U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA

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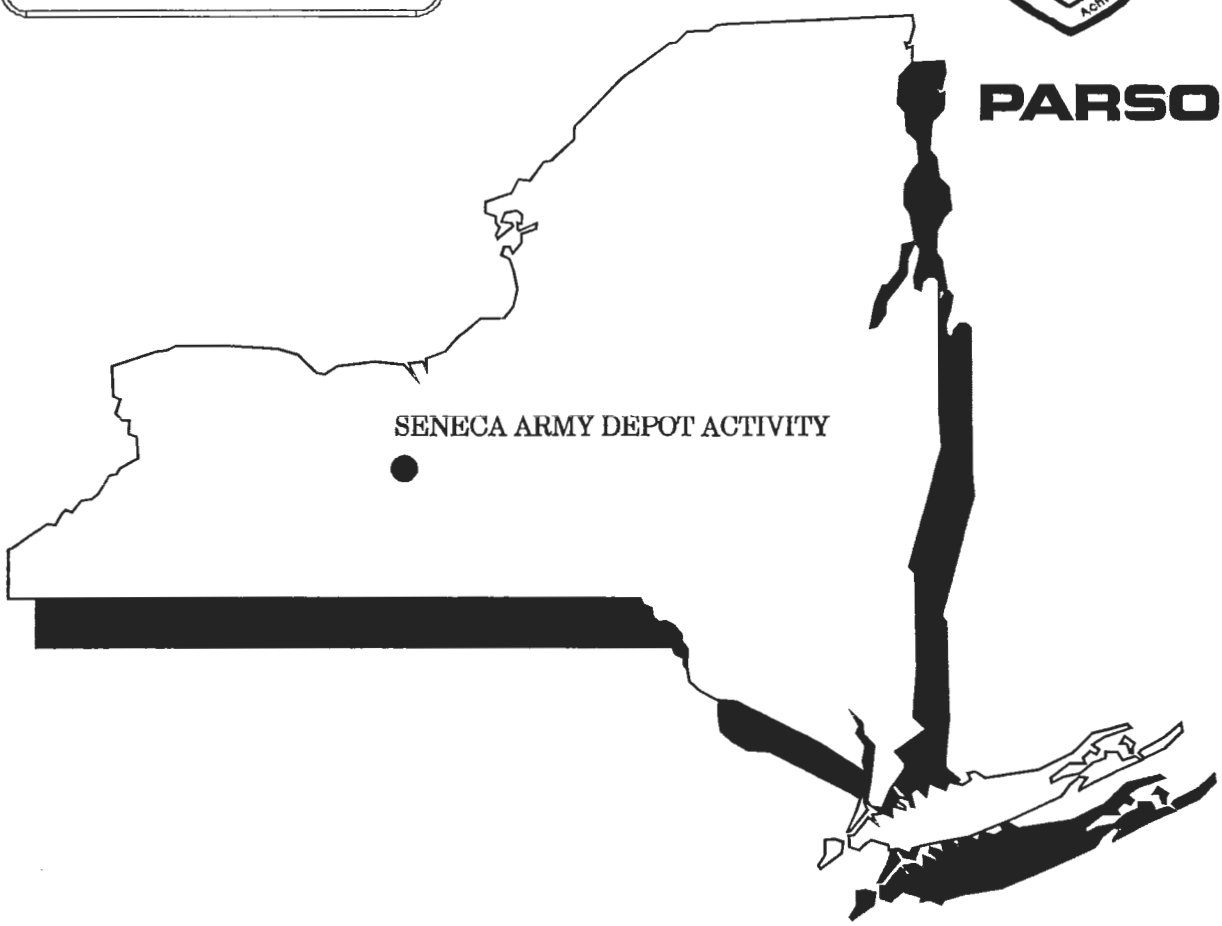

DRAFT Findings Report
Suspected Small Arms Range
Lake Housing Area

SENECA ARMY DEPOT ACTIVITY (SEDA)

April 2003

DRAFT Findings Report
Small Arms Range, Lake Housing Area
SEAD-119B

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1 INTRODUCTION

On behalf of the U.S. Army (Army), Parsons Engineering Science, Inc. (Parsons) developed and conducted a site investigation of a suspected Small Arms Range that was reported to have once existed near the intersection of West Kendaia Road and Scorpion Road in the Lake Housing Area of the Seneca Army Depot Activity (SEDA) in Romulus, New York. This site is identified by the Army as SEAD-119B. The objectives of the investigative study were to develop sufficient information to verify whether the reported range had actually been located at the identified site and, if it was found to have once been present at the site, to assess whether there was evidence that contamination associated with the range's historic use was present in the area and was potentially impacting the environment and surrounding populations.

The investigation of the Small Arms Range at the Lake Housing Area was performed according to requirements and guidance of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as set forth in the Interim Final "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (EPA, 1988). Work also complied with the latest guidance provided by the U. S. Environmental Protection Agency (USEPA), New York State Department of Environmental Conservation (NYSDEC), and the Department of Defense's (DoD's) Base Realignment and Closure (BRAC) Office. Specific details of the work proposed to evaluate the site and to assess potential environmental releases are presented in the document "Final Workplan for the Environmental Baseline Survey (EBS) at the Former Small Arms Range at the Lake Housing Site, Seneca Army Depot Activity" (Parsons, January 2002).

The investigation consisted of a geophysical survey, soil sampling, installation of monitoring wells, physical and chemical analysis of soil samples and excavation and evaluation of test pits. **Section 2** presents the history of the site and a summary of work completed at the site. **Section 3** presents a summary of the results and findings of the investigations. **Section 4** presents a summary and conclusions of the investigation.

2 STUDY AREA INVESTIGATION

2.1 BACKGROUND

The Seneca Army Depot Activity (SEDA) occupies approximately 10,600 acres of land that is located near the Village of Romulus in Seneca County, New York. The military facility has been owned by the U.S. Government and operated by the Army since 1941. SEDA is located in an uplands area, which forms a divide separating two of the New York Finger Lakes, Cayuga Lake on the east and Seneca Lake on the west. The elevation of the facility varies from a low of approximately 480 feet National Geodetic Vertical Datum (NGVD, 1929) at it lowest point along the edge of Seneca Lake in the Lake Housing Area to a high of approximately 760 feet (NGVD, 1929) along the eastern edge of the Depot near the village of Romulus and NY State Route 96.

On July 14, 1989, the USEPA proposed SEDA for inclusion on the National Priorities List (NPL). Supporting its recommendation for listing, the USEPA stated, "the Army identified a number of potentially contaminated areas, ...". The USEPA recommendation was approved and finalized on August 30, 1990, when SEDA was listed in Group 14 of the Federal Facilities portion of the NPL. The Depot's USEPA identification number is NY0213820830.

In 1995, SEDA was designated for closure under the DoD's Base Realignment and Closure (BRAC) process. Congress approved DoD's nomination for closure, and SEDA was officially listed under BRAC in October of 1995. The mission closure date for SEDA was set for September 30, 1999, and the installation closure date was set for September 30, 2000.

In accordance with requirements of BRAC, Woodward-Clyde Federal Services was retained by the Army to conduct and present the findings of an Environmental Baseline Survey (EBS) for SEDA. Under the EBS process, Woodward-Clyde assessed all property and facilities at the Depot to classify each into one of seven standard environmental condition definitions of property area types consistent with the Community Environmental Response Facilitation Act (CERFA – Public Law 102-426), which amends Section 120 of CERCLA. Parcels of land that are classified as Level 1 through 4 are suitable for transfer or lease, while parcels that are designated as Level 5 through 7 are not considered suitable for transfer, pending the initiation and completion of necessary remedial actions or the completion of further or additional site evaluations and investigations. The results of Woodward-Clyde's effort were documented in the U.S. Army Base Realignment and Closure 95 Program Report that was issued on October 30, 1996. Data and

information compiled during the preparation of this report served as part of the basis for subsequent decisions made regarding potential future land use.

Pursuant to other requirements of BRAC, the Seneca County Board of Supervisors established the Seneca Army Depot Local Redevelopment Authority (LRA) in October 1995. The primary responsibility assigned to the LRA was to plan and oversee the redevelopment of the Depot. The Reuse Plan and Implementation Strategy for SEDA was adopted by the LRA and approved by the Seneca County Board of Supervisors on October 22, 1996. Under this plan and subsequent amendment, areas within the Depot were classified according to their most likely future use. The proposed future use designations identified by the LRA and approved by the Board of Supervisors included:

- housing;
- institutional;
- industrial;
- warehousing;
- conservation/recreational land;
- an area designated for a future prison;
- an area for an airfield, special events, institutional, and training; and
- an area to be transferred from one federal entity to another (i.e., the area of the existing navigational LORAN transmitter).

A map showing the LRA's recommended future land use for the Depot is provided as **Figure 2-1**.

2.2 SITE DESCRIPTION AND HISTORY

Within the EBS Report, Woodward-Clyde did not identify or indicate the presence of any suspected small arms range at the Lake Housing Area. In the final report, Woodward-Clyde assigned a classification identifier of 1(1) to the Lake Housing Area and wrote:

> "This parcel is most of the Lake Housing Area, with the exclusion of the housing area itself. This parcel consists of the area between the housing and the highway. The housing area is excluded from this parcel and placed in Parcel 5(2) because it is associated with petroleum storage activities. The parcel is designated as a Category 1 parcel because there has been no documented storage of hazardous substances or petroleum products; nor is

there evidence of release, disposal, or migration from an adjacent property of hazardous substances or petroleum products with the identified area."

The Parcel 1(1) assignment includes the area where the suspected small arms range is located near the intersection of West Kendaia Road and Scorpion Road.

The presence of the suspected small arms range at the Lake Housing Area was first reported in the ordnance and explosives (OE) Archive Search Report (ASR) (USACE, St. Louis, 1998) prepared by the Army Corps of Engineers. The archive search was conducted to determine the presence and condition of any warfare materials left at the base at the time of writing. As part of the site visit to the Depot for the ASR, inspectors visited a reported small arms range at what was once the Lake Housing Area for Sampson Air Force Base and SEDA. Investigation of this site during the ASR was based on its presence on the 27 February 1955 site plan of Sampson Air Force Base and on the Seneca Ordnance Depot Layout Map No. 1 produced on 12 March 1956 (USACE, St. Louis, 1998). A brief discussion of the ASR site visit to the reported Small Arms Range states: "We found a tower and a small shack, but there is no target berm or evidence of ordnance in the area". A photograph included in the OE ASR shows the tower overgrown with brush and small trees, perhaps 10 to 15 feet in height. Based on the lack of any evidence suggesting a target berm in this area, the OE Archive Search Report recommended no further action/investigation of the Small Arms Range at the Lake Housing Area.

While the ASR recommended no further action at this site based on OE concerns, the Small Arms Range's inclusion in this document prompted the USEPA to take notice of the site. The USEPA felt that residual substances from past activities at the site were a potential concern. As there was no target berm found during the ASR site visit, it was believed likely that the berm was subsequently bulldozed and represented a potential source area for surface or near-surface soil contamination by small arms projectiles. A second potential source was anticipated concentrations of cartridge casings in surface soil at or near the former firing point(s). Potential release mechanisms from these source areas included infiltration to groundwater and dust and volatile emission. Given these concerns, the Army decided to further investigate the alleged site to develop information and data to substantiate or refute these concerns. This report details the fieldwork performed during the investigation of the area believed to be the Small Arms Range, Lake Housing Area and the results of the work completed.

