir, Normans Kill, and Black Creek.

1.6.2 Black Creek is the primary drainage feature in the vicinity of SADVA. Black Creek drains a large part of the site vicinity, and passes through the site. Surface water drainage over the mostly impervious surface area of SADVA is diverted into Black Creek, which originates approximately 3 miles southwest of the site in the Black Creek Marsh Wetlands. From there, Black Creek flows north and passes into the south end of SADVA. It branches into a man-made tributary channel at the south, and the two branches flow along the east and west sides of the site before rejoining the main channel at the north end of the site. Black Creek then meanders toward the northwest before discharging into the Bozen Kill approximately 2 miles from the site. The Bozen Kill empties into the Watervliet Reservoir which in turn, drains into the Normans Kill. The Normans Kill flows southeast approximately 5 miles before it empties to the Hudson River.

1.6.3 The New York State Bureau of Watershed Management has classified this section of Black Creek as a Class C stream, suitable for recreation and human consumption of fish. The NYSDEC Division of Fish, Wildlife and Marine Resources, suggests that this section of Black

Creek be reclassified as a Class A waterway (suitable as a drinking water source) due to its tributary status to the Watervliet Reservoir. The Reservoir is about 3 miles downstream of SADVA and serves as a source of drinking water for the City of Watervliet and the Town of Guilderland. Most residences in the site vicinity are served by municipal drinking water, however, many homes along County Route 201 have residential wells, some of which are used as a drinking water source.

1.6.4 Surface water quality in Black Creek will be characterized by collecting samples upstream and downstream of certain AOCs at SADVA. Results for surface water samples collected from Black Creek will be compared to both Class A and Class C standards.

1.6.5 Sediment quality in Black Creek will also be characterized during the RI. The "Technical Guidance for Screening Contaminated Sediments" published November 22, 1993 and updated January 25, 1999 by NYSDEC's Division of Fish, Wildlife and Marine Resources will be used for characterizing sediment contamination.

1.7 DEMOGRAPHY AND LAND USE

According to the 1990 census, the Town of Guilderland has a population of 30,000. In 1980, the population in the Town of Guilderland was 26,515 (USACE, 1999). SADVA is currently zoned industrial, while most properties adjacent to the site are zoned agricultural. According to the 1983 census of agriculture, about 27.2 percent of the area in Albany County was farmed (USACE, 1999). There are also residences occupying the various agricultural parcels. Other properties zoned as single-family residences are located near the site. Park Guilderland Apartments, an apartment complex which is zoned multi-residential, is located north of the SADVA. A small shopping center which is zoned large business is located adjacent to the Park Guilderland Apartments. Tawasentha Park, which is zoned open space, is situated northeast of the SADVA along Altamont Road.

1.8 CLIMATE

Information on the climate of the Albany area was obtained from a 1995 National Oceanic and Atmospheric Administration (NOAA) report (USACE, 1999). The climatological data was compiled at the Albany County Airport weather station located approximately 9 miles east-northeast of the SADVA; this is the nearest complete reporting weather station to the site. Climatological data is available for this location for the period 1961 to 1995. Monthly mean values for precipitation and temperature, along with the yearly average, are presented in Table 1. The prevailing wind is reportedly from the south; average wind speed is highest in the spring, at approximately 10 miles per hour.

Table 1 Monthly Mean Climatological Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	*Avg*
Precipitation (inches)	2.36	2.27	2.93	2.99	3.41	3.62	3.18	3.47	2.95	2.83	3.23	2.93	*36.17*
Temp (◦ F)	20.6	23.5	34.3	46.4	57.6	66.9	71.8	69.6	61.3	50.2	39.7	26.5	*47.3*

SECTION 2

AOC DESCRIPTIONS AND SAMPLING OBJECTIVES

2.1 INTRODUCTION

2.1.1 This section presents the RI sampling objectives, organized by AOC. Each AOC subsection is divided into five elements. The first element is the historical background specific to that AOC. This information is taken from the Revised Draft Archival Search Report (EAEST, 1999), and provides the sequence of past DoD activities. The second element is characterization data from previous sampling and investigations. These two elements are used to establish the third element, the conceptual site model (CSM). The CSM is the source-pathway-receptor model for that specific AOC. From this information, specific RI objectives for the sampling strategy have been developed. Finally, a suggested site close-out strategy is offered for the reader's consideration. This strategy provides an endpoint on which the sampling strategy is focused.

2.1.2 This section includes discussions of the following AOCs:

- AOC 1 - U.S. Army Southern Landfill
- AOC 2 - Former Bivouac Area/Post Commander's Landfill
- AOC 3 - Former Burn Pit Area
- AOC 4 - Construction & Demolition Landfill
- AOC 5 - DLA/DNSC Voorheesville Depot
- AOC 6 – Wastewater Treatment Plant Area
- AOC 7 - Triangular Disposal Area
- AOC 8 - Black Creek
- AOC 9 – Building 60 Area

2.2 AOC 1-U.S. ARMY SOUTHERN LANDFILL

2.2.1 The U.S. Army Southern Landfill, located in the southeast portion of the NEIP, has been designated AOC 1. The U.S. Army Southern Landfill has a NYSDEC Class 2 ranking, indicating that the site is a significant threat to public health and environmental action is required.

2.2.2 A report by the Albany County Environmental Management Council (1980) prompted environmental concern at the NEIP. This report revealed excavation and disposal activities in the southeastern areas of the NEIP. These activities occurred during the time SADVA was in operation by DoD. However, according to a report by the U.S. Army Toxic and Materials Agency, no documentation was found that would indicate disposal of wastes by landfill or burial at the former depot. There is no information regarding past disposal practices at the U.S. Army Southern Landfill. The 1980 Albany County report eventually led to several investigations covering the entire industrial park, including the Southern Landfill.

2.2.1 Background

The following text describing historical activities is taken directly from the Revised Draft Archival Search Report (EAEST, 1999) and the draft work plan prepared by USACE (USACE, 1999). It is intended to provide the reader with a better understanding of the rationale for the proposed sampling strategy at the U.S. Army Southern Landfill.

2.2.1.1 1941-1945 (WWII Time Period)

2.2.1.1.1 The Albany County Environmental Management Council (ACEMC) prepared a report, "Northeast Industrial Park (Voorheesville Depot) and Vicinity, Closed Landfill Study," dated June 25, 1980 (ACEMC, 1980), that included an aerial photograph analysis. In that report, Albany County discussed observations of an approximately 15-acre dump that was referred to as the U.S. Army Southern Landfill, located in the southern part of SADVA (Figure 2). Next to the dumpsite was a 3-acre pond, which was located at the southwest edge of the dumpsite. The County also noted a (possible) 1.5-acre storage container and/or debris area at the northwest edge of this site.

2.2.1.1.2 Based on a review of 1942 and 1943 aerial photography, it was noted that the area located in the extreme southeastern portion of SADVA was highly disturbed. The area was traversed by a rail extension and contained several linear features which appeared to be access roads and cleared areas. Several structures and containers and/or debris were scattered throughout this area. Two disturbed areas were visible in the 1942 and 1943 aerial photographs. The first area was a few acres in size and was a possible borrow area/dump site/disposal area. The second area was approximately 5 to 7 acres in size and contained possible mounds of debris, which were most apparent in the southeast corner. Several ponds were located in the northern section of this area.

2.2.1.2 1946-1952 (Post-WWII through Korean Conflict)

2.2.1.2.1 Albany County noted that based on a review of the 1952 aerial photograph, an active 2-acre area existed alongside a road that runs parallel to the 15-acre dump. In addition, the area at the southeastern edge of the site (which was also noted in the 1942/1943 photographs) remained active but was reduced to slightly more than 3 acres. The County noted that the pond located in this area increased to 4 acres, and that debris was located in three areas just to the west of the former dumpsite (the approximate sizes of these debris areas were described as 1.5, 0.25, and 0.25 acres).

2.2.1.2.2 Based on a review of 1952 aerial photography, it was apparent that the area east of the large linear pond in the southeastern portion of SADVA appeared to be inactive with scattered vegetation. This area was identified in 1942 aerial photography as possibly containing debris piles. A roughly elliptical-shaped area, approximately 1 to 2 acres in size, was located north of the pond and appeared to contain mounds of debris.

2.2.1.2.3 Two borrow pits are shown in this area on a drawing entitled "Voorheesville, NY Regulating Station–Plot Plan," last revised 30 December 1952, created by the Construction Division Office of the Quartermaster General.

2.2.1.3 1953-1968 (Post-Korean Conflict through Deactivation)

2.2.1.3.1 Albany County reported that, based on a review of aerial photographs from 1963 and 1968, the following was observed:

- 1963–The former dumpsite that ran parallel to the road had been backfilled. Active dumping continued at the southeast edge of this site. The pond had been reduced in size. The remaining dumpsite remained inactive, but debris continued to appear in areas west of this site. A building was constructed at the northwest edge of the dump area.
- 1968–Dumping had ceased throughout this area and backfilling was occurring. One small ponded area had disappeared.

2.2.1.3.2 According to an aerial photograph interpretation conducted as part of the Archival Search, this area appeared active in 1960. The elongated pond visible in previous years had been partially filled in, particularly along its southwestern boundary. Debris piles were observed along the edges of the pond. Two additional disturbed areas were visible on the western side of the base access road. A circular depression (with possible liquid) approximately 75 feet in diameter was clearly visible. A cleared area containing structures and stored items was located north of the depression. Ground scarring was observed immediately west of the Post Engineer Shop and flammable storage warehouse. In 1969, the area retained a faintly scarred appearance. The water in the large pond on the western boundary was slightly reduced, indicating some encroachment, possibly by filling during the 1960-1969 period. Three small circular areas are also noted along the western edge of the pond.

2.2.1.4 Post-DoD Use of Former SADVA

2.2.1.4.1 Albany County noted that based on a review of the 1974 and 1977 aerial photographs, the site appeared to be inactive.

2.2.1.4.2 According to an interpretation of 1973, 1978, 1982, 1986, and 1995 aerial photography conducted as a part of the Archive Search, the following was noted:

- 1973, 1978–The U.S. Army Southern Landfill was inactive and a portion of the area had been backfilled. Ponds in the area were visible, although reduced in size.
- 1982–The primary features of the landfill area included a large pond at the southern end of the area and three smaller ponds in the northeastern portion of the area. Buildings 25 and 26 appeared active with numerous vehicles parked adjacent to the structures. The former landfill appeared inactive.

- 1986–The area appeared inactive.
- 1995–The pond located in the southern portion of the area was smaller with island-like features. The remaining area was unchanged.

2.2.2 Characterization From Previous Investigations

2.2.2.1 Previous investigations at the U.S. Army Southern Landfill consisted of a preliminary contamination evaluation by Metcalf and Eddy, Inc. in 1998. The evaluation concluded that contamination existed in groundwater and recommended further investigation to determine the extent of groundwater contamination. In 1990, ERM-Northeast conducted additional investigations for the Galesi Group. They identified in test pits buried drums, construction and demolition debris, ash, metal debris, chemical solvent odors, floating product, and oil-saturated sand above the water table. ERM-Northeast recommended quantification of the buried wastes. In 1991, OHM Remediation Services Company conducted a Phase II investigation for the U.S. Army Corps of Engineers. Contaminants detected in soils included acetone, chlorobenzene, trichloroethene and its derivatives, toluene, xylenes, and polycyclic aromatic hydrocarbons (PAHs). Detected contaminants in groundwater included acetone, trichloroethene, and its derivatives, ethylbenzene, xylenes, and a few metals. OHM recommended a second round of groundwater sampling and additional characterization of the bedrock aquifer.

2.2.2.2 The USACE developed a Scope of Work dated April 27, 1995 for a Limited Remedial Investigation/Feasibility Study (LRI/FS) to be performed at the former SADVA under USACE Contract No. DACA31-94-D-0017 by Malcolm Pirnie, Inc. (MPI). MPI subcontracted URS Consultatns, Inc. (URS) to conduct the field investigation to assess the migration pathways, and to evaluate alternative remedial actions as per the Statement of Work. Figure 3 presents the LRI sampling locations; Figure 4 presents previous sampling results for AOC 1.

2.2.2.3 The 1997 LRI activities conducted at AOC 1 included:

- Excavation of 18 test trenches to evaluate the areal extent of fill material at the U.S. Army Southern Landfill (Figure 3; Malcolm Pirnie, 1997).
- Collection of six surface soil samples; samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals (arsenic, chromium, silver, lead, and hexavalent chromium), and total recoverable petroleum hydrocarbons (TRPHs).
- Installation of five overburden monitoring wells to evaluate the overburden aquifer.
- Collection of groundwater samples from each of the five newly installed monitoring wells, and eight existing monitoring wells. Samples were analyzed for VOCs, metals (including arsenic, barium, chromium, lead, and hexavalent chromium), and TRPH.
- Collection of two surface water samples.

Figure 3 AOC 1 Southern Disposal Landfill 1997 Limited Remedial Investigation Sampling Locations

Figure 4 AOC 1 Southern Disposal Landfill Previous Sampling Results

2.2.2.4 The 1997 LRI report concluded the following for surface soil:

- The extent of PAH, arsenic, chromium, and silver contamination in surface soils is localized.
- Soil sample SS-04, which was collected in the southern portion of the landfill, reported the greatest number of PAHs and metals at the highest concentrations.
- Horizontal migration of the PAH and metal contaminants via erosive processes is not likely due to the vegetative cover over the majority of the landfill surface.
- Vertical migration of these contaminants is not a concern, because contamination potentially leaching from the surface fill would not be expected to migrate below the fill/glacial till interface due to the dense and relatively impermeable nature of the glacial till.

2.2.2.5 The LRI report stated the following regarding subsurface soil samples:

- The results of the analyses reported the presence of VOCs, including chlorinated hydrocarbons and fuel-related compounds, PAHs, pesticides, and metals.
- Chlorinated hydrocarbons and fuel-related analytes were present in samples only from the southern portion of the landfill, just south of the pond.
- The concentrations of PAHs were higher and more widespread across the site compared to VOCs.
- The highest concentrations of PAHs were observed in samples collected from the southern portion of the landfill, just south of the pond.
- Pesticides were limited to samples from the southern portion of the landfill.
- Reported concentrations of total petroleum hydrocarbons (TPHs) were highest in samples collected from borings advanced in the southern portion of the landfill.

2.2.2.6 The LRI report stated the following for groundwater:

- The horizontal extent of groundwater contamination was limited to an area of approximately 2 acres within the southern portion of the landfill (i.e., near AMW-1 and ACE-2).
- The contamination consisted chiefly of chlorinated hydrocarbons (i.e., trichloroethene (TCE) and its derivatives) and to a lesser degree benzene, acetone, arsenic, and lead.
- The LRI results support the findings of the previous investigations with regard to contaminants detected and their extent.
- The contamination is restricted to the shallow perched water table, which discharges to adjacent surface water bodies around the site.

- The source of acetone reported in bedrock monitoring well sample AMW-11 is attributed to either laboratory contamination or localized shallow water-table contamination which migrated into this well through its compromised bedrock seal.
- Since ACE-2 contained high VOC concentrations and the adjacent bedrock well AMW-2 did not contain any contamination, the bedrock aquifer has not been impacted.

2.2.2.7 The LRI report stated the following for surface water:

- The historical surface water analytical data indicates virtually no impact to surface water from the landfill.
- The VOCs detected previously in the pond onsite were not detected during the LRI sampling.
- The VOCs detected in the shallow water table samples apparently are either degrading or volatilizing to undetectable levels in the adjacent surface water bodies.

2.2.2.8 Three sediment samples were collected in the vicinity of the U.S. Army Southern Landfill as part of a 1990 investigation conducted by ERM–Northeast. These samples were analyzed for TPH, extraction procedure (EP) toxicity metals, pesticides, and polychlorinated biphenyls (PCBs). The 1990 ERM-Northeast report stated that the reported concentrations of metals exceeding NYSDEC criteria for sediments included arsenic, copper, and nickel.

2.2.3 Conceptual Site Model

The Southern Landfill reportedly contains construction and demolition debris, industrial and domestic wastes, and wastes from the former burning pit area. The landfill boundaries have previously been determined, and impacts by VOCs, PAHs and metals in surface soil, subsurface soil and groundwater have been documented, particularly in the southern section. The potential migration pathway may be groundwater discharging to, and impacting, surface water and sediment in or near Black Creek. Black Creek flows to Watervliet Reservoir, which is the local drinking water supply. Direct contact with the surface soils, surface water, and sediment is the most likely exposure pathway. USACE believes the surface soil, subsurface soil and groundwater in the vicinity of AOC 1 have been adequately characterized. Additional data are needed to assess impacts to the surface water and sediments in areas surrounding the landfill.

2.2.4 RI Project Objectives

The objectives of the present RI are as follows:

- Characterize the surface water and sediment in the pond and wetlands adjacent the Southern Landfill; contaminants of potential concern are VOCs, SVOCs, and metals.
- Survey for any drainage structures along the railroad tracks (not in Conrail easement) as potential migration pathways adjacent to the Southern Landfill. The adjacent railroad bed is a stable berm with no drainage pathways. Any drainageways found should be documented for future sampling.

- Abandon and replace monitoring well AMW-11. Obtain a groundwater sample to evaluate whether the leaking bedrock seal from AMW-11 has introduced contamination from the overburden into the bedrock aquifer.
- Investigate the shallow hydrogeology in the vicinity at AOC 1 to assess whether there is hydraulic communication between the shallow water-bearing zone and the deeper bedrock aquifer.

2.2.5 Proposed RI Sampling Strategy

2.2.5.1 Four sediment samples (SD04 through SD07) and four surface water samples (SW04 through SW07) are proposed in the pond adjacent to the Southern Landfill, the adjacent wetlands, and the "standing surface water" between the Southern Landfill and the Construction and Demolition Landfill, to fully characterize potential impacts due to the Southern Landfill. One soil and groundwater sample are proposed from the newly installed monitoring well (AMW-11R). Samples will be analyzed for VOCs, SVOCs and metals (Tables 2 and 3). Sample locations are shown on Figure 5.

Table 2 AOC 1 Sampling Strategy

Sample ID	Rationale	Northing	Easting
SW04/SD04	Characterize pond and standing water/sediment near landfill	641237	1400755
SW05/SD05	Characterize pond and standing water/sediment near landfill	641140	1400789
SW06/SD06	Characterize pond and standing water/sediment near landfill	640993	1401164
SW07/SD07	Characterize pond and standing water/sediment near landfill	640822	1400931
GW11R	Abandon and replace AMW-11 and assess source of acetone	641028	1400768

2.2.5.2 Well AMW-11 will be abandoned in place by flushing the casing, filling with grout, and removing the top five feet of casing. The replacement well will be installed as follows: drill through overburden to 4 to 5 feet into bedrock (top of rock at 70 feet) and grout in a 6-inch steel casing. Drill bedrock to 85 feet and place 4-inch PVC casing with screen at 85 feet (screen zone from 85 to 75 feet), and construct standard well with bentonite seal 4 feet above and below the bedrock interface. Develop and sample well.

2.2.5.3 Based on observations during the LRI, it was stated that a confining layer was believed to exist below the landfill, effectively confining the bedrock aquifer from potential impacts associated with the landfill. Shallow groundwater is apparently discharged from the fill mass to the surrounding ponds and drainage swales, which are generally stagnant, but ultimately discharge to the Black Creek.

TABLE 3

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	Matrix	Analyses and Method							
		Sample Depth (ft)	TCL VOCs	TCL SVOCs	TCL Pesticides	TCL PCBs	TOC	TAL Metals	Dioxin
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
AOC 1									
SW04	Surface Water	-	1	1				1	
SW05	Surface Water	-	1	1				1	
SW06	Surface Water	-	1	1				1	
SW07	Surface Water	-	1	1				1	
SW08(Dup)	Surface Water	-	1	1				1	
SD04	Sediment	0-0.5	1	1				1	
SD05	Sediment	0-0.5	1	1				1	
SD06	Sediment	0-0.5	1	1				1	
SD07	Sediment	0-0.5	1	1				1	
SD08 (Dup)	Sediment	0-0.5	1	1				1	
GW11R	Groundwater	75-85	1	1				1	
AOC 2									
GW01	Groundwater	-	1	1	1	1		1	
HP01	Soil	0.2, 5, 10	3	3				3	1
HP01	Groundwater	Water Table	1	1				1	
HP02	Soil	0.2, 5, 10	3	3				3	1

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	Matrix	Analyses and Method							
		Sample Depth (ft)	TCL VOCs	TCL SVOCs	TCL Pesticides	TCL PCBs	TOC	TAL Metals	Dioxin
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
HP02	Groundwater	Water Table	1	1				1	
HP03	Soil	0.2, 5, 10	3	3				3	1
HP03	Groundwater	Water Table	1	1				1	
HP04	Soil	0.2, 5, 10	3	3				3	1
HP04	Groundwater	Water Table	1	1				1	
HP05	Soil	0.2, 5, 10	3	3				3	1
HP05	Groundwater	Water Table	1	1				1	
HP06	Soil	0.2, 5, 10	3	3				3	1
HP06	Groundwater	Water Table	1	1				1	
HP07	Soil	0.2, 5, 10	3	3				3	1
HP07	Groundwater	Water Table	1	1				1	
HP08	Soil	0.2, 5, 10	3	3				3	1
HP08	Groundwater	Water Table	1	1				1	
HP09	Soil	0.2, 5, 10	3	3				3	1
HP09	Groundwater	Water Table	1	1				1	

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	**Matrix**	**Analyses and Method**							
		Sample Depth (ft)	**TCL VOCs**	**TCL SVOCs**	**TCL Pesticides**	**TCL PCBs**	**TOC**	**TAL Metals**	**Dioxin**
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
HP10	Soil	0.2, 5, 10	3	3			1	3	1
HP11	Soil	0.2	1	1			1	1	
HP12	Soil	0.2	1	1			1	1	
HP13	Soil	0.2	1	1			1	1	
HP14	Soil	0.2	1	1			1	1	
HP15	Soil	0.2	1	1			1	1	
HP16	Soil	0.2	1	1			1	1	
HP17	Soil	0.2	1	1			1	1	
HP18	Soil	0.2	1	1			1	1	
HP19 (Dup)	Soil	0.2, 5	2	2			2	2	2
HP20 (Dup)	Groundwater	Water Table	1	1				1	
SW01	Surface Water	-	1	1				1	
SW02	Surface Water	-	1	1				1	
SW03	Surface Water	-	1	1				1	
SW04	Surface Water	-	1	1				1	
SW05	Surface Water	-	1	1				1	

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	**Matrix**	**Analyses and Method**							
		Sample Depth (ft)	**TCL VOCs**	**TCL SVOCs**	**TCL Pesticides**	**TCL PCBs**	**TOC**	**TAL Metals**	**Dioxin**
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
SW06 (Dup)	Surface Water	-	1	1				1	
SD01	Sediment	0-0.5	1	1				1	
SD02	Sediment	0-0.5	1	1				1	
SD03	Sediment	0-0.5	1	1				1	
SD04	Sediment	0-0.5	1	1				1	
SD05	Sediment	0-0.5	1	1				1	
SD06 (Dup)	Sediment	0-0.5	1	1				1	
AOC 3									
SB01	Soil	See text	3	3	3	3		3	1
SB02	Soil	See text	3	3	3	3		3	1
SB03	Soil	See text	3	3	3	3		3	1
SB04	Soil	See text	3	3	3	3		3	1
SB05	Soil	See text	3	3	3	3		3	1
SB06	Soil	See text	3	3	3	3		3	1
SB07	Soil	See text	3	3	3	3		3	1
SB08	Soil	See text	3	3	3	3		3	1

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	Matrix	Analyses and Method							
		Sample Depth (ft)	TCL VOCs	TCL SVOCs	TCL Pesticides	TCL PCBs	TOC	TAL Metals	Dioxin
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
SB09	Soil	See text	3	3	3	3		3	1
SB10	Soil	See text	3	3	3	3		3	1
HP01	Groundwater	Water Table	1	1	1	1		1	
HP02	Groundwater	Water Table	1	1	1	1		1	
HP03	Groundwater	Water Table	1	1	1	1		1	
HP04	Groundwater	Water Table	1	1	1	1		1	
SB01 (Dup)	Soil	See Text	3	3	3	3		3	
HP05 (Dup)	Groundwater	Water Table	1	1	1	1		1	
AOC 5									
SS01	Soil	0.2, 2						2	
SS02	Soil	0.2, 2						2	
SS03	Soil	0.2, 2						2	
SS04	Soil	0.2, 2						2	
SS05	Soil	0.2, 2						2	
SS06	Soil	0.2, 2						2	
SS07	Soil	0.2, 2						2	

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

		Analyses and Method							
Sample ID	**Matrix**	**Sample Depth (ft)**	**TCL VOCs**	**TCL SVOCs**	**TCL Pesticides**	**TCL PCBs**	**TOC**	**TAL Metals**	**Dioxin**
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
SS08	Soil	0.2, 2						2	
SS09 (Dup)	Soil	0.2						1	
SS10 (Dup)	Soil	0.2						1	
GW01	Groundwater	Water Table						1	
GW02 (Dup)	Groundwater	Water Table						1	
HP01	Soil	Water Table						1	
HP01	Groundwater	Water Table						1	
HP02	Soil	Water Table						1	
HP02	Groundwater	Water Table						1	
HP03	Soil	Water Table						1	
HP03	Groundwater	Water Table						1	
HP04	Soil	Water Table						1	
HP04	Groundwater	Water Table						1	
SW01	Surface Water	-						1	
SW02	Surface Water	-						1	
SW03	Surface Water	-						1	

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	Matrix	Analyses and Method							
		Sample Depth (ft)	TCL VOCs	TCL SVOCs	TCL Pesticides	TCL PCBs	TOC	TAL Metals	Dioxin
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
SW04	Surface Water	-						1	
SW05	Surface Water	-						1	
SW06	Surface Water	-						1	
SW07	Surface Water	-						1	
SW08	Surface Water	-						1	
SW09	Surface Water	-						1	
SW10	Surface Water	-						1	
SW11	Surface Water	-						1	
SW12	Surface Water	-						1	
SW13 (Dup)	Surface Water	-						1	
SD01	Sediment	0-0.5						1	
SD02	Sediment	0-0.5						1	
SD03	Sediment	0-0.5						1	
SD04	Sediment	0-0.5						1	
SD05	Sediment	0-0.5						1	
SD06	Sediment	0-0.5						1	

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	Matrix	Analyses and Method							
		Sample Depth (ft)	TCL VOCs	TCL SVOCs	TCL Pesticides	TCL PCBs	TOC	TAL Metals	Dioxin
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
SD07	Sediment	0-0.5						1	
SD08	Sediment	0-0.5						1	
SD09	Sediment	0-0.5						1	
SD10	Sediment	0-0.5						1	
SD11	Sediment	0-0.5						1	
SD12	Sediment	0-0.5						1	
SD13 (Dup)	Sediment	0-0.5						1	
AOC 6									
TP01	Soil	TBD	1	1	1	1		1	
TP02	Soil	TBD	1	1	1	1		1	
TP03	Soil	TBD	1	1	1	1		1	
TP04	Soil	TBD	1	1	1	1		1	
TP05	Soil	TBD	1	1	1	1		1	
TP06	Soil	TBD	1	1	1	1		1	
AOC 7									
SB01	Soil	0.2, TBD	3	3	3	3		3	

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	Matrix	Analyses and Method							
		Sample Depth (ft)	TCL VOCs	TCL SVOCs	TCL Pesticides	TCL PCBs	TOC	TAL Metals	Dioxin
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
SB02	Soil	0.2, TBD	3	3	3	3		3	
SB03	Soil	0.2, TBD	3	3	3	3		3	
SB04	Soil	0.2, TBD	3	3	3	3		3	
SB05 (Dup)	Soil	0.2	1	1	1	1		1	
HP01	Groundwater	Water Table	1	1	1	1		1	
HP02	Groundwater	Water Table	1	1	1	1		1	
HP03	Groundwater	Water Table	1	1	1	1		1	
HP04	Groundwater	Water Table	1	1	1	1		1	
HP05 (Dup)	Groundwater	Water Table	1	1	1	1		1	
2AMW-5	Groundwater	Water Table	1	1	1	1		1	
2AMW-7	Groundwater	Water Table	1	1	1	1		1	
AOC 8									
SW14	Surface Water	-	1	1	1	1		1	
SW15	Surface Water	-	1	1	1	1		1	
SW16	Surface Water	-	1	1	1	1		1	
SW17	Surface Water	-	1	1	1	1		1	

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

Sample ID	Matrix	Analyses and Method							
		Sample Depth (ft)	**TCL VOCs**	**TCL SVOCs**	**TCL Pesticides**	**TCL PCBs**	**TOC**	**TAL Metals**	**Dioxin**
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
SW18	Surface Water	-	1	1	1	1		1	
SW19	Surface Water	-	1	1	1	1		1	
SW20	Surface Water	-	1	1	1	1		1	
SW21	Surface Water	-	1	1	1	1		1	
SW22	Surface Water	-	1	1	1	1		1	
SW23	Surface Water	-	1	1	1	1		1	
SW24	Surface Water	-	1	1	1	1		1	
SD14	Sediment	0 - 0.5	1	1	1	1		1	
SD15	Sediment	0 - 0.5	1	1	1	1		1	
SD16	Sediment	0 - 0.5	1	1	1	1		1	
SD17	Sediment	0 - 0.5	1	1	1	1		1	
SD18	Sediment	0 - 0.5	1	1	1	1		1	
SD19	Sediment	0 - 0.5	1	1	1	1		1	
SD20	Sediment	0 - 0.5	1	1	1	1		1	
SD21	Sediment	0.0.5	1	1	1	1	1	1	
SD22	Sediment	0.0.5	1	1	1	1	1	1	

TABLE 3 (CONTINUED)

SAMPLING AND ANALYTICAL PROGRAM

		Analyses and Method							
Sample ID	**Matrix**	**Sample Depth (ft)**	**TCL VOCs**	**TCL SVOCs**	**TCL Pesticides**	**TCL PCBs**	**TOC**	**TAL Metals**	**Dioxin**
			SW8260 with 25-ml purge*	SW8270 SW8310 (PAHs)	SW8081	SW8082	Walkley-Black	SW6010B SW7470 SW7471	SW8290
SD23	Sediment	0.0.5	1	1	1	1	1	1	
SD24	Sediment	0.0.5	1	1	1	1		1	
SD25 (Dup)	Sediment	0.0.5	1	1	1	1		1	
AOC 9									
SB01	Soil	See Text	2	2				2	
SB02	Soil	See Text	2	2				2	
SB03	Soil	See Text	2	2				2	
SB04	Soil	See Text	2	2				2	
MW-9	Groundwater	Water Table	1	1				1	
COEMW-10	Groundwater	Water Table	1	1				1	
COEMW-11	Groundwater	Water Table	1	1				1	
COEMW-12	Groundwater	Water Table	1	1				1	

(Dup) - Field duplicate sample.

