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