2.3 PHYSICAL SITE CHARACTERIZATION

The area suspected to be the location of the Small Arms Range at the Lake Housing Area was identified based on the map of sites investigated during the ASR. The suspected range is located approximately 5,000 feet west of the main portion of the Depot and State Route 96A, near the intersection of West Kendaia and Scorpion Roads (**Figure 2-2**). The elevation of the site varies from approximately 560 to 580 feet (NGVD 1929). The land slopes gently towards Seneca Lake (elevation 445 feet), which is located 4,000 feet to the west of the suspected Small Arms Range. The site is bounded on the north and the east by the gorge through which Kendaia Creek flows and which is 80 to 100 feet deep in this area, by Scorpion Road on the west, and by West Kendaia Road to the south. **Figure 2-2** shows a map of the area suspected to be the Small Arms Range.

Examination of aerial photographs taken in 1959 and 1968 does not provide evidence of the suspected range or of the small shack and tower described in the OE ASR, perhaps due to the small footprint of these structures, and the high elevation of the aerial photography. By 1998 when the ASR site visit was conducted, the area in question was overgrown with thick underbrush and small trees. This condition prevailed when the field investigation began in March 2002.

In March 2002, brush cutting was performed over approximately 3-4 acres of site to clear the suspected range prior to the start of the sampling and surveying programs. The actual area cleared was determined based on the review of a map contained in the Base Master Plan developed at the time of SEDA's construction which clearly showed a small arms range and a rifle range located at the intersection of West Kendaia and Scorpion Roads. The map also depicts what appears to be four firing lines located northeast of Scorpion Road in the direction of Kendaia Creek. During brush cutting operations, a berm structure measuring approximately 350 feet long by 4 feet wide by 4 feet high was discovered running northeast-to-southwest along the eastern side of the suspected site. It is presumed that this structure may have been constructed to eventually be used as a target backstop berm at the range. Additionally, several metal posts aligned in straight lines running parallel to, but offset in a easterly direction from, Scorpion Road , which may have once been used either to hold target lines or to mark firing lines were also observed once the brush was cleared. Thus, this area became the focal area of the subsequent site investigation.

The following tasks were completed to investigate the suspected Small Arms Range at the Lake Housing Area:

- Records review and discussions with Depot personnel,

- Geophysical survey,
- Soil sampling,
- Installation of monitoring wells,
- Chemical and physical characterization of soil samples, and
- Test pitting.

2.4 METHODS AND MATERIALS

2.4.1 Geophysical Survey

A geophysical survey was performed at the suspected Small Arms Range to determine if subsurface metal debris were present in the identified area and if bullet casings or fragments indicated that the site was actually used as a small arms range. This survey was performed in April of 2002 using an EM-61 Time Domain Metal Detector (TDMD). The EM-61 was selected as the most appropriate geophysical instrument for this type of survey (i.e., a target munition of small arms slugs and casings) at SEDA based on a geophysical instrument prove-out conducted in January 2000, prior to the fieldwork for the OE Engineering Evaluation/Cost Analysis (EE/CA). In the conclusions of this work, the following summary is provided:

> "Each of the instruments [i.e., magnetometry and electromagnetics] was able to detect the OE projectiles to and beyond the depths specified in the DID [Data Item Description], however the EM-61 was able to detect the most items out of all of the data recording instruments."

Further,

> "Because the EM-61 was the most effective mapping geophysical instrument, Parsons ES recommends that it be used for the "meandering" surveys, primarily planned as transects in open areas, with an assumed footprint of three feet. Positioning information should be recorded using a Trimble ProXRS™, as this instrument provided accurate enough positioning data (within approximately 1 ft.) for Parsons ES to reacquire anomaly locations within contract specifications (per DID-005-05). This instrument will also be more useful than the Trimble 4800™ in areas where surveys will be performed along the edge of canopied terrain or in lightly canopied terrain."

The results of the OE-EE/CA prove-out are presented in the *Final Report on Geophysical Equipment Test Prove-out* (Parsons, April 2000).

The EM-61 TDMD instrument generates an electromagnetic (EM) pulse in the target area and this pulse triggers eddy currents in metallic objects that are present on the surface or in the subsurface. Decay of the eddy currents produces a secondary magnetic field that is monitored by a receiving coil and recorded by the incorporated data logger. By monitoring the decay of the eddy current for an extended time after the pulse, the induced current fully dissipates and only the residual eddy current in the metal is still producing a secondary field, and these are recorded and displayed.

Prior to the start of the fieldwork, a system of 11, 100-foot by 100-foot grids was laid out on the site using measuring tapes (**Figure 2-3**). The grids were laid out parallel to the berm, with the majority of the gridded area covering the region to the west of the berm, as this was on the side of the observation tower and thus between the location of the presumed firing line and the identified berm. The two, 200-foot long by 100-foot wide blocks that comprise the northeastern and northwestern most corners of a full 15 grid sector (5 block long by 3 block wide), rectangular system (i.e., imaginary grids A4, A5, C4, and C5) were excluded due to being heavily wooded which made pulling the EM-61 coils impossible. However, as these grid cells are generally beyond the northern end of the presumed firing line (imaginary grid cells A4 and A5) and beyond the northern end of the presumed backstop berm (imaginary grid cells C4 and C5) and perpendicular to the presumed path of firing, it is likely that they received little, if any, fire from the range.

At the time the geophysical survey was performed (early April 2002), the grid cell located in the northwest corner of the 11 grid block setup (i.e., grid block A3) was extremely wet and could not be surveyed with the EM-61 due to the inability to pull the coils through the marshy terrain. Therefore, geophysical data were collected in the remaining 10 grid blocks and a partial grid was added at the southeast corner (i.e., grid block C0) of the site to cover the area surrounding the southern-most length of the identified berm. Data were collected along parallel survey lines spaced 2.5 feet apart, which were traversed over a known distance with data being collected incrementally with distance. Electromagnetic (EM) measurements were collected each time the instrument's tire rotated a specified distance. Fiducial marks were manually inserted by the operator at 50-foot intervals and these were used during the post processing of the data to correct data line length by compressing or expanding the recorded measurement locations for each line so that the lines covered the actual distance traveled. This operation was required to compensate for variations in the terrain along the survey line, typically resulting in an extension in the recorded line length over the actual line length. The survey data were then rotated and translated from the local coordinate system they were collected in (where the southwest corner of the grid surveyed was assigned a coordinate of 0E, 0N) to the

New York State Plane (Central Grid) coordinate system. Once in State Plane coordinates, the data were contoured and examined for anomalous spots that might be representative of subsurface metal. Anomalies were selected based on observed peaks in the data for each grid and comparison with background readings across the site.

During the collection of the geophysical data, Parsons also visually examined the surface of the grid blocks and noted where metallic debris such as pipe was present. No bullets or casings were noted as a result of the physical examination of the site.

2.4.2 Surface Soil Investigation

2.4.2.1 Surface Soil Sampling

Surface soil samples were collected at 18 locations as part of the Small Arms Range investigation (**Figure 2-4**). Eleven of the surface soil samples were collected at randomly selected locations; one sample was collected from each of the 11 grid blocks originally set for the geophysical survey (samples SS119-1001 to -1011). The remaining seven surface soil samples (SS119-1012 to -1018) were collected from biased locations that were selected based on observed, site features. Four of these were collected along the berm at 70-foot intervals, two were collected behind the berm (towards Kendaia Creek) to assess the potential impact of ammunition which overshot the berm, and one was collected in the assumed location of the firing line.

With reference to the randomly placed surface soil samples located in the geophysical grids, each 100-foot by 100-foot grid was subdivided into 100, 10-foot by 10-foot blocks; and one of these blocks was randomly chosen for sampling. At each of these sampling locations, five discrete grab samples of surface soil were collected; one of these five grab sub-samples was collected from each of the four corners of the block, while the fifth grab sub-sample was collected from the center of the 100 square foot block. For the biased sampling locations on and behind the berm, the sides of the sampling block were shortened to 2 feet in length; however, one sub-sample was still collected from each corner of the block, with the fifth being collected from the center of the 4 square foot block. At all sampling points, vegetation was removed and a 2-inch deep hole was excavated using a decontaminated stainless steel spoon. Approximately equal amounts of soil were then removed from each sampling point across the full depth interval to provide a representative vertical composite. Approximately 250 grams of soil were collected in this manner from each discrete sub-sample location and placed into a stainless steel bowl. Large stones and pieces of vegetation were then removed, and the sample was homogenized by mixing collected soil with the spoon.

Once the soil representing a grid was composited and homogenized, clean sample jars were filled, labeled, and packaged for shipment under chain-of-custody. Soil sampling procedures are specified in Section 3.4.4 and Section 4.1 of the Field Sampling and Analysis Plan (Parsons, 1995, Appendix A). Soil sampling records are provided in **Appendix A**.

Field quality control (QC) consisted of the collection and analysis of one field duplicate sample (SS119-1000) that was submitted with the other 18 samples to the primary analytical laboratory and one split sample that was sent to the US Army Corp of Engineers' MRD laboratory. The duplicate sample sent to the primary laboratory with the rest of the field samples was identified using standard sample identifiers, which provided no indication of its QC role. Quality Assurance/Quality Control (QA/QC) sampling requirements are described in Section 5.4 of Appendix C of the Generic Installation RI/FS Workplan (Parsons, 1995). Required sample containers, preservation techniques, and holding times are also specified in the Generic Installation RI/FS Workplan.

2.4.2.2 Sample Analysis

All surface soil samples were analyzed for Target Analyte List (TAL) metals and cyanide according to the NYSDEC Contract Laboratory Program (CLP) Statement of Work (SOW), explosive compounds (i.e., nitroaromatics and nitroamine compounds) by EPA SW-846 Method 8330, and Total Organic Carbon (TOC) by the Lloyd Kahn Method. Results of the lab analysis of the samples are discussed in Section 3 of this report.

2.4.3 Groundwater Investigation

2.4.3.1 Introduction

A groundwater investigation was proposed for the Small Arms Range to determine if contaminants associated with small arms related debris were present and had impacted the groundwater quality. Three monitoring wells were installed at locations surrounding the site (**Figure 2-3**). Monitoring well MW119-1 was set approximately 30 feet to the east of the backstop berm; while wells MW119-2 and MW119-3 were both installed west of the assumed location of the firing line in the vicinity of the two surface soil samples that exhibited the highest lead concentrations detected at the site. Based on preliminary groundwater elevation data collected during the development of the wells, it appears that the local groundwater flows from the area of Scorpion Road northeast towards Kendaia Creek.

2.4.3.2 Monitoring Well Installation

Monitoring well installation procedures were consistent with the USEPA Region II CERCLA QA Manual and the NYSDEC TAGM (HTRW-88-4015) regarding design, installation, development and collection of groundwater samples. Further, work was completed in compliance with all requirements described in the NYSDEC, 6 NYCRR Part 360, Solid Waste Management Facilities Regulations, Section 360-2.11, which details groundwater monitoring well requirements.