* - 25-ml purge applied to water samples only.

2.2.5.4 As previously stated, the objective of the shallow hydrogeologic investigation is to compile information to establish the presence or absence of hydraulic communication between the surficial and bedrock aquifers. Upon preliminary review of the available hydrogeologic data (Malcolm Pirnie 1997), it appears that the rate of groundwater recovery in the existing bedrock monitoring well is insufficient to perform a constant-rate aquifer pumping test. Consequently, the following tasks are proposed as a means to investigate the shallow hydrogeology in the vicinity of the landfill:

Task 1:	Hydrogeologic data review
Task 2:	Staff gauge installation and survey
Task 3:	Measurement of static groundwater and surface water elevations
Task 4:	Groundwater recovery rate assessment

Task 1: Review of Existing Data

2.2.5.5 Prior to the initiation of field work, available data regarding the existing monitoring wells will be reviewed. The review will specifically target: (1) groundwater recharge rates observed during and following well purging; and (2) information regarding the hydraulic conductivity of the various stratigraphic units.

2.2.5.6 The purpose of the review will be to optimize the selection of monitoring wells in which the recharge or response rate of several monitoring wells will be measured during a pumping test conducted in the new bedrock well which will replace AMW-11.

Task 2: Installation of Staff Gauges

2.2.5.7 Commercial staff gauges will be mounted and installed at pre-selected locations in the pond adjacent to the east side of the landfill, and in the two “standing surface water” areas located on the west side of the landfill (Figure 5). The objective is to assess the potential connection between the pond surface water elevation, and the elevation of the groundwater table in the shallow unconfined aquifer, as established through monitoring well gauging. This data should also allow an assessment of whether the groundwater mounding in the landfill is partially or entirely due to ponding in these areas.

2.2.5.8 The elevations of the staff gauges will be surveyed relative to the same vertical datum as the monitoring wells. The water level of the pond will be measured each time that monitoring wells are gauged. In addition, the water level in the pond will be monitored closely during the pumping test.

Task 3: Groundwater and Surface Water Elevations

2.2.5.9 Records indicate that there are 17 monitoring wells located in the vicinity of the U.S. Army Southern Landfill. Static water levels in the existing monitoring wells and the three pond staff gauges will be measured a total of three times. Wells will be monitored using a decontaminated oil-water interface probe (IFP) to assess the presence of separate-phase petroleum product.

2.2.5.10 During the initial site visit, the wells will be located and identified, and the current condition of each of the wells will be assessed. If necessary, well locks may have to be cut and replaced, and wells may need to be re-labeled with a paint pen. Accessible wells will be gauged using an IFP.

2.2.5.11 Static water levels in the wells will be gauged on at least two additional occasions. One round of gauging will occur immediately prior to (and during) the pumping test; and one round will occur within approximately one month after the conclusion of pumping activities.

Task 4: Groundwater Recharge Evaluation

2.2.5.12 Two activities will be conducted to evaluate the connectivity between the shallow overburden aquifer and the underlying bedrock aquifer and evaluate recharge between and within the units. The first activity will consist of a short-term aquifer stress test; the second activity will consist of monitoring water levels in monitoring wells and surface water bodies.

Task 4.1 Short-Term Aquifer Stress Test

2.2.5.13 A short, 4-hour stress (pumping) test, followed by a 2-hour recovery test will be conducted in a replacement bedrock monitoring well. The bedrock aquifer will be "stressed" and water levels will be monitored in existing monitoring wells to identify any response to the pumping. The stress test will be conducted in a bedrock well constructed to replace monitoring well AMW-11. The existing monitoring wells in the bedrock (AMW-2), till (ACE-6) and fill (AMW-1) will be used to measure the water levels in other units during the pump test.

2.2.5.14 Because of the potentially wide variability in bedrock hydraulic conductivity, it is not known at this time what the pumping rate during the pump test will be. Because the RI slug test data indicate low hydraulic conductivities in both the bedrock and till, it is assumed that the pumping rate will be less than 2 gallons per minute (gpm). If during construction of the new well, the sustainable pumping rate is estimated to be 2 gpm or less, then the pumping test will be conducted as a constant-head test. If the estimated sustainable rate is greater than 2 gpm, then the pumping test will be conducted as a constant-rate test. The pumping test will be conducted for 4 hours, followed by a 2-hour recovery period. The discharge water from the pumping test will be routed to a drainage ditch and discharged at least 100 feet from the pumping well to minimize any influence on the pumping test. Details of the aquifer testing equipment requirements and procedures are presented in Appendix C.

2.2.5.15 The pump-test data will be plotted as log-log and semi-log plots. The data will be qualitatively evaluated to identify hydraulic response to the pumping. If a response is observed in bedrock monitoring well AMW-2 then an analysis of the AMW-2 data will be made using standard methods, including the Theis and Hantush methods. The purpose of this analysis will be to estimate aquifer transmissivity. Because of the short pumping period, storage coefficient will not be calculated.

Task 4.2 Water-Level Monitoring

2.2.5.16 As noted in the previous section, the hydraulic conductivity of both the bedrock and till are low. If the sustainable pumping rate is significantly less than 1 gpm, the stress test may yield ambiguous results. Therefore, water-level monitoring for a period of two weeks will be conducted to characterize the connectivity of the bedrock and shallow aquifers by monitoring the responses to natural stresses, including barometric pressure changes and precipitation events.

2.2.5.17 Water levels will be measured every ½ hour during the two-week period using pressure transducers. Pressure transducers will be placed in a bedrock well (AMW-2), a till well (ACE-6) and a fill well (AMW-1). Pressure transducers will also be placed in the pond on the east side of the landfill and in the southernmost “standing surface water” area located on the west side of the landfill.

2.2.5.18 Water level changes in the overburden and bedrock wells will be compared to identify any lag times in response to barometric changes and precipitation. The lag times will be used to evaluate the connectivity between the bedrock and overburden. Water level changes in the till and fill will be compared to water level changes in the two surface water bodies to characterize recharge/discharge relationships between shallow groundwater and surface water.

2.2.6 Site Closeout Strategy

2.2.5.19 The proposed sampling strategy should aid in determining whether past DoD disposal activities conducted at the former U.S. Army Southern Landfill have impacted the surface water and/or sediment in the adjacent pond and wetlands. Results of this investigation will be used to determine the necessity and nature of further action to reduce the risk to human health, safety and the environment resulting from past DoD activities. For AOC 1, and all other AOCs in this RI, the sample results will be compared to the following regulatory guidance and criteria:

Soil - NYSDEC TAGM 4046;

Groundwater – NYSDEC Class GA standards and guidance values;

Surface Water – NYSDEC Class A and Class C standards and guidance values; and

Sediment – NYSDEC Technical Guidance for Screening Contaminated Sediments.

A landfill remediation evaluation is being conducted independent of this RI.

2.3 AOC 2 – FORMER BIVOUAC AREA

The Former Bivouac Area is a 40.6-acre parcel which is on the west side of County Road 201, and was part of SADVA from its inception until the parcel was sold in 1963 (Figure 2). Historical information indicates the parcel was used as a transit troop bivouac area and officer family housing area in the 1950s and 1960s. After being purchased in 1963, the new owners of the parcel noticed a disposal area (later known as the Post Commander's Landfill) which they ultimately reported to the NYSDEC.

2.3.1 Background

The following text describing historical activities is taken directly from the revised draft Archival Search Report (EAEST, 1999) and the draft work plan (USACE, 1999). It is intended to provide the reader with a better understanding of the rationale for the proposed sampling strategy at the former Bivouac Area, a 40-acre parcel on the west side of County Road 201.

2.3.1.1 1941-1945 (WWII Time Period)

2.3.1.1.1 The Albany County aerial photograph analysis included observations of the former Bivouac Area, which is located west of County Road 201, adjacent to the western part of SADVA (Figure 2). The County noted that based on a review of the 1940s aerial photographs, the site consisted of undeveloped agricultural land.

2.3.1.1.2 Based on a review of 1942 and 1943 aerial photography, the approximately 40-acre portion of SADVA located west of County Road 201 contained open agricultural areas, an approximately 4-acre wooded area in the western portion of the property, and orchards. A barn and related farm structures were also located on the property. A narrow, linear dirt path extended about 700 feet from County Road 201 toward the wooded section of the property. In 1943, there was a cleared section in the wooded area less than 1 acre in size.

2.3.1.2 1946-1952 (Post-WWII through Korean Conflict)

Albany County noted that based on a review of the 1952 aerial photograph, a 0.5-acre excavation was located at this site and a ponded area was observed within the depression. There was no evidence of storage containers.

2.3.1.3 1953-1968 (Post-Korean Conflict through Deactivation)

Albany County reported that based on a review of aerial photographs from 1961, 1963, and 1968, the following was noted:

- 1961–The previously noted excavation had been backfilled and was almost entirely vegetated except for a small circular area. Two small circular areas were observed near the loop in the road. A 0.75-acre area had been cleared north of the initial depressional area and a building had been constructed on this area. Two small circular areas were located southwest of the building.
- 1963–The site remained similar to the conditions observed in the 1961 aerial photograph. The cleared area was being backfilled and becoming revegetated. The building had been removed. There was a small circular area west of the site, which could be a dirt mound.

- 1968–The area was inactive and three slight depressions remained visible. A small stream existed from the former dump areas toward a wetland area.

2.3.1.4 Post-DoD Use of Former SADVA

2.3.1.4.1 The Burns' acquired this 40.6-acre property from the United States by Deed dated May 31, 1963. This property has been used as a residence and farm from 1963 through the present.

2.3.1.4.2 Albany County noted that based on a review of aerial photographs from 1974 and 1977, the site appeared to be inactive.

2.3.1.4.3 According to an aerial photograph interpretation conducted as a part of the Archival Search, the following were noted in relation to this area :

- In 1973, this property consisted of a mix of forested areas in the western section and open field, bare ground, and areas of regrowth interspersed through the rest of the property. The northern portions showed vegetation that was in contrast to the open areas in the southeastern portions.
- In 1978, the property was more densely overgrown with little evidence of significant changes in conditions or activities. Open and sparsely vegetated areas were located around the residence, and the area at the western end of the path showed evidence of scarring and disturbance.
- In 1982, the western sections of the property were forested. Areas closest to County Road 201 were open ground with scattered vegetation. Possible debris mounds, some of which appeared vegetated, were evident at the southern boundary and off of the unpaved access road.
- In 1995, a considerable portion of the property was densely covered with vegetation. A small pond was observed due north of the residence.

2.3.2 Previous Investigations

2.3.2.1 NYSDEC Hazardous Waste Disposal Sites Report

An NYSDEC Hazardous Waste Disposal Sites Report indicated that areas devoid of vegetation and containing small vials, which appeared to contain pharmaceutical pills, were observed on the former Bivouac Area. According to the report, samples were collected by NYSDEC personnel in July 1979 and July 1980, but were never analyzed because of an accident at the Health Department lab.

2.3.2.2 NYSDEC Letter Report

A letter dated January 11, 1982, regarding the NYSDEC analysis of samples from the former Bivouac Area, indicated that some analytes with retention times corresponding to priority pollutants, albeit generally at low concentrations of less than one part per million (ppm), were present at the former Bivouac Area.

2.3.2.3 Department of Health (DOH) Letter Report

A letter from the Albany County DOH to Mr. Kevin A. Moss, Supervisor, Town of Guilderland–Town Hall, dated January 10, 1983, indicated the following:

- The former Bivouac Area and NEIP had been included on a recently published New York State Superfund list of sites.
- The former Bivouac Area had been sampled by the NYSDEC. The results indicated that priority pollutants were not of concern. Pills found at the former Bivouac Area were determined to be salt tablets.
- The GSA and the DOA had been contacted regarding their records on disposal activities at the former Bivouac Area. According to the GSA and DOA, no disposal activities were performed at the former Bivouac Area.
- NEIP had been surveyed by the Albany County DOH and NYSDEC, and no apparent environmental or health problems were noted.
- GSA and DOA indicated that no toxic and/or hazardous waste material was dumped on NEIP property.

2.3.2.4 Phase I Investigation Report

2.3.2.4.1 A report entitled "Phase I Investigation Report, Northeastern Industrial Park (Formerly Voorheesville General Depot) Albany County, New York," dated September 1984, prepared by Wehran Engineering, P.C., focused on the former Bivouac Area. This report indicated the following:

- It was evident that dumping of waste occurred on the former Bivouac Area. The disposal area (also known as the Post Commander's Landfill) was located on a 2- to 3-acre hillcrest in the western portion of the former Bivouac Area (Figure 6).
- Five to seven 20- to 30-foot elliptical areas were observed by the property owners to be leaching oily material, discolored water, and "paint-like" odors.
- A mound of soil (15 feet high) located in the middle of the disposal area was suspected to be covering drums of waste.
- Hundreds of bottles containing pharmaceutical pills were scattered about the surface of the disposal area.
- Approximately 10 (15- to 50-gallon) rusted out drums, scattered brown amber glass lab bottles, and several stained soil areas were present on the surface.
- A small "pond" was located on the former Bivouac Area, and the water level reportedly would rise and overflow during rainy periods. The drainage path from this pond was devoid of vegetation and had reportedly been so for at least 20 years.

Figure 6 AOC 2 Bivouac Area Post Commander’s Landfill Area

- A gravel and dirt road, approximately 1,000 feet long, originated at County Road 201 and terminated adjacent to the disposal area near a number of broken concrete pads and a small building foundation.

2.3.2.4.2 Furthermore, the former Bivouac Area was a primary concern due to its proximity to Black Creek and the marsh wetlands, which drain into the Watervliet Reservoir (the primary water supply for two local water companies). The former Bivouac Area had been inactive since 1963 when the Government sold the property. No records were available which documented disposal operations at the former Bivouac Area. The current owner first noticed the disposal area shortly after purchasing the property in 1963, and described the area as being the same in 1984 as it was in 1963-1964. In 1979, the owner reported the disposal area to the Albany County DOH.

2.3.2.4.3 The Phase I Report states that one set of soil samples was taken from the former Bivouac Area. The results reportedly indicated the presence of diethyl and dioctyl phthalate, phenanthrene, dyrene (sic) and fluoranthene. No information on sample locations was provided.

2.3.2.5 Wehran Engineering Report

During a site inspection by Wehran Engineering, Albany County DOH, and the NYSDEC, the following observations were made:

- Several hundred pill bottles containing pharmaceutical tablets were present within the disposal area.
- Vegetative growth within the elliptical areas of the disposal area was absent, and bare, discolored soil was present.
- The vegetation surrounding a drainageway leading from the disposal area to the Black Creek marsh wetlands had visibly stressed vegetation with red and grey soil staining.
- Several partially-buried rusted barrels and broken reagent bottles were observed within the disposal area. VOC readings of 5-10 ppm were obtained intermittently using an HNU photoionization detector.
- A dirt and gravel road, approximately 1,000 feet long, extended from County Road 201 and terminated adjacent to the disposal area near a number of cracked and broken concrete pads.
- A large mound near the center of the disposal area was suspected of covering buried materials.
- Several areas containing oily scums were observed on the surface of the disposal area.
- Several small "sneaker prints" were observed within the disposal area, indicating potential direct human contact with the surface soils in the area.

2.3.2.6 Kaselaan Report

An environmental site assessment dated August 12, 1988 was prepared by Kaselaan & D'Angelo Associates, Inc. for the Galesi Group. The Kaselaan Report stated that a portion of the former Bivouac Area exhibited evidence of contamination from past military activities. Evidence was available to substantiate the fact that pharmaceutical waste was dumped at the former Bivouac Area. The Kaselaan Report stated that initial sampling performed under a hazardous waste confirmation study identified contaminants as being present in the soils and groundwater, and that future sampling was planned to delineate the extent and severity of the contamination.

2.3.2.7 Metcalf & Eddy Report

2.3.2.7.1 In February 1988, an "Engineering Final Report Site Investigation, Contamination Evaluation at the Former Schenectady Army Depot, New York; Submitted by Metcalf and Eddy, Inc." was prepared. The investigation consisted of:

- sampling of six drums and pharmaceutical bottles;
- an electromagnetic (EM) survey to evaluate if buried metallic material was present; and
- installation of a monitoring well (MW-05) downgradient of the Bivouac Area.

2.3.2.7.2 The report stated that during the EM survey of the Bivouac Area, two possible areas of buried metal were discovered. The first area encompassed the immediate vicinity in and around the location of the exposed drums, and included numerous individual earth mounds. The second area consisted of a small, level section of the site identified as containing buried metal (Figure 6).

2.3.2.7.3 The report stated that during the site inspection, abandoned 55-gallon drums that were severely corroded were observed on the site. The material collected from the drums appeared to be a black tar-like substance that did not flow out of the drum when it was tipped. It was determined that all of the drums contained light fuel oil. Barium, chromium and lead were also detected in the metals analysis.

2.3.2.7.4 The pharmaceutical sample bottles found on the Bivouac Area were analyzed for reactivity, cyanide, and sulfate. This report stated that all of these tests proved negative. Extraction procedure toxicity tests were run on the samples, and none produced levels of metals above the action levels.

2.3.2.7.5 Metcalf & Eddy installed a monitoring well (MW-05) and several soil borings. Drill logs for this well and the borings are unavailable, however, the report states that the well was screened in glacial till and could be bailed dry. Bedrock was encountered at a depth of approximately 14 feet, and the well was completed at this depth. The groundwater level was 7 feet below ground surface. Based on the surface topographical high (knoll) southeast of well MW-05, the well was interpreted as being downgradient from the Bivouac site, and potentially part of a local groundwater flow regime that discharges to the wetlands north and west of the site. Analysis of the groundwater in the well detected chromium at a concentration below the maximum contaminant level (MCL). This well has been damaged by frost heave, and is no longer usable.

2.3.2.8 OHM Remediation Report

2.3.2.8.1 In June 1991, a "Phase I Draft Report, Schenectady Army Depot Site, Voorheesville, Guilderland, New York", was prepared by OHM Remediation. Ten surface soil samples were collected at the Bivouac Area and analyzed for VOCs, total SVOCs, pesticides, PCBs, and metals (Figure 7).

2.3.2.8.2 The report stated that a total of 20 drums were removed from the Southern Landfill and Bivouac Area (Figure 8). The exact number of drums that were removed specifically from the Bivouac Area is unknown.

2.3.2.8.3 The report stated that sample BP-06 from the Bivouac Area exhibited a significant concentration of m+p-xylene and o-xylene, and that the presence of xylenes at the surface indicates other VOCs may exist within the subsurface. The results of the soil samples obtained from the Bivouac Area may be indicative of elevated levels of chromium, lead, and zinc in BP-01. High levels of TPH were reported in samples BP-04, BP-05, BP-06, and BP-08, indicating the possibility of subsurface contamination in these areas.

2.3.2.9 USACE EM Investigation

2.3.2.9.1 In May 1999, USACE intended to perform an EM investigation to delineate the disposal area. However, due to the thick brush and interference from electrical lines in the vicinity, the contractor was unable to perform the investigation. However, it was determined using electrical resistivity imaging that the water table is most likely located within the upper 16 feet, and that no suggestion of a contaminant plume was apparent in the data collected at the Bivouac Area. Landmarks that were identified in previous investigations (the concrete foundation) still existed at the site.

2.3.2.9.2 In April 1997, Quantum Geophysics, Inc., completed a geophysical investigation under contract to USACE. The purpose of the investigation was to: 1) locate large metallic or other objects in the subsurface, 2) identify the horizontal and vertical boundaries of the former disposal areas, particularly the depth to and/or thickness of fill layers, 3) locate the shallow aquifer and evaluate the continuity of any confining layers, and 4) determine if a contaminant plume is present.

2.3.2.9.3 The investigation incorporated an EM61 metal detector survey, an EM31 ground conductivity survey, and an electrical resistivity imaging survey. The fill area on the Bivouac parcel was not surveyed with EM31 or EM61 equipment, due partly to extensive brush cover, and partly due to the discovery during the Archival Search that this area had been surveyed with EM equipment by OHM in 1990 and no metallic anomalies were identified. Instead, electrical resistivity methods were used to delineate a contaminant plume(s), if present.

Figure 7 AOC 2 Bivouac Area 1991 OHM Investigation Surface Water and Soil Sample Locations Title

Figure 8 AOC 2 Former Bivouac Area Previous Sampling Results

2.3.2.9.4 Electrical resistivity imaging was performed along two lines. The resistivity profile showed somewhat erratic results due to nearby overhead powerlines. The location of the water table was uncertain, but appeared to be located within the upper 16 feet. A shallow bedrock high was apparent in the middle of the line at a depth from 9 to 15 feet. No suggestion of a contaminant plume was apparent in the resistivity data.

2.3.3 Conceptual Site Model

2.3.3.1 Previous use of the Bivouac Area included the disposal of drums and chemical waste in a portion of the 40-acre site. The disposal site has since been backfilled and is covered with vegetation consisting of grass and thick brush. Evidence of the disposal activities are present, consisting of small medical vials that are observed sporadically around the area. An area of ground where standing water has been observed during rainy periods has produced discolored soil and runoff.

2.3.3.2 Results of previous surface soil samples have detected petroleum hydrocarbons, xylenes and chromium contamination. Results of groundwater samples collected downgradient of the disposal area in 1988 only detected chromium, which was below the groundwater standard. The disposal area is approximately 1,000 feet west of the residence with a drinking water well which was used by the residents at one time, but no longer is in use, except for bathing (EAEST, 1999). The exposure pathway for soil, surface water and sediment consists of direct contact with, and possible ingestion of, contaminated soil, water or sediment. Possible receptors at this site include the residents, persons disturbing the soil or water, and farm animals coming in contact with contaminated soil and water.

2.3.4 RI Project Objectives

- Locate and characterize the extent of fill in the area known as the Post Commander's Landfill within the former Bivouac area.
- Analyze surface soil samples for VOCs, SVOCs, dioxins, and metals to assess the potential dermal and ingestion exposure pathways by humans and fauna (Table 4).
- Locate and characterize residual subsurface soil contamination and the nature of fill as a source for VOCs, SVOCs and metals.
- Locate and characterize residual groundwater contamination for VOCs, SVOCs and metals.
- Investigate potential Army ownership of abandoned drum remains at the base of the hill, northwest of the pill boxes. Unless there are markings or labels on the drums indicating otherwise, the debris will be assumed to be under Army ownership.
- Properly abandon existing well MW-05.
- Characterize surface water/sediment in drainageway leading from disposal area toward Black Creek (Table 4).
- Sample the residential well located on the property (designated GW01).

Table 4 AOC 2 Sampling Strategy

Sample ID	Rationale	Northing	Easting
GW-1	Characterize groundwater in residential well	-	-
HP01	Characterize soil and groundwater in and around disposal area	635356	1403496
HP02	Characterize soil and groundwater in and around disposal area	635356	1403481
HP03	Characterize soil and groundwater in and around disposal area	635357	1403470
HP04	Characterize soil and groundwater in and around disposal area	635357	1403470
HP05	Characterize soil and groundwater in and around disposal area	635374	1403465
HP06	Characterize soil and groundwater in and around disposal area	635340	1403464
HP07	Characterize soil and groundwater in and around disposal area	635324	1403464
HP08	Characterize soil and groundwater in and around disposal area	635358	1403443
HP09	Characterize soil and groundwater in and around disposal area	635357	1403430
HP10→HP18	Characterize surface soil in the site vicinity	*	*
SW01/SD01	Characterize surface water and sediment leading from disposal area	635121	1403687
SW02/SD02	Characterize surface water and sediment leading from disposal area	635044	1403555
SW03/SD03	Characterize surface water and sediment leading from disposal area	635009	1403470
SW04/SD04	Characterize surface water and sediment leading from disposal area	634981	1403400
SW05/SD05	Characterize surface water and sediment leading from disposal area	634848	1403393

*** Background sample locations to be determined in the field**

2.3.5 Proposed RI Sampling Strategy

2.3.5.1 Surface soil, subsurface soil, and groundwater samples will be collected using split spoons and Hydropunch technology in a grid formation over the Post Commander’s Landfill. Sampling locations will be on a grid with 10-foot centers over the landfill area and beyond. Nine sampling locations will be established, and 3 soil and 1 ground water sample will be collected at each sampling location. Soil samples for analysis will be collected at the surface to characterize the direct contact exposure pathway. Samples will also be collected from the fill material to characterize it as a source of contamination, and for waste disposal characterization. The third sample from each location will be from undisturbed soil beneath the fill zone and above the water table to assess the vertical extent of contamination. Groundwater samples will be collected just below the water table, which is suspected to be at 16 feet below the ground surface. If deemed necessary during the site reconnaissance, test pit excavations will be added to the scope of work to provide definition of the extent of fill.

2.3.5.2 Nine background surface soil sample locations will be determined in the field. Five surface water and sediment samples will be collected to determine if there is contamination downgradient from the disposal area in the discolored and visibly stressed drainageway to Black Creek. The background surface soil and sediment samples will also be analyzed for TOC. A groundwater sample will be collected from the residential well on the property. The analytical program is summarized on Tables 3 and 4. Sample locations are shown on Figure 9.

2.3.6 Site Closeout Strategy

The proposed sampling strategy should aid in determining whether past DoD activities conducted at the former Post Commander's Landfill have contaminated the surface and subsurface soil, surface water, sediment and/or groundwater. Results of this investigation will be compared to applicable regulatory criteria, and used to determine the necessity and nature of remedial action to reduce the risk to human health, safety and the environment. Characterization of the fill material will be used to determine if there is a human health or environmental risk which requires mitigative action in the form of fill removal or covering.

2.4 AOC 3 – FORMER BURN PIT AREA

The Former Burn Pit Area is an area of less than 10 acres in the north end of SADVA (Figure 2). Historical aerial photography indicates the area may have been used for waste burning and/or disposal. Historical records for SADVA tend to confirm the presence of a disposal area where materials were burned or otherwise disposed. The historical records and photographs suggest the area has been the site of numerous dump areas and pits or scarred areas that are thought to have been locations where wastes were burned.

2.4.1 Background

The following text describing historical activities is taken directly from the revised draft Archival Search Report (EAEST, 1999) and the draft work plan (USACE, 1999). It is intended to provide the reader a better understanding of the rationale for the proposed sampling strategy at the former Burn Pit Area.

2.4.1.1 1941-1945 (WWII Time Period)

2.4.1.1.1 The Burn Pit Area was located in the northern part of SADVA, west of the sewage treatment plant in the "salvage area" (Figure 2). Albany County noted that, based on a review of a 1940s aerial photograph, a 0.25-acre circular depression existed at this site (ACEMC, 1980).

2.4.1.1.2 The aerial photograph analysis completed as part of the archival search noted the following in the Burn Pit Area:

Figure 9 AOC 2 Former Post Commander's Landfill Proposed Sampling Locations

- A circular and unpaved road network surrounding the Salvage Building (T-62) was noted in 1942 aerial photography. At the center of the road was a dark feature, which appeared to be a storage tank. The area south of the Salvage Building appeared disturbed with possible debris or material piles. The road network extended southward, combining with a second circular road complex containing equipment or vehicles.
- In a 1943 aerial photograph, the second circular road complex appeared to be more disturbed (Figure 10).

2.4.1.2 1946-1952 (Post-WWII through Korean Conflict)

2.4.1.2.1 Albany County noted that, based on a review of a 1952 aerial photograph, the former depression in this area had been reduced slightly in size. In addition, two new rectangular depressions 0.25 acres in size were southwest of the former depressions. Storage containers were reportedly observed throughout this site and two buildings had been constructed north of the site.

2.4.1.2.2 The aerial photograph analysis completed as part of the archival search noted that, based on a review of a 1952 aerial photograph, the burn pits appeared as shallow, darkened areas which were rectangular in shape (with dimensions of 50 feet by 50 feet) and which straddled the access road. East of the access road and south of the burn pits was a possible drum storage area, and further south of the burn pit area on the west side of the access road was an open storage area (OSA) containing crates and other oblong-shaped containers and stacked materials.