The overburden monitoring wells were installed using 4.25-inch inside diameter (I.D.) hollow stem augers. The borings were advanced to auger refusal; which, for the purposes of these investigations, is defined as the interface between weathered shale and competent shale. During drilling, split spoon samples were collected continuously until spoon refusal was encountered. Monitoring wells were constructed of ASTM-approved Schedule 40 polyvinyl chloride (PVC) pipe with a well screen slot size of 0.010-inch, with threaded, flush joints that contained a rubber gasket. A silt sump "point" was installed at the bottom of each well. No solvents or other adhesives were used to connect the PVC casing. Prior to installation, all well components were inspected to ensure that a proper working condition would exist upon completion. All monitoring wells were inspected to guarantee that the components being used were clean, uncontaminated and free of any defects in workmanship.

Once the boring was complete, and the well screen and upriser were properly positioned, a sand pack was placed by pouring sand from the surface into the annular space between the well screen and the hollow stem auger. The sand pack was not extended more than two feet (but at least six inches) above the top, or six inches below the bottom of the screen. A layer of bentonite chips measuring between one and two feet thick was poured within the annular space and extended from the top of the sand pack to the ground surface.

Wells were screened from three feet above the water table (if space allowed) to the top of the competent shale. Water table variations, site stratigraphy, and expected contaminant flow and behavior were also considered in determining the screen length and position.

In all instances, wells were protected with a steel casing, four inches in diameter and five feet in length. This protective steel casing extended 2.5 feet below the ground surface to prevent heaving by frost. The protective casing had a locking cap with a weather-resistant, padlock. A weep hole was drilled at the base of the protective steel casing above the cement collar to allow drainage of water. A locking expandable cap was also placed in the top of the PVC well casing. A cement collar was placed around

each well and a permanent well identification number was marked on the steel protective casing. Monitoring well completion reports are contained in **Appendix B.**

2.4.3.3 Monitoring Well Development

Following well installation, each monitoring well was developed to ensure that a proper hydraulic connection existed between the well and the surrounding aquifer. The development of monitoring wells was performed two to seven days after well installation and at least seven days prior to planned well sampling. During development, effort was made to attain the lowest turbidity, preferably less than 50 Nephelometric Turbidity Units (NTUs).

The development process used for the three wells at the suspected Small Arms Range, Lake Housing Area required use of a bailer, which was used to remove water from the well until it was dry. The well was then allowed to recharge to at least 80 percent of the original depth to water before the baildown process was repeated. Each well was purged to dryness three times using the bailer. During the development process, it was noted that recharge rates for these wells were extremely slow, most likely due to the low porosity of the till and weathered shale through which the wells were screened. Measurements taken continuously during well development also indicated that the groundwater entering the well from the aquifer was extremely turbid (>1,000 NTU) in every measurement recorded. Well development forms are contained in **Appendix B.**

During the well development process, it became apparent that the three installed wells would not yield sufficient water to allow for the collection of necessary samples in a reasonable period of time and that the highly turbid water in the wells would influence the analytical results. Parsons, on behalf of the Army, sent a letter dated September 23, 2002 to the USEPA and NYSDEC requesting that the groundwater sampling and analysis requirement be waived for this site. The Waiver was requested based on the following factors: There is no physical or geophysical surficial evidence of small arms munitions at the site; the analytical results from the surface soil samples collected did not show metals contamination; and, there is no historical evidence to suggest that the area had ever been used as an active small arms range. The NYSDEC approved the Army's request in a letter dated December 13, 2002, while the USEPA approved the waiver request via an email dated January 10, 2003. Therefore, groundwater samples were not collected during the Small Arms Range Lake Housing Area investigation.

2.4.4 Test Pits

The geophysical survey results showed anomalous areas within the small arms range area that could have been interpreted as fill. Accordingly, the Army decided to excavate test pits at locations of representative anomalies to determine if filled materials were present. On February 14, 2003, four test pits were excavated in the area of the small arms range. These test pits were located based on the results of the EM-61 survey. All test pits were excavated to the bottom of the natural fill layer, to the top of bedrock, or to a maximum depth of approximately eight feet due to equipment limitations. The bedrock surface (if encountered), bottom of natural fill layer, and the top of the water table (if encountered) were documented at each test pit location. The material removed from each test pit was returned to the excavated area at the completion of each test pit investigation. Test pitting procedures are provided in Section 3.4.3 of Appendix A, Field Sampling and Analysis Plan in the Generic Workplan.

3 RESULTS

3.1 GEOPHYSICAL RESULTS

The results of the EM-61 investigation at the Small Arms Range are shown in **Figure 3-1**. Background EM-61 readings, which were normalized to approximately 0 millivolts (mV) during post-processing, appear green and elevated readings appear as red or pink. Numerous large anomalies were detected in the geophysical investigation. These large anomalies not consistent with those that would be expected at a small arms range. Typically, high amplitude anomalies with a relatively large areal extent would only be expected in the immediate vicinity of the target berm, where the majority of the expended ammunition would be concentrated. Anomaly amplitude and areal extent should both decrease with increased distance from the berm. This is not the case in the collected data, as anomalies of greater than 80 mV are present at distances of over 150 feet from the berm and only approximately 50 feet from the firing line. For comparison, the highest amplitude anomaly detected during the Geophysical Prove-Out conducted for the OE EE/CA was approximately 80 mV over a 155 millimeter (mm) shell simulant buried at 21 inches; and the areal extent of the 155mm anomaly was less than that of many of the unexplained anomalies in the Small Arms Range data. Accordingly, the geophysical survey did not identify and evidence indicative of a small arms range.

Due to the findings of the EM-61 survey, four test pits were excavated at the Small Arms Range, Lake Housing Area to investigate the numerous large anomalies. The results of the test pitting and contents of the test pits are discussed in **Section 3.3,** below.

3.2 SURFACE SOIL SAMPLE ANALYSIS

The locations of the 19 surface soil samples collected at the Small Arms Range are shown in **Figure 2-4.** These samples were analyzed for TAL metals and cyanide, explosive compounds, and Total Organic Carbon (TOC). The results of these analyses are presented in **Table 3-1**. In summary, none of the 14 explosives compounds of interest were detected in any of the 19 soil samples collected. With respect to metals and cyanide, 17 of the 24 analytes of interest (Al, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, V, and Zn) were detected in all 19 of the soil samples characterized. Conversely, thallium and cyanide were not detected in any of the soil samples characterized. Selenium (3 times) and sodium (5 times) were found in fewer than 33 percent of the samples, while antimony, mercury, and silver were each found in more than 70 percent of the samples analyzed. Most importantly, however, is that only five of the concentrations measured for all metals were found at levels that surpassed the ninety-fifth

percentile concentration computed from a set of background soil samples collected at the Seneca Army Depot, which is consistent with NYSDEC's TAGM HRW-94-4046. A summary of this data is provided below.

Analyte	Sample ID	Measured Concentration	95th percentile concentration of Metal found in Background data set	Maximum concentration of Metals found in Background data set
Arsenic	1013	9.5 J mg/Kg	8.2 mg/Kg	21.5 mg/Kg
Lead	1007	31.6 J mg/Kg	24.8 mg/Kg	266 mg/Kg
Lead	1018	33.9 J mg/Kg	24.8 mg/Kg	266 mg/Kg
Potassium	1002	2570 mg/Kg	2380 mg/Kg	3160 mg/Kg
Potassium	1012	2670 mg/Kg	2380 mg/Kg	3160 mg/Kg

As may be seen from the provided summary, none of the measured concentrations for metals in soil were higher than the maximum concentrations measured in Seneca's background data set.

The Total Organic Carbon levels found in the soil samples ranged from a low of 22,800 mg/Kg to a high of 46,600 mg/Kg.

3.3 TEST PIT RESULTS

Four test pits (TP-01 through TP-04) were excavated at the Small Arms Range in an attempt to discover the source of some of the larger anomalies in the EM-61 data **(Figure 3-2)**. Two of these pits were situated in the location of two large anomalies in the vicinity of the suspected firing line, and two were situated on anomalies immediately to the west (i.e., in front of) of the berm. Each test pit was approximately 25 feet in length and 3 feet wide; and each was dug to the glacial till – weathered shale boundary, which was consistently less than 4.5 ft below ground surface across the site.

The typical test pit encountered the following layers:

- 0 to 1 foot of topsoil;
- 1 foot to 4 feet of dark brown till;
- refusal at top of brown weather shale.

With the exception of a few vitrified clay tiles found in two of the test pits, there was no evidence of any contaminated fill materials, trash or other buried materials. No metal of any kind was recovered, and there were no signs of anything relating to the site's possible use as a Small Arms Range. The Army believes that the geophysical anomalies are related to higher points in the weathered shale. The anomalies are not indicative of buried materials. The test pit logs are presented in **Appendix C**.

4 SUMMARY AND CONCLUSIONS

A site investigation was conducted at the suspected Small Arms Range at the Lake Housing Area at the Seneca Army Depot. The investigation included brush removal, an electromagnetic (EM-61) geophysical survey, soil sampling and analyses, the installation and development of groundwater sampling wells (samples were not collected), and the excavation of four test pits at locations of identified geophysical anomalies.

As a result of the brush removal activity, evidence of a backstop berm was identified, and combined with the presence of an observation tower; the Army believes that a shooting range may have once been planned at the site. However, the Army does not believe that the range was used extensively, if at all, because there is no evidence of munitions or metallic contamination at the site.

Analytical results from surface soil samples show no evidence of nitroaromatic or nitroamine compounds (explosives), or elevated levels of metals. Five different samples contained one metal that was detected at a level above its respective ninety-fifth (95^{th}) percentile value in the Depot's background soil data set. However, none of the measured metal concentrations were above the maximum concentration measured for that metal in the background data set.

Although the results of geophysical survey suggested several large anomalies, subsequent test pitting did not result in the discovery of any significant buried non-metallic or metallic objects. No bullets, bullet fragments or shell casings were observed during any phase of the work.

Given results and findings of the site investigation conducted at the suspected Small Arms Range, Lake Housing Area, the Army recommends that site be removed from the list of potential solid waste management units (SWMUs) or areas of concern (AOC) at the Depot. This site should continue to be viewed as a category 1 site, as it was initially assessed in the Environmental Baseline Survey, and be assessed as free for release for beneficial future uses. The Army does not intend to perform additional work at the site.

Table 3-1
Surface Soil Sampling Results

Small Arms Range, Lake Shore Housing Area (SEAD-119)
Seneca Army Depot Activity, Romulus NY

Parameter	Units	Maximum Concentration	Frequency of Detection	NYSDEC TAGM Level	Number of times Exceed TAGM	Number of times Detected	Number of times Analyzed	SEAD-119 SS119-A1-98 SOIL 119-1001 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-A2-24 SOIL 119-1004 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-A3-04 SOIL 119-1007 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-B1-37 SOIL 119-1002 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-B2-36 SOIL 119-1005 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-B3-09 SOIL 119-1008 0 0.2 4/11/02 SA RI 1 Value (Q)
1,3,5-Trinitrobenzene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
2-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
3-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
4-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
HMX	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
Nitrobenzene	UG/KG	0	0%	200	0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
RDX	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
Tetryl	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U
Metals and Cyanide													
Aluminum	MG/KG	18100	100%	19300	0	19	19	13700	14500	15200	18100	12500	15100
Antimony	MG/KG	0.74	84%	5.9	0	16	19	0.24	0.41	0.74	0.31	0.23 U	0.46
Arsenic	MG/KG	9.5	100%	8.2	1	19	19	5.1 J	4.8 J	5.7 J	4.8 J	4.8 J	5.2 J
Barium	MG/KG	114	100%	300	0	19	19	98.2	92.5	99.9	114	95	99.3
Beryllium	MG/KG	1.1	100%	1.1	0	19	19	0.78 J	0.75 J	0.86 J	1.1 J	0.77 J	0.83 J
Cadmium	MG/KG	0.52	100%	2.3	0	19	19	0.4	0.41	0.43	0.52	0.45	0.43
Calcium	MG/KG	80900	100%	121000	0	19	19	17600	5060	9680	5930	47200	4920
Chromium	MG/KG	25.6	100%	29.6	0	19	19	18.1 J	19.5 J	20.3 J	25.6 J	17.1 J	20.1 J
Cobalt	MG/KG	17.3	100%	30	0	19	19	7.4	8.7	9.3	7.9	6.7	7.8
Copper	MG/KG	30.2	100%	33	0	19	19	13.9 J	15.5 J	18.4 J	18.3 J	14.3 J	16.3 J
Cyanide	MG/KG	0	0%	0.35	0	0	19	0.62 U	0.59 U	0.69 U	0.72 U	0.58 U	0.6 U
Iron	MG/KG	30000	100%	36500	0	19	19	17500	19200	20300	24200	18200	20600
Lead	MG/KG	33.9	100%	24.8	2	19	19	21.5 J	22.9 J	**31.6** J	20.9 J	17.7 J	24 J
Magnesium	MG/KG	19200	100%	21500	0	19	19	4950	4230	5280	5010	19200	3990
Manganese	MG/KG	769	100%	1060	0	19	19	454	482	531	422	530	354
Mercury	MG/KG	0.047	89%	0.1	0	17	19	0.038	0.033	0.047	0.047	0.031	0.03
Nickel	MG/KG	42.1	100%	49	0	19	19	17.7	19.4	21.8	26.1	17	20
Potassium	MG/KG	2670	100%	2380	2	19	19	1820	1860	2070	**2570**	1860	2120
Selenium	MG/KG	0.31	16%	2	0	3	19	0.25 U	0.26 U	0.31	0.33 U	0.26	0.26 U
Silver	MG/KG	0.33	74%	0.75	0	14	19	0.25	0.24	0.26	0.26	0.32	0.33
Sodium	MG/KG	99.1	26%	172	0	5	19	44.4 U	44.8 U	50.5 U	57.2 U	44.1 U	44.9 U
Thallium	MG/KG	0	0%	0.7	0	0	19	0.42 U	0.42 U	0.48 U	0.54 U	0.42 U	0.42 U
Vanadium	MG/KG	31.8	100%	150	0	19	19	24.4 J	27 J	29.5 J	31.8 J	25.4 J	29.5 J
Zinc	MG/KG	104	100%	110	0	19	19	68.2 J	78.7 J	95 J	102 J	78.2 J	73.3 J
Other Analytes													
Total Organic Carbon	MG/KG	46600	100%	N/A/	N/A	19	19	33900	34100	33700	46600	38400	43400

Table 3-1
Surface Soil Sampling Results

Small Arms Range, Lake Shore Housing Area (SEAD-119)
Seneca Army Depot Activity, Romulus NY

Parameter	Units	Maximum Concentration	Frequency of Detection	NYSDEC TAGM Level	Number of times Exceed TAGM	Number of times Detected	Number of times Analyzed	SEAD-119 SS119-B3-09 SOIL 119-1000 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-B4-52 SOIL 119-1010 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-B5-52 SOIL 119-1011 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 S119-Behind Berm SOIL 119-1016 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-Berm 0,0 SOIL 119-1012 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-Berm 0,150 SOIL 119-1014 0 0.2 4/11/02 SA RI 1 Value (Q)	S
1,3,5-Trinitrobenzene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
3-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
4-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
HMX	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
Nitrobenzene	UG/KG	0	0%	200	0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
RDX	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
Tetryl	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
Metals and Cyanide														
Aluminum	MG/KG	18100	100%	19300	0	19	19	15500	15100	15700	13900	12100	14300	
Antimony	MG/KG	0.74	84%	5.9	0	16	19	0.53	0.39	0.42	0.47	0.54	0.4	
Arsenic	MG/KG	9.5	100%	8.2	1	19	19	4.3 J	5.1 J	5.3 J	5.3 J	3.8 J	5.2 J	
Barium	MG/KG	114	100%	300	0	19	19	100	90.1	97.4	68.3	93.8	66.1	
Beryllium	MG/KG	1.1	100%	1.1	0	19	19	0.75 J	0.76 J	0.79 J	0.78 J	0.74 J	0.84 J	
Cadmium	MG/KG	0.52	100%	2.3	0	19	19	0.42	0.44	0.44	0.45	0.42	0.48	
Calcium	MG/KG	80900	100%	121000	0	19	19	4390	4950	5420	42900	51800	39800	
Chromium	MG/KG	25.6	100%	29.6	0	19	19	20.6 J	20 J	20.4 J	22.7 J	18.9 J	25 J	
Cobalt	MG/KG	17.3	100%	30	0	19	19	7.6	8.3	8.9	10.7	8.2	17.3	
Copper	MG/KG	30.2	100%	33	0	19	19	16.9 J	15.5 J	16.3 J	16.9 J	18.6 J	18.8 J	
Cyanide	MG/KG	0	0%	0.35	0	0	19	0.69 U	0.72 U	0.67 U	0.57 U	0.65 U	0.58 U	
Iron	MG/KG	30000	100%	36500	0	19	19	20800	19900	20100	26400	19500	30000	
Lead	MG/KG	33.9	100%	24.8	2	19	19	24.3 J	22.7 J	21.7 J	11 J	10.6 J	12.6 J	
Magnesium	MG/KG	19200	100%	21500	0	19	19	3610	4140	4170	13900	11000	9500	
Manganese	MG/KG	769	100%	1060	0	19	19	280	391	552	477	391	587	
Mercury	MG/KG	0.047	89%	0.1	0	17	19	0.033	0.033	0.03	0.021	0.026	0.02 U	
Nickel	MG/KG	42.1	100%	49	0	19	19	20.7	19.6	20.2	30.1	25.4	42.1 J	
Potassium	MG/KG	2670	100%	2380	2	19	19	2200	2040	2150	1810	**2670**	2120	
Selenium	MG/KG	0.31	16%	2	0	3	19	0.3 U	0.25 U	0.29 U	0.24 U	0.25 U	0.23 U	
Silver	MG/KG	0.33	74%	0.75	0	14	19	0.18 U	0.15 U	0.23	0.14 U	0.31	0.3	
Sodium	MG/KG	99.1	26%	172	0	5	19	51.9 U	44.6 U	51 U	54.5	71	93	
Thallium	MG/KG	0	0%	0.7	0	0	19	0.49 U	0.42 U	0.48 U	0.4 U	0.42 U	0.39 U	
Vanadium	MG/KG	31.8	100%	150	0	19	19	26.1 J	29.4 J	29.3 J	22 J	22.1 J	20 J	
Zinc	MG/KG	104	100%	110	0	19	19	64.9 J	104 J	91.2 J	74.2 J	74.3 J	70.5 J	
Other Analytes														
Total Organic Carbon	MG/KG	46600	100%	N/A/	N/A	19	19	40500	44500	39800	32100	34200	22800	

Table 3-1
Surface Soil Sampling Results

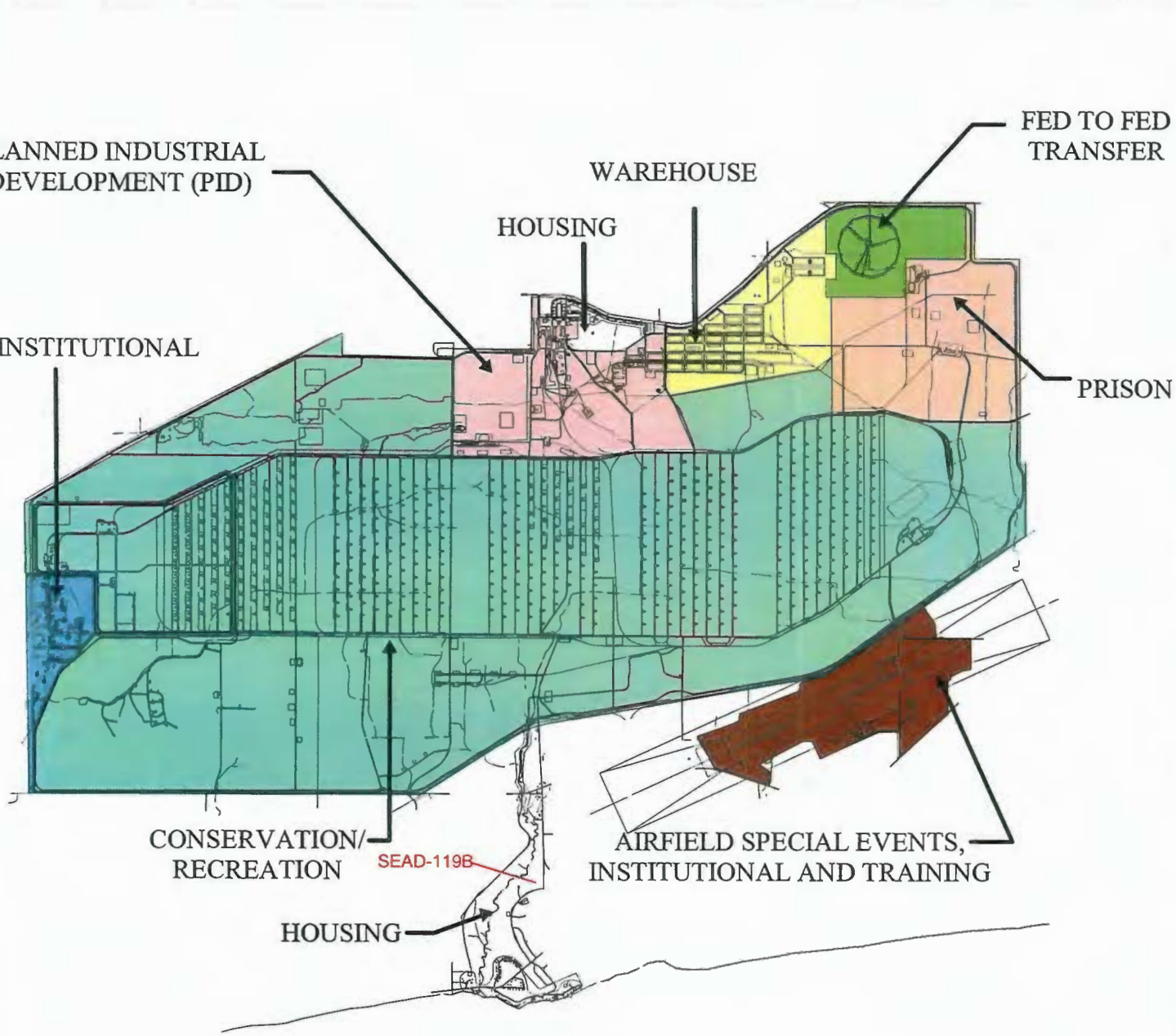
Small Arms Range, Lake Shore Housing Area (SEAD-119)
Seneca Army Depot Activity, Romulus NY