2.4.1.3 1953-1968 (Post-Korean Conflict through Deactivation)

2.4.1.3.1 Albany County reported that, based on a review of aerial photographs from 1961, 1963, and 1968, the following was noted (Figure 10):

- 1961–The initial depression observed in the 1940s aerial photograph was no longer present. The area had been almost entirely filled in and was partially vegetated. A pathway to one of the existing depressions was observed. Two active depressions contained white circular objects, which the County report said were possible storage containers. A number of black circular objects in rows were located west of the inactive depression area. Buildings north of the site had been removed and the area where the buildings were located had been backfilled.
- 1963–The initial depression was inactive. The other circular areas still existed; no containers were present within these circular areas. Storage containers were still stored west of the initial depression.
- 1968–Debris was located within the more recent depression areas. The remaining areas surrounding the depression areas consisted of open space.

2.4.1.3.2 According to an analysis of 1960 and 1969 aerial photography conducted as a part of the archival search, the burn pits appeared as distinct circular features. In relation to the 1952 aerial photography, the area appeared less active with fewer discernable roadways, vehicles, and structures in 1960. Possible drum storage and other areas that contained open crate and equipment storage in 1952 were absent in 1960 aerial photography. An oblong scarred area was visible along the present-day North Road, approximately 750 feet south of the burn pits.

Figure 10 AOC 3 Historical Site Layout

2.4.1.3.3 Three buildings were visible in the area. By 1969, the buildings had been removed and the surrounding areas began to show light vegetative cover. There was no open storage of equipment or staining observed in this area in 1969. Scarred areas and devegetated areas noted in the 1960 photograph appeared overgrown.

2.4.1.4 Post-DoD Use of Former SADVA

2.4.1.4.1 Albany County noted the following, based on a review of aerial photographs from 1974 and 1977:

- 1974–No changes were observed in the former dump areas. Three small dump areas had developed west of the inactive area. A 2-acre dumpsite had developed adjacent to the road lying northwest of the major dumping areas.
- 1977–Two dumpsites remained active, but were being filled in. Debris was situated within the remaining depression areas. The new areas developed previous to the 1974 aerial photograph were now inactive and had been backfilled and revegetated.

2.4.1.4.2 The revised draft Archival Search Report indicated that although burning pits were located in the upper northeast section of SADVA, no information was found indicating what types of material was burned in the pits. In addition, the report indicated that in the 1950s, latent fires occasionally occurred spontaneously in the pit area and that patrols were assigned responsibility for checking the pits at the end of each work day and again at midnight.

2.4.1.4.3 According to an interpretation of 1973, 1978, 1982, 1986, and 1995 aerial photography conducted as a part of the archival search, the following was noted:

- 1973, 1978, 1983, and 1986–The two burn pits and the entire area appeared inactive.
- 1995–The area remained undeveloped and only faint traces of the former burn pits were visible.

2.4.2 Previous Investigations

2.4.2.1 In 1988, Metcalf & Eddy installed the nearest monitoring well (MW-4-2) to this site; it is about 600 feet away (Figure 11). Two soil borings were also drilled south of this well to monitor for contamination from the former Burn Pits. No drill logs are available for the well or borings, although the report states that cobbles were encountered at a depth of 30 feet and drilling could not be advanced. The well was screened in a permeable sand and gravel aquifer. The water level in the well was 13 feet below ground surface.

2.4.2.2 In 1989, ERM conducted geophysical surveys at AOC 3 to determine the location of buried metal debris, if any. The results of the geophysical surveys revealed anomalies representing potential buried metals and debris. Additionally, anomalous readings were recorded outside of the suspected burn pit areas, suggesting the potential for buried metals in those areas also. All areas of electromagnetic anomalies were small and localized, indicating disposal of small amounts of debris.

2.4.2.3 ERM conducted test pit excavations to determine the nature of the subsurface materials in the areas of anomalies. Test pits were excavated at the two burn pit areas to depths of approximately 25 feet. These depths correspond to the vertical extent of buried materials at those locations. The burn pits were circular, having a diameter of approximately 35 feet as judged from a visible ground surface depression. Materials encountered within the limits of the suspected burn pits were composed of ash deposits, domestic waste, and industrial debris. A two-foot thick lens of oily soil was encountered at the base of one test pit. A total of eight test pits were excavated in the remainder of AOC 3. Minor amounts of near-surface debris (e.g., nails, bolts, reinforcing bar) were encountered in these test pits. Native soils, free of debris, were found at depths of 6 to 18 inches below grade. Three soil samples were collected from the various test pits; the highest concentrations of PAHs detected in any of the three samples was 22.8 ppm. Based on the investigation results, ERM recommended further investigation of this area.

2.4.2.4 In April 1999, Quantum Geophysics, Inc., completed a geophysical investigation under contract to USACE. The purpose of the investigation was to: 1) locate large metallic or other objects in the subsurface, 2) identify the horizontal and vertical boundaries of the former burn areas, particularly the depth to and/or thickness of fill layers, 3) locate the shallow aquifer and evaluate the continuity of any confining layers, and 4) determine if a contaminant plume is present.

2.4.2.5 The investigation incorporated an EM61 metal detector survey, an EM31 ground conductivity survey, and an electrical resistivity imaging survey. The Burn Pit Area was originally thought to be 0.5 acres in extent, but was increased to approximately 5.8 acres due to multiple pits seen in areal photographs during the archival search (Figure 10).

2.4.2.6 A total of 11 “probable disposal areas” were identified in the Burn Pit Area (Figure 12). Probable disposal areas 1 through 9 appear to be caused by buried metal debris. Probable disposal areas 10 and 11 are caused by a non-metallic, conductive material. The shape of area 10 suggests that it may represent a waste disposal trench. Area 11 is a small conductive area that may represent a dumping ground. The water table may be anywhere from 16 to 49 feet in depth, although some of this variation in depth estimate may be due to interference by metallic debris. No suggestion of a contaminant plume was indicated by the geophysical surveys.

2.4.3 Conceptual Site Model

The Burn Pit Area likely contains impacted surface and subsurface soils from the burning or disposal of wastes. The potential contaminant migration pathways are soils to groundwater, groundwater to surface water, and soils to surface water. The possible exposure pathways are direct contact with, or ingestion of, soil, groundwater and surface water. Possible receptors would be persons working at, or visiting the NEIP. To assess the potential for exposure, surface and subsurface soils and groundwater will be sampled in and around AOC 3. Surface water will be addressed with AOC 8.

Figure 11 AOC 3 Burn Pit Area Previous Sampling Results

Figure 12 AOC 3 Proposed RI Sampling Locations and Previous Geophysical Results

2.4.4 RI Project Objectives

- Delineate the presence and vertical extent of surface and subsurface soil contamination in geophysical anomalies at the Burn Pit Area.
- Characterize shallow groundwater quality at the Burn Pit Area.

2.4.5 Proposed Sampling Strategy

To accomplish the project objectives, this area was surveyed in April 1999 using geophysical instruments to locate the anomalies identified by previous investigations. The results of the geophysical surveys were used to guide the number and locations of soil and groundwater samples. The locations of the observed anomalies and proposed sample locations are shown on Figure 12. At ten soil boring locations, soil samples will be collected at the surface and at two-foot intervals until groundwater is encountered. Samples to be analyzed by the laboratory are: 1) at the surface (top 2 inches) for dioxin, TCL organic compounds (volatiles, semivolatiles and pesticide/PCBs), and TAL metals; 2) within the fill zone to characterize the fill (TCL/TAL analysis); and 3) in native soil immediately beneath the base of the fill, or at the water table interface (which ever occurs first) with analysis for TCL/TAL. The objectives of this sampling scheme are to characterize the surface soils for direct contact risks, to characterize the fill material to assess the contaminant presence and migration risk, and to identify the lower extent of contamination by sampling beneath the fill zone. At four other locations (one upgradient and three downgradient), groundwater samples will be collected using an attachment to the Hydropunch^{TM} and analyzed for TCL/TAL (Tables 3 and 5). Prior to collecting the groundwater samples, the depth to water will be measured through the drill rod:

Table 5 AOC 3 Sampling Strategy

Sample ID	Rationale	Northing	Easting
SB01	Investigate geophysical anomalies/assess soil	636868	1408446
SB02	Investigate geophysical anomalies/assess soil	637789	1408328
SB03	Investigate geophysical anomalies/assess soil	636894	1408221
SB04	Investigate geophysical anomalies/assess soil	636982	1408307
SB05	Investigate geophysical anomalies/assess soil	637070	1408309
SB06	Investigate geophysical anomalies/assess soil	637025	1408122
SB07	Investigate geophysical anomalies/assess soil	637014	1407956
SB08	Investigate geophysical anomalies/assess soil	637066	1407890
SB09	Investigate geophysical anomalies/assess soil	636930	1407815
SB10	Investigate geophysical anomalies/assess soil	637147	1408190
HP01	Assess upgradient groundwater quality	TBD	TBD
HP02	Assess downgradient groundwater quality	TBD	TBD
HP03	Assess downgradient groundwater quality	TBD	TBD
HP04	Assess downgradient groundwater quality	TBD	TBD

2.4.6 Site Closeout Strategy

The proposed sampling strategy should aid in determining whether past DoD activities conducted at the former Burn Pit Area have impacted the surface and subsurface soil, and/or groundwater. Results of the RI will be compared to regulatory criteria, and used to determine the necessity and nature of remedial action to reduce the risk to human health and safety, and to the environment.

2.5 AOC 4 – CONSTRUCTION & DEMOLITION LANDFILL

2.5.1 AOC 4 is a construction and demolition (C&D) landfill located at the south end of SADVA (Figure 2). USATHAMA conducted an assessment of SADVA in 1980 using historical documents from various agencies, and aerial photographs from 1940, 1952,1961,1963,1968,1974, and 1977. The historical documents did not acknowledge any dumping by the Army during its operations at AOC 4. USATHAMA reports that the AOC 4 area was open space and inactive, based on air photos from 1940, 1952, 1961, 1963. An air photo in 1968 reportedly showed that active dumping was occurring around the Signal Corps building at AOC 4. Active dumping and expansion at AOC 4 reportedly continued through 1989, following DoD ownership of the property.

2.5.2 The Archival Search Report interpreted historical black and white aerial photography, and one color infrared image. Evidently, the photos are not the same ones examined by USATHAMA in 1980, since the dates are different. The Archival Search Report states that the October 1969 air photo does not show signs of disturbance at AOC 4, and that the Signal Corps building and its access road are clearly visible. The photo from 1973 shows activity immediately surrounding the Signal Corps building, suggesting a possible dump site. The Archival Search Report indicates that the sequence of available imagery suggests that activity at this site commenced sometime between October 1969 and 1973, after the DoD relinquished ownership of the property. Considering the fact that Army operations at SADVA were declining since 1963, and aerial photography provides evidence that activity at AOC 4 began after October 1969 (the year that DoD transferred ownership) it is recommended that no further investigation be performed at AOC 4 by DoD.

2.6 AOC 5 - DLA/DNSC VOORHEESVILLE DEPOT

The discussion of AOC 5 is organized in a slightly different fashion because a significant amount of detailed documentation exists for this parcel, as opposed to the other SADVA AOCs. The discussions in this section have been organized to maximize the use of background information about site use, the composition of materials stored onsite, and the mechanisms and pathways by which these materials might enter the environment and migrate off-site.

2.6.1 Background

2.6.1.1 The Voorheesville Depot is currently owned by the Federal Government and operated by the Defense Logistics Agency (DLA), Defense National Stockpile Center (DNSC). The facility is operated under the National Stockpile Program for the purpose of storing metallurgical ores and materials necessary for manufacturing defense materials, or strategic materials used in national defense.

2.6.1.2 The Voorheesville Depot is situated adjacent to the southwest corner of the Northeast Industrial Park. The Depot is bounded on the north by open land of the former SADVA, on the northeast by the Northeast Industrial Park, and on the east by open land and a wooded area. Black Creek is located approximately 1,600 feet east of the site. County Route 201 is located along the southern and western boundaries of the site.

2.6.1.3 The Voorheesville Depot currently consists entirely of outdoor storage of strategic metals. The facility occupies approximately 35.5 acres and contains two buildings, a guard trailer and an administration trailer. There are three workers typically present on-site; a contract security guard and two DLA workers. The entire site is relatively flat and covered with gravel. As of late 1998, approximately 249,577 square feet of the 1,243,698 square feet of usable open storage area was occupied. Figure 13 presents a detailed site map with locations of the trailers and storage piles, as well as identification of the materials on-site as of late 1998.

2.6.1.4 Security of the entire facility is maintained by a six-foot high chain-link fence topped with three strands of barbed wire located around the perimeter of the Depot. The main entrance to the Depot is guarded 24 hours a day by contracted security personnel.

2.6.1.5 The Depot has its own septic field for sanitary sewage from the sinks and toilets in the guard trailer. Surface water drainage from the Depot flows into drainage ditches around the perimeter of the site. The drainage ditches formerly flowed towards the eastern side of the site and eventually into Black Creek. During Spring 1999, modifications to the surface drainage features at the site redirected the flow of surface water into two retention basins located at the east and west corners of the site. Those modifications have, for the most part, eliminated or greatly reduced the off-site discharge of surface water, except during periods of prolonged, heavy precipitation. There are no habitats for threatened or endangered species within 0.5 miles of the Depot. The nearest wetland is approximately 700 feet east of the Depot.

2.6.2 Site History

2.6.2.1 During World War II, the United States became critically short of chrome and manganese ores used in the manufacturing of steel for the war effort. The National Stockpile Program was developed to create depots strategically located across the country. The Voorheesville Depot was originally part of the Schenectady Army Depot, but is now a separate 35.5-acre parcel owned by the General Services Administration and operated by the DLA as a satellite storage area for the Scotia Depot.

2.6.2.2 Materials that have been stored at the Voorheesville Depot in outdoor stockpiles or in drums in outdoor storage areas included aluminum, aluminum oxide, columbium/tantalum, copper, ferrochrome, lead, and zinc. Most of the ground surface at the Depot has been covered by stockpiled materials or storage areas at one time or another.

Figure 13 AOC 5 Site Plan

2.6.2.3 Operations at the Depot currently consist of maintenance and movement of the stockpiled materials from one depot to another, or sale of the commodities. All supporting operations related to maintenance of the Depot are conducted out of the Scotia Depot. Approximately 88,990 tons of ferrochrome, aluminum oxide, lead and zinc were stored at the Voorheesville Depot as of late 1998. Lead (ingots), zinc (slabs), aluminum oxide (in drums), and ferrochrome (in drums) are stored outdoors on gravel surfaces and dunnage wood. Ferrochrome in bulk form is stored outdoors on concrete pads.

2.6.3 Regulatory Status

2.6.3.1 There have never been any underground storage tanks at the Voorheesville Depot. Hazardous waste materials are not typically generated during site operations, and no on-site hazardous waste disposal has been documented.

2.6.3.2 Low-level radioactive columbium/tantalum was stored in drums on-site from June 1988 to August 1990. The DNSC has a low-level radioactive license (STC 133) from the Nuclear Regulatory Commission (NRC) that lists each facility containing radioactive materials. After the drummed materials were removed from the Voorheesville Depot, a close-out radiological survey was conducted in late 1990 and early 1991. The Voorheesville Depot was officially removed from the NRC license in 1994.

2.6.3.3 There are periodic inspections of the stockpiled materials at the Depot by DNSC personnel. Documentation of these inspections is available in the facility records.

2.6.4 Previous Investigations

2.6.4.1 A site visit conducted on June 2, 1998, assessed the potential for stockpiled materials or wastes to be released to the environment which could result in a potential threat to human health and the environment. The assessment was performed pursuant to the United States Environmental Protection Agency (USEPA) Guidance for Performing Preliminary Assessments under CERCLA (EPA/540/6-91/013).

2.6.4.2 A Preliminary Assessment (PA) Report for the Voorheesville Depot, issued in December 1998, developed hypotheses concerning the potential for contamination to exist, and concluded a site investigation is necessary to test the hypotheses (Parsons ES, 1998). Samples of various environmental media are proposed to identify the presence and migration of contamination. The results will help determine whether future sampling will be needed to characterize the magnitude and extent of any identified contamination.

2.6.5 Conceptual Site Model

2.6.5.1 Based on the results of the PA scoring, and in conjunction with known environmental conditions, the primary pathways by which hazardous substances may be released and migrate are soil, surface water/sediment, and groundwater. The air pathway is not considered to have the potential for a release or for contaminant migration. Resources stored at the Depot are either stored in drums or are in solid metal form and therefore unlikely to undergo erosion. Therefore, air samples are not proposed for the investigation. However, it is possible that contaminated soil, if present, could become airborne and migrate off-site as fugitive dust. This pathway will be investigated by assessing surface soil quality as a first step.

2.6.5.2 The hazardous substance release mechanism is the same for all three pathways. It is hypothesized in the PA report that the hazardous substances from the outdoor metals stockpiles could be leached by exposure to precipitation and enter the surrounding soil, surface water/sediment and groundwater via storm water runoff and infiltration. This hypothesis is based on results of several studies conducted by DNSC that suggest metals can leach from the stockpiles of metals (Parsons ES, 1998).

2.6.5.3 It is hypothesized that the current and former outdoor metals stockpiles at the Voorheesville Depot have the potential to leach hazardous substances, and potentially release them to the soil, groundwater, and surface water (and associated sediment) pathways. To test these hypotheses and suspected source area releases, the investigation includes an environmental sampling and analysis program.

2.6.6 Project Objectives

Some of the minerals within the stockpiles are identified as CERCLA hazardous substances which could be contaminants if they have migrated to, or been deposited in, the soil, surface water/sediment, and groundwater. The project objective is to assess whether individual sources within AOC 5 are leaching, or have leached, metals into the soil, groundwater, and surface water/ sediments. Because there are a variety of different existing and historical activities or areas on-site which could act as source areas, this project objectives section has been organized by potential source area to explain which of these potential source areas will be investigated, and why. These sources are discussed in the following subsections.

2.6.6.1 Materials Currently Stored Outside

2.6.6.1.1 Ferrochrome

2.6.6.1.1.1 Ferrochrome is stored in lump form in two large piles (high carbon and low carbon) on a concrete pad and in drums. The lump ferrochrome consists of dense, irregularly-shaped chunks, typically ranging from four inches to 12 inches in length, and has a silvery metallic appearance with a fine to coarse crystal structure. It is composed of approximately 67 to 71 percent chromium, up to 27 percent iron, and 0.05 to 8 percent carbon. Traces of antimony, manganese, arsenic, lead, tin, phosphorus, sulfur and zinc may also be present. During the site inspection, the concrete pad was observed to be cracked and deteriorated at several locations. A six-inch high concrete block containment wall is present around the perimeter of the pad. The block wall was observed to be crumbled and deteriorated at several locations. The drums of ferrochrome are stored on a gravel surface. The total quantity of ferrochrome stored on-site as of late 1998 was 21,185 tons.

2.6.6.1.1.2 Chromium in soil mainly exists as insoluble oxide (Cr_2O_3), and is not very mobile in soil. Organic matter in soil will convert soluble chromium (VI) to insoluble Cr_2O_3. Soluble and unabsorbed chromium (VI) and (III) complexes in soils may leach into groundwater.

2.6.6.1.2 Lead

2.6.6.1.2.1 Lead bars (ingots) are stored on dunnage wood and gravel surfaces. The lead bars are bound in small bundles that are stacked in long rows approximately five to six feet high. Approximately 14,924 tons of lead were stored on-site as of late 1998.

2.6.6.1.2.2 Lead is a naturally-occurring element and thus is persistent in the environment. Lead may be strongly sorbed to organic matter in soils. Therefore, most lead is retained in soil and typically very little is transported into surface or ground water. Downward movement of lead by leaching is very slow. Increased transport may be associated with low pH, or the formation of soluble chelates.

2.6.6.1.3 Zinc

2.6.6.1.3.1 Zinc slabs are stored on a gravel surface. The slabs are bound together in bundles that are stacked in long rows approximately five to six feet high. Approximately 44,986 tons of zinc were stored on-site as of late 1998.

2.6.6.1.3.2 Zinc is naturally-occurring, and the tendency of zinc to be sorbed to soils is affected by pH and salinity. Zinc tends to sorb to soil more readily at a high pH (pH >7). Zinc in a soluble form, such as zinc sulfate, is fairly mobile in most soils. However, relatively little land-disposed zinc is in the soluble form, and mobility is therefore limited by a slow rate of dissolution. Consequently, movement towards groundwater is expected to be slow.

2.6.6.1.4 Aluminum Oxide

2.6.6.1.4.1 Aluminum oxide is stored in drums on a gravel surface. The drums are stacked in long rows that are three drums high. Approximately 7,894 tons of aluminum oxide were stored on-site as of late 1998.

2.6.6.1.4.2 Aluminum occurs widely in silicates and because of its reactivity, is not found as a free metal in nature. Aluminum does not degrade in the environment. It can complex with many electron-rich anions, therefore transport depends on the ability of the ligand to move through various soils. Low pH rain waters may assist in the transport of aluminum. However, the drum storage mitigates the potential release of aluminum oxide at the site.

2.6.6.2 Commodities Historically Stored On-Site

In the past, two other commodities were stored outside, but are no longer present on-site.

2.6.6.2.1 Copper

Copper was stored at the site on gravel surfaces until at least 1980. The copper was in the form of coils, rods, cakes or billets. The estimated volume of copper stored on-site is unknown but was greater than 2,673 tons in 1975.

2.6.6.2.2 Columbium-Tantulum

Low specific activity columbium-tantulum was stored in drums in the southeastern portion of the site from June 1978 to August 1990. Approximately 2,000 steel drums, totaling approximately 835 tons, were stored on concrete blocks. Monitoring of the stockpiled drums was conducted semi-annually, beginning in June 1978, by a Zonal Radiological Officer with a Geiger counter in accordance with stockpile storage and NRC regulations. Five drums were removed from the site in 1979, and the remaining drums were relocated to the Scotia Depot in August 1990. A close-out radiological survey was completed and the Voorheesville Depot was officially removed from the license by the NRC on February 9, 1994.

2.6.6.3 Other Materials and Potential Areas of Concern

Several other potential areas of concern were identified during the PA, but have not been included in the sampling program for the reasons described herein.

2.6.6.3.1 Herbicides

Herbicides have been used at the Depot to control vegetation growth around the base of the stockpiles. The volume used historically is unknown. Herbicides are not stored or disposed of on-site. Herbicides are applied by a contractor in accordance with accepted practice. Therefore, there is no source of herbicide contamination beyond normal use.

2.6.6.3.2 Septic System

The facility had a septic tank and leach field that was historically used to process sanitary sewage from the toilets in the trailers. The septic system was replaced approximately 15 years ago with a new leach field. The system is used to process only sanitary sewage from the sinks and toilets in the trailers. This system is not considered to be a contaminant source.

2.6.6.3.3 Dry Well

Historically there was a dry well on-site near the main trailer. The dry well was used for disposal of wash water from the sink in the trailer. The dry well was filled in approximately 15 years ago when the new septic system was installed. The new septic system processes both wash water from the sinks and water from the toilets. The dry well is not considered to be a contaminant source.

2.6.6.3.4 Drum Repainting

Paint and primer have been removed from the drums during repainting operations by using steel pellets in a “sand-blasting”-type process. The reported location of the “sand-blasting” area is shown on Figure 13. The “sand-blasted” materials were not collected. This area will be investigated.

2.6.7 Proposed Sampling Strategy

The proposed sampling strategy discussion is organized by migration pathway.

2.6.7.1 Soil Pathway

2.6.7.1.1 It is hypothesized in the PA report that the hazardous substances from the ferrochrome, zinc, and lead stockpiles could be leached by exposure to precipitation and enter the surrounding soil via infiltration. To test this hypothesis, two grab samples will be collected at each of six locations across the site. Figure 14 shows the sample locations. Grab samples will be collected at depths of 0 to 2 inches and from just below 2 feet via a hand auger.

2.6.7.1.2 The analyte list is focused on the contaminants most likely to be present in the potential source areas. The samples will be analyzed for the following metals:

Antimony
Arsenic
Beryllium
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Silver
Thallium
Zinc

2.6.7.1.3 The two sample depth intervals are intended to assess both presence and migration of the metals potentially leaching from the stockpiles. The 0 to 2-inch sample depth interval is to assess the presence of higher than normal levels of metals, and the potential for possible direct contact or fugitive dust threats (windblown soil leaving the site and being inhaled). The sample depth interval below 2 feet is to assess whether the metals are migrating downward through the soil column and potentially posing a risk to groundwater.

2.6.7.1.4 The three soil sample locations (SS01, SS02, and SS03) near the lead, zinc and ferrochrome stockpiles are intended to detect whether soil immediately adjacent to the stockpiles has been impacted. The remaining three samples (SS04, SS05, and SS06) are intended to determine whether soil in areas where historical stockpiles were present has been impacted. SS04 is also located in the former drum “sand-blasting”/repainting area. The results for these samples will be compared to four background soil samples (two from each depth interval) collected upwind in an area not believed to be affected by the outdoor storage piles (SS07 and SS08).

2.6.7.1.5 If the analytical data show that concentrations on-site are significantly above background, and above applicable regulatory criteria for direct contact with soils and for protection of groundwater (NYSDEC TAGM 4046), then recommendations for additional characterization of the nature and extent of contamination will be developed.

2.6.7.2 Surface Water/Sediment Pathway

2.6.7.2.1 It is hypothesized that the storage piles could generate leachate and storm water runoff which could be transported off-site to surface water and wetlands. Materials stored at the Depot are either stored in drums or are in solid metal form and therefore unlikely to undergo erosion. Results of the previously-described testing indicate that the ferrochrome, lead, and zinc stockpiles at the Voorheesville Depot have the potential to leach hazardous substances.

2.6.7.2.2 Storm water runoff from the Voorheesville Depot flows into a drainage ditch around the perimeter of the Depot. The water accumulates in retention basins in the eastern and western corners of the Depot. The retention basins have, for the most part, eliminated off-site surface water discharges, except during periods of prolonged, heavy precipitation. The drainage ditches around the Depot formerly flowed into Black Creek, located approximately 2,000 feet east of the Depot. Black Creek is classified by the NYSDEC as a Class C water body, suitable for fishing and fish propagation. Black Creek has an average flow of approximately 1 to 10 cubic feet per second (cfs).

2.6.7.2.3 To test the surface water/sediment release and migration hypotheses, surface water and sediment samples will be collected from six on-site locations along the perimeter drainage ditch and from six locations downstream of AOC 5 (Figure 14). Sediment samples will be collected from the upper 6 inches of sediment. The surface water and sediment samples will be analyzed for the same 13 metals as the soil samples.

2.6.7.2.4 The surface water samples will assess the potential that contaminants may have been transported by surface water off-site to the wetlands and Black Creek. Sediment samples will assess whether the sediments have accumulated metals which could possibly migrate off-site as suspended sediment during storm events. A surface water and sediment sample set (SW/SD01) will be collected from the drainage ditch along the northern portion of the site near the current stockpiles. This sample location will assess impacts from the current stockpiles to the drainage ditch and the wetlands located north of the site. A second surface water and sediment sample set (SW/SD02) will be collected from the drainage ditch to assess runoff on the western side of the site. A third surface water and sediment sample set (SW/SD03) will be collected from the drainage ditch near the southeastern corner of the site to assess runoff from the former outdoor metals storage areas. A fourth surface water and sediment sample set (SW/SD04) will be collected from the drainage ditch on the east side of the site. A pair of sample sets (SW/SD05 and SW/SD06) will be collected at infall points where storm sewers along Route 201 discharge onto the site. Samples SW/SD07 and SW/SD08 will be collected in the drainage pathways from AOC 5 to Black Creek, at the north and south ends of AOC 5, respectively. Samples SW/SD09 and SW/SD10 and SW/SD11 and 12 will be collected in Black Creek upstream and downstream of the discharge points for the drainage ditches leading from AOC 5.

Figure 14 AOC 5 Proposed Sampling Locations

2.6.7.2.5 The surface water results will be compared to Class A and Class C surface water standards. The sediment analytical results from the retention basins and ditches will be compared to the background surface soil sample results to assess the presence of elevated concentrations of metals, since the ditches are dry during certain times of year and occur as surface soil at those times. If significant contaminant concentrations attributable to the stockpiles are detected in the drainage ditches, then future off-site samples may be warranted. Potential impacts to Black Creek sediment will be assessed separately. Sediment samples collected from Black Creek will be compared to the NYSDEC "Technical Guidance for Screening Contaminated Sediments".

2.6.7.3 Groundwater Pathway

2.6.7.3.1 Given the shallow depth to groundwater at the site, it is hypothesized that the hazardous substances from the natural resource stockpiles could be leached from exposure to precipitation and enter the groundwater. Results of the previously referenced DNSC studies indicate that the ferrochrome, lead, and zinc stockpiles at the Voorheesville Depot have the potential to leach hazardous substances.

2.6.7.3.2 There are no primary targets identified for groundwater. Off-site groundwater sampling of residential wells south and west of the Depot was conducted in 1990 by the Albany County Health Department. Sampling results from those residential wells showed that groundwater quality is within the NYSDOH Drinking Water Standards. The residential wells south and west of the Depot are believed to be side gradient to, or upgradient of, the Depot. Therefore no off-site sampling is proposed in this investigation.

2.6.7.3.3 To test the groundwater release hypothesis, a groundwater sample will be collected from the on-site water well used to provide non-potable water to the bathrooms in the trailers (Figure 14). This well is approximately 32 feet deep and is located between the stockpiles and the residences south of County Route 201. The groundwater sample will be analyzed for the same 13 metals as the other samples. Groundwater and soil samples will also be collected from a series of four borings located upgradient (HP01) and downgradient (HP02, HP03, and HP04) of AOC 5. In each boring, a soil sample will be collected from the water table interface, and a groundwater sample will be collected with the Hydropunch at the top of the water table. The soil and groundwater samples will be analyzed for TAL metals.