Parameter	Units	Maximum Concentration	Frequency of Detection	NYSDEC TAGM Level	Number of times Exceed TAGM	Number of times Detected	Number of times Analyzed	SEAD-119 S119-Berm 0,250 SOIL 119-1015 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-Berm 0,75 SOIL 119-1013 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-C1-32 SOIL 119-1003 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-C2-05 SOIL 119-1006 0 0.2 4/11/02 DU RI 1 Value (Q)	SEAD-119 SS119-C3-06 SOIL 119-1009 0 0.2 4/11/02 SA RI 1 Value (Q)	SEAD-119 SS119-Creek, N D4 SOIL 119-1017 0 0.2 4/11/02 SA RI 1 Value (Q)	S
1,3,5-Trinitrobenzene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
3-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
4-Nitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
HMX	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
Nitrobenzene	UG/KG	0	0%	200	0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
RDX	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
Tetryl	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U	120 U	
Metals and Cyanide														
Aluminum	MG/KG	18100	100%	19300	0	19	19	14200	11100	16100	16000	9630	15600	
Antimony	MG/KG	0.74	84%	5.9	0	16	19	0.33	0.48	0.44	0.26 U	0.22	0.27 U	
Arsenic	MG/KG	9.5	100%	8.2	1	19	19	4.4 J	9.5 J	4.3 J	4.1 J	2.6 J	4.4 J	
Barium	MG/KG	114	100%	300	0	19	19	74.7	72.6	104	89.8	54	94.5	
Beryllium	MG/KG	1.1	100%	1.1	0	19	19	0.9 J	0.72 J	0.98 J	0.84 J	0.44 J	0.81 J	
Cadmium	MG/KG	0.52	100%	2.3	0	19	19	0.43	0.45	0.51	0.41	0.26	0.4	
Calcium	MG/KG	80900	100%	121000	0	19	19	78200	80900	4500	9650	2700	3430	
Chromium	MG/KG	25.6	100%	29.6	0	19	19	24.2 J	18.2 J	22.9 J	22.2 J	12.4 J	20.5 J	
Cobalt	MG/KG	17.3	100%	30	0	19	19	11.4	8.3	7.1	7.2	4.1	8.4	
Copper	MG/KG	30.2	100%	33	0	19	19	20 J	30.2 J	16.5 J	14.3 J	7.9 J	13.9 J	
Cyanide	MG/KG	0	0%	0.35	0	0	19	0.57 U	0.65 U	0.77 U	0.75 U	0.75 U	0.69 U	
Iron	MG/KG	30000	100%	36500	0	19	19	26300	19800	21500	21200	19000	19300	
Lead	MG/KG	33.9	100%	24.8	2	19	19	6.4 J	11.1 J	20.2 J	15.8 J	12.9 J	18 J	
Magnesium	MG/KG	19200	100%	21500	0	19	19	9790	15400	4380	4350	2260	3940	
Manganese	MG/KG	769	100%	1060	0	19	19	769	430	396	373	162	400	
Mercury	MG/KG	0.047	89%	0.1	0	17	19	0.019 U	0.021	0.044	0.034	0.015	0.032	
Nickel	MG/KG	42.1	100%	49	0	19	19	35.7	24.7	23.1	21.9	10.3	21.3	
Potassium	MG/KG	2670	100%	2380	2	19	19	2220	2330	2330	2020	1160	2260	
Selenium	MG/KG	0.31	16%	2	0	3	19	0.24 U	0.26 U	0.31	0.29 U	0.19 U	0.3 U	
Silver	MG/KG	0.33	74%	0.75	0	14	19	0.32	0.29	0.21	0.17 U	0.12	0.21	
Sodium	MG/KG	99.1	26%	172	0	5	19	99.1	78.4	53.5 U	49.9 U	33.3 U	52.2 U	
Thallium	MG/KG	0	0%	0.7	0	0	19	0.4 U	0.43 U	0.5 U	0.47 U	0.31 U	0.49 U	
Vanadium	MG/KG	31.8	100%	150	0	19	19	22 J	21.5 J	28.5 J	27.8 J	18.2 J	26.9 J	
Zinc	MG/KG	104	100%	110	0	19	19	64.9 J	83.3 J	83 J	75.5 J	43.2 J	78.4 J	
Other Analytes														
Total Organic Carbon	MG/KG	46600	100%	N/A/	N/A	19	19	26600	40200	45000	41400	36200	33600	

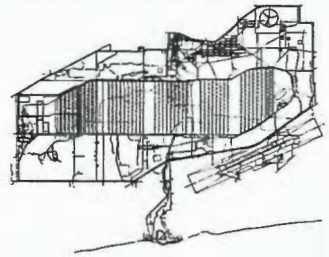
Table 3-1
Surface Soil Sampling Results

Small Arms Range, Lake Shore Housing Area (SEAD-119)
Seneca Army Depot Activity, Romulus NY

								SEAD-119 SS119-FL A1 SOIL 119-1018 0 0.2 4/11/02 SA RI 1	
Parameter	**Units**	**Maximum Concentration**	**Frequency of Detection**	**NYSDEC TAGM Level**	**Number of times Exceed TAGM**	**Number of times Detected**	**Number of times Analyzed**	Value	(Q)
1,3,5-Trinitrobenzene	UG/KG	0	0%		0	0	19	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	19	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	19	120	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	19	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	19	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	19	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	19	120	U
4-Nitrotoluene	UG/KG	0	0%		0	0	19	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	120	U
HMX	UG/KG	0	0%		0	0	19	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	19	120	U
RDX	UG/KG	0	0%		0	0	19	120	U
Tetryl	UG/KG	0	0%		0	0	19	120	U
Metals and Cyanide									
Aluminum	MG/KG	18100	100%	19300	0	19	19	14300	
Antimony	MG/KG	0.74	84%	5.9	0	16	19	0.35	
Arsenic	MG/KG	9.5	100%	8.2	1	19	19	4.6	J
Barium	MG/KG	114	100%	300	0	19	19	93.6	
Beryllium	MG/KG	1.1	100%	1.1	0	19	19	0.78	J
Cadmium	MG/KG	0.52	100%	2.3	0	19	19	0.42	
Calcium	MG/KG	80900	100%	121000	0	19	19	10700	
Chromium	MG/KG	25.6	100%	29.6	0	19	19	18.6	J
Cobalt	MG/KG	17.3	100%	30	0	19	19	9.1	
Copper	MG/KG	30.2	100%	33	0	19	19	17	J
Cyanide	MG/KG	0	0%	0.35	0	0	19	0.73	U
Iron	MG/KG	30000	100%	36500	0	19	19	18900	
Lead	MG/KG	33.9	100%	24.8	2	19	19	**33.9**	J
Magnesium	MG/KG	19200	100%	21500	0	19	19	6310	
Manganese	MG/KG	769	100%	1060	0	19	19	542	
Mercury	MG/KG	0.047	89%	0.1	0	17	19	0.032	
Nickel	MG/KG	42.1	100%	49	0	19	19	19.6	
Potassium	MG/KG	2670	100%	2380	2	19	19	2000	
Selenium	MG/KG	0.31	16%	2	0	3	19	0.26	U
Silver	MG/KG	0.33	74%	0.75	0	14	19	0.16	U
Sodium	MG/KG	99.1	26%	172	0	5	19	45.5	U
Thallium	MG/KG	0	0%	0.7	0	0	19	0.43	U
Vanadium	MG/KG	31.8	100%	150	0	19	19	26.5	J
Zinc	MG/KG	104	100%	110	0	19	19	87.2	J
Other Analytes									
Total Organic Carbon	MG/KG	46600	100%	N/A/	N/A	19	19	37500	



Airfield
Conservation
Federal
Industrial
Institutional
Prison
Warehouse
Housing



PARSONS

SENECA ARMY DEPOT ACTIVITY
SUSPECTED SMALL ARMS RANGE
LAKE HOUSING AREA

Figure 2-1
Future Land Use

Project: 739263	April 2003

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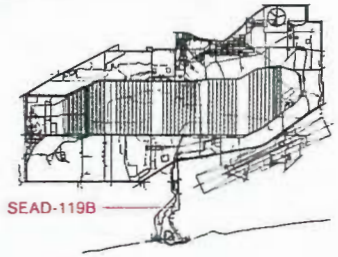