2.6.7.3.4 Results from the groundwater samples and the deeper soil samples (below 2 feet) will be used to assess whether hazardous substances from the natural resource stockpiles are present in the groundwater beneath the site or have the potential to migrate to the groundwater.

2.6.8 Site Closeout Statement

The proposed sampling strategy should allow an assessment of the presence of hazardous substance sources on-site and whether those substances are migrating off-site and are posing a risk to human health and the environment. The sample results will be compared to the applicable regulatory criteria to determine whether remedial action is necessary to mitigate any identified risks to human health or the environment.

2.7 AOC 6 – WASTEWATER TREATMENT PLANT AREA

2.7.1 AOC 6 consists of the area surrounding the former SADVA wastewater treatment plant (WWTP). The Town of Guilderland had used the former SADVA WWTP prior to the construction of the new plant, which began in 1993 and was completed in 1995. The Town of Guilderland demolished the former SADVA WWTP and constructed the new WWTP in its place.

2.7.2 The Archival Search Report states that one small area in the northeast corner of AOC 6 was a possible dumping ground in 1952 (Figure 15). The construction of a sewage treatment plant over most of this area leaves one or possibly two small dumpsites along Black Creek that remain to be investigated. It is recommended that a site reconnaissance be performed in this area in an attempt to locate the boundaries of these dumpsites, so that a subsurface investigation can be performed.

2.7.3 If the area is open and/or shows visible evidence of mounding or landfilling activity, a series of test pits will be excavated to provide visual documentation of the presence or absence of fill. If fill materials are present, or the area appears to have been disturbed, at least one soil sample will be collected from each test pit and analyzed for TCL volatiles, semivolatiles, pesticide/PCBs and TAL metals. Six samples and analyses are shown on Table 3 for budget purposes. However, the need for, and scope of, any sampling will be a field decision based on the results of the site reconnaissance and test pit excavations, so the number of samples may vary.

2.8 AOC 7 – TRIANGULAR DISPOSAL AREA

Aerial photographs from the early 1940s indicate the presence of a possible dump in a triangular area located between railroad tracks at the south end of SADVA (Figure 2). No other written documentation has been found to confirm the presence of a dump area, or to indicate what materials were dumped there. During the 1990's, the USACE conducted geophysical surveys to investigate the presence of subsurface disposal areas. The geophysical survey results suggested that subsurface disposal areas or fill material may be present in this AOC.

2.8.1 Background

The following text describing historical activities is taken directly from the revised draft Archival Search Report (EAEST 1999) and the USACE RI Work Plan (USACE, 1999). It is intended to provide the reader with a better understanding of the rationale for the proposed sampling strategy at the Triangular Disposal Area.

Figure 15 AOC 6 Wastewater Treatment Plant Area Suspected Dump Areas

2.8.1.1 1941-1945 (WWII Time Period)

An aerial photograph analysis completed by Albany County included observations at a small area described by the County as a 2-acre dump just west of the U.S. Army Southern Landfill but east of the C&D Landfill in the southern portion of SADVA. Based on a review of a 1940s aerial photograph, the County noted that a 2-acre dump was located in a triangular junction of railroad tracks in this area. No storage containers or debris was noted in this area (Figures 2 and 16).

2.8.1.2 1946-1952 (Post-WWII through Korean Conflict)

Based on a review of a 1952 aerial photograph, Albany County noted that the site was inactive and partially revegetated.

2.8.1.3 1953-1968 (Post-Korean Conflict through Deactivation)

The County reported that, based on a review of aerial photographs from 1963 and 1968, the following was noted:

- 1963–The triangular section of railroad tracks no longer existed. The site consisted of partially revegetated open space.
- 1968–The site consisted of partially revegetated open space.

2.8.1.4 Post-DoD Use of Former SADVA

2.8.1.4.1 Albany County reported that, based on a review of aerial photographs from 1974 and 1977, the following was noted:

- 1974–The site consisted of partially revegetated open space.
- 1977–No change was noted in this area.

2.8.1.4.2 The tracks along the southern and eastern legs of the triangular area have been removed and the area is now surrounded by woods on all sides. No storage containers or debris were noted, which may mean that debris was buried. In a drawing dated August 1941, last revised December 1952, it is noted that two borrow pits were shown in the vicinity of this area, which may have provided soil cover for the dumping area.

2.8.2 Previous Investigation

2.8.2.1 In 1991, the U.S. Army Corps of Engineers retained OHM Remediation Services to conduct a field investigation of SADVA, which included an EM survey and monitoring well installation at AOC 7. The EM survey found one major anomaly that extended out of the investigation grid area toward the Southern Landfill. The anomaly indicated the presence of significant amounts of metal similar to a pipeline; however, the facility drawings showed no underground utilities in this area. As a result of this finding, OHM installed a shallow well (2AMW-7) in AOC 7 and collected soil and groundwater samples (Figure 16). Split-spoon samples revealed silt containing some cinders from 0 to 2 feet below ground, silty-clay with rubber tire fragments from 2 to 4 feet, followed by clay and silty clay layers containing gravel down to 15 feet, and

Figure 16 AOC 7 Triangular Disposal Area Previous Sampling Results then sand and gravel down to 21.5 feet, where auger refusal occurred. The soil samples from the boring showed elevated levels of semivolatile organics and various metals; the groundwater sample had a small amount of methylene chloride and xylenes.

2.8.2.2 In April 1999, Quantum Geophysics, Inc., completed a geophysical investigation under contract to USACE. The purpose of the investigation was to: 1) locate large metallic or other objects in the subsurface, 2) identify the horizontal and vertical boundaries of the former disposal areas, particularly the depth to and/or thickness of fill layers, 3) locate the shallow aquifer and evaluate the continuity of any confining layers, and 4) determine if a contaminant plume is present.

2.8.2.3 The investigation incorporated an EM61 metal detector survey, an EM31 ground conductivity survey, and an electrical resistivity imaging survey. Only about 0.5 acres of the 2-acre Triangular Disposal Area could be surveyed because of extensive brush cover. The area was surveyed in two sections; designated Area A and Area B, separated by piles of railroad ties over some of the area.

2.8.2.4 Three probable disposal areas were identified by Quantum in Area A and are designated 12, 13, and 14. Probable disposal areas 12 and 13 appear to contain buried metal debris. Area 14 is a ground conductivity anomaly that measures approximately 50 x 70 feet, and incorporates probable disposal area 13. The water table in Area A is at a depth of about 6.5 to 8 feet below ground. No confining layers are apparent in the resistivity profile for Area A, nor is there any suggestion of a contaminant plume.

2.8.2.5 Four probable disposal areas were identified by Quantum in Area B and are designated 15, 16, 17, and 18. Areas 15 and 16 are associated with buried metal debris; Areas 17 and 18 interpreted to be caused by a non-metallic, conductive material. A water table is not apparent in Area B, nor is there any suggestion of a contaminant plume. No confining layers are apparent in the resistivity data for Area B. Top of rock may be at depths between 40 to 50 feet below ground surface.

2.8.3 Conceptual Site Model

2.8.3.1 Impacted soil and groundwater, if they exist in AOC 7, could be acting as potential sources for hazardous substances. The substances potentially present in these source areas is unknown, therefore, a broad list of analytes has been proposed. The surface soil, subsurface soil, and groundwater are potential migration pathways that will be investigated. The potential exposure pathways are direct contract and/or ingestion of soil or groundwater by site workers or persons accessing the vicinity of this AOC. Samples of surface and subsurface soil, and groundwater will be collected and analyzed for a broad list of analytes to assess the presence or absence of impacts.

2.8.3.2 It is not clear from the field geologist's drill log where groundwater at well 2AMW-7 was encountered. The log indicates that the formation becomes saturated between 11 and 15 feet, but also lists the depth to groundwater encountered at 6.22 feet. This latter depth may actually be the measured depth to water upon completion of the well. The only contaminant found in the groundwater sample from 2AMW-7, other than a probable laboratory solvent (methylene chloride), was xylene. On the other hand, the well installation report states that "soil samples collected for laboratory analysis were taken from an interval of approximately zero to six inches above the water table". The soil sample from the boring showed elevated levels of semivolatile organics and various metals. Therefore, any contaminants in the soil sample are currently at or just above the water table, and could eventually migrate into the groundwater.

2.8.3.3 AOC 7 is located on dry, open ground between the US Army Southern Landfill and the Former Construction and Demolition Landfill. The Black Creek and associated wetlands are located about 800 feet to the west, and the property fenceline along Depot Road is also about 800 feet to the south. Private residences with water wells are located along this section of Depot Road, however, these residences are upgradient of the site based on the regional groundwater flow direction, so they probably would not receive groundwater contaminants if they were released from this AOC. Since trees and vegetation surround this area, airborne dust and particulates would presumably not pose a problem, unless the landowner initiates construction in the area.

2.8.4 RI Objectives

2.8.4.1 No previous sampling of soil or groundwater has been done within the boundary of the triangular area. Geophysical anomalies have been observed here, which may indicate the presence of buried fill areas. Therefore, the RI objectives in this AOC are as follows:

- Investigate the geophysical anomalies with test pits to assess the presence or absence of fill materials.
- Characterize the impacts on surface soil at the Triangular Disposal Area; analyze samples for VOCs, SVOCs, PCBs/pesticides and metals.
- Characterize the impacts on subsurface soil and fill at the Triangular Disposal Area; analyze for VOCs, SVOCs, PCBs/pesticides and metals.
- Characterize groundwater impacts at the Triangular Disposal Area; analyze samples for VOCs, SVOCs, PCBs/pesticides and metals.

2.8.5 Proposed RI Sampling Strategy

To accomplish the project objectives, the results of the geophysical survey were used to guide the number and locations of soil and groundwater samples. The locations of the observed anomalies and proposed sample locations are shown in Figure 17. Surface and subsurface soil samples will be obtained from four areas where ground conductivity anomalies were identified during the geophysical survey (Table 6). Soil samples will be collected at the surface and at five-foot intervals until groundwater is encountered. Samples for laboratory analysis will be taken at the surface, within the fill zone, and immediately beneath the fill zone and analyzed for VOCs, SVOCs, pesticides/PCBs and metals. At three other locations, a groundwater sample will be collected from a 10-foot deep boring using the Hydropunch^{TM}. In addition, two adjacent wells

Figure 17 AOC 7 Proposed Sampling Locations/Geophysical Results associated with the Southern Landfill will be sampled. The intent of the groundwater sampling scheme is to assess groundwater quality upgradient, within, and downgradient of AOC 7. Given the close proximity of other source areas, such as the C&D Landfill and the Southern Landfill, it may be difficult to distinguish groundwater impacts associated with AOC 7 from impacts associated with other sources.

Table 6 AOC 7 Sampling Strategy

Sample ID	Rationale	Northing	Easting
AOC7SB01	Characterize surface and subsurface soil quality	640540	1401385
AOC7SB02	Characterize surface and subsurface soil quality	640465	1401227
AOC7SB03	Characterize surface and subsurface soil quality	640610	1401264
AOC7SB04	Characterize surface and subsurface soil quality	640666	1401206
AOC7HP01	Characterize groundwater quality	TBD	TBD
AOC7HP02	Characterize groundwater quality	TBD	TBD
AOC72AMW-5	Characterize groundwater quality in well 2AMW-5	TBD	TBD
AOC72AMW-7	Characterize groundwater quality in well 2AMW-7	TBD	TBD

2.8.6 Site Closeout Statement

The proposed sampling strategy should aid in determining whether past DoD disposal activities conducted at the former Triangular Disposal Area have impacted surface and subsurface soil and/or groundwater. Results of this investigation will be compared to applicable regulatory criteria, and used to determine the necessity and nature of remedial action to reduce the risk to human health, safety and the environment.

2.9 AOC 8 – BLACK CREEK

2.9.1 Background

Black Creek is an AOC because previous investigations have shown the presence of VOCs and metals in surface water and/or sediment at concentrations above applicable regulatory criteria. In 1998, the USACE investigated impacts to Black Creek as part of an investigation at Building 60 at SADVA. Building 60 is in the northeast portion of the site, near AOC 6 (Figure 2). Building 60 was investigated because petroleum contamination was encountered during excavation for a new building by the present site owner. Black Creek is a tributary to Watervliet Reservoir, which is the local drinking water supply source.

2.9.2 Previous Investigation

2.9.2.1 A focused groundwater and surface water investigation was performed by USACE in 1998. The investigation objectives were to determine whether petroleum-related contamination in the Building 60 Area had impacted the groundwater or Black Creek, and whether Black Creek has been impacted by any other contaminants of concern at the SADVA site.

2.9.2.2 USACE found that the surface water of Black Creek had not been adversely impacted in the vicinity of the Building 60 Area at the north end of the site. However, lead was detected in the sediment at concentrations that exceeded the Lowest Effect Level identified in the NYSDEC's Technical Guidance for Screening Contaminated Sediments (Figure 16). Although the sediment in the Building 60 Area appeared to be impacted by lead, there is not enough data to determine whether it exceeds background concentrations of lead.

2.9.2.3 In addition, the overall quality of Black Creek was examined. The analytical results of the surface water samples were compared to the ambient water quality standards listed in the NYSDEC Technical & Operational Guidance Series (TOGS). The analytical results were also compared to the background sample (SW-2). Based on these comparisons, there appeared to be a limited impact on the quality of the surface water within Black Creek. Aluminum, iron, lead, and 1,1,2,2-tetrachloroethane were detected above the regulatory criteria in a few of the sampling locations located upstream, downstream and adjacent to SADVA (Figure 18).

2.9.2.4 In completing the archival search for the Building 60 area, post-DoD activities were identified that may have contributed to the on-site contamination. As a result, no further sampling in Black Creek downstream of Building 60 is proposed for this RI. The RI will focus on areas upstream of the Building 60 area.

2.9.3 Conceptual Site Model

2.9.3.1 The potential source areas for AOC 8 are the Southern Landfill (AOC 1), the Bivovac Area (AOC 2), the former Burn Pits Area (AOC 3), and the Voorheesville Depot (AOC 5). The media potentially impacted are surface water and sediment in the creek, and the ditches/outfalls leading to the creek from the noted AOCs. Impacts by VOCs and metals have already been indicated by the data collected to date, although the specific source has not been defined.

2.9.3.2 The migration pathways would be surface water and sediment flowing off-site, and the exposure pathways would be direct contact with, or ingestion of, surface water and/or sediment. To assess the presence or absence of impacts to Black Creek which are attributable to DoD activities, samples of surface water/sediment on-site and upstream of the site will be collected.

2.9.3.3 Black Creek is the primary drainage feature in the vicinity of SADVA. Surface water drainage over the mostly impervious surface area of SADVA is diverted into Black Creek. It is possible that contaminants from other AOCs may have entered the surface water and sediment within the creek.

Figure 18 AOC 8 Black Creek Previous Sampling Results/Proposed Sampling Locations

2.9.3.4 The New York Bureau of Watershed Management considers this section of Black Creek a Class C water body, suitable for human consumption of fish in fresh waters. Surface water sample results will be compared to both Class A (drinking water standards) and Class C standards because Black Creek is a tributary to Watervliet Reservoir.

2.9.4 RI Objectives and Proposed Sampling Strategy

- Assess the impacts that the identified AOCs have had on Black Creek.
- Resample the surface water and sediment in locations SW/SD1, 2, 3, 4, 5, and 12 as well as upstream and downstream of AOC 3 and analyze for VOCs, SVOCs, pesticides/PCBs, and metals (the respective new sample designations are SW/SD20, 19, 18, 17, 16, 15, 24 and 14).
- Determine background levels for Black Creek by collecting three sediment and surface water samples upstream of the former SADVA property boundaries south of County Road 201. Sample locations are to be determined in the field. Rights-of-entry will be required. Analyze for VOCs, SVOCs, PCBs/pesticides, TOC, and metals (Table 7).

2.9.5 Site Closeout Statement

The proposed sampling strategy should aid in determining whether past DoD activities conducted at SADVA have contaminated surface water and/or sediment downgradient of specific AOCs. Results of this investigation will be compared to regulatory criteria, and used to determine the necessity and nature of remedial action to reduce the risk to human health, safety and the environment.

Table 7 AOC 8 Sampling Strategy

Sample ID	Rationale	Northing	Easting
SW14/SD14	Assess downstream of AOC 3	637315	1408148
SW15/SD15	Assess downstream of AOC 5	637527	1402439
SW16/SD16	Assess downstream of AOC 1	639545	1403133
SW17/SD17	Assess downstream of AOC 1	639729	1402356
SW18/SD18	Assess downstream of AOC 7	639789	1401552
SW19/SD19	Assess surface water/sediment as it enters the site	639412	1400521
SW20/SD20	Assess surface water/sediment as it enters the site	640325	1400280
SW21/SD21	Offsite, upstream locations to be determined in the field	TBD	TBD
SW22/SD22	Offsite, upstream locations to be determined in the field	TBD	TBD
SW23/SD23	Offsite, upstream locations to be determined in the field	TBD	TBD
SW24/SD24	Assess upstream of AOC 3	TBD	TBD

2.10 AOC 9 – BUILDING 60 AREA

AOC 9 is the Building 60 Area located in the northeast corner of NEIP (Figure 2).

2.10.1 Background

Potential petroleum contamination was encountered in February 1998 during excavation at the NEIP by the current tenant of the site. The excavation activities were initiated for the construction of three buildings located just north of Buildings 60 and 77. A site visit was conducted on February 23, 1998 by members of the U.S. Army Corps of Engineers and the NYSDEC. Review of previous investigations and site maps indicated that the Building 60 Area had been used by the DoD for vehicle maintenance and contained a total of seven large underground storage tanks (USTs). Although it was believed that the tanks had been removed in recent years, no documentation or soil sample results were available for confirmation.

2.10.2 Previous Investigations

2.10.2.1 Based on the site visit, the U.S. Army Corps of Engineers Rapid Response Team was mobilized to the site on March 2, 1998 to characterize the nature and extent of soil contamination. The Rapid Response Team excavated areas of suspected contamination and stockpiled the soil for testing/disposal. In addition, excavation pits were dug around the footprint of the buildings being constructed to ensure that contamination was not present (Figure 19). A total of ten excavation pits (one of which included an area around an oil/water separator) were dug, and an oil/water separator and some pipelines were removed. Surface water which collected in the excavation pits was pumped into a 6,500-gallon storage tank for testing/disposal. Soil, surface water, and sludge from the piplines were tested for VOCs, SVOCs, PCBs, TPH (gasoline and diesel range organics), and metals in compliance with the Spill Technology And Remediation Series (STARS) Memo #1: Petroleum-Contaminated Soil Guidance Policy, dated August 1992. Based on the results of the chemical analyses, VOCs and SVOCs are identified as the contaminants of concern in this area.

2.10.2.2 The Rapid Response Team also performed four tank excavation trenches in an area where USTs were suspected to exist. During the excavation activities, no evidence was found to indicate that USTs still exist in this area. However, documents of tank closure/removal have likewise not been found.

2.10.2.3 During test pit excavations, a 12-inch clay pipe was excavated to nearby Black Creek. The clay pipe appeared to originate at the oil/water separator. This clay pipe was removed, and appeared to be an abandoned storm sewer line which acted as a discharge from the oil/water separator to Black Creek.

2.10.2.4 In addition, the overall quality of Black Creek was examined. The analytical results of the surface water samples were compared to the applicable NYSDEC ambient surface water quality criteria. The analytical results were also compared to the background sample (SW-2).

2.10.2.5 Stream samples SD6/SW6, SD7/SW7, and SD8/SW8 were used to evaluate the potential impact from petroleum-related contamination in the Building 60 Area. As such, only analyses for VOCs, SVOCs, and lead were evaluated. Samples SD7/SW7 are located at a storm water outfall in Building 60 Area. This storm water outfall was connected to the oil/water separator, and both the outfall pipe and the oil/water separator were removed during the Immediate Response Action. Samples SD6/SW6 are located 300 feet upstream of SD7/SW7, and samples SD8/SW8 are located 300 feet downstream of SD7/SW7. The location of these samples enabled assessment of the quality of the surface water and sediment in the creek entering and exiting the Building 60 Area.

2.10.2.6 The analytical results indicate that the surface water of Black Creek in the Building 60 Area was not adversely impacted at the time the samples were collected.

2.10.2.7 The sediment in the Building 60 Area appears to be impacted by lead, however, there was insufficient background or upstream data to definitively identify impacts or source areas. It is possible that the former discharge pipe from the oil/water separator has contributed to the sediment contamination within Black Creek, however, the results are inconclusive. Additional information is required to determine if remediation is necessary and what risks to the environment are present.

2.10.3 Conceptual Site Model

2.10.3.1 Further characterization of the impacts on Black Creek has been addressed by the investigation at AOC 8 (see Section 2.9). Investigative activities at AOC 9 will focus on the groundwater and soil migration pathways.

2.10.3.2 The potential source area for AOC 9 was the oil/water separator, which has been removed. A storm sewer pipeline leading from the oil/water separator to Black Creek has also been removed. The remaining potential source area would be residual contamination in the soil which could have originated from pipeline leaks. Lateral migration to the creek via the soil and pipeline backfill, and downward migration to the groundwater table are the potential pathways being investigated.

2.10.4 RI Objectives and Proposed Sampling Strategy

2.10.4.1 Soil along the former pipeline route will be assessed to determine whether residual contamination exists (Table 8). Four soil borings will be conducted approximately 50 feet apart between Building A and Black Creek. Borings will be continuously sampled to 10 feet below ground surface. Two soil samples from each boring will be collected and analyzed for TCL volatiles and semivolatiles, and TAL metals. Samples chosen for laboratory analysis will be based on visual or other field evidence of contamination. The second sample from each boring will be to determine the vertical extent of contamination. Borings will be drilled deeper, if necessary, when visual or other field evidence suggests the lower extent of contamination has not been reached.

2.10.4.1 Groundwater will be assessed by sampling four wells in the vicinity of AOC 9 (MW-9, COEMW-10, COEMW-11, and COEMW-12 – refer to Figure 19). Groundwater samples will be analyzed for TCL volatiles and semivolatiles, and TAL metals.

Table 8 AOC 9 Sampling Strategy

Sample ID	Rationale	Northing	Easting
SB01	Assess soil quality along pipeline	TBD	TBD
SB02	Assess soil quality along pipeline	TBD	TBD
SB03	Assess soil quality along pipeline	TBD	TBD
SB04	Assess soil quality along pipeline	TBD	TBD
MW-9	Assess groundwater quality	TBD	TBD
COEMW-10	Assess groundwater quality	TBD	TBD
COEMW-11	Assess groundwater quality	TBD	TBD
COEMW-12	Assess groundwater quality	TBD	TBD

2.10.5 Site Closeout Statement

The soil and groundwater data will provide an assessment of the presence of residual contamination. If concentrations are below Class GA groundwater and TAGM 4046 soil criteria, then AOC 9 can be closed out. If regulatory criteria are exceeded, the need for remediation will be assessed.

2.11 QUALITY ASSURANCE/QUALITY CONTROL

2.11.1 During the RI, QA/QC samples will be collected to ensure that the sample results are representative, accurate, and precise. The QA/QC samples will be analyzed for the same analytes as the corresponding field samples. The field duplicate samples are intended to assess the representativeness of the sampling procedures. Four soil, three sediment, two groundwater, and two surface water field duplicate samples will be collected. The laboratory matrix spike and matrix spike duplicate samples (MS/MSD) samples are intended to assess the presence of analytical interferences caused by the sample matrix. One water source blank (SB-1) will be collected and analyzed to document the purity of the water used for the final decontamination rinse. A trip blank sample will be analyzed for VOCs and accompany each day’s shipment of water samples scheduled for VOC analysis to assess impacts of sample handling and shipping.

2.11.2 Data validation will be in accordance with USEPA guidance for data validation, and consist of Level IV validation on 10 percent, and Level III validation on 100 percent, of the field samples analyzed for TCL volatiles, semivolatiles, pesticide/PCBs, and TAL metals.

Figure 19 AOC 9 – Building 60 Area

2.12 SAMPLING EQUIPMENT AND PROCEDURES

The sampling equipment and procedures are outlined in Section 4 of the General Site Investigation Work Plan (Appendix A).

2.13 SAMPLE DESIGNATION

A sample numbering system is indicated on Table 3, based on Section 5.2 of the General Site Investigation Work Plan. The sampling locations will be designated with the prefix identifying the AOC that they belong to.

2.14 SAMPLE HANDLING AND ANALYSIS

Sample custody and documentation procedures are described in Section 5 of the Site Investigation Work Plan. The analytical procedures will utilize USEPA SW846 methods and be conducted and reported in accordance with the NYSDEC Analytical Services Protocol (ASP) Category B deliverables. Table 9 lists the analytical holding times specific to the NYSDEC ASP requirements. Further details of the SW846 methods are outlined in Section 6 of the General Site Investigation Work Plan (Appendix A). Note that in order to achieve the lower detection limits for PAHs, the method SW8310 will be run on soil samples in conjunction with the TCL semivolatile (SW8270) method.

TABLE 9
NYSDEC ASP HOLDING TIMES FOR LABORATORY ANALYSES

(ALL HOLDING TIMES ARE FROM VTSR)

PARAMETER	METHOD	WATER	SOIL
Metals	SW6010B	6 months	6 months
Mercury	SW7470/7471	26 days	26 days
Semi-volatile Organics; PAHs	SW8270; SW8310	5 days from VTSR to extraction; 40 days from extraction to analysis	10 days from VTSR to extraction; 40 days from extraction to analysis
Volatile Organics	SW8260	10 days	10 days
Pesticides	SW8081	5 days from VTSR to extraction; 40 days from extraction to analysis	10 days from VTSR to extraction; 40 days from extraction to analysis
PCBs	SW8082	5 days from VTSR to extraction; 40 days from extraction to analysis	10 days from VTSR to extraction; 40 days from extraction to analysis
TOC	SW9060(1)	28 days	28 days
Dioxin	SW8290	5 days to extraction; 40 days to analysis	5 days to extraction; 40 days to analysis

VTSR - validated time of sample receipt.

(1) - NYSDEC prefers the use of the USEPA-approved Lloyd Kahn method for sediment samples.

SECTION 3

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APPENDIX A

GLOBAL FIELD SAMPLING PLAN

APPENDIX B

SITE-SPECIFIC AND GENERAL HEALTH AND SAFETY PLAN

APPENDIX C

SAMPLING EQUIPMENT AND PROCEDURES FOR FIELD MEASUREMENTS AND MONITORING

APPENDIX C

SAMPLING EQUIPMENT AND PROCEDURES FOR FIELD MEASUREMENTS AND MONITORING

AQUIFER TESTING

The following section specifies the methods that will be used to conduct aquifer pumping tests. A constant-rate test or a constant-head test will be conducted based upon the anticipated well yield estimated during well installation. A constant-rate test will be conducted if the well capacity is greater than two gpm. A constant-head test will be conducted if the well capacity is equal to or less than two gpm.

Equipment and Supplies

- Electronic data logger and transducers (Hermit Model SE 1000C or 2000 or equivalent)
- Flow meter with capacity suitable to the pumping rate
- Five-gallon bucket marked in half-gallon increments
- Electronic water level indicator (Solinist or equivalent)
- Field computer
- Field printer
- Submersible pump, piping, and wiring
- Generator
- Stop watch
- Lighting
- Personal protective equipment in accordance with the project Health and Safety Plan
- Field book and project plan
- Tanker truck(s) or moveable storage tank

Constant-Rate Test

If the sustained pumping rate is greater than two gpm, the pumping test will be conducted as a constant-rate test. The test will be conducted for a period of 4 hours. The pumping rate for the test will be conducted at the maximum rate of 5 gpm or until the well is dry. After the pump is turned off, water levels will be measured for a period of 2 hours.

Immediately prior to starting the pump, the water levels will be measured in all designated wells to determine static water levels. These data and the times of measurement will be recorded in the field notebook.

During the pumping and recovery period, water level readings will be collected in the following wells: the pumping well, a bedrock well (AMW-2), a till well (ACE-6) and a fill well (AMW-1). The water levels will be measured using a data logger equipped with pressure transducers. The data loggers will be set to record data on a logarithmic time schedule. Water levels will also be measured with a water level indicator, as needed, in the wells equipped with transducers, using the following schedule as a guideline:

- Every minute for 10 minutes.
- Every 10 minutes for 50 minutes
- Every ½ hour for the remainder of the test.

During the recovery period, the data loggers will be reset to initiate a new logarithmic recording schedule.

During the test, discharge rates will be measured using a flowmeter every ½ hour to verify that the flow rates are remaining constant and to measure cumulative flow so that an average flow rate can be determined.

Constant-Head Test

If the sustained pumping rate is less than two gpm or is so low that a constant-rate cannot be reasonably maintained, a constant-head test will be conducted. The constant-head test will be conducted for a maximum of 4 hours. The pump will be placed at the bottom of the well and run at a rate to maintain a constant drawdown or dry the well. Once the pumping rate is established, no attempt will be made to adjust pumping rates during the remainder of the test. Following completion of the test, recovery measurements will be taken for 2-hours.

The analysis of a constant-head test is dependent upon obtaining accurate time-discharge readings. The discharge rate will measured by timing the filling of the 5-gallon bucket with a stopwatch on the following schedule:

- Every minute for 10 minutes.
- Every 10 minutes for 50 minute.
- Every ½ hour for the remainder of the test.

The discharge readings will be verified with a flow meter on the same schedule.

Time-drawdown and distance-drawdown data are not used in constant-head analyses. Therefore, only manual water-level measurements will be made during the pumping phase of the test. Water levels in the pumping well, and the two observation wells will be manually measured once before the test, once a day during the test, and just before the recovery period. Additional measurements will be made during the recovery period as described below.