PARSONS

SENECA ARMY DEPOT ACTIVITY
SUSPECTED SMALL ARMS RANGE
LAKE HOUSING AREA

Figure 2-2
Suspected Small Arms Range
Lake Housing Area

Job No.: 739855	Date: April 2003

LEGEND

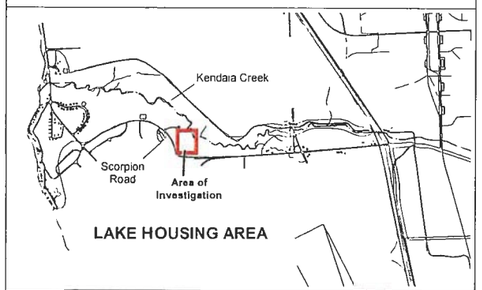
A1 — Geophysical grid w/ grid number

A5 — Grid Cell not surveyed w/ grid number

Note: Berm is approximately 4 ft wide by 4 ft high

N

50 0 50 100 Feet



PARSONS

SENECA ARMY DEPOT ACTIVITY

SUSPECTED SMALL ARMS RANGE
LAKE HOUSING AREA

FIGURE 2-3
GRIDS SET FOR GEOPHYSICAL SURVEY AT THE SMALL ARMS RANGE

JOB NUMBER: 739855-01003

DATE: April 2003

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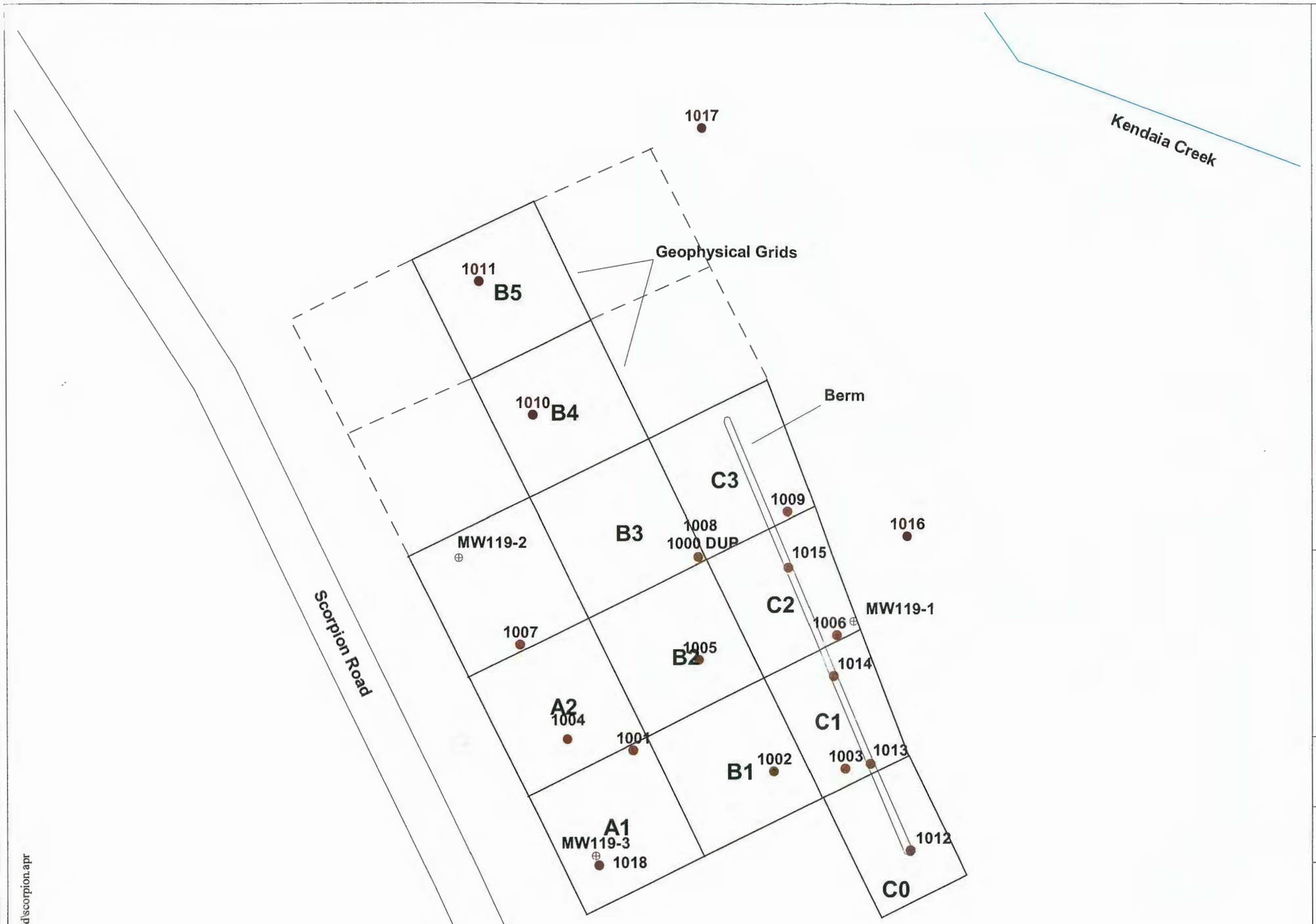


LEGEND

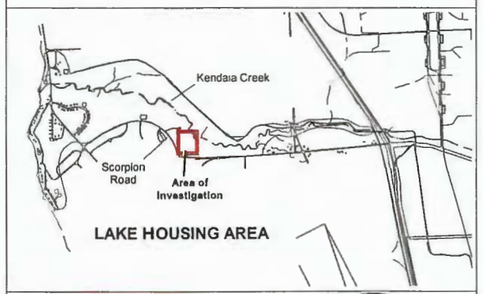
0001 ● Surface Soil Sample Location

MW119-1 ⊕ Monitoring Well Location

Note: Berm is approximately 4 ft wide by 4 ft high

N

50 0 50 100 Feet



PARSONS

SENECA ARMY DEPOT ACTIVITY

SUSPECTED SMALL ARMS RANGE
LAKE HOUSING AREA

FIGURE 2-4
MONITORING WELL AND SURFACE SOIL SAMPLE LOCATIONS

JOB NUMBER: 739855-01003	DATE: April 2003

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Contractor: SJB	**PARSONS**	**BORING/** Sheet 1 of 2	
Driller: Walt Ketter	**DRILLING RECORD**	**WELL NO.** MW-119-1	
Inspector: Ed Ashton	**PROJECT NAME:** Seneca Army Depot-SEAD 119	**Location Description:** Former Small Arms Range	
Rig Type: ATV-CME-850	**PROJECT NUMBER:** 739855.01002	Near Lake Shore Housing	

GROUNDWATER OBSERVATIONS								
Water Level (bgs)	17'							
Date	8/8/02							
Time	0953							
Meas. From	TOC							

Weather: Sunny - 70'F

Date/Time Start: August 6, 2002 -1510

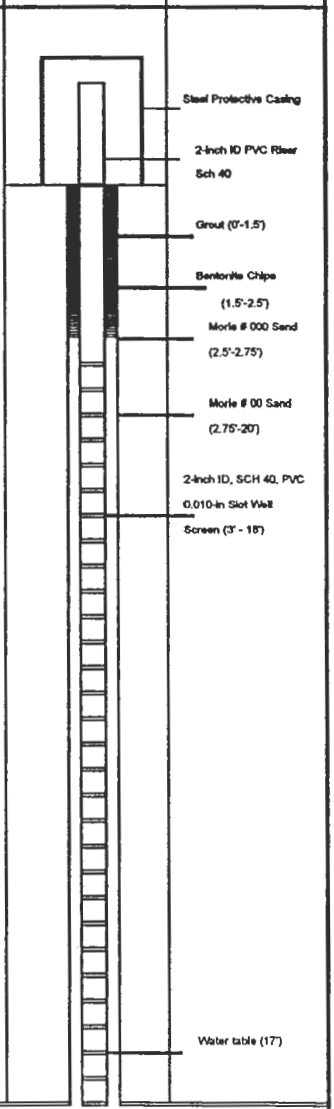
Date/Time Finish: August 6, 2002 -1755

Location Plan N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+3					
+2					
+1					
0					
		4	50	NA	(0'-2):Brown, silt with fine sand, trace fine sand, roots, dry. (SM)
1		6			
		7			
2		9			
		23	100	NA	(2'-4'):Brown, silt with fine sand, fine-medium gravel, dry. (SM)
3		15			
		19			
4		23			
		19	50	NA	(4'-6'):Brown, silt with fine sand, trace fine gravel, black shale fragments, dry.
5		28			(ML/SM)-Till
		34			
6		36			
		31	10	NA	(6'-8'):Same As Above. (ML/SM)- Till
7		35			
		41			
8		47			
		21	10	NA	(8'-8.9'): Same As Above. (ML/SM)- Till
9		50/.4			Refusal at 8.9 feet. Drilled to 10 feet with HSAs.
10					
		50/.4	10	NA	(10'-10.4'): Same As Above. (ML/SM)- Till
11					Refusal at 10.4 feet. Drilled to 12 feet with HSAs.
12					
		50/.1	0	NA	(12'-12.1'): No recovery
13					Refusal at 12.1 feet. Drilled to 14 feet with HSAs.
14					
		50/.1	0	NA	(14'-14.1'): No recovery
15					Refusal at 14.1 feet. Drilled to 16 feet with HSAs.
16					
		50/.0	0	NA	No recovery
17					Refusal at 16 feet. Drilled to 20 feet with HSAs.
18					

SCHEMATIC



COMMENTS

COMMENTS:

No environmental samples collected.

Drilled to 20 feet bgs from 16 feet bgs due to last three split spoons had no recovery.

SAMPLING METHOD

SS = SPLIT SPOON

A = AUGER CUTTINGS

C = CORED

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LEGEND

⊕ Known Geophysical Anomaly

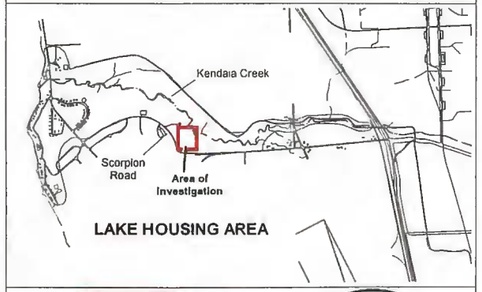
Note: Berm is approximately 4 ft wide by 4 ft high

EM-61 Response (mv)

10
5
0
-5

N

50 0 50 100 Feet

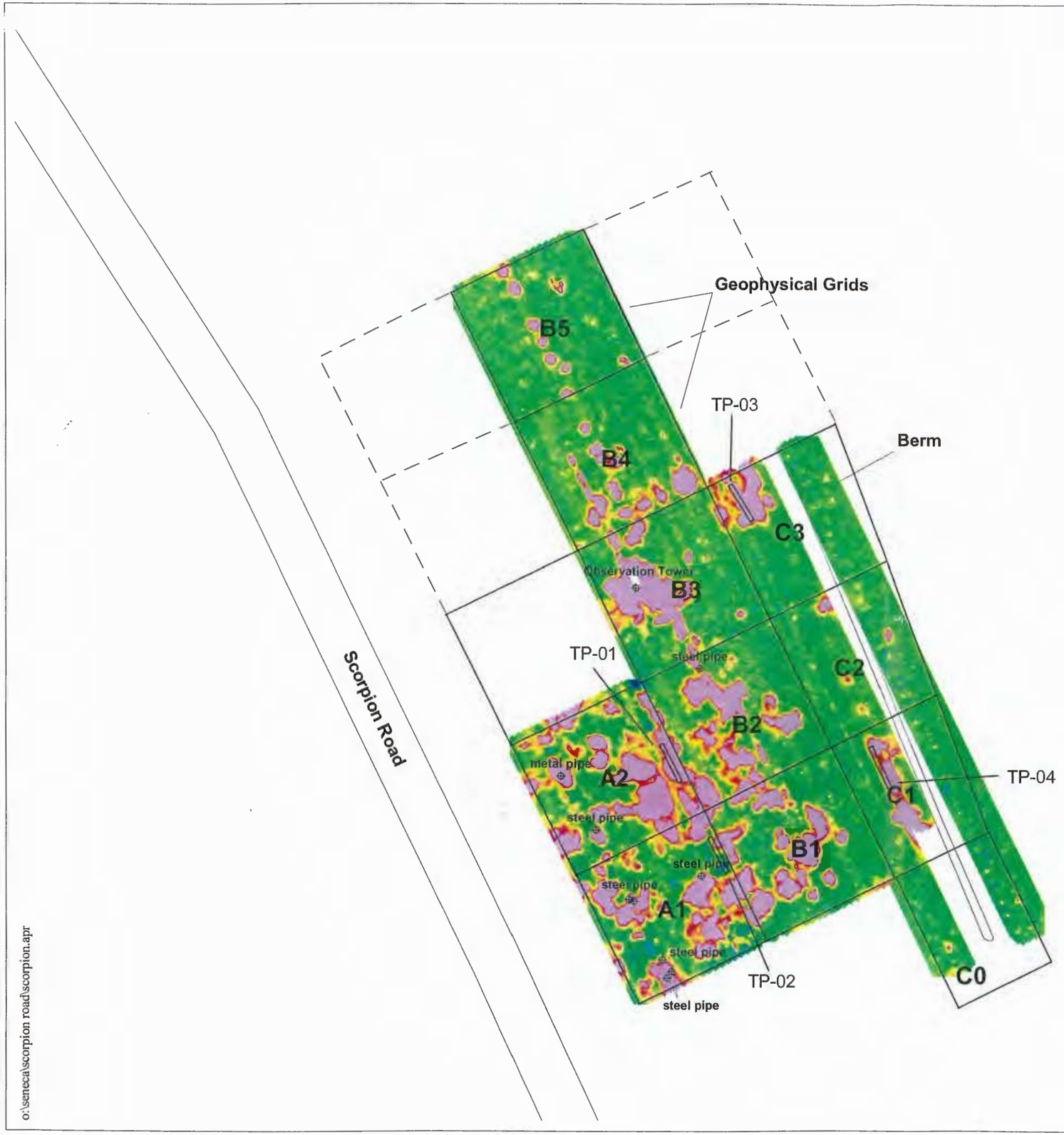


PARSONS

SENECA ARMY DEPOT ACTIVITY
SUSPECTED SMALL ARMS RANGE
LAKE HOUSING AREA

FIGURE 3-1
RESULTS OF GEOPHYSICAL SURVEYS AT THE SMALL ARMS RANGE

JOB NUMBER: 739855-01003	DATE: April 2003



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LEGEND

⊕ Known Geophysical Anomaly

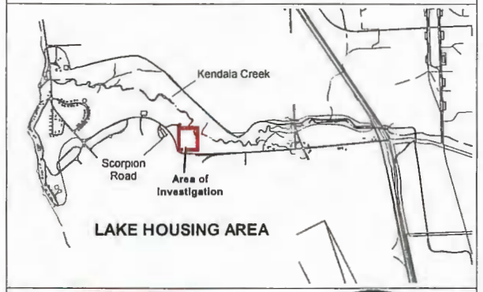
Note: Berm is approximately 4 ft wide by 4 ft high