Time-drawdown data from the recovery period will be analyzed using variable pumping-rate analysis methods. Therefore, during the recovery period, the data loggers will be set to initiate a logarithmic recording schedule. Water levels in the observation wells will be measured by hand using the schedule and procedures described for constant-rate tests.

Data Analysis

The initial analysis of the time-drawdown data will be according to the Theis non-equilibrium procedures (curve matching), and the Jacob modified (time-drawdown and distance-drawdown; straight line) procedures. Other analytical procedures, including Hatush leaky aquifer analysis, may be utilized according to the response of the aquifer. Water level adjustments will be made if if adjustments due to saturated thickness reductions or partial penetration are appropriate.

Time-discharge data will be initially analyzed using the Jacob-Lohman method. The time-drawdown recovery data from the constant-head test will be analyzed using the Kawecki method. The constant-rate analytical methods described above may also be used to analyze the constant-head recovery data. In that case, the average flow rate of the constant head test will be used in the analytical formulas.

APPENDIX A

GLOBAL FIELD SAMPLING PLAN

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SECTION 1
PROJECT DESCRIPTION

1.1 The Defense National Stockpile Center (DNSC) operates depots across the country for the purpose of stockpiling resources deemed to be critical to national security. The primary materials stockpiled are: raw ore resources, processed ore storage in ingot form, and containerized materials stored in warehouses. Most of the raw and processed ores are stored outdoors in piles that are not covered. The depots have been operable since the 1940s. The need for the stockpiled minerals has diminished due to the end of the cold war, and the DNSC is in the process of selling the materials and consolidating the remaining inventory at specific depots such that some depots can be closed.

1.2 In preparation for consolidating and closing some of the depots, an assessment was conducted to determine the likelihood for the sites to have been contaminated over the period of operation. The US Army Engineering Support Center Huntsville (USAESCH) was contracted to manage the performance of the Preliminary Assessment at 15 depots which include:

- Curtis Bay Depot, Maryland
- Fort Worth Depot, Texas,
- Hammond Depot, Indiana,
- LetterKenny Depot, Pennsylvania,
- Marrietta Depot, Pennsylvania,
- Mechanicsburg Depot, Pennsylvania
- New Haven Depot, Indiana,
- Point Pleasant Depot, West Virginia,
- Scotia Depot, New York,
- Sharonville Depot, Ohio,
- Somerville Depot, New Jersey,
- Voorheesville Depot, New York, and
- Warren Depot, Ohio.

1.3 The results of the Preliminary Assessments (Parsons ES, 1998) indicated that contamination is possible at these sites. It was recommended that a Focused Site Investigation (SI) be performed to collect samples from locations where contamination would have the highest likelihood of occurring in order to tests the hypotheses developed during the Preliminary Assessment. The LetterKenny and Mechanicsburg depots (Pennsylvania) are located completely within larger military establishments that are being investigated under the National Priorities List (NPL) program. No SIs are being proposed for these two DNSC depots because investigations conducted as part of the NPL program include these depots. The Focused Site Investigations will collect enough samples to confirm or deny the presence of contamination, but will not assess the magnitude and extent of contamination migration. Future sampling will be performed if necessary to assess the magnitude and extent of contamination.

1.4 The purpose of this document is to provide the sample collection, analytical, and data validation and reporting procedures that will be applied consistently at each of the depots. A specific addendum to this document will also be prepared for each depot specifying the hypotheses being tested, the number of samples being collected, the locations of the samples, and the specific analytes of interest. The combination of the depot specific addendum and this "global" work plan will provide all the information needed to collect and analyze the samples.

SECTION 2
PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 There are four organizations that will be involved in conducting the Focused Site Investigation as follows:

- DNSC - The DNSC owns the depots and is responsible for providing information and access to the sampling teams.
- USAESCH - the USAESCH is responsible to the DNSC for the overall management of the Focused Site Investigation project at each of the 13 Depots.
- Parsons Engineering Science (Parsons) - Parsons is contracted to the USAESCH for planning, collecting the samples, and preparing the Focused Site Investigation report summarizing the results of the sampling programs.
- Quanterra - Quanterra is the analytical laboratory that is responsible to Parsons for performing the specified analyses at each of the depots.

2.2 Figure 2-1 provides an organization chart depicting key personnel and responsibilities. Figure 2-2 presents a more detailed breakdown of the depot specific task managers and includes the analytical laboratory to be used for each site.

SECTION 3
PROJECT QUALITY ASSURANCE OBJECTIVES

3.1 DATA QUALITY OBJECTIVES

Data quality objectives (DQO's) are qualitative and quantitative statements that specify the quality and the level of the data required to support the decision making processes during each investigation. Guidance for the DQO development process is contained in *EM 200-1-2, Technical Project Planning Process* (USACE, 1998), *Guidance for Performing Site Inspections Under CERCLA* (EPA, 1992), *Data Quality Objectives for Superfund* (EPA, 1994) and *Planning for Data Collection: The Data Quality Objectives Process for Environmental Decisions,* Draft Guidance, Washington (Neptune, et al., 1991). The data collection objectives, the data uses, and the appropriate analytical data quality level(s) for each medium are identified in this section.

3.1.1 Project Objective

The overall objective of the field effort is to provide a summary of the types of hazardous substances which may be present at the depots while ensuring that the data collected are of known and documented quality and useable for the intended purposes. The collected samples and the data generated from these samples and other site-generated data are intended to provide the information necessary to determine whether there is a need for further site characterization. Guidance for the procedures to generate data of known quality is contained in *Engineer Regulation 1110-1-263* (USACE, 1998) and *Engineer Manual 200-1-6, Chemical Quality Assurance for HTRW Projects* (USACE, 1997). Samples will be collected from the locations where contaminants should be concentrated such as along drainage flow paths. A determination of whether contamination exists will be made by comparing concentrations of substances present to current Federal or State regulatory levels. If there are no published Federal or State levels for a substance, a qualitative comparison of the data will be made to the background levels established for a depot to assess the relative impact.

3.1.2 Analytical Data Quality Levels

The analytical data quality levels for the data acquisition program are defined as follows:

- <u>Screening analyses</u> will be performed using portable instruments, such as pH meters, temperature probes, photoionization detectors (PIDs), and radiological survey instruments. The portable instruments produce real-time, non-compound specific results that are typically used for health and safety and field operational monitoring. In addition, these instruments or field test kits may be used to: produce data for determining where to collect a sample to assess the presence of contamination; field screening of samples to be designated for laboratory confirmation analyses; and/or monitoring additional field operational parameters.

- Definitive analyses of organic and inorganic parameters will use EPA Wastewater Methods, SW-846 protocols, and special radionuclide methodologies as specified in Section 6 of this document. This data quality level provides compound-specific results with established accuracy and precision.

3.1.3 Analytical Quantitation Limits

Table 3.1 presents the quantitation limits for all definitive data quality level laboratory analytical methods, compounds and matrices to be addressed during the SI. Included in the table are any applicable Federal regulatory levels for all target compounds. If a State regulatory level requires lower quantitation limits be achieved, these variances will be addressed in the appropriate site-specific addendum.

3.1.4 Soil Samples

3.1.4.1 The collection objective for soils is to determine whether any hazardous substances are present at the sampling locations which may indicate physical transport and/or potential source areas. If present, an evaluation will be performed to determine the relative impact versus Federal and/or State regulatory levels or background levels. Soil sampling will be conducted at the locations most likely to contain hazardous substances.

3.1.4.2 Screening analyses will be performed in the field (volatile organic and radiological investigations) to help assure that the sample collected contains the highest substance concentrations on site. All collected soil samples will be sent to the laboratory for a variety of definitive analyses based on the depot history. The target levels for soil samples are presented in Table 3.1. Variations to the limits in Table 3.1 based on State requirements will be addressed in the site-specific addendum.

3.1.5 Surface Water & Sediment Samples

3.1.5.1 The collection objective for surface water and sediments is to determine whether any hazardous substances are migrating from potential source areas at the depots. If present, an evaluation will be performed to determine the relative impact versus Federal and/or State regulatory levels or background levels. Surface water and sediment sampling will be conducted at the locations on site most likely to contain hazardous substances.

3.1.5.2 All surface water and sediment samples collected will be sent to the laboratory for a variety of definitive analyses based on history of the site. The target levels for surface water and sediment samples are presented in Table 3.1. Variations to the limits in Table 3.1 based on State requirements will be addressed in the site-specific addendum.

3.1.6 Groundwater

3.1.6.1 The collection objective for groundwater is to determine whether any hazardous substances are present which could have migrated from potential source areas on the depot. If present, an evaluation will be performed to determine the relative impact versus

TABLE 3.1
PROJECT QUANTITATION AND DETECTION LIMITS

			Quantitation Limits		Method Detection Limits		State of New York Standards	
	Analysis/Compound	Method	Water (ug/L)	Soil (ug/kg)	Water (ug/L)	Soil (ug/kg)	Water (ug/L) (a)	Soil (mg/kg) (b)
	Volatile Organics (25 ml purge)							
1	1,1,1-Trichloroethane	SW8260B	1	5	0.267	1.616	5	800
2	1,1,2,2-Tetrachloroethane	SW8260B	1	5	0.264	1.902	5	600
3	1,1,2-Trichloroethane	SW8260B	1	5	0.281	2.19	1	
4	1,1-Dichloroethane	SW8260B	1	5	0.211	1.737	5	200
5	1,1-Dichloroethene	SW8260B	1	5	0.185	1.605	5	400
6	1,2-Dichloroethane	SW8260B	1	5	0.18	1.863	0.6	100
7	1,2-Dichloroethene(total)	SW8260B	1	5	0.411	1.186	5	300
8	1,2-Dichloropropane	SW8260B	1	5	0.265	1.958	1	
9	2-Butanone (MEK)	SW8260B	10	20	1.926	1.852		300
10	2-Hexanone	SW8260B	10	20	1.027	2.218		
11	4-Methyl-2-pentanone(MIBK)	SW8260B	5	20	0.764	1.617		1000
12	Acetone	SW8260B	10	20	0.894	2.571		200
13	Benzene	SW8260B	1	5	0.214	1.668	1	60
14	Bromodichloromethane	SW8260B	1	5	0.238	1.411		
15	Bromoform	SW8260B	1	5	0.289	1.584		
16	Bromomethane	SW8260B	2	10	0.659	0.644	5	
17	Carbon Disulfide	SW8260B	1	5	0.243	1.254		2700
18	Carbon Tetrachloride	SW8260B	1	5	0.267	1.219	5	600
19	Chlorobenzene	SW8260B	1	5	0.324	1.798	5	1700
20	Chloroethane	SW8260B	2	10	0.582	1.219	5	1900
21	Chloroform	SW8260B	1	5	0.241	1.695	7	300
22	Chloromethane	SW8260B	2	10	1.157	0.579	5	
23	cis-1,3-Dichloropropene	SW8260B	1	5	0.28	1.55	0.4	
24	Dibromochloromethane	SW8260B	1	5	0.294	1.852	5	
25	Ethyl Benzene	SW8260B	1	5	0.349	1.77	5	5500
26	Methylene Chloride	SW8260B	1	5	0.208	1.756	5	100
27	Styrene	SW8260B	1	5	0.313	1.677	5	
28	Tetrachloroethene	SW8260B	1	5	0.304	1.772	5	1400
29	Toluene	SW8260B	1	5	0.287	2.039	5	1500
30	trans-1,3-Dichloropropene	SW8260B	1	5	0.267	1.549	0.4	
31	Trichloroethene	SW8260B	1	5	0.299	1.599	5	700
32	Vinyl Chloride	SW8260B	2	10	0.46	0.96	2	200
33	Xylenes(total)	SW8260B	1	5	0.316	1.716	5	1200

TABLE 3.1
PROJECT QUANTITATION AND DETECTION LIMITS

			Quantitation Limits		Method Detection Limits		State of New York Standards	
	Analysis/Compound	Method	Water (ug/L)	Soil (ug/kg)	Water (ug/L)	Soil (ug/kg)	Water (ug/L) [(a)]	Soil (ug/kg) [(b)]
	Semivolatile Organics							
1	1,2,4-Trichlorobenzene	SW8270C	10	330	1.702	150.278	5	3400
2	1,2-Dichlorobenzene	SW8270C	10	330	1.723	66.261	3	7900
3	1,3-Dichlorobenzene	SW8270C	10	330	1.612	117.32	3	1600
4	1,4-Dichlorobenzene	SW8270C	10	330	1.696	114.419	3	8500
5	2,2'-oxybis(1-chloropropane)*	SW8270C	10	330	0.692	166.264	5	
6	2,4,5-Trichlorophenol	SW8270C	25	330	1.274	121.03	1	100
7	2,4,6-Trichlorophenol	SW8270C	10	330	1.396	149.203	1	
8	2,4-Dichlorophenol	SW8270C	10	330	1.927	163.393	1	400
9	2,4-Dimethylphenol	SW8270C	10	330	2.196	153.93	1	
10	2,4-Dinitrophenol	SW8270C	25	330	1.594	112.236	1	200
11	2,4-Dinitrotoluene	SW8270C	10	330	1.024	145.884	5	
12	2,6-Dinitrotoluene	SW8270C	10	330	1.061	149.066	5	1000
13	2-Chloronaphthalene	SW8270C	10	330	1.596	92.834		
14	2-Chlorophenol	SW8270C	10	330	1.817	77.346	1	800
15	2-methyl-4,6-Dinitrophenol	SW8270C	25	330	0.994	150.305		
16	2-Methylnaphthalene	SW8270C	10	330	1.794	149.669		36400
17	2-Methylphenol	SW8270C	10	330	2.163	157.575	1	100
18	2-Nitroaniline	SW8270C	25	330	1.201	146.821	5	430
19	2-Nitrophenol	SW8270C	10	330	1.817	152.416	1	330
20	3,3'-Dichlorobenzidine	SW8270C	10	330	7.464	68.784	5	
21	3-Nitroaniline	SW8270C	25	330	2.719	79.197	5	500
22	4-Bromophenyl-phenyl ether	SW8270C	10	330	1.082	120.011		
23	4-Chloro-3-methylphenol	SW8270C	10	330	1.351	165.472		240
24	4-Chloroaniline	SW8270C	10	330	1.318	45.01	5	220
25	4-Chlorophenyl-phenyl ether	SW8270C	10	330	1.342	153.603		
26	4-Methylphenol	SW8270C	10	330	4.909	140.237	1	900
27	4-Nitroaniline	SW8270C	25	330	2.461	119.879	5	
28	4-Nitrophenol	SW8270C	25	330	2.332	66.706	1	100
29	Acenaphthene	SW8270C	10	330	1.545	147.466		50000
30	Acenaphthylene	SW8270C	10	330	1.561	143.603		41000
31	Anthracene	SW8270C	10	330	1.202	133.821		50000
32	Benzo(a)anthracene	SW8270C	10	330	1.103	108.684		224
33	Benzo(a)pyrene	SW8270C	10	330	1.842	132.975		61
34	Benzo(b)fluoranthene	SW8270C	10	330	0.96	102.788		1100

TABLE 3.1
PROJECT QUANTITATION AND DETECTION LIMITS

	Analysis/Compound	Method	Quantitation Limits Water (ug/L)	Quantitation Limits Soil (ug/kg)	Method Detection Limits Water (ug/L)	Method Detection Limits Soil (ug/kg)	State of New York Standards Water (ug/L) [(a)]	State of New York Standards Soil (ug/kg) [(b)]
	Semivolatile Organics, cont.							
35	Benzo(g,h,i)perylene	SW8270C	10	330	1.112	32.586		50000
36	Benzo(k)fluoranthene	SW8270C	10	330	0.99	141.519		1100
37	bis(2-Chloroethoxy) methane	SW8270C	10	330	2.563	150.88	5	
38	bis(2-Chloroethyl) ether	SW8270C	10	330	1.653	162.485	1	
39	bis(2-ethylhexyl)phthalate	SW8270C	10	330	3.325	101.958	5	50000
40	Butylbenzylphthalate	SW8270C	10	330	1.329	138.269		50000
41	Carbazole	SW8270C	10	330	1.784	134.433		
42	Chrysene	SW8270C	10	330	1.259	126.329		400
43	Di-n-butylphthalate	SW8270C	10	330	1.178	147.807	50	8100
44	Di-n-octylphthalate	SW8270C	10	330	0.888	124.815		50000
45	Dibenz(a,h)anthracene	SW8270C	10	330	0.876	35.044		14
46	Dibenzofuran	SW8270C	10	330	1.362	145.66		6200
47	Diethylphthalate	SW8270C	10	330	1.424	147.245		7100
48	Dimethylphthalate	SW8270C	10	330	1.263	146.033		2000
49	Fluoranthene	SW8270C	10	330	0.947	142.421		50000
50	Fluorene	SW8270C	10	330	1.315	113.973		50000
51	Hexachlorobenzene	SW8270C	NA (8081A)	330	1.198	131.689		410
52	Hexachlorobutadiene	SW8270C	10	330	0.915	152.443	0.5	
53	Hexachlorocyclopentadiene	SW8270C	10	330	7.31	84.971	5	
54	Hexachloroethane	SW8270C	10	330	1.591	116.13	5	
55	Indeno(1,2,3-cd)pyrene	SW8270C	10	330	3.333	30.446		3200
56	Isophorone	SW8270C	10	330	1.841	155.064		4400
57	N-Nitroso-di-n-propylamine	SW8270C	10	330	2.063	160.17		
58	N-nitrosodiphenylamine	SW8270C	10	330	7.723	150.469		
59	Naphthalene	SW8270C	10	330	1.87	152.419		13000
60	Nitrobenzene	SW8270C	10	330	4.092	117.707	0.4	200
61	Pentachlorophenol	SW8270C	25	330	1.17	135.607	1	1000
62	Phenanthrene	SW8270C	10	330	1.132	134.683		50000
63	Phenol	SW8270C	10	330	2.061	78.84	1	30
64	Pyrene	SW8270C	10	330	1.224	151.364		50000

TABLE 3.1
PROJECT QUANTITATION AND DETECTION LIMITS

			Quantitation Limits		Method Detection Limits		State of New York Standards	
	Analysis/Compound	**Method**	**Water (ug/L)**	**Soil (ug/kg)**	**Water (ug/L)**	**Soil (ug/kg)**	**Water (ug/L) (a)**	**Soil (mg/kg) (b)**
	Pesticides							
1	Aldrin	SW8081	0.05	1.7	0.00318	0.138	ND	41
2	alpha-BHC	SW8081	0.05	1.7	0.0104	0.101		110
3	beta-BHC	SW8081	0.05	1.7	0.00411	0.407		200
4	delta-BHC	SW8081	0.05	1.7	0.0029	0.348		300
5	gamma-BHC (Lindane)	SW8081	0.05	1.7	0.00396	0.122		60
6	alpha-Chlordane	SW8081	0.05	1.7	0.0104	0.163	0.05	540
7	gamma-Chlordane	SW8081	0.05	1.7	0.00307	0.112	0.05	540
8	4,4'-DDD	SW8081	0.05	1.7	0.00781	0.238	0.3	2900
9	4,4'-DDE	SW8081	0.05	1.7	0.00181	0.171	0.2	2100
10	4,4'-DDT	SW8081	0.05	1.7	0.00721	0.0542	0.2	2100
11	Dieldrin	SW8081	0.05	1.7	0.00269	0.0716	0.004	44
12	Endosulfan I	SW8081	0.05	1.7	0.00391	0.309		900
13	Endosulfan II	SW8081	0.05	1.7	0.00237	0.138		900
14	Endosulfan sulfate	SW8081	0.05	1.7	0.00424	0.245		1000
15	Endrin	SW8081	0.05	1.7	0.00385	0.0804	ND	100
16	Endrin aldehyde	SW8081	0.05	1.7	0.00308	0.164	5	
17	Endrin ketone	SW8081	0.05	1.7	0.00302	0.143	5	
18	Heptachlor	SW8081	0.05	1.7	0.00556	0.209	0.04	100
19	Heptachlor epoxide	SW8081	0.05	1.7	0.00178	0.198	0.03	20
20	Hexachlorobenzene	SW8081	0.1	N/A	0.1	N/A	0.04	
21	Methoxychlor	SW8081	0.5	17	0.00471	0.266	35	10,000
22	Toxaphene	SW8081	2	67	0.15	2.624	0.06	
	PCBs							
1	Aroclor-1016	SW8082	1.0	33	0.263	3.92	0.09	1000
2	Aroclor-1221	SW8082	2.0	33	0.22	8.09	0.09	1000
3	Aroclor-1232	SW8082	1.0	33	0.22	8.09	0.09	1000
4	Aroclor-1242	SW8082	1.0	33	0.22	8.09	0.09	1000
5	Aroclor-1248	SW8082	1.0	33	0.22	8.09	0.09	1000
6	Aroclor-1254	SW8082	1.0	33	0.22	8	0.09	1000
7	Aroclor-1260	SW8082	1.0	33	0.22	8.09	0.09	1000

TABLE 3.1
PROJECT QUANTITATION AND DETECTION LIMITS

Analysis/Compound	Method	Quantitation Limits Water (ug/L)	Quantitation Limits Soil (mg/kg)	Method Detection Limits Water (ug/L)	Method Detection Limits Soil (mg/kg)	State of New York Standards Water (ug/L) (a)	State of New York Standards Soil (mg/kg) (b)
Metals							
*1 Antimony	SW6010B	60	5.0	2.114	0.211	3	
*2 Arsenic	SW6010B	10	1	1.9	0.2	25	7.5
3 Barium	SW6010B	200	1	0.5	0.035	1000	300
4 Beryllium	SW6010B	5	0.5	0.1	0.005	3(G)	0.16
*5 Cadmium	SW6010B	5	0.5	0.246	0.025	5	1
*6 Chromium	SW6010B	10	1	0.378	0.038	50	10
7 Copper	SW6010B	25	2.5	1.281	0.001	200	25
*8 Lead	SW6010B	3	0.5	1.087	0.109	25	400(c)
9 Mercury	SW7470A/7471A	0.2	0.01	0.0567	0.00945	0.07	0.1
10 Nickel	SW6010B	40	4	5.486	0.81	100	13
*11 Selenium	SW6010B	5	1	1.356	0.136	10	2
*12 Silver	SW6010B	10	1	0.702	0.071	50	
*13 Thallium	SW7841	10	1	3.534	0.353	0.5 (G)	
14 Zinc	SW6010B	20	2	5.219	0.612	2000 (G)	20
15 Vanadium	SW6010B	50	1	2.381	0.412		150
16 Cobalt	SW6010B	50	1	4.046	0.143		30
17 Aluminum	SW6010B	200	20	20.778	0.541		
18 Calcium	SW6010B	5000	500	15.886	16.193		
19 Iron	SW6010B	100	10	7.937	0.652	300	2000
20 Magnesium	SW6010B	5000	500	12.999	1.501	35000 (G)	
21 Manganese	SW6010B	15	1.5	0.864	0.106	300	
22 Potassium	SW6010B	5000	500	249.072	35.416		
23 Sodium	SW6010B	5000	500	41.469	2.281	20000	

Notes:
N/A - Not Applicable
(a) - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, NYSDEC, October 1998
(b) - Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994. For metals in soil, the standards are typically based on site-specific background.
(c) - EPA Guidance on Residential Lead-Based Paint, Lead Contaminated Dust, and Lead Contaminated Soil, July 14, 1994
* - Analyzed using Trace ICP.
(G) - Guidance value.

Federal and/or State regulatory levels or background levels. Groundwater sampling will be conducted at existing site monitoring wells or newly installed temporary wells. The selection of wells or sites for new wells will be based on those areas determined to be most impacted by prior activities utilizing hazardous substances.

3.1.6.2 Screening analyses will be performed in the field prior to sample collection to help assure that representative samples of the aquifer will be obtained. All groundwater samples collected will be sent to the laboratory for a variety of definitive analyses based on history of the site. The target levels for groundwater samples are presented in Table 3.1. Variations to the limits in Table 3.1 based on State requirements will be addressed in the site-specific addendum.

3.2 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

Data required to complete the project objectives must meet adequate quality assurance measures. This section describes data quality objectives in terms of precision, accuracy, representativeness, completeness, and comparability (PARCC) for both laboratory and field programs.

3.2.1 Laboratory DQO and PARCC Parameters

Control or recognition of sampling, analytical, and data reduction errors is important in analyzing the data and in preparing the final summary. DQOs for analytical data are usually expressed in terms of PARCC parameters. Definitions and descriptions of these PARCC parameters are presented in the following subsections. The calculations for precision, accuracy and completeness are described in Section 7.

3.2.1.1 Precision

Precision is the measure of the variability of individual sample measurements. Precision will be inferred through the use of laboratory duplicate samples and field duplicate samples. Frequency of duplicate sampling is discussed in Section 3.5. Targeted acceptable precision values are dependent on the sample matrix and defined in the SW-846, Method E418.1, and TH-NAS-NS-3004.

3.2.1.2 Accuracy

Accuracy is a measure of the analytical bias. Bias is defined as the difference between the actual sample analyte value and the measured/reported laboratory sample analyte value. The exact analytical bias cannot be determined since the actual sample analyte value is not known. Examination of laboratory blank analytical data, field blank analytical data and laboratory matrix spiked analytical data allows any bias introduced by laboratory sample handling and procedures to be assessed. Targeted acceptable accuracy measures are dependent on the sample matrix and are defined in the SW-846, Method E418.1, and TH-NAS-NS-3004.

3.2.1.3 Representativeness

Representativeness is the degree to which a set of data accurately reproduces the characteristics of the population. Analyses performed by the analytical laboratory will follow standard analytical methodologies for data representativeness by the methods presented in Section 6. Instrument performance checks, initial and continuing calibrations, laboratory blanks, and internal standards are some of the measures evaluated to determine that representativeness has been achieved.

3.2.1.4 Completeness

Completeness is a measure of the amount of data actually collected, analyzed, and validated compared to the amount specified in the sampling plan. Laboratory completeness is based on the number of samples shipped to the laboratory and the number of validated analyses performed. The goal for laboratory completeness will be 90 percent. The overall measure of completeness achieved will be the ratio of the valid results to the total number of results.

3.2.1.5 Comparability

Comparability expresses the confidence with which one set of data can be compared with another. Comparability can be related to precision and accuracy as these quantities are measures of data reliability. All measurement data generated will be expressed in units as defined by the method to allow comparability of data among sampling locations, as well as between depots, as applicable. The laboratory will maintain a quality assurance/quality control (QA/QC) program and perform analyses in accordance with applicable EPA protocols and other applicable standard methods.

3.3 FIELD DQO AND PARCC PARAMETERS

The field data quality objectives can be divided into two major segments: those pertaining to field screening and field instruments and those related to sample selection, collection, and shipping. Descriptions of each PARCC parameter is presented below. Field screening procedures to be conducted include pH, temperature, and conductivity measurements, headspace analysis by PID and Flame Ionization Detector (FID), and radiological surveys. Section 4 provides guidelines for performing the field screening procedures.

3.3.1 Precision

3.3.1.1 Due to the intended use of field screening data, precision values are not required.

3.3.1.2 Sampling and shipping precision will be controlled by adhering to the guidelines presented in Sections 4 and 5. Sampling precision will be inferred through the results of the field duplicates sent to the laboratory for analysis. Due to the qualitative and general measurements of the sampling and shipping procedures, precision values are not defined.

3.3.2 Accuracy

3.3.2.1 Accuracy for field screening procedures will be controlled through the proper calibration of the instruments, adherence to the operational procedures, and documentation of all observations and readings. Due to the qualitative and general measurements of the field screening analyses, accuracy values are not defined.

3.3.2.2 Performing all sampling and shipping procedures according to the guidelines presented in Sections 4 and 5, will help to assure that adequate accuracy is achieved. Sampling accuracy will be evaluated through the field blanks. Due to the qualitative and general measurements of the sampling and shipping procedures, accuracy values are not defined.

3.3.3 Representativeness

3.3.3.1 Representativeness for field screening procedures will be controlled through the proper calibration of the instruments, adherence to the operational procedures, documentation of all observations and readings, and proper selection of the measurement point. Due to the qualitative and general measurements of the field screening analyses, representativeness values are not defined.

3.3.3.2 Representativeness can be assumed for groundwater sampling by purging the aquifer to a point at which indicator parameters stabilize prior to sample collection as described in Section 4. Surface water, soil, and sediment samples will not necessarily be representative of the entire site. Sampling locations will be determined in an effort to collect samples from the areas suspected to have the highest degree of hazardous substances. Soil samples will be screened using headspace or radiological surveys to further determine the location of highest contamination. To help insure a representative soil sample of the suspect area is used for analysis, the cut and quartering sampling technique, described in Section 4, will be used. By following the guidelines in Section 5, shipping and handling representativeness can be assumed. Due to the qualitative and general measurements of the sampling and shipping procedures, representativeness values are not defined.

3.3.4 Completeness

Field completeness is based on the number of samples planned and the number of samples taken. In order to complete the site characterizations, all samples outlined in the site-specific addendum should be collected. The minimum goal for field completeness is 90% for each depot. However, field teams should take all measures necessary to complete the sampling program.

3.3.5 Comparability

All field measurement data generated will be expressed in units as defined by the method to allow comparability of data among sampling locations, as well as between depots, as applicable. The field team will perform all procedures according to the guidelines in Sections 4 and 5 to maintain comparability throughout the sampling effort.

3.4 HOLDING TIMES

To maximize representativeness of sample results, all samples will be extracted and/or analyzed within the holding times specified in each method. Table 3.2 presents the maximum holding times allowed for each method and matrix. Any deviations to the holding times based on State requirements, will be addressed in the site-specific addendum. Extraction or analysis performed after the expiration of the holding time will result in the qualification of the results during the data validation procedures.