EM-61 Response (mv)

10
5
0
-5

N

50 0 50 100 Feet



PARSONS

SENECA ARMY DEPOT ACTIVITY
SUSPECTED SMALL ARMS RANGE
LAKE HOUSING AREA

FIGURE 3-2
TEST PIT LOCATIONS VERSUS RESULTS OF GEOPHYSICAL SURVEYS
SMALL ARMS RANGE

JOB NUMBER: 739855-01003 | DATE: April 2003

Contractor: SJB Driller: Walt Ketter Inspector: Ed Ashton Rig Type: ATV-CME-850	**PARSONS** **DRILLING RECORD** **PROJECT NAME:** Seneca Army Depot-SEAD 119 **PROJECT NUMBER:** 739855.01002	**BORING/** Sheet 2 of 2 **WELL NO.** MW-119-1 **Location Description:** Former Small Arms Range Near Lake Shore Housing

GROUNDWATER OBSERVATIONS								
Water Level (bgs)								
Date								
Time								
Meas. From								

Weather: Sunny - 70'F

Date/Time Start: August 6, 2002 -1510

Date/Time Finish: August 6, 2002 -1755

Location Plan N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
19							PVC sump (18'-19') PVC end cap
20							20'
					Boring terminated at 20 feet bgs.		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
See page 1 comments.

Contractor: SJB Driller: Walt Ketter Inspector: Ed Ashton Rig Type: ATV-CME-850	**PARSONS** **DRILLING RECORD** PROJECT NAME: Seneca Army Depot-SEAD 119 PROJECT NUMBER: 739855.01002	BORING/ WELL NO. MW-119-2 Sheet 1 of 2 Location Description: Former Small Arms Range Near Lake Shore Housing

GROUNDWATER OBSERVATIONS								
Water Level (bgs)	8.20'							
Date	8/8/02							
Time	0830							
Meas. From	TOC							

Weather: Sunny - 70'F

Date/Time Start: August 6, 2002 - 0940

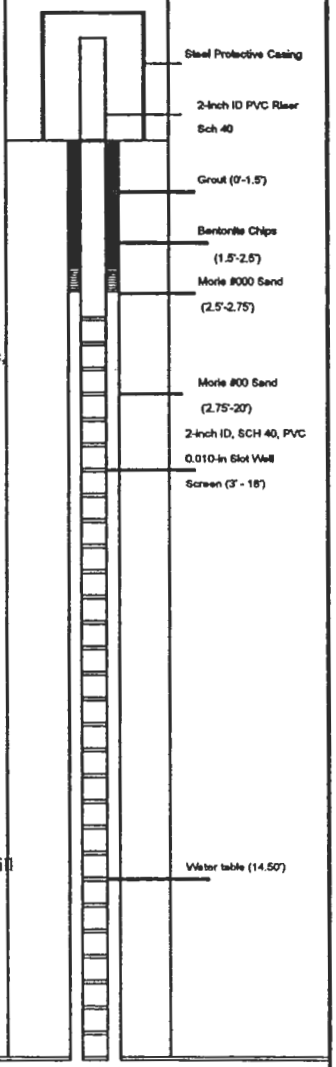
Date/Time Finish: August 6, 2002 - 1417

Location Plan

N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+3					
+2					
+1					
0					
		5	50	NA	(0'-2'):Brown, silt with fine sand, roots, trace fine gravel, dry. (SM)
1		7			
		11			
2		11			
		15	100	NA	(2'-4'):Brown, silt with trace-fine sand, fragments of black shale, dry. (ML/SM)-Till
3		17			
		19			
4		25			
		18	100	NA	(4'-6'):Brown, silt with trace fine sand, fine-medium gravel, fragments of black shale,
5		21			dry. (ML/SM)-Till
		18			
6		22			
		50/.4	5	NA	(6'-6.4'):Brown, silt with trace clay, black shale, dry. (ML/SM)- Till
7					Refusal at 6.4 feet. Drilled to 8 feet with HSAs.
8					
		10	80	NA	(8'-10'):Brown, silt with trace clay, black shale, dry to moist. (ML/SM)-Till
9		27			
		34			
10		47			
		13	100	NA	(10'-12'): Same As Above. (ML/SM)-Till
11		24			
		44			
12		45			
		50/.3	5	NA	(12'-12.3'): Same As Above. (ML/SM)-Till
13					Refusal at 12.3 feet. Drilled to 14 feet with HSAs.
14					
		38	50	NA	(14'-15.7'):Brown to grey, silt with trace clay, black shale, dry to moist. (ML/SM)-Till
15		35			Refusal at 15.7 feet. Drilled to 20 feet with HSAs.
		27			
16		50/.2			
17					
18					



SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
No environmental samples collected.

Contractor: SJB Driller: Walt Ketter Inspector: Ed Ashton Rig Type: ATV-CME-850	**PARSONS** **DRILLING RECORD** **PROJECT NAME:** Seneca Army Depot-SEAD 119 **PROJECT NUMBER:** 739855.01002	**BORING/ WELL NO.** MW-119-2 Sheet 2 of 2 **Location Description:** Former Small Arms Range Near Lake Shore Housing

GROUNDWATER OBSERVATIONS								
Water Level (bgs)								
Date								
Time								
Meas. From								

Weather: Sunny - 70'F

Date/Time Start: August 6, 2002 - 0940

Date/Time Finish: August 6, 2002 - 1417

Location Plan

N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
19							PVC sump (18'-19') PVC end cap
20							20'
					Boring terminated at 20 feet bgs.		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
See page 1 comments.

Appendix B

Well Development Reports

WELL DEVELOPMENT REPORT

PARSONS	CLIENT: USACOE	WELL #: MW - 119-1

PROGRAM TYPE:	REMEDIAL INVESTIGATION	CREW INITIALS	START DATE	END DATE
SWMU # (AREA):	SEAD- 119	RM	8/18/02	8/18/02
PROJECT NO. (JOB #):	739855.0102			

DRILLING DATE:	8/16/02	MONITORING	BEFORE DEVELOPMENT		AFTER DEVELOPMENT	
INSTALLATION DATE:	8/16/02	INSTRUMENT	OVM	RAD	OVM	RAD
SOP REFERENCE NO. & REV. NO.:	NA	READING	NA	NA	NA	NA
PUMP EQUIPMENT:	Pool Bailer and nylon rope	UNITS (ppm or cps)	NA	NA	NA	NA

WELL TYPE (circle one)	BEDROCK	(OVERBURDEN)	MEASURED WATER DEPTH (feet from TOC):	17.0
WELL INNER RISER DIAMETER (inches)	2	2	MEASURED POW DEPTH (feet from TOC):	21.0
WELL DIAMETER FACTOR (gal/ft)	0.163	0.163	WATER COLUMN (feet):	4
BORING DIAMETER (inches)	3.80	8.5	INSTALLED WATER DEPTH (feet from TOC):	15.5
BORING DIAMETER FACTOR (gal/ft)	0.5894	2.955	INSTALLED POW DEPTH (feet from TOC):	21.0

1. ~~STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR =~~ see note under comments section _____ GAL. = A

2. ~~STANDING WATER IN ANNULAR SPACE =~~
~~WATER COLUMN BELOW SEAL(ft) X (BORING DIAMETER FACTOR - WELL DIAMETER FACTOR) X 0.3 =~~
_____ GAL. = B

3. ~~SINGLE STANDING WATER VOLUME~~ = A + B _____ GAL. = C

4. ~~MINIMUM VOLUME~~ TO BE REMOVED = 3 X C _____ GALS.

DATE	ACTIVITY	START TIME (military)	END TIME (military)	GALLONS REMOVED PER TIME PERIOD	pH	CONDUCTIVITY (umhos/cm)	TEMPERATURE (degrees C)	TURBIDITY (NTUs)
8/18/02	well development	1025	1027	0.50	7.03	0.48	66.0	>1,000
Purge	well dry. Let well recharge							→
8/18/02	well development	1130	1135	0.50	7.71	0.41	62.1	>1,000
Purge	well dry a 2nd time. Let well recharge							→
8/18/02	well development	1340	1345	0.50	7.63	0.40	62.8	>1,000
Purge	well dry a 3rd time.							→
Note:	Purge well MW-119-1 dry three separate times w/ bailer and rope. Well considered purged. A total of 1.50 gals extracted. Well was developed again after it recovered to within 80% of original DTW after it purged dry							
	TOTALS/FINAL							

COMMENTS: Total Depth of well - Depth to water x .164 gal/ft x 3 well volumes = gals purged (min).
21' - 17' x .164 gal/ft x 3 wells = 1.96 gals minimum to be purged.