3.5 QC SAMPLE PROGRAM

The analytical data for all samples must be sufficient in both precision and accuracy to identify the compounds present and the respective concentrations. Field duplicates, field blanks, and trip blanks will be collected and submitted to the analytical laboratory for assessing the quality of these data. Duplicate samples will be collected and analyzed to check for sample reproducibility. Blank samples will be collected and analyzed to check for systematic errors in the sampling and analytical procedures, and ambient site conditions. The Project Chemist, or the Chemist's designee, will review the data to evaluate the precision and accuracy of the data generated. During each sampling effort, a number of QA/QC samples will be collected for laboratory analysis. Described below are the types of QA/QC samples which may be collected and the collection frequency required. The specific QA/QC samples to be collected for a site investigation, will be identified in the site-specific addendum.

3.5.1 Trip Blank

3.5.1.1 Trip blanks will be collected and analyzed for volatile organic compounds. The analytical results will serve as a baseline measurement of volatile organic contamination that samples may be exposed to during transport and laboratory storage prior to analysis.

3.5.1.2 Trip blanks originate in the laboratory. They are HPLC-Grade water placed in sample containers, transported to the sample collection site, handled with the samples, and returned to the laboratory with samples of water collected for volatile organic analysis. The trip blank containers are not to be opened in the field.

3.5.1.3 One trip blank will be sent to the laboratory for each day water samples are sent to the laboratory for volatile organic analyses. The trip blank will be stored in the laboratory with the associated samples and will be analyzed by the laboratory for volatile organics.

3.5.2 Source Blank

3.5.2.1 Source blanks are samples of the final rinse water (distilled/de-ionized) used for equipment decontamination. The samples are collected in the field and analyzed for the same parameters as the environmental samples which are collected with decontaminated equipment. The purpose of the source blank is to detect contamination which may be introduced into the samples through decontamination rinse waters.

3.5.2.2 If required by a specific state regulation, then one source blank will be collected from the water used to decontaminate sampling equipment at a site.

3.5.3 Duplicate Samples

Field duplicates will be collected during the field effort. Duplicate samples are samples collected simultaneously from the same media source under identical conditions, homogenized and split into separate containers. Ten percent of the samples for each matrix will be collected in duplicate and submitted for laboratory analysis. Field duplicates will be labeled so that persons performing laboratory analyses cannot distinguish duplicates from other samples.

3.5.4 Matrix Spike / Matrix Spike Duplicate Samples

3.5.4.1 For organics and metals analysis, matrix spikes and matrix spike duplicates (MS/MSDs) are used to assess interferences in analytical results caused by the sampled matrix. The MS/MSDs are spiked by the analytical laboratory with known concentrations of specified compounds, and the MS/MSDs are then analyzed. The percent recovery is calculated and is used to evaluate interference effects.

3.5.4.2 One sample for MS and one sample for MSD will be collected for every 20 environmental samples of each medium at a site. The samples for MS/MSD will be collected immediately after an original sample and will be labeled with the same identifier as the original; however, the MS/MSD sample labels and chain-of-custody forms will note that the samples are to be used as MS/MSDs. The MS/MSD analysis will be performed on project specific samples.

3.5.5 Laboratory Control Sample / Laboratory Control Sample Duplicate

3.5.5.1 The laboratory control sample (LCS) is analyte-free water for aqueous analyses or Ottawa sand for soil analyses (except metals where glass beads may be used) spiked with all target analytes for the method. Each analyte in the LCS shall be spiked at a level less than or equal to the midpoint of the calibration curve for each analyte. The LCS shall be carried through the complete sample preparation and analysis procedure.

3.5.5.2 One LCS shall be included in each analytical batch of not more than 20 environmental samples. As applicable per the analytical method, a laboratory control sample duplicate (LCSD) shall be analyzed. The LCSD shall be prepared in the same manner as the LCS. The percent recoveries for all LCS shall be calculated and acceptance determined based on the control limits established by the laboratory. If LCS/LCSD analyses are performed, an evaluation of the RPD shall also be completed. The LCS recoveries will measure the accuracy of the laboratory procedures, while the LCS/LCSD RPD will measure the precision or reproducibility of the laboratory procedures.

SECTION 4
SAMPLE COLLECTION GUIDELINES

Contained with in this section are various guidelines related to the sample collection activities which will be performed at the depots. These guidelines will be used by the field personnel to ensure the samples are collected and field activities are performed in a consistent manner. Each guideline is formatted as a separate document to allow the field teams to customize the field copies of the Global Work Plan to meet the specific sampling requirements of each depot. The guidelines contained is this section are:

Attachment A provides guidelines for the operation of the measuring devices which will be used in the field. The guidelines included in Attachment A are:

4.1 SOIL SAMPLING GUIDELINES

4.1.1 Scope and Purpose

This section provides the guidelines and requirements for soil sampling. The objective of the guideline is to ensure a representative soil sample is collected at each designated sampling location to accurately define the concentration and determine whether the depot soils have been impacted by the depot activities.

4.1.2 Sampling Process

Soil samples will be collected as specified in the depot specific addendum using a hand auger. Listed below is the process for collecting soil samples:

1. A new pair of clean disposable goves will be donned at each sampling location.
2. Prepare the sampling location by removing all vegetation, roots, etc., from the sampling point.
3. Advance and decontaminated hand auger to the desired sampling depth below ground surface.
4. Remove the hand auger from the boring and use a decontaminated stainless steel spoon to remove the sample from the auger bucket.
5. Carefully place the soil samples for volatile organic analysis directly in to the sample bottles ensuring that no head space exists.
6. Place the remaining sample into a decontaminated bowl (stainless steel or Pyrex). The borehole may need to be further advanced to obtain enough sample to fill all the sample containers.
7. Once enough sample has been collected, homogenize the sample using the quartering method (see below). When the sample has been completely mixed, fill the remaining sample containers.
8. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.
9. QA/QC samples will be collected as specified in Sampling Guideline 4.10.
10. Backfill the boring with the soil removed from the hole and return the site to it's natural state.

The following should be considered when collecting a soil sample using a hand-auger:

- When a vertical sampling interval has been established, one auger-bucket is used to advance the auger hole to the first desired sampling depth.
- If discrete grab samples are to be collected to characterize each depth, a new bucket must be placed on the end of the auger extension immediately prior to collecting the next sample.
- The top few inches of soil should be removed from the bucket to minimize the chances of cross-contamination of the sample from fall-in of material from the upper portions of the hole.

The cut and quartering technique is as follows:

- The sample will be thoroughly mixed in a bowl, and divided into quarters.
- A portion of the soil will be gathered from two of the quartered sections. This process will be repeated until the amount of soil needed to completely fill the sample containers has been obtained.
- It is very important that the soil samples be mixed as thoroughly as possible to ensure that the sample is representative of the interval sampled.

4.1.3 Records

Soil sampling records will be kept in the field log book. The information to be recorded will include the general requirements presented in Record Keeping Guideline 4.9. The following records will also be reported:

1. Name and location (including sample interval) of the soil sample and boring.
2. Depth to top of sample and soil description when applicable.
3. Type of equipment used during the soil sampling/boring.
4. Sample location (see Section 4.11).

4.2 SURFACE WATER SAMPLING GUIDELINES

4.2.1 Scope and Purpose

This section provides the guidelines and requirements for collecting surface water samples. The purpose of the guideline is to ensure that the surface water samples are collected in such a manner as to minimize the introduction of sediments into the sample and ensure that a representative sample is collected at each designated location. The samples will be analyzed to assess whether depot activities have impacted surface water resources.

4.2.2 Sampling Process

The surface water sample collection location should be: deep enough so the sample bottles can be completely submerged, in an area with minimal flow or surface disturbance to minimize the loss of volatiles, and free of suspended material. Downstream samples will be collected first and wading should be avoided. At locations where both surface water and sediments will be collected, the surface water samples should be collected before sediment samples. The process for collecting surface water samples:

1. A new pair of clean disposable gloves will be donned at each sampling location.
2. Facing up-stream, submerge pre-labeled sample bottles in the up right position to prevent the loss of preservative into the water. Sediment should not be disturbed during the collection of surface water samples.
3. Allow sample bottle to fill and use bottle cap if necessary to fill the bottle completely. The volatile organics vials will be filled so that no head-space exists. If samples can not be collected directly into the sample bottle, a decontaminated sample collection device may be used.
4. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.
5. Conductivity, pH, and temperature, will be measured after sample collection. The measurements will be recorded in the field log book.
6. QA/QC samples will be collected as specified in Sampling Guideline 4.10.

7. Records

Sample collection records will be kept in the field log book. The information recorded will include the general requirements presented in the Record Keeping Guideline 4.9. In addition, the following records will also be reported:

1. Sample location conditions (water flow, suspended matter, accessibility, presence of organic matter, etc.)
2. Description of how to get to sample point location.
3. Field measurements.
4. GPS sample location (see Section 4.11).

4.3 SEDIMENT SAMPLING GUIDELINES

4.3.1 Scope and Purpose

This section provides the guidelines and requirements for collecting sediment samples. The purpose of the guideline is to ensure that the sediment samples are collected in such a manner to ensure that a representative sample is collected at each designated location. The samples will be analyzed to assess whether depot activities have impacted surface water resources.

4.3.2 Sampling Process

The sediment samples should be collected from background or furthest from the source locations first, to minimize the possibility of cross-contamination. Thereafter, the most downstream sediment samples will be collected followed by the next up-stream samples. If surface water samples are to be taken at the same location, they should be collected before the sediment samples. The addition of organic matter into the sediment samples should be avoided. Listed below is the process for collecting sediment samples:

1. A new pair of clean disposable gloves will be donned at each sampling location.
2. In shallow streams and ditches which can be waded, sediment samples will be collected by using a decontaminated stainless steel spoon or scoop. In areas where wading is not possible, a hand auger or scoop attached to a pole may be needed to collect sediment samples.
3. While facing up-stream, collect the sample by scooping along the bottom of the surface water body. Remove excess water and place the sediment sample into a decontaminated stainless steel bowl. Samples for volatile organic analysis will be placed directly into the pre-labeled sample bottle with no head space remaining.
4. After a sufficient sample volume has been collected into the stainless steel bowl, the sample will be homogenized using the quartering method and then placed into the appropriate precleaned, and labeled sample bottle.
5. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.
6. QA/QC samples will be collected as specified in Sampling Guideline 4.10.

4.3.3 Records

Sample collection records will be kept in the field log book. The information recorded will include the general requirements presented in the Record Keeping Guideline 4.9. In addition, the following records will also be reported:

1. Sample location conditions (water flow, suspended matter, accessibility, presence of organic matter, etc.)
2. Description of how to get to sample point location.
3. GPS sample location (see Section 4.11).

4.4 BORING USING A GEOPROBE

4.4.1 Scope and Purpose

This section provides the guidelines and requirements for advancing soil borings using a Geoprobe for the purpose of extracting groundwater samples. The purpose of the sampling is to determine whether or not groundwater at the boring locations has been impacted by the potential source areas.

4.4.2 Sampling Process

Following are the guidelines to be used when advancing Geoprobe borings and extracting groundwater samples in the immediate areas surrounding the locations where depot activities may have impacted groundwater resources:

1. Sampling locations will be determined in the field by the Parsons ES on-site geologist. Prior to advancing the Geoprobe, underground utilities in the area will be identified.
2. The Geoprobe borings will be advanced to just below the water table.
3. The outer sleeve will be retracted exposing the inner stainless steel screen.
4. Sample will be obtained using a peristaltic pump, tubing and check ball system, or a mini bailer.
5. In areas with low groundwater yield, a temporary piezometer constructed out of pre-cleaned schedule 40 PVC (1” diameter) will be placed in the Geoprobe borehole after the down hole tools have been removed.
6. If the boring yields sufficient water to allow for sample collection completion within one hour, a peristaltic pump, tubing and check ball system, or a mini bailer will be used for sample collection per section 4.6.
7. Groundwater will be removed under very low-flow conditions to minimize turbidity when filling precleaned, pre-preserved, prelabeled sample bottles, starting with the collection of the samples for volatile organic analyses.
8. Make sure there are no bubbles in the volatile organic samples.
9. Continue to fill remaining bottles.

10. If samples for metals analysis contain excessive silt, the samples may be allowed to settle. The less turbid sample will be decanted and sent to the laboratory for analysis.
11. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.
12. QA/QC samples will be collected as specified in Sampling Guideline 4.10.
13. Conductivity, pH, and temperature will be measured after sample collection. The measurements will be recorded in the field log book.
14. Once the sample collection process has been completed, the temporary casing will be removed and the borehole will be backfilled with soil removed from the hole. If the hole is not completely backfilled to ground surface with the soil removed from the hole, bentonite chips will be used to backfill the remaining space.

4.4.3 Records

Geoprobe records will be recorded in the field log book. The information recorded will include the general requirements presented in Record Keeping Guideline 4.9. The following records will also be reported:

1. Name and location of the Geoprobe sample and boring.
2. Date and time that the Geoprobe boring/sampling was conducted.
3. Depth of sample.
4. Name of the persons overseeing and company conducting the Geoprobe borings.
5. Type of equipment used during the Geoprobe boring and during construction of the temporary piezometers, as well as soil description when applicable.
6. Type of equipment used during sampling, number and type of containers used for sampling purposes, and analyses to be conducted.
7. Sample location (see Section 4.11).

4.5 BORING WITH A STANDARD DRILLING RIG

4.5.1 Scope and Purpose

This section provides the guidelines and requirements for advancing soil borings with a standard hollow-stem auger drilling rig for the purpose of extracting soil samples. The purpose of the procedure is to determine whether or not subsurface soil at the boring locations has been impacted by the depot activities.

4.5.2 Sampling Process

The following procedure will be used to advance borings using an auger rig and a split spoon sampler to collect the subsurface soil samples. Listed below is the procedure for collecting subsurface soil samples:

1. Determine and clear (for utilities) the boring location through the depot and the local underground facilities locating service. Surface materials such as vegetation may be removed from the boring location.
2. A minimum 2.5" diameter hollow stem auger will be used to advance the borehole to the desired subsurface depth.
3. Once the desired sampling depth has been reached, a decontaminated split spoon sampler will be used to retrieve the subsurface soil sample.
4. The split spoon sampler will be brought to the surface, and opened for sample collection and lithological description.
5. Small portions of soil will be collected along the length of the split spoon sample and placed in the volatile organics sample bottles. The sample bottles will be filled in such a manner as to minimize head space and to ensure that a representative sample from the designated sampling depth is collected.
6. After the volatile organic sample is collected, the remaining sample will be placed in a decontaminated stainless steel bowl, homogenized using the quartering method (see Soil Sampling Guidelines 4.1), and then used to fill the remaining sample containers.
7. Once the samples have been collected they will be packaged as specified in Section 5.0.
8. QA/QC samples will be collected as specified in Sampling Guideline 4.10.

9. Backfill the boring with the soil removed from the hole, place bentonite on the top of the backfilled hole, and restore the boring location to it's original condition.

4.5.3 Records

Standard drilling rig records and soil sampling records will be kept in the field log book. The information recorded will include the general requirements presented in Record Keeping Guideline 4.9, and the following:

1. Name and location of the boring.
2. Date and time that the boring/sampling was conducted.
3. Depth to top of sample and sample collection interval.
4. Names of the persons on-site and of the company conducting the borings.
5. Lithological description of subsurface soils for each boring location (see Figure 4.1).
6. Length of split spoon sampler and amount of recovered sample.
7. Sample location (see Section 4.11).

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DRILLING RECORD

BORING/ WELL NO. Sheet ____ of ____

Contractor: ____________
Driller: ____________
Inspector: ____________
Rig Type: ____________

PROJECT NAME: ____________
PROJECT NUMBER: ____________

Location Description:

GROUNDWATER OBSERVATIONS

Water Level				
Date				
Time				
Meas. From				

Weather: ____________

Date/Time Start: ____________

Date/Time Finish: ____________

Location Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
GP = GEOPROBE - DIRECT PUSH

COMMENTS:

4.6 GROUNDWATER SAMPLING GUIDELINES

4.6.1 Scope and Purpose

This section provides the guidelines and requirements for collecting groundwater samples from monitoring wells. The purpose of the guideline is to ensure that the groundwater samples are collected in such a manner to ensure that a representative sample is collected at each designated sampling location. The samples will be analyzed to assess whether depot activities have impacted groundwater resources.

4.6.2 Sampling Process

Prior to the collection of groundwater samples, the monitoring wells and water supply wells will be purged to remove the stagnant water which is not representative of aquifer conditions. Purge water disposal will be addressed in the addendum on a depot specific basis. A new pair of clean disposable goves will be donned at each sample location.

4.6.2.1. Listed below are the procedures for monitoring well purging:

1. Place plastic around well head.
2. Unlock protective casing and remove well cap.
3. Immediately (after well cap removal) take an organic vapor reading down the well casing using a photoionization detector and record reading in the field logbook.
4. Measure water level distance from top of casing and sound the total depth as detailed below. Record in logbook. Check tip of water level indicator for silt or product residue (if either are observed note in logbook).
    a. Lower decontaminated water level indicator into monitoring well until indicator sounds and light is illuminated.
    b. Confirm that the water surface has been contacted by repeatedly raising and lowering the indicator at least three times to ensure a consistent sounding level has been reached.
    c. Measure and record depth (nearest 0.01 feet) to the water surface from the top of casing in field logbook.
    d. Lower the indicator to the well bottom and record the total depth.
    e. Retrieve and decontaminate water level indicator.
5. Calculate volume to remove for purging.

6. Lower decontaminated purging device into well.
7. Begin to remove water from the well near the bottom.
8. Observe and record: odor, color, clarity, siltiness and general water condition in logbook. Also record changes in the physical condition of the monitoring wells that could effect the well integrity.
9. Temperature, pH, and specific conductivity of the groundwater will be measured and recorded periodically during well purging. The sample may be collected after the water has cleared sufficiently and the temperature, pH, and conductivity have stabilized. Stabilization is defined as follows: temperature ± 1°C, pH ± 0.1 S.U., and conductivity ± 10 μmhos/cm^2.
10. A total of at least 3-5 volumes of well water should be removed for purging to be considered complete. Wells with little or no recharge will be purged to near dryness. If a pump is used for well purging, it will be brought to the water surface prior to completion of purging activities to ensure complete removal of stagnant water.

4.6.2.2 Water supply wells which need to be sampled for constituents of concern and are equipped with an operable pump, will also be purged of stagnant water. To do so, the total depth and diameter of the well should be known or accurately estimated, and it must be determined whether or not a storage tank exits. If a storage tank is present and is located before the sample port location, it must also be purged of stagnant water.

4.6.2.3 Listed below are the guidelines used for water supply well purging:

1. Locate a sample port or discharge location.
2. Determine volume to be removed based on total depth and diameter of the well and the storage capacity of the storage tank if it exists.
3. Activate the submersible pump in the well.
4. Begin to remove water from the well, and continue until it has been determined that the stagnant water has been removed based on discharge rate and well construction.
5. Observe and record: odor, color, clarity, siltiness and general water condition in logbook. Also record observed construction of the water supply well.
6. Temperature, pH, and, specific conductivity of the groundwater will be measured and recorded periodically during water supply well purging. The sample may be collected after the water has cleared sufficiently and the temperature, pH, and conductivity have stabilized. Stabilization is defined

as follows: temperature ± 1°C, pH ± 0.1 S.U., and conductivity ± 10 μmhos/cm^2.

7. If well construction information is not available, then the recommended purge time is 15 minutes for a high volume pump.

4.6.2.4 Monitoring wells which contain excess silt and have a low yield will be purged using the low flow method. This method of purging and well sampling will be used to minimize the volume of purge water removed from the well and to reduce the turbidity in the groundwater samples collected. The pumping device selected should operate at variable speeds to reduce aquifer stress and agitation.

4.6.2.5 Listed below are the guidelines used for purging a well using the low flow method:

1. Place plastic around well head.
2. Unlock protective casing and remove well cap.
3. Immediately (after well cap removal) take an organic vapor reading down the well casing using a photoionization detector and record reading in the field logbook.
4. Measure water level distance from top of casing and sound the total depth as detailed below. Record in logbook. Check tip of water level indicator for silt or product residue (if either are observed note in logbook).
    a. Lower decontaminated water level indicator into monitoring well until indicator sounds and light is illuminated.
    b. Confirm that the water surface has been contacted by repeatedly raising and lowering the indicator at least three times to ensure a consistent sounding level has been reached.
    c. Measure and record depth (nearest 0.01 feet) to the water surface from the top of casing in field logbook.
    d. Lower the indicator to the well bottom and record the total depth.
    e. Retrieve and decontaminate water level indicator.
5. Calculate volume to remove for purging.
6. Lower decontaminated low flow purging device into well within the screened area of the well producing the highest flow rate.
7. Begin pumping and measure the groundwater elevation to ensure that the aquifer is not being stressed. If significant drawdown occurs, reduce the

pumping rate. Flow rates should range between 100 mLs/ min and 1,000 mLs/min.

8. Observe and record: odor, color, clarity, siltiness and general water condition in logbook. Also record changes in the physical condition of the monitoring wells that could effect the well integrity.
9. Temperature, pH, turbidity, dissolved oxygen, redox potential, and specific conductivity of the groundwater will be measured and recorded periodically during well purging. The sample may be collected after the water has cleared sufficiently, water quality indicators have stabilized after 3 successive measurements, and at least one well volume has been removed. Stabilization is defined as follows: temperature ± 1°C, pH ± 0.1 S.U., redox potential ± 3% for 10 mv and turbidity/dissolved oxygen ± 10 %.
10. After the monitoring well is purged, do not turn off the pump or remove it from the well.

4.6.2.6 Groundwater sample collection from a monitoring well:

1. Purge the monitoring well as described in Section 4.6.2.1.
2. Establish that the well has properly recharged (80% of static water level has recovered). No more than 16 hours should lapse between purge completion and sample collection.
3. Carefully lower a decontaminated bailer (with a fresh nylon line attached for each well) down the monitoring well. Disposable bailers may also be used.
4. Continue to lower the sample collection device to the desired sampling depth.
5. Raise the bailer and carefully fill precleaned, pre-preserved, prelabeled sample bottles, starting with volatile organic samples.
6. Make sure there are no bubbles in the volatile organic samples.
7. Continue to fill remaining bottles.
8. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.
9. QA/QC samples will be collected as specified in Sampling Guideline 4.10.
10. Conductivity, pH, and temperature, will be measured after sample collection. The measurements will be recorded in the field log book.

4.6.2.7 Groundwater sample collection from a water supply well:

1. Purge the well as described in Section 4.6.2.3.

2. At the sampling port carefully fill precleaned, pre-preserved, prelabeled sample bottles, starting with volatile organic vials.
3. Make sure there are no bubbles in the volatile organic samples.
4. Continue to fill remaining bottles.
5. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.
6. QA/QC samples will be collected as specified in Sampling Guideline 4.10.
7. Conductivity, pH, and temperature, will be measured after sample collection. The measurements will be recorded in the field log book.

4.6.2.8 Groundwater sample collection using the low flow method:

1. Purge the monitoring well as described in Section 4.6.2.5.
2. Use the pumping device already in place to collect the samples where turbidity can influence the analytical results (such as metals).
3. If a peristaltic pump/ vacuum jug assembly or stainless steel and Teflon bladder pump were used for purging, continue to collect the remaining samples using these devices.
4. If neither of the devices listed above were used, carefully remove the pump from the well and use a Teflon bailer to collect the remaining groundwater samples.
5. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.
6. QA/QC samples will be collected as specified in Sampling Guideline 4.10.
7. Conductivity, pH, and temperature will be measured after sample collection. The measurements will be recorded in the field log book.

4.6.3 Records

Sample collection records will be kept in the field log book. The information recorded is described in Record Keeping Guideline 4.9. In addition, the following records will also be reported:

1. Observations of groundwater condition (see above).

2. Field measurements.

4.7 RADIOLOGICAL SURVEY GUIDELINES

4.7.1 Scope and Purpose

This section provides the guidelines and requirements for the collection of radiological samples. The purpose of this guideline is to ensure that samples collected for radiological analysis are collected and handled properly.

4.7.2 Sampling Guidelines

Soil, sediment, and groundwater samples will be collected as specified in the appropriate guidelines (4.1, 4.3, and 4.6), but the following additional guidelines will be applied when dealing with samples for radiological analysis:

1. Conduct an operational check of the Geiger Mueller survey meter pursuant to guideline presented as A.5.
2. Survey an area (1 meter x 1 meter) where no radiological materials were stored to establish the general site background. The meter shall be held approximately on half inch from the ground surface. Record the average value in counts per minute in the field log.
3. Survey the area around the intended sampling location before sampling. This will identify the presence of gross contamination by comparison to the background readings. The sample should be collected from the location where the highest readings (count per minute) are detected. Record the readings in the field log book. This step will allow a field assessment of whether the site is radioactively contaminated.
4. If radioactivity is detected above background, then the sample collection process will continue after the appropriate personal protective equipment is donned and Health and Safety precautions in place (tyvek coveralls and respirator).
5. As samples for radiological analysis are collected, the outside of the sample collection device will be scanned using the Geiger Mueller survey meter. In the case of groundwater, this survey will be conducted during the purging process.
6. Once the radiological samples have been collected in the appropriate sample containers, the outside of the containers will be scanned using the Geiger Mueller survey meter.
7. If radioactivity is detected above background, the outside of the container will be wiped with distilled/deionized water (wipe will be disposed of as radioactive waste for special on-site disposal as determined by depot personnel).

8. The outside of the container will once again be scanned for radioactivity.
9. Repeat steps 4 and 5 until background radioactivity readings are detected.
10. If radioactivity has been detected above background while scanning during the sample collection process, a record will be made in the field logbook (data recorded in counts per minute) and the laboratory performing the analysis will be notified via the chain of custody form.
11. Shipping containers carrying samples which contained radioactivity above background levels will be properly labeled and packaged. Prior to shipment of these packages, Federal Express Dangerous Goods Hot-Line will be consulted (800-463-3339 ext. 81) and Chem Tel's Environmental Services Division will be contacted (813-248-0573) to ensure that proper shipping protocol has been used. The UN number for the radiological samples collected will be UN2912.
12. Equipment which contained samples determined to be radioactive above background levels, will be scanned with the Geiger Mueller survey meter after being decontaminated (Guideline 4.8).
13. If the radioactivity is detected above background, the equipment will be decontaminated with a distilled/deionized wipe (wipe will be disposed of as radioactive waste for special on-site disposal as determined by depot personnel) prior to being re-surveyed.
14. Repeat step 13 until radioactivity is not detected above background levels on the equipment.

4.7.3 Records

Radiological survey records will be kept in the field log book. The information recorded will include the general requirements presented in Record Keeping Guideline 4.9. The following records will also be included:

1. Description of radioactivity scans including: time, date, material scanned, instrument reading, person performing the scan.

2. Corrective action taken when radioactivity was detected above background levels.

4.8 DECONTAMINATION GUIDELINES

4.8.1 Scope and Purpose

This section provides the guidelines and requirements for decontaminating sampling equipment prior to each use. The purpose of the guideline is to ensure the cleanliness of the sample collection equipment and to reduce the risk of cross contamination during sample collection.

4.8.2 Decontamination Process

Listed below are the decontamination processes for the various equipment that may be used to collect environmental samples. Sample collection devices will be decontaminated prior to each use. All potentially hazardous rinse liquids and materials will be containerized and properly disposed. Decontamination methods were selected based on analyses to be performed. Listed below are the decontamination methods to be used for equipment associated with sample collection:

4.8.2.1. Sample collection devices (bailers, stainless steel scoops/spoons, hand auger bucket) used to collect groundwater, surface soil, subsurface soils, surface water, or sediment samples:

1. Wash with tap/potable water and laboratory-grade detergent (Alconox or Liquinox). Use a scrub brush to remove dirt and surface film.
2. Rinse thoroughly with tap/potable water.
3. Rinse with distilled/deionized water.
4. Rinse with isopropanol.
5. Rinse thoroughly with distilled/deionized water.
6. Remove excess water.
7. Wrap in aluminum foil, shiny side out.
8. Radiological sample collection - scan sampling equipment with Geiger Mulluer Meter for sampling equipment used to collect radiological samples only. If a positive reading occurs continue the distilled/deionized water rinse until equipment is determined to be free of radioactive material.

4.8.2.2 Submersible pump and water level indicator:

1. Wash outside of pump/water level indicator and hoses/lines with Liquinox and water.
2. Rinse outside of pump/water level indicator and hoses/lines with potable water.
3. Rinse outside of pump/water level indicator and hoses/lines with distilled/deionized water.
4. Remove excess water.
5. Wrap pump hose in plastic, pump in aluminum foil, and wrap water level indicator in plastic.

4.8.2.3 Drilling Rig:

1. Any portion of the drilling rig that will be over the borehole, including hollow stem augers, will be cleaned with high pressure hot water.
2. Down hole tools such as augers and split spoons will be brushed cleaned using soap and tap water if pressure cleaning does not remove particulate matter.
3. Down hole equipment such as split spoons, used to collect soil samples, will be rinsed with a solvent (pesticide grade isopropanol).
4. Down hole equipment such as split spoons, used to collect soil samples, will be rinsed with distilled/deionized water.
5. Cleaned down hole equipment such as augers, will be placed on clean tarps, racks, or saw horses to dry.
6. After drilling equipment has been allowed to dry, it will be covered with clean, unused plastic.

The equipment decontamination area should be a clean area free of fugitive dust and organic vapors if possible. The decontaminated equipment will be covered with aluminum foil or plastic following decontamination.

4.8.3 Records

Decontamination records will be kept in the field log book. The information recorded will consist of, but not be limited to:

1. Date and time decontamination process performed.
2. Name of person(s) performing decontamination.
3. Equipment being decontaminated between locations.

4.9 RECORD KEEPING GUIDELINES

4.9.1 Scope and Purpose

This section provides the guidelines and requirements for keeping records during field activities. The purpose of the guideline is to ensure that sufficient information is recorded to fully document field activities.

4.9.2 Record Keeping Process

A logbook will be maintained during each sampling event. Its primary purpose is to provide documentation of activities which have occurred in the field on any given day including the conditions or activities that affected the field work. Entries in the logbook will be signed and dated. The following is a partial list of the types of information which may be recorded in the logbook:

- Name and title of author; date and time of entry; and physical/environmental (weather included) conditions during the daily field activities.
- Names of field personnel.
- Names and titles of all site visitors.
- Sampling activity purpose and plan.
- Type of sampled media (i.e., groundwater, surface water, sediment, surface soil, subsurface soil).
- Sample collection method (i.e.; grab-into sample container).
- Number, type, and volume of samples taken.
- Description of sampling points (including location).
- GPS location of the sampling point.
- Sample description.
- Analysis, number of containers, and preservation required.
- Client address.
- Date and time sample was collected.
- Laboratory shipping address.
- Instrument operational check records.

- Description of sample collection activities.
- Overnight shipper airbill number for each shipment.

Any corrections made in the logbook will be marked through with a single line and then dated and initialed.

4.10 QA/QC SAMPLE COLLECTION GUIDELINES

4.10.1 Scope and Purpose

This section provides the guidelines and requirements for collecting QA/QC samples. The purpose of the guideline is to ensure that the QA/QC samples are collected to ensure that the project quality assurance objectives are met.

4.10.2 QA/QC Process

In addition to the collection of environmental samples, five different types of QA/QC samples may be collected at each site. Section 3.0 describes the purpose for collecting each of these samples.

4.10.2.1 Trip Blank

Trip blank samples are used to evaluate potential volatile organic contamination related to sample bottle handling and sample transportation. Trip blanks are prepared by the laboratory, transported to the field, kept with the environmental samples throughout the sampling effort, and returned to the laboratory for analysis with the volatile organics environmental samples. One trip blank will be included in every cooler containing surface water and/or groundwater environmental samples for volatile organic compound analysis. Trip blanks will not be included in shipments which contain only soil or sediment samples for volatile organics analysis.

4.10.2.2 Coded Field Duplicate

A field duplicate sample is defined as a second or duplicate sample collected from the same location of the field sample under identical conditions. Duplicate samples will be labeled so that the laboratory personnel performing the analyses cannot distinguish the duplicate sample from the field samples. The duplicate samples provide a measure of the representativeness of the sampling procedure. The coded field duplicate sample for volatile organic analysis will be collected immediately following the collection of the field sample for volatile organics analysis. The remaining bottles will then be filled, with the field sample being collected first and the coded field duplicate sample being collected last. One coded field duplicate sample will be collected for every ten field samples collected per matrix. The coded field duplicate will be analyzed for the same parameters as the field sample.

4.10.2.3 Source Water Blank

Source water blanks are collected to ensure that the water used in the final rinse is contaminant free. Precleaned bottles supplied by the laboratory are filled with the source water used for the final rinse of the decontamination process. These samples are packaged and shipped with the environmental samples via overnight express to the laboratory. One source water blank will be collected for each depot if the specific state requires that this analysis be performed.

4.10.2.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSDs are collected to determine if matrix interferences exist in the field samples. MS/MSDs will be collected at a frequency of one for every twenty field samples collected at each depot per matrix. At field-selected sample locations, two additional sets of samples will be collected in addition to the field sample. The location selected for collection of the MS/MSD samples should be all/most inclusive of the analyses to be performed for that matrix at that depot. These samples are packaged and shipped with the field samples via overnight express to the laboratory.

The following guidelines will be followed for the collection of the QA/QC samples:

1. Carefully fill precleaned, pre-preserved, prelabeled sample bottles, starting with volatile organic samples.
2. Make sure there are no bubbles in the volatile organic water samples.
3. Continue to fill remaining bottles.
4. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 5.0.

4.10.2.5 Records

Sample collection records will be kept in the field log book. The information recorded is described in Record Keeping Guideline 4.9 and, the following will also be included:

1. Type of QA/QC sample collected and required analyses.
2. Equipment used for rinseate sample; type and quantity.
3. Coded field duplicate sample ID will be recorded next to environmental sample ID and will be labeled as a coded field duplicate.

4.11 GPS SURVEY GUIDELINES

4.11.1 Scope and Purpose

This section provides guidelines for collecting real-time, differential corrected, survey data using a Trimble PRO XRS Global Positioning Satellite (GPS) receiver and standard Trimble dataloggers/survey controllers. The purpose of this guideline is to outline good surveying practices and provide general guidance in using these Trimble products. This guideline assumes that you have the operating manual for the instrument being used is available and the operator is familiar with menu driven controllers/dataloggers.

4.11.2 General Considerations

Listed below are the major topics that should be addressed prior to arriving on-site to perform GPS surveys.

1) Identify the type(s) of differential corrections that will be available. Use of the Coast Guard beacon frequencies is recommended as this is a radio link and is less susceptible to interference from surrounding objects (buildings, tree canopy, etc.). Coast Guard beacon information can be obtained from the following sources:

- ➢ USGS Navigation Center, 7323 Telegraph Rd., Alexandria, VA, 22315-3998 or,
- ➢ USGS Navigation Center Fax on demand service: (703) 313-5931 or,
- ➢ USGS Navigation Center 24 hour watchstander: (703) 313-5900 or,
- ➢ USGS Navigation Center Internet site: http://www.navecen.uscg.mil.

If a Coast Guard beacon is not available, identify the Landstar or Omnistar frequencies that are available for your site.

IMPORTANT: Confirm with the instrument supplier that your unit is equipped to receive the Landstar or Omnistar services.

2) Identify local survey monuments, local bench marks, and/or local HARN (High Accuracy Reference Network) points. These can be obtained from the National geodetic Survey (NGS) information center at (301)713-3242 or on the internet at http://www.ngs.noaa.gov.

3) Identify available power sources. Ensure that sufficient batteries and chargers are supplied with the instrument. Alternative power sources such as power inverters (which can be plugged into vehicle cigarette lighter sockets), cam-corder batteries, or small lead-acid batteries (such as lawn tractor batteries) may be needed for extended surveys.

4) The operators should become familiar with the coordinate system(s) (both horizontal and vertical) that they will be working in.

5) Identify periods during which satellite (SV) availability may be low. (i.e. number of SVs above the horizon)

4.11.3 Survey Setup

IMPORTANT*: If a cigarette lighter adapter is being used to power the GSP unit,* ***DO NOT*** *turn the vehicle on or off while the power plug is in the lighter socket.*

IMPORTANT*: Operators should always check the cable connections that are being made and become familiar with the various cables supplied and their function. Most cables will have either a 5 pin or a 7 pin Limo type termination. DO NOT force cable connections into the GPS instruments. When disconnecting cables with Limo type terminations, use the pull cords attached at each connection point to pull the connector straight out. DO NOT use twisting motions when disconnecting Limo type cable connectors.*

Listed below are considerations and general setup parameters that should be used whenever possible. Use of different parameters may be warranted for a particular location, with the understanding that position accuracy may be degraded.

- If the instrument is turned on at a location that is over 300 miles from where it was previously used, or if the instrument was cold booted (to recover from a system lock-up), it may need up to 15 minutes to acquire a new almanac and to identify satellites that are above the horizon.
- Set the GMT time offset for the location you are working in. This option is usually found within the Configuration menu. Note: Eastern Standard time is 5 hours behind GMT, Eastern Daylight time is 4 hours behind GMT.
- Set the coordinate display units and the working coordinate system to those for the project (optional). This is usually done in the Units and Display Menu. Note: these settings affect only how your position is displayed on the GPS unit's screen. The unit should record all horizontal data in Lat/Long and vertical data in ellipsoid height. To view your geoid height, it will be necessary to load (or create) a geoid model within the project.

NOTE: The conversion from meters to international feet is 3.2808398 feet/meter. The conversion from meters to US Survey feet is 3.28083 feet/meter.

- Set the horizon mask to 15 degrees, the PDOP (position dilution of precision) mask to 6 and the SNR (signal to noise ratio) mask to 6. The horizon mask can be set lower to increase SV availability, but position accuracy will degrade. The

PDOP mask can be set higher, but position accuracy will degrade. The PDOP mask should not be set above 12. The SNR can be set lower, but position accuracy will degrade. All of these parameters are normally found in the Rover Options sub-menu of the Configuration Menu.

- Configure the real time correction parameters in the RTCM (Radio Technical Commission for Maritime Services) sub-menu. The RTCM sub-menu is usually found as an F1 hot-key within the Rover Options sub-menu. Choose the best real time source available for the site. If using a satelite service (Omnistar or Landstar), the unit may take up to ten minutes to lock on to the correction transmission. The GPS controller will flash a message at the bottom of the screen to this effect.
- Set the antenna height as accurately as possible. Setting the antenna height to zero will yeild points with elevations referenced to the location of the GPS antenna. Note: the antenna height does not affect the calculated position.
- Set the Position Mode to Auto 2D/3D (collects 3D positions when 4 or more SVs are being tracked), Manual 3D (will only collect 3D positions, requires a minimum of 4 SVs), or Overdet. 3D (Overdetermined 3D--will only collect 3D positions, requires a minimum of 5 SVs). The Position Mode selections are usually found in either the Position Filters sub menu, the Set Position Fix Mode sub menu, or the Logging Options sub menu of the Options Menu.
- Create a Rover file or re-open an existing Rover file. This option is usually found in the Files menu or in the Data Capture menu. Record the default name of the file created, or specify and record a file name using the keypad. Keep the file name length to eight characters or less.

4.11.4 Collecting Survey Data

Once the survey parameters have been set, and a survey file has been created or re-opened, feature locations can be surveyed by starting a feature measuring event. This is usually accomplished by going to the Survey Menu and selecting Start Survey, or in some instances, by selecting the appropriate Start Feature option that becomes available immediately after file creation (or after a file has been re-opened). Typically, the operator will want to log Point generic features. Assuming the default logging time for point features is unchanged from 5 seconds, the GPS unit will measure satellite data for 5 seconds and record an average position as determined during that time. For greater accuracy, it is recommended that the GPS antenna be held stationary during that time.

Listed below are several important points to be considered while performing a survey:

- Enter a unique location ID (feature Name) for each point surveyed.

- Verify that each point is being recorded (stored) once the name has been assigned and the 5 second logging cycle is complete.
- Check that the antenna height above the measured feature is equal to the height entered during the survey setup.
- Avoid taking measurements in close proximity to solid objects (including vehicles, buildings, road signs, etc.).
- Monitor the GPS receiver status as indicated on the bottom portion of the logger/controller display. Make sure an RTCM correction is being received, that sufficient SVs are being tracked, that battery levels are sufficient, and that the system is actively tracking a good position. If messages such as "RTK FLOAT", "FLOAT", "AUTONOMUS POSITION", "RADIO LINK DOWN", "RADIO LINK LOST", etc., are displayed, stop and identify the source of the problem.
- Survey files should not be deleted from the GPS logger/controller until the files have been successfully downloaded to a computer and backed-up onto a secondary media, or printed in hard-copy.

4.11.5 QC Checks

The best method of checking the GPS system is to occupy a known point. If surveyed locations are available, it is good practice to occupy such points before and after each survey outing. Note the differences between the GPS position displayed and the actual coordinate of the point being occupied. If the difference between the two coordinates is greater than those acceptable for the project, stop and identify the source(s) of the error. In general, the more occupations you have over known points, the more confident you can be in the accuracy statements made at the end of the project.

If no known points are available, a second, though less accurate, QC check can be performed by re-occupying points previously surveyed. At a minimum, such checks should be performed before and after each survey outing.

SECTION 5
SAMPLE HANDLING

This section describes the manner in which all samples will be handled including sample custody, designation of sample location, bottle labeling, container and preservation requirements, and bottle packaging.

5.1 SAMPLE CUSTODY

Samples shipped to the laboratory for analysis will be accompanied by a chain of custody form (Figure 5.1). These forms track the custody of the samples after they have been collected and verify the information on the bottle labels. Every sample bottle shipped to the laboratory for analysis will be listed on the chain of custody form. Other information on the form include:

- Job number
- Project name and location
- Samplers names
- Date and time of sample collection
- Sample location identification
- Number of containers
- Analysis and preservation required
- Sample type and matrix
- Laboratory address
- Remarks
- Airbill number
- Relinquishing signatures, dates and times

CHAIN OF CUSTODY RECORD

NO:

CLIENT:

PROJECT NO.

PROJECT MGR:

PROJECT NAME:

NOTES - (Reference QAPP and/or analytical protocols to be used):

SAMPLERS:

Send results to:
PARSONS ENGINEERING SCIENCE, INC.
290 Elwood Davis Road-Suite 312
Liverpool, NY 13088
Telephone: (315) 451-9560
Fax: (315) 451-9570

Lab Submitted to:

FIELD SAMPLE ID	LOCATION DESCRIPTION	DATE	TIME	GRAB	COMP	MATRIX	NUMBER OF BOTTLES	ANALYSES REQUIRED									REMARKS

Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by:(Signature)	Date:	Time:	Cooler Temp: ________°C Samples Intact: ____Yes ____No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by:(Signature)	Date:	Time:	Cooler Temp: ________°C Samples Intact: ____Yes ____No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by:(Signature)	Date:	Time:	Cooler Temp: ________°C Samples Intact: ____Yes ____No

TYPE CODES:	SOLID		WATER			MATRIX	QUALITY CONTROL
	SD- Sediment	TP- Test Pit/Tank Pit	MW- Monitoring Well	FD- Fuel Dispenser	ST- Storm Water	WG - Ground Water	FB- Field Blank (number each)
	SS- Surface Soil	DR- Drum Waste	LC- Leachate	MH- Manhole	WW- Waste Water	WS - Surface Water	TB- Trip Blank (number each)
	SB- Subsurface Soil	WA- Solid Waste	SW- Surface Water	OW- Oil Water Separator	OL- Other Liquid (eg. Drum liquid)	SO - Soil	WB- Wash Blank (number each)
	MW- Monitoring Well Boring	OS- Other Solid	DW- Drill Water	PR- Piping Run		SW-Swab or Wipe	
		WP- Wipe Sample					

NO:

5.2 SAMPLE DESIGNATION

A sample numbering system will be used to identify each sample collected during the field investigation and for all QA/QC samples. The numbering system will provide a tracking procedure to allow retrieval of information about a particular location and to monitor that each sample is uniquely numbered. The samples will be identified by the following sample designation scheme. Each sample taken at a specific depot will be preceded by an abbreviation (identified in the site-specific sampling plan) to identify the sample location. The sample designation will include the following:

Sampling Location Sample Type Sample Number Sample Depth

Sample Type Abbreviations which may be used include:

SS	Soil Sample
SW	Surface Water Sample
SED	Sediment Sample
GW	Ground Water Sample
A	Air
RAD	Radiological Survey
SB	Source Blank
TB	Trip Blank
ER	Equipment Rinse

Example sample number: **PP-SS-01-2'**
Explanation: Point Pleasant depot, surface soil sample, location 1, at a depth of 2 feet.

5.3 SAMPLE BOTTLE LABELS

Each bottle shipped to the laboratory for analysis will have a sample label (Figure 5.2) containing the following information:

- Project name
- Depot name
- Job number
- Sample number designation
- Date and time of sample collection

FIGURE 5.2

SAMPLE BOTTLE LABEL

PARSONS ENGINEERING SCIENCE, INC.
5390 TRIANGLE PARKWAY, SUITE 100
NORCROSS, GA 30092 (770)446-4900

Project: DLA-SI **Job #** 735139

Sample Designation: ____________________ **Date:** __________

Location-type-number -depth

Depot Name: ____________________ **Time:** __________

Analysis: ____________________

Sampler: __________ **Preservation:** __________

- Analysis required
- Preservation
- Sampler

Prior to sample collection, the sample label information will be completed, the label will be placed on the appropriate bottle, and covered with clear tape to protect the sample label.

5.4 SAMPLE BOTTLE AND PRESERVATION REQUIREMENTS

Precleaned, and preserved sample bottles will be provided by the laboratory for use in collecting samples. Table 5.1 contains a list of the preservation and bottles which will be used to contain the samples collected for various analyses.

5.5 SAMPLE HANDLING

Once the samples have been collected, the following guidelines will be used to prepare the sample bottles for shipment to the laboratory:

1. Seal the container by wrapping tape around the lid of the container. Use Teflon® tape on bottles containing samples for organic constituent analysis. Use PVC tape on bottles containing samples for inorganic constituent analysis.
2. Place containers in bubble pack.
3. Place all glass containers in ziplock-type bag and seal.
4. Line insulated shipping cooler with a large trash bag and place samples into the lined, insulated cooler then cool (to 4° C) using wet ice.
5. Seal completed chain-of-custody form in a ziplock-type plastic bag and tape to the inside of the cooler lid.
6. Close trash bag and seal with tape.
7. Securely seal shipping container/cooler with packing tape and custody seals (provided by laboratory).
8. Ship container/ cooler to the appropriate laboratory via overnight express.

Samples for radiological analysis will be sent to:

Quanterra Environmental Services (Lab)
13715 Rider Trail North
Earth City, MO 63045-1205
(314) 298-8566

Samples collected in MD, TX, WV, IN, OH will be sent to:

Quanterra Environmental Services (Lab)
4101 Shuffel Drive, NW
North Canton, OH 44720
(330) 497-9396

Samples collected in PA, NY, NJ will be sent to:

Quanterra Environmental Services (Lab)
450 William Pitt Way
Building 4, Fourth Floor
Pittsburgh, PA 15238
(412) 820-8380

Table 5.1
Sample Bottle and Preservation Requirements

Parameters	Analytical Method	Bottle Requirements *	Preservation
WATER SAMPLES			
Volatile Organics	SW8260B	three-40 ml, glass VOA vials	HC1, 4°C
Volatile Organics (BTX)	SW8021B	three-40 ml, glass VOA vials	HC1, 4°C
Semivolatile Organics	SW8270C	two-1 liter amber, glass bottle	4°C
Pesticides	SW8081A	one-1 liter amber, glass, bottles	4°C
PCBs	SW8082	one-1 liter amber, glass, bottle	4°C
Herbicides	SW8151A	one-1 liter amber, glass, bottle	4°C
Herbicides	SW8321A	one-1 liter amber, glass, bottle	4°C
Metals	SW6010B/ SW7841	one-1 liter plastic bottle	$HNO_{3,}$ 4°C
Mercury	SW7470A	one-1 liter plastic bottle	$HNO_{3,}$ 4°C
Gross Alpha and Beta	SW9310	500 mL, amber glass bottle	$HNO_{3,}$ 4°C
Thorium	TH-NAS-NS-3004	1000 mL, amber glass bottle	$HNO_{3,}$ 4°C
TPH	SW8015M	one-1 liter glass bottle	HCL, 4°C
Total Organic Carbon	SW9060	100 mL, amber glass bottle	HCL or $H_2SO_{4,}$ 4°C
SOIL/ SEDIMENT SAMPLES			
Volatile Organics	SW8260B	4 oz, glass jar	4°C
Volatile Organics (BTX)	SW8021B	4 oz, glass jar	4°C
Semivolatile Organics	SW8270C	8 oz, wide-mouth, glass jar	4°C
Pesticides	SW8081A	8 oz, wide-mouth, glass jar	4°C
PCBs	SW8082	8 oz, wide-mouth, glass jar	4°C
Herbicides	SW8151A	8 oz, wide-mouth, glass jar	4°C
Herbicides	SW8321A	4 oz, wide-mouth, glass jar	4°C
ICP Metals	SW6010B	16 oz, wide-mouth, plastic bottle	4°C
Mercury	SW7471A	8 oz, wide-mouth, plastic bottle	4°C
Gross Alpha and Beta	SW9310	8 oz, wide-mouth, glass jar	4°C
Thorium	TH-NAS-NS-3004	8 oz, wide-mouth, glass jar	4°C
TPH	SW8015M	8 oz, wide-mouth, glass jar	4°C
TOC	SW9060	4 oz, wide-mouth, glass jar	4°C

* - Bottles containing samples for organic analysis will have Teflon lined bottle caps.

SECTION 6
ANALYTICAL PROCEDURES

6.1 METALS ANALYSES

6.1.1 Samples will be analyzed for metals using SW846 Methods 6010B and 7470. Method SW846-6010B will be used for the analysis of all metals in Table 3.2 except mercury. Mercury will be analyzed by SW846-7470 (water) and 7471 (soil). Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration curves used in the determination of metals shall be prepared as follows:

6.1.2 Standard calibration curves derived from data consisting of one reagent blank and four concentrations, for atomic desorption (AA) and inductively coupled plasma (ICP), shall be prepared for each inorganic analyte. Standard curves shall be prepared daily for metals with a subsequent initial calibration blank. If the results of the verification are not within 10 percent of the original curve, a new standard shall be prepared and analyzed. If the results of the second verification are not within 10 percent of the original standard curve, a reference standard should be employed to determine if the discrepancy is within the standard or with the instrument. New standards should also be prepared on a quarterly basis at a minimum. All data used in drawing or describing the curve shall be so indicated on the curve or its description. A record shall be made of the verification.

6.1.3 The continuing calibration verification (CCV) standards shall be analyzed at a frequency of 10% or every two hours during the analytical sequence. Additionally, continuing calibration blanks shall be analyzed after the CCV and prior to the analysis of any samples. All applicable QC measures shall be performed as outlined in the method(s).

6.2 SEMI-VOLATILE ORGANIC ANALYSIS

6.2.1 Samples will be analyzed for semi-volatile organics using SW846 Method 8270. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration curves used in the determination of semi-volatile organics shall be prepared as follows:

6.2.2 Prior to initiating analysis, it is required to establish that a given instrument meets the method tuning standard. The tune of each gas chromatography/mass spectrometry (GC/MS) system used for the determination of semi-volatile organic analytes shall be checked with decafluorotriphenylphosphine (DFTPP). The required ion abundance criteria shall be met before determination of any analytes. If the system does not meet the required specification of one or more of the required ions, the instrument will be re-tuned and rechecked before proceeding with sample analysis. The method-specified tuning criteria will be met.

6.2.3 Prior to analysis, GC/MS instruments will be calibrated using a minimum of five calibration levels by the appropriate procedure. Each calibration standard will be tabulated and the retention times recorded. All target compounds are used to check calibration of the instrument being used. A calibration check will be conducted prior to any analysis.

6.2.4 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with surrogate compounds prior to extraction. Surrogate spike recoveries shall fall within the control limits as specified in the applicable methods to assess the extraction and analytical efficiency.

6.2.5 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with internal standard compounds prior to analysis. Internal standard spike recoveries and retention times shall fall within the control limits as specified in the applicable method and will be used to quantify target compounds.

6.2.6 All other QC measures shall be performed as outlined in the method (i.e. blanks, LCS, matrix spikes, and retention time windows). Control limits will be followed as described in the method.

6.3 VOLATILE ORGANIC ANALYSIS

6.3.1 Samples will be analyzed for volatile organics using SW846 Method 8260. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration curves used in the determination of volatile organics shall be prepared as follows:

6.3.2 Prior to initiating analysis, it is required to establish that a given instrument meets the method tuning standard. The tune of each GC/MS system used for the determination of volatile organic analytes shall be checked with 4-bromofluorobenzene (BFB). The required ion abundance criteria shall be met before determination of any analytes. If the system does not meet the required specification of one or more of the required ions, the instrument will be re-tuned and rechecked before proceeding with sample analysis. The method-specified tuning criteria will be met.

6.3.3 Prior to analysis, GC/MS instruments will be calibrated using a minimum of five calibration levels by the appropriate procedure. Each calibration standard will be tabulated and the retention times recorded. All target compounds are used to check calibration of the instrument being used. A calibration check will be conducted prior to any analysis.

6.3.4 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with surrogate compounds prior to extraction. Surrogate spike recoveries shall fall within the control limits as specified in the applicable methods to assess the extraction and analytical efficiency.

6.3.5 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with internal standard compounds prior to analysis. Internal standard spike recoveries and retention times shall fall within the control limits as specified in the applicable method and will be used to quantify target compounds.

6.3.6 All other QC measures shall be performed as outlined in the method (i.e. blanks, LCS, matrix spikes, and retention time windows). Control limits will be followed as described in the method.

6.4 PESTICIDE ANALYSIS

6.4.1 Samples will be analyzed for pesticides using SW846 Method 8081. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration curves used in the determination of pesticides shall be prepared as follows:

6.4.2 Prior to initiating analysis, it is required to establish that a given instrument demonstrates adequate resolution and instrument sensitivity. The Resolution Check Mixture must be analyzed at the beginning of every initial calibration sequence. The Performance Evaluation Mixture (PEM) must be analyzed following the Resolution Check Mixture and at the end of the initial calibration sequence. The PEM must also be analyzed at the beginning of every other 12-hour period. If the system does not meet the required specification of the checks, column and instrument maintenance will be performed and the initial calibration sequence reanalyzed.

6.4.3 Prior to analysis, GC instruments will be calibrated using a minimum of three calibration levels for the individual target compounds by the appropriate procedure. Each calibration standard will be tabulated and the retention times recorded. Initial calibrations must meet the criteria presented in the method. All initial calibrations will be verified using blanks, the PEM, and the midpoint concentration of the individual standard components.

6.4.4 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with surrogate compounds prior to extraction. Surrogate spike recoveries shall fall within the control limits as specified in the applicable methods to assess the extraction and analytical efficiency.

6.4.5 All other QC measures shall be performed as outlined in the method (i.e. blanks, LCS, matrix spikes, and retention time windows). Pesticide cleanup procedures as described in the method will be utilized to remove matrix interferences from sample extracts prior to analysis as necessary. All target compound detections must be confirmed on a second column as specified in the method. Control limits will be followed as described in the method.

6.5 HERBICIDE ANALYSIS

6.5.1 Samples will be analyzed for pesticides using SW846 Method 8150 or SW846 Method 8321. Prior to analyzing any samples, the instrument(s) must be properly calibrated.

Standard calibration curves used in the determination of herbicides shall be prepared as follows:

6.5.2 Prior to initiating Method 8321 analysis, it is required to establish that a given instrument meets the method tuning standard. The tune of each high performance liquid chromatography/mass spectrometry (HPLC/MS) system used for the determination of herbicides shall be checked with polyethylene glycol (PEG) 400, 600, or 800. The required ion abundance criteria shall be met before determination of any analytes. If the system does not meet the required specification of one or more of the required ions, the instrument will be re-tuned and rechecked before proceeding with sample analysis. The method-specified tuning criteria will be met.

6.5.3 Prior to analysis, GC or HPLC instruments will be calibrated using a minimum of five calibration levels for target compounds by the appropriate procedure. Each calibration standard will be tabulated and the retention times recorded. Initial calibrations must meet the criteria presented in the method. All initial calibrations will be verified using continuing calibrations. The percent difference and retention time windows must meet the control criteria as presented in the method.

6.5.4 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with surrogate compounds prior to extraction. Surrogate spike recoveries shall fall within the control limits as specified in the applicable methods to assess the extraction and analytical efficiency.

6.5.5 All other QC measures shall be performed as outlined in the methods (i.e. blanks, LCS, matrix spikes, duplicates and retention time windows). All target compound detections must be confirmed on a second column as specified in the method. Control limits will be followed as described in the method.

6.6 PCB ANALYSIS

6.6.1 Samples will be analyzed for PCBs using SW846 Method 8082. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration curves used in the determination of PCBs shall be prepared as follows:

6.6.2 Prior to analysis, GC instruments will be calibrated using a minimum of five calibration levels for AR-1016 and AR-1260. A single standard for each of the remaining Aroclors must be run. A minimum of three peaks must be used for calibration and retention time windows must be calculated as specified in the method. Each calibration standard will be tabulated and the retention times recorded. Initial calibrations must meet the criteria presented in the method. All initial calibrations will be verified each 12-hr shift using a check mixture of AR-1016 and AR-1260. The verification will also be performed at an interval of every 20 samples and at the end of the sequence.

6.6.3 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with internal standard compounds prior to analysis. Internal standard spike recoveries and retention times shall fall within the control limits as specified in the applicable method and will be used to quantify target compounds.

6.6.4 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with surrogate compounds prior to extraction. Surrogate spike recoveries shall fall within the control limits as specified in the applicable methods to assess the extraction and analytical efficiency.

6.6.5 All other QC measures shall be performed as outlined in the method (i.e. blanks, LCS, matrix spikes, and retention time windows). Pesticide cleanup procedures as described in the method will be utilized to remove matrix interferences from sample extracts prior to analysis as necessary. All target compound detections must be confirmed on a second column as specified in the method. Control limits will be followed as described in the method.

6.7 BTEX ANALYSIS

6.7.1 Samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) using SW846 Method 8021. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration curves used in the determination of BTEX shall be prepared as follows:

6.7.2 Prior to analysis, GC instruments will be calibrated using a minimum of five calibration levels for target compounds by the appropriate procedure. Each calibration standard will be tabulated and the retention times recorded. Initial calibrations must meet the criteria presented in the method. All initial calibrations will be verified using continuing calibrations. The percent difference and correlation coefficient must meet the control criteria as presented in the method.