INVESTIGATION DERIVED WASTE (IDW):

DATE	8/18/02		
GALLONS OF WASTE WATER	1.50		
DRUM NO. & LOCATION	SEAD-119-SW1		

WELL DEVELOPMENT REPORT

PARSONS	CLIENT: USACOE	WELL #: MW-119-2

PROGRAM TYPE:	REMEDIAL INVESTIGATION	CREW INITIALS	START DATE	END DATE
SWMU # (AREA):	SEAD- 119	EJA	8/8/02	8/8/02
PROJECT NO. (JOB #):	739855.0102			

DRILLING DATE:	8/5/02	MONITORING	BEFORE DEVELOPMENT		AFTER DEVELOPMENT	
INSTALLATION DATE:	8/5/02	INSTRUMENT	OVM	RAD	OVM	RAD
SOP REFERENCE NO. & REV. NO.:	NA	READING	NA	NA	NA	NA
PUMP EQUIPMENT:	Poly. bailer & nylon Rope	UNITS (ppm or cps)	NA	NA	NA	NA

WELL TYPE (circle one)	BEDROCK	(OVERBURDEN)	MEASURED WATER DEPTH (feet from TOC):	8.20
WELL INNER RISER DIAMETER (inches)	2	2	MEASURED POW DEPTH (feet from TOC):	20.8
WELL DIAMETER FACTOR (gal/ft)	0.163	0.163	WATER COLUMN (feet):	12.60
BORING DIAMETER (inches)	3.80	8.5	INSTALLED WATER DEPTH (feet from TOC):	14.5
BORING DIAMETER FACTOR (gal/ft)	0.5894	2.955	INSTALLED POW DEPTH (feet from TOC):	20.8

1. STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = see note under comments section _____ GAL. = A

2. STANDING WATER IN ANNULAR SPACE = WATER COLUMN BELOW SEAL(ft) X (BORING DIAMETER FACTOR - WELL DIAMETER FACTOR) X 0.3 = _____ GAL. = B

3. SINGLE STANDING WATER VOLUME = A + B _____ GAL. = C

4. MINIMUM VOLUME TO BE REMOVED = 3 X C _____ GALS.

DATE	ACTIVITY	START TIME (military)	END TIME (military)	GALLONS REMOVED PER TIME PERIOD	pH	CONDUCTIVITY (umhos/cm)	TEMPERATURE (degrees C)	TURBIDITY (NTUs)
8/8/02	well development	0832	—	3.5	6.96	0.43	66.2	>1,000
8/8/02	"	—	—	4.0	6.90	0.42	63.1	>1,000
8/8/02	"	—	0840	4.5	6.98	0.41	62.3	>1,000
Purged well dry. Let well recharge →								→
8/8/02	well development	1030	—	5.25	7.19	0.42	62.2	>1,000
8/8/02	"	—	1050	6.0	7.21	0.40	62.8	>1,000
Purged well dry 2nd time. Let well recharge. →								→
8/8/02	well development	1315	—	6.50	7.24	0.41	65.8	>1,000
8/8/02	"	—	—	7.00	7.30	0.39	62.3	>1,000
8/8/02	"	—	1330	7.25	7.31	0.39	61.9	>1,000
Note:	Purged well MW-119-2 dry three separate times w/ bailer and rope. Well considered purged. A total of 7.25 gals extracted. well was developed approx after recovery to within 80% of original DTW after it was purged dry.							
	TOTALS/FINAL							

COMMENTS: Total Depth of well - depth to water x .164 gal/ft x 3 well volumes = gals purged (MIN)
20.8' - 8.20 x .164 gal/ft x 3 well volumes = 6.19 gals. minimum to be purged

INVESTIGATION DERIVED WASTE (IDW):

DATE	8/8/02		
GALLONS OF WASTE WATER	7.25		
DRUM NO. & LOCATION	SEAD-119-SW		

WELL DEVELOPMENT REPORT

PARSONS	CLIENT: USACOE	WELL #: MW-119-3

PROGRAM TYPE:	REMEDIAL INVESTIGATION	CREW INITIALS	START DATE	END DATE
SWMU # (AREA):	SEAD- 119	EA	8/18/02	8/18/02
PROJECT NO. (JOB #):	7398 55.01002			

DRILLING DATE:	8/15/02
INSTALLATION DATE:	8/15/02
SOP REFERENCE NO. & REV. NO.:	NA
PUMP EQUIPMENT:	Poly bailer & nylon rope

MONITORING	BEFORE DEVELOPMENT		AFTER DEVELOPMENT	
INSTRUMENT	OVM	RAD	OVM	RAD
READING	NA	NA	NA	NA
UNITS (ppm or cps)	NA	NA	NA	NA

WELL TYPE (circle one)	BEDROCK	(OVERBURDEN)
WELL INNER RISER DIAMETER (inches)	2	2
WELL DIAMETER FACTOR (gal/ft)	0.163	0.163
BORING DIAMETER (inches)	3.80	8.5
BORING DIAMETER FACTOR (gal/ft)	0.5894	2.955

MEASURED WATER DEPTH (feet from TOC):	8.62
MEASURED POW DEPTH (feet from TOC):	16.0
WATER COLUMN (feet):	7.38
INSTALLED WATER DEPTH (feet from TOC):	6.60
INSTALLED POW DEPTH (feet from TOC):	16.0

1. ~~STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR =~~ see note under comments section _____ GAL. = A

2. STANDING WATER IN ~~ANNULAR SPACE~~ = WATER COLUMN BELOW SEAL(ft) ~~X (BORING DIAMETER FACTOR - WELL DIAMETER FACTOR)~~ X 0.3 = _____ GAL. = B

3. SINGLE STANDING WATER VOLUME = A + B _____ GAL. = C

4. MINIMUM VOLUME ~~TO BE~~ REMOVED = 3 X C _____ GALS.

DATE	ACTIVITY	START TIME (military)	END TIME (military)	GALLONS REMOVED PER TIME PERIOD	pH	CONDUCTIVITY (umhos/cm)	TEMPERATURE (degrees C)	TURBIDITY (NTUs)
8/18/02	well development	0850	–	1.50	7.13	0.39	64.2	>1,000
8/18/02	"	–	–	2.00	7.09	0.36	61.8	>1,000
8/18/02	"	–	0910	2.50	7.33	0.37	62.8	>1,000
Purged	well dry. Let well recharge							→
8/18/02	well development	1140	–	3.00	7.25	0.37	65.0	>1,000
8/18/02	"	–	–	3.50	7.23	0.36	61.9	>1,000
8/18/02	"	–	–	4.00	7.20	0.36	60.6	>1,000
8/18/02	"	–	–	4.50	7.20	0.35	61.1	>1,000
8/18/02	"	–	1115	5.00	7.27	0.35	60.9	>1,000
Purged	well dry second time. Let well recharge							→
8/18/02	well development	1245	–	5.50	7.69	0.38	70.9	>1,000
8/18/02	"	–	–	6.00	7.42	0.36	66.0	>1,000
8/18/02	"	–	–	6.50	7.39	0.36	64.5	>1,000
8/18/02	"	–	1367	7.00	7.39	0.36	63.6	>1,000
note:	Purged well MW-119-3 dry three separate times w/ bailer and rope							
well	considered purged. A total of 7.00 gals. extracted							
	TOTALS/FINAL							

COMMENTS: Total depth of well - depth to water x .164 gal/ft x 3 well vols = gals. purged (min)
16.0' - 8.62' x .164 gal/ft x 3 well vols. = 3.63 gals minimum to be purged

INVESTIGATION DERIVED WASTE (IDW):

DATE	8/18/02		
GALLONS OF WASTE WATER	7.00		
DRUM NO. & LOCATION	SEAD-119-35		

well was developed again after it recovered to within 50% of original DTW after it was purged dry.

Appendix C

Test Pit Logs

TEST PIT REPORT

PARSONS	CLIENT: USACE - Huntsville	TEST PIT NO.: TP-01 - west side, cen

PROJECT: Site Investigation - Small Arms Range
LOCATION: Lake Housing Area - Seneca Army Depot

JOB NUMBER: 739855-01002
GROUND ELEV:
INSPECTOR: DRD Parsons SYR
CONTRACTOR: SEAD
START DATE: 2/14/03 11:30
COMPLETION DATE: 2/14/03 12:00
CHECKED BY:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION METHOD
25'	3'	4'	Case 580K Backhoe

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
MicroTip	PID	0	2/14/03 11:30

QA/QC DUPLICATE SAMPLE: YES OR NO
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
Comments:

DEPTH (FT)	VOC	SAMPLE NO.	SAMPLE DEPTH RANGE	STRATA	SAMPLE DESCRIPTION (As per Burmeister: color, grain size. MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	REMARKS
1				1.0'	Dark brown organic top soil	0 ppm
2					Dark brown, reddish till with clay. No fill materials noted, some sand.	0.4 ppm
3						
4				4.0'		
5					Dark brown weathered shale, semi-brittle Refusal at 4'.	
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

TEST PIT REPORT

PARSONS	CLIENT: USACE - Huntsville	TEST PIT NO.: TP-02 - SW corner

PROJECT: Site Investigation - Small Arms Range
LOCATION: Lake Housing Area - Seneca Army Depot

JOB NUMBER: 739855-01002
GROUND ELEV:
INSPECTOR: DRD Parsons SYR
CONTRACTOR: SEAD
START DATE: 2/14/03 11:00
COMPLETION DATE: 2/14/03 23:30
CHECKED BY:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION METHOD
25'	3'	4.5'	Case 580K Backhoe

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
MicroTip	PID	0	2/14/03 11:00

QA/QC DUPLICATE SAMPLE: YES OR NO
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
Comments:

DEPTH (FT)	VOC	SAMPLE NO.	SAMPLE DEPTH RANGE	STRATA	SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	REMARKS
1				1.0'	Dark brown organic topsoil	0 ppm
2						
3					Dark brown till with clay. On north end a vitrified clay tile was found at 2.5' in depth. No evidence of any other fill material. Till has some reddish color, sandy.	0.4 ppm
4				4.5'		
5					Refusal at 4.5'. Weathered brown shale, semibrittle.	
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

TEST PIT REPORT

PARSONS	CLIENT: USACE - Huntsville	TEST PIT NO.: TP-03 - NE Corner

PROJECT: Site Investigation - Small Arms Range
LOCATION: Lake Housing Area - Seneca Army Depot

JOB NUMBER: 739855-01002
GROUND ELEV:
INSPECTOR: DRD Parsons SYR
CONTRACTOR: SEAD
START DATE: 2/14/03 12:35
COMPLETION DATE: 2/14/03 13:00
CHECKED BY:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION METHOD
25'	3'	4'	Case 580K Backhoe

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
MicroTip	PID	0	2/14/03 12:35

QA/QC DUPLICATE SAMPLE: YES OR NO
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
Comments:

DEPTH (FT)	VOC	SAMPLE NO.	SAMPLE DEPTH RANGE	STRATA	SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	REMARKS
1				1.0'	Dark brown organic topsoil.	0 ppm
2						
3					Dark Brown Till with clay, sandy. No fill materials. Vitrified clay tile on south end at 2' depth.	0.2 ppm
4				4.0'		
5					Brown weathered shale, brittle	
6						
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12						
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14						
15						

TEST PIT REPORT

PARSONS	CLIENT: USACE - Huntsville	TEST PIT NO.: TP-04 - SE Corner

PROJECT: Site Investigation - Small Arms Range
LOCATION: Lake Housing Area - Seneca Army Depot

JOB NUMBER: 739855-01002
GROUND ELEV:
INSPECTOR: DRD Parsons SYR
CONTRACTOR: SEAD
START DATE: 2/14/03 12:05
COMPLETION DATE: 2/14/03 12:30
CHECKED BY:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION METHOD
25'	3'	4'	Case 580K Backhoe

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
MicroTip	PID	0	2/14/03 12:05

QA/QC DUPLICATE SAMPLE: YES OR NO
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
Comments:

DEPTH (FT)	VOC	SAMPLE NO.	SAMPLE DEPTH RANGE	STRATA	SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	REMARKS
1				1.0'	Dark brown organic topsoil.	0 ppm
2						
3					Dark brown till with clay. No fill materials, some cobbles, sandy.	0.4 ppm
4				4.0'		
5					Brown weathered shale, brittle	
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