6.7.3 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with internal standard compounds prior to analysis. Internal standard spike recoveries shall fall within the control limits as specified in the applicable method and will be used to quantify target compounds.

6.7.4 Every blank, standard, and environmental sample, including matrix spike/matrix spike duplicate samples, shall be spiked with surrogate compounds prior to extraction. Surrogate spike recoveries shall fall within the control limits as specified in the applicable methods to assess the extraction and analytical efficiency.

6.7.5 All other QC measures shall be performed as outlined in the method (i.e. blanks, LCS, and matrix spikes). All target compound detections must be confirmed on a second column as specified in the method. Control limits will be followed as described in the method.

6.8 TPH ANALYSIS

6.8.1 Samples will be analyzed for total petroleum hydrocarbons (TPH) using EPA Method 418.1. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration curves used in the determination of TPH shall be prepared as follows:

6.8.2 Prior to analysis, GC instruments will be calibrated using a minimum of four calibration levels for target compounds by the appropriate procedure. Each calibration standard will be tabulated. Initial calibrations must meet the criteria presented in the method. All initial calibrations will be verified using continuing calibrations. The percent difference and correlation coefficient must meet the control criteria as presented in the method.

6.8.3 All other QC measures shall be performed as outlined in the method (i.e. blanks, LCS, and matrix spikes). Control limits will be followed as described in the method.

6.9 TOTAL ORGANIC CARBON ANALYSIS

6.9.1 Samples will be analyzed for total organic carbon (TOC) using SW846 Method 9060. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration curves used in the determination of TOC shall be prepared as follows:

6.9.2 Prior to analysis, instruments will be calibrated using the manufacturer's specifications listed in the instrument manual. All initial calibrations will be verified using continuing calibrations every 15 samples according to the method criteria.

6.9.3 All samples will be analyzed in quadruplicate as specified in the method. All other QC measures shall be performed as outlined in the method (i.e. blanks and duplicates). Control limits will be followed as described in the method.

6.10 RADIONUCLIDE ANALYSIS

6.10.1 Samples will be analyzed for gross alpha and gross beta using SW846 Method 9310. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration used in the determination of gross alpha and gross beta shall be prepared as follows:

6.10.2 Prior to analysis, counters will be calibrated by preparing separate alpha and beta particle self-absorption graphs (water sample residue weight versus efficiency factor). The alpha graph standard will be prepared using aliquot residue weights varied between 0 - 100mg. The beta graph standard will be prepared using aliquot residue weights varied between 0 - 300mg.

6.10.3 All other QC measures shall be performed as outlined in the method (i.e. blanks, duplicates, and periodic spiked samples). Control limits will be followed as described in the method.

6.10.4 Samples will be analyzed for thorium using Method TH-NAS-NS-3004. Prior to analyzing any samples, the instrument(s) must be properly calibrated. Standard calibration used in the determination of thorium shall be prepared in accordance with the analytical method requirements.

6.11 FIELD MEASUREMENT PROCEDURES

Field measurements of temperature, pH, specific conductance and water levels will be performed at the time of sample collection. Water levels also will be taken prior to purging the monitoring wells.

6.11.1 Temperature Measurement Procedures

The temperature of water samples will be measured using a mercury thermometer. This measurement also will be used to calibrate the pH and conductivity meter.

6.11.2 pH Measurement

The pH of water samples will be measured using a portable pH meter. The meter will be calibrated daily using appropriate buffer solutions for expected values of pH. The meter also will be recalibrated periodically during periods of continued use.

6.11.3 Conductivity Measurement

The specific conductance of water samples will be measured with a portable conductivity meter. A standard potassium chloride solution will be used to calibrate the instrument each day prior to use. The meter also will be recalibrated periodically during periods of continued use.

6.11.4 Water Level Measurements

Water level measurements will be made using electric water level indicators. Water levels will be measured (0.01 foot) and recorded for monitoring wells at the time of completion and prior to purging.

6.11.5 Headspace Measurements

Screening measurements of organic vapor in soil samples will be collected using a PID and a FID. The detectors will be operationally checked every day against source gasses. The units will also be periodically checked during periods of continued use.

6.11.6 Organic Vapor Measurement

Measurements of organic vapor in the atmosphere will be collected using a PID. The detector will be operationally checked every day against source gasses. The unit will also be periodically checked during periods of continued use.

6.11.7 Radiological Survey

A radiological survey will be performed at specific locations where radioactive contamination is possible. Gross alpha and gross beta radiation will be measured using a Geiger Mueller survey meter. The meter will be operationally checked each day against a check source. The check source will also be used periodically throughout the day to ensure the meter is functioning properly.

SECTION 7
DATA REDUCTION, VALIDATION AND REPORTING

7.1 LABORATORY PROCEDURES

7.1.1 Data Reduction

7.1.1.1 The procedures used for calculations and data reduction are specified in each laboratory analytical method referenced in Section 6. Calculations required to arrive at the final (reported) value for each sample include factors such as sample dilution ratios and conversion to dry-weight basis for solid samples.

7.1.1.2 Data will be reported in the units listed in Table 3.2. Concentration units are to be listed on reports and any special conditions, such as dry weight conversions will be noted.

7.1.2 Data Validation

All analytical data will be verified prior to being released by the laboratory. Laboratory data verification will consist of reviewing the data for both editorial and technical validity. The editorial review consists of a check for typographical, transpositional and omissional errors. This review also includes a proofreading of any text which may accompany the data. The technical review consists of a check to see that all precision, accuracy and detection limits have been met.

7.1.3 Data Reporting

As a minimum, the laboratory report will show traceability to sample analyzed, and will contain the following information:

- Name of report;
- Date of report preparation;
- Laboratory name, address, and telephone number;
- Sample I.D. number;
- Name of sample;
- Type of sample (water, soil, etc.);
- Analyses performed;
- Initial sample volume for analysis;
- Final sample volume (after extraction) for analysis;

- Type of extraction performed (including method number);
- Date of sampling;
- Date sample was received;
- Date extractions/analyses were performed;
- Applicable laboratory blank results;
- Sample detection limits for each compound;
- Quality control check sample summaries including amount spiked, amount found in unspiked sample, percent recoveries and relative percent differences between the two percent recoveries;
- Calibration and instrument tuning performance summaries;
- All supporting raw data.

Project name and I.D. number will appear on the Chain of Custody Record.

7.2 DATA ASSESSMENT

All analytical data generated during the SI will be validated by the Project Chemist at Parsons ES. The precision, accuracy, and completeness of measurement data generated during the investigation will be assessed. This is made possible by the inclusion of QC procedures and samples in the data collection process.

7.2.1 Field Measurements

Accuracy of the field measurements will be assessed using daily instrument calibrations, calibration checks, and analysis of blanks. Precision will be assessed on the basis of reproducibility by multiple reading of a single sample.

7.2.2 Laboratory Data

Data validation for laboratory data will be performed for all sample results in accordance with the requirements contained in the USEPA *National Functional Guidelines for Data Review* (1994). Laboratory results will be assessed for compliance with required precision, accuracy, completeness and sensitivity.

7.2.2.1 Precision

Precision of laboratory analysis will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate, field duplicate, and laboratory duplicate analyses. The relative percent difference (%RPD) will be calculated for each pair of duplicate analysis using the following equation:

$$\text{Percent RPD} = [(S-D)/(S+D)/2]\text{x}100$$

where,

S = First sample value (original value)

D = Second sample value (duplicate value)

7.2.2.2 Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria that are described in this document and in the specific methods using the analytical results of method blanks, reagent/preparation blank, matrix spike samples, laboratory spikes, source blanks, and equipment rinseate blanks. The percent recovery (%R) of samples will be calculated using the following:

$$\text{Percent R} = [(A-B)/C]\text{x}100$$

where,

A = The analyte concentration determined experimentally from the spiked sample;

B = The background level determined by a separate analysis of the unspiked sample; and

C = The amount of the spike added.

7.2.2.3 Completeness

The data completeness of laboratory analytical results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using the following:

$$\text{Completeness} = (\text{Valid Data}/\text{Total Data}) \text{ x } 100$$

7.2.2.4 Sensitivity

The achievement of method detection limits depends on instrument sensitivity and matrix effects. Therefore, it is important to monitor the instrument sensitivity to ensure the data quality through constant instrument performance. The instrument sensitivity will be monitored through the analysis of method blanks and calibration check samples.

7.3 PERFORMANCE SYSTEM AUDITS

The laboratory QA officer will carry out performance and/or systems audits to insure that data of known and defensible quality are produced during the program.

7.3.1 System Audits

Systems audits are qualitative evaluations of components of the laboratory quality control measure systems. They determine if the measurement systems are being used appropriately. The audits may be carried out before all systems are operational, during the laboratory program, or after the completion of the laboratory program. Such audits typically involve a comparison of the activities given in the QA/QC Plan with activities actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities.

7.3.2 Performance Audits

7.3.2.1 The performance audit is a quantitative evaluation of the measurement systems of a program. It requires testing the measurement systems with samples of known composition or behavior to evaluate precision and accuracy. The performance audit is carried out by or under the auspices of the laboratory QA Officer without the knowledge of the analyst.

7.3.2.2 The laboratory QA Officer is responsible for evaluating the accuracy and precision of the analytical data. Based on this evaluation, the laboratory QA Officer will implement corrective actions as necessary to ensure that reliable data is obtained.

7.3.3 External Audit

The Project QA/QC Officer may perform at least one complete sample handling, analysis, and laboratory procedures audit apart from the normal audits performed by the laboratory QA Officer prior to, during, or subsequent to the field activities. The laboratory will be using methods as specified in Section 6.

7.4 PREVENTATIVE MAINTENANCE

All field equipment, instruments, tools, gauges and other items requiring preventative maintenance will be serviced in accordance with the manufacturer’s specified recommendations. The laboratory instruments will be maintained as specified in the laboratory's Quality Assurance Manual. Maintenance records will be documented and traceable to specific equipment at the laboratory.

7.5 CORRECTIVE ACTION

The Parsons ES Field Team Leader, Project Manager, and Chemist shall be responsible for implementing corrective actions for the field work. The laboratory QA Officer shall be responsible for implementing laboratory corrective actions. The need for corrective actions, if any, shall be determined by periodic audits as previously discussed. The corrective actions implemented, if any, shall be documented in the field log book or laboratory files, as applicable.

7.6 QA REPORTS

The Project Manager and site-specific Task Manager will receive reports on the performance of the data quality at the completion of the data validation process from the Project Chemist. These reports will at least include:

- Assessment of measurement quality indicators, i.e., data accuracy, precision and completeness;
- Significant QA/QC problems and any impact to the data quality.

These reports will be included, in part or whole, in the site-specific SI reports. Any instance of rejected data will be brought to the attention of the Project Manager and the site-specific Task Manager as soon as it is detected.

A.1
SPECIFIC CONDUCTANCE METER

A.1.0 GUIDELINE

The guidline for calibration, operation, and maintenance of the conductivity meter is outlined below. The operation manual provided by the manufacturer should be consulted for instructions concerning the operation of various makes and models.

A.1.1 Operational Check

Operational check shall be performed daily, prior to sample collection activities and when excess variability is noted.

1. Be sure the probe is clean.
2. Soak the probe in DI water for at least 30 minutes, if probe is dirty.
3. Remove the probe from the water and shake out excess water.
4. Immerse the probe to or beyond the vent holes in a beaker containing calibration standard. (Typically Potassium Chloride Standard Solution, 1,413 μmhos/cm^2).
5. Turn the instrument on. Verify that the batteries are not low.
6. Press appropriate range key.
7. Check the reading on the display. If adjustment is needed, adjust calibration knob until concentration of the standard solution is displayed.
8. Record calibration observations, adjustments, and readings in the field log book.

A.1.2 Operation

1. Turn the instrument on. Verify that the low battery indicator does not appear.
2. Select the appropriate range. If the range is unknown, begin with the highest range and adjust until reading falls within the selected range.
3. Insert the probe into the sample solution. Immerse the tip to or beyond the vent holes and agitate the probe vertically to remove trapped air bubbles. Allow time for the reading to stabilize. If the reading is less than 10% of the range, select the next lower range and again allow the reading to stabilize before recording the measurement. An overrange condition may cause a 1 display followed by blank digits.

4. Specific Conductance will be reported to two significant figures below 100 µmhos/cm^2 and three significant figures at 100 µmhos/cm^2 or above.
5. Rinse the probe thoroughly with deionized water after each measurement.
6. Record sample conductivity readings in log book.

A.1.3 Preventive Maintenance

Cleaning the Probe:

The probe should be wiped with a clean paper towel between measurements during normal use. Should the sample contain oils, greases or fats, however, the electrodes could become coated and thus affecting the accuracy of the readings. If the probe becomes coated with oil or a residue, it should be cleaned with a strong detergent solution and then rinsed thoroughly with deionized water.

Battery Replacement:

A low battery indication will appear in the display when battery replacement is needed. Replace batteries per manufacturer's instructions.

A.2

pH METER

A.2.0 GUIDELINE

The guideline for operational check, operation and maintenance of the pH meter is outlined below. The operation manual provided by the manufacturer should be consulted for detailed instructions concerning the operation of various makes and models. Temperature readings will be recorded using a temperature electrode or thermometer.

A.2.1 Operational Check

An operational check shall be performed each day prior to sample collection activities or when excess variability is noted. For best results, calibrate pH with two fresh buffer solutions that bracket the expected pH of the sample. The following procedure describes the steps for calibration of the pH meter.

1. Rinse the pH and temperature electrodes with water.
2. Insert the pH and temperature electrodes into fresh pH 7 buffer solution.
3. Calibrate instrument to pH 7 buffer per manufacture's recommendations.
5. After the 7.00 buffer calibration has been completed, rinse the electrodes and then place in the second buffer.
6. Calibration procedures for the second buffer should be performed in the same manner as the 7.00 buffer trying to achieve either a 4.00 or 10.00 calibration point (depending on the expected range of pH to be measured in the samples).
7. After the second buffer calibration has been completed, switch the meter to a mode of operation.
8. Record calibration observations, adjustments, slope, and readings in the field log book.

A.2.2 Operation

1. Remove storage cap from pH and temperature electrodes.
2. Turn instrument on.
3. Rinse both electrodes thoroughly with deionized water, or wipe with a wet paper towel.
4. Immerse electrodes in solution to be measured. For proper operation, immerse electrodes to half their length.
5. Agitate electrodes briefly, let reading stabilize, and note final reading; pH will be reported to 0.1 standard units.
6. Rinse electrodes thoroughly with DI water and replace electrode caps.

7. Record pH reading and temperature in log book.

A.2.3 Preventive Maintenance

The pH meter should be cleaned and inspected daily before and after use. Batteries shall be replaced as necessary, and the pH and temperature electrodes shall be replaced when cracked, or when the instrument operational check can not be successfully completed. The pH electrode can be maintained by cleaning after use with DI water and storing with caps on electrodes.

A.3
PHOTOIONIZATION METER

A.3.0 GUIDELINE

The guideline for operational check, operation, and maintenance of photoionization meter is outlined below. Operational checks will be performed daily in accordance with the manufacture's instructions. The manufacture's operation manual should be consulted for detailed instructions concerning the operation of various makes and models of photoionization meters.

A.3.3 Operational Check

1. Check to see that the batteries are sufficiently charged.
2. Confirm that the instrument is in the survey mode or read mode
3. Confirm that the previously entered standard gas value is consistent with the current gas value. Make adjustments as required.
4. Connect the standard calibrations gas bottle.
5. Turn the calibration gas cylinder on.
6. The reading should be close to the actual gas concentration. If not wait a few seconds and then repeat this process until the calibration gas has stabilized to 1-2 ppm with the calibration gas range.
7. Exit the calibration mode, turn off the gas and disconnect the calibration gas cylinder from instrument.

The calibration gas typically used for calibration is isobutylene at a concentration of 100 ppm. The use of this calibration gas will result in a reading of 100 ppm in the calibration mode.

A.3.2 Operations

1. Turn the instrument on.
2. Place sensor near the sample or location to be measured.
3. After the necessary measurements have been observed and recorded, turn the instrument off.

A.3.3 Preventive Maintenance

After daily use of the photoionization meter for field investigations, the unit shall be inspected and cleaned as necessary. The battery should be recharged daily (if needed) while in continuous use.

A.4
WATER LEVEL INDICATOR

A.4.0 PROCEDURE

The procedure for operation and maintenance of the water level indicator is outlined below. The operation manual supplied by the manufacturer should be consulted for instructions concerning the operation of various makes and models.

A.4.1 Calibration

Calibration will be performed periodically to determine if the measuring scale on the water level indicator is accurate. Calibration will consist of verifying water level measuring increments, against a calibrated measuring device. This calibration procedure should be conducted on a quarterly basis by rental agency.

A.4.2 Procedure

1. Unlock protective casing and remove well cap.
2. Lower decontaminated water level indicator into monitoring well until indicator sounds and light is illuminated.
3. Confirm that the water surface has been contacted by repeatedly raising and lowering the indicator until a consistent sounding level has been reached.
4. Mark the line of indicator (where water surface has been contacted) by pinching the line between the thumb and forefinger while holding the line level with the measuring point at the well head.
5. Measure and record depth (nearest 0.01 feet) to the water surface in field log book.
6. Lower indicator to well bottom and record total depth.
7. Retrieve and deacontaminant water level indicator. Note in log book, observations of silt or product residue on tip of water level indicator.

A.4.3 Preventive Maintenance

The water level indicator should be rinsed with soapy water and then DI water after each reading. Solvents may be used sparingly to aid in the removal of contamination. The probe should always be kept free of silt and product coatings. If solvents are to be used for cleaning, they should be applied to a dye free paper towel, the probe and dirty line wiped, and then rinsed with DI water.

A.5

EBERLINE HP-260/120 OR LUDLUM 12/44-9

A.5.0 PROCEDURE

The procedure for operation and maintenance of the Eberline HP-260, HP-120, or Ludlum 44-9 is outlined below. These units are all very similar in operation. The operation manual supplied by the manufacturer should be consulted for instructions concerning the operation of various makes and models A copy of the manufacturers operation manual for the Ludlum 44-9 is attached for reference.

A.5.1 Operational Check

Background determination and instrument performance as described in this procedure shall be performed prior to the first use of the instrument each day or if sporadic readings occur. Prior to entering a radiological survey area, the instrument should be determined to be fully functional. The calibration controls shall not be adjusted in the field. An operational check shall be performed in the following manner:

1. Visually check the instrument for signs of physical damage and check the calibration status of the instrument.
2. Turn the instrument on.
3. Test the batteries to ensure that the instrument is functional by turning the dial to the “BATT” portion of the scale. The meter should deflect to the battery check portion of the meter scale.
4. Replace the batteries if they are dead and recheck.
5. Press the speaker button to the “ON” position.
6. Set the dial for the appropriate scale.
7. Use the designated beta source identified on the label located on the side of the instrument to determine if the instrument is functioning. Handle the check source by the outer rim only.
8. Place the source in contact with the middle portion of the detector probe.
9. Verify that the reading obtained corresponds to the beta source concentration.
10. If the reading is not within 20% refer to owner’s manual for further action.

A.7.2 Procedure

1. Determine that the instrument is operational using the procedure listed above.
2. Perform the survey holding the instrument 0.5 inches from the surface to be measured.
3. Note and record reading.

A.7.3 Preventive Maintenance

The instrument will be checked daily for signs of physical damage. Calibration adjustments of the instrument shall be performed in a controlled environment by certified personnel.

ATTACHMENT A

EQUIPMENT OPERATION GUIDELINES

APPENDIX B

SITE-SPECIFIC AND GENERAL HEALTH AND SAFETY PLAN

SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR REMEDIAL INVESTIGATION AT FORMER SADVA

1.0 SITE DESCRIPTION

The purpose of this remedial investigation (RI) is to adequately characterize the nature and extent of contamination at the areas of concern (AOCs) which have been identified at the former Schenectady Army Deport – Voorheesville Area (SADVA) in the Town of Guilderland, New York. The AOCs proposed for investigation include AOC 1-U.S. Army Southern Landfill, AOC 2-Bivouac Area, AOC 3-Burn Pit Area, AOC 7-Triangular Disposal Area and AOC 8-Black Creek. The AOCs proposed for no further action include AOC 4-Construction and Demolition Landfill, and AOC 6-Sewage Disposal Facility. In addition, the Voorheesville Depot (designated AOC 5 for the purposes of this work plan) will be included in this RI. The Voorheesville Depot is an active supply depot used to store strategic natural resources critical to national defense.

Descriptions of each AOC and the historical processes that took place are described in detail in Section 2 of the Field Sampling Plan as noted below:

- AOC 1 – 2.2.1, 2.2.2
- AOC 2 – 2.3.1, 2.3.2
- AOC 3 – 2.4.1, 2.4.2
- AOC 5 – 2.6.1, 2.6.2
- AOC 6 – 2.7.1, 2.7.2
- AOC 7 – 2.8.1, 2.8.2
- AOC 8 – 2.9.1, 2.9.2
- AOC 9 – 2.10.1, 2.10.2

The Voorheesville Depot is currently owned by the Federal Government and operated by the Defense Logistics Agency (DLA), Defense National Stockpile Center (DNSC). The facility is operated under the National Stockpile Program, for the purpose of storing metallurgical ores and materials necessary for manufacturing defense materials or strategic materials used in national defense.

The former SADVA and Voorheesville Depot are located along Albany County Route 201, approximately 1.5 miles south of the Village of Guilderland Center, New York. The Depot is situated in the southwest corner of the Northeast Industrial Park, which was formerly part of the original 643-acre SADVA.

2.0 SCOPE OF WORK

This health and safety plan is specific to the former SADVA and the Voorheesville Depot and is designed to complement the General Safety and Health Plan (Parsons ES, 1999) to form a complete Safety and Health Plan for field work performed at this depot.

Sampling at the former SADVA and Voorheesville Depot will include soil, groundwater, surface water, and sediment samples. Section 2 of the Remedial Investigation - Field Sampling Plan for the SADVA (Parsons ES, 1999) details the location for each sample to be taken, the site-specific equipment and procedures, the sample designation, and the sample handling and analysis. This information is provided in the specific subsections listed below:

- AOC 1 – 2.2.5
- AOC 2 – 2.3.5
- AOC 3 – 2.4.5
- AOC 5 – 2.6.7
- AOC 6 – 2.7.3
- AOC 7 – 2.8.5
- AOC 8 – 2.9.4
- AOC 9 – 2.10.4

The General Field Sampling Plan details guidelines for sample collection and analysis and the USEPA-approved procedure for performing each type of laboratory analysis.

3.0 CHEMICAL HAZARDS

Chemicals of concern for this sampling event include, but are not limited to, PCBs, volatile organic compounds, semivolatile organic compounds, herbicides, and metals. Other compounds may be present at the sites. The subsections noted above under "Site Description" provide details of what chemicals have been found in the various media at each AOC. However, the existing data generally are not comprehensive, so other constituents may be present which were not analyzed for during sampling events. As a conservative measure, it should be assumed that any of the constituents being analyzed during the RI could be present at any of the AOCs. An appropriate risk analysis of the hazards associated with the compounds will be communicated to the on-site employees. An MSDS for the chemical to be used in the sampling program (isopropyl alcohol) is attached to this plan. The procedures in the General Safety and Health Plan will be followed, with the exception that mercury monitoring with Drager tubes will not be necessary.

4.0 PHYSICAL HAZARDS

Physical hazards are described in Section 5.2 of the General Safety and Health Plan (attached). Physical hazards are generally applicable to all AOCs since the physical hazards are based on the activity being performed.

5.0 LEVELS OF PROTECTION

All work will be conducted in Level D protection as defined in Section 7.2.1 of the General Safety and Health Plan (attached). The action levels for personal protection upgrade are presented in Section 9.3 of the General Safety and Health Plan.

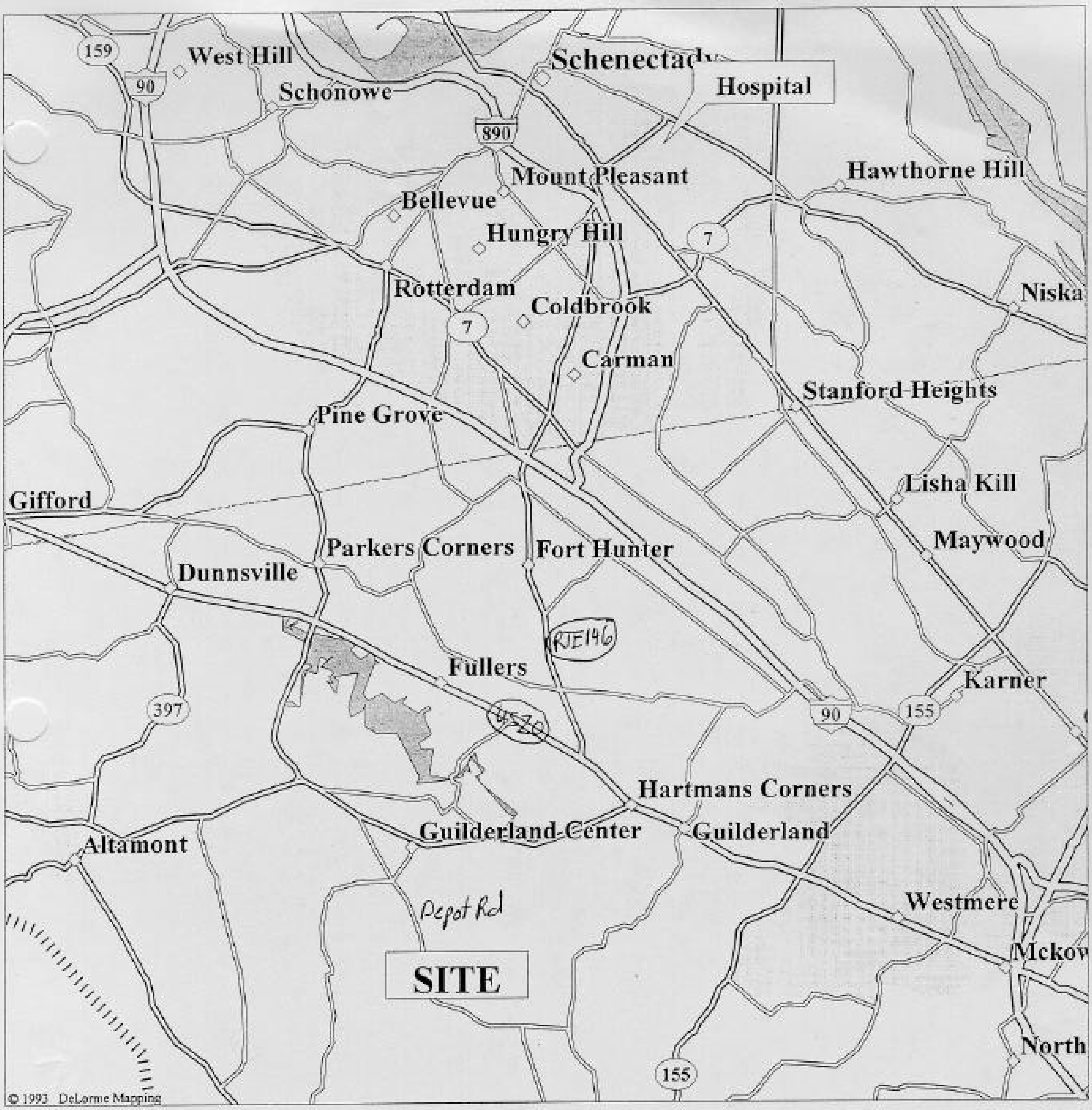
6.0 EMERGENCY RESPONSE PLAN

In the event of an emergency situation, on-site personnel will take appropriate actions to mitigate the situation and prevent physical injury. For any emergency situation, the appropriate contacts will be made from the following list.

Emergency Response	911
Site Contact (Dennis Wesolowski)	(518) 370-3347
Parsons ES Contacts	
Greg Hedrick, Program Manager	(770) 446-4900
George Moreau, SADVA RI Project Manager	(315) 451-9560
Brian Powell, Project Health and Safety Officer	(315) 451-9560
UFPO (NYS One call system)	(800) 962-7962
St. Clares Hospital 600 McClellan St. Schenectady, NY 12304-1090	518-382-2000

Route to the St. Clares Hospital: Head North on Depot Road until it connects with Route 146. Turn right onto Route 146 (= Altamont Rd., = US Rt.20) and travel approximately 2 miles. Turn left onto Route 20 and 146 (Western Ave.) and travel ¾ mile. Turn right onto Carmen Rd (Route 146 at US 20 junction). Travel north on Carmen Rd. for approximately 6.5 miles. Carmen Rd. becomes Hamburg St. and then Brandywine Ave. but remains Route 146 throughout. After crossing State Street in Schenectady, turn right onto Bradley Street. Follow signs for the hospital. Refer to Figure 1, the Route to hospital map.

Approximate travel time to the hospital is 20 minutes.



LEGEND

Population Center
○ State Route
◇ Town, Small City
Large City
Interstate, Turnpike
------- County Boundary
Major Street/Road
State Route
Interstate Highway
US Highway
▨ Open Water
IIIIIII Contour

Scale 1:87,500 (at center)

2 Miles

2 KM

Figure 1 Route to Hospital
Mag 12.00
Fri Jul 09 15:44:41 1999

7.0 REFERENCES

General Safety and Health - Plan Focused Site Investigation, Parsons Engineering Science, March 1999

Remedial Investigation Field Sampling Plan SADVA, Parsons Engineering Science, October 1999

General Field Sampling Plan - Focused Site Investigation, Parsons Engineering Science, March 1999.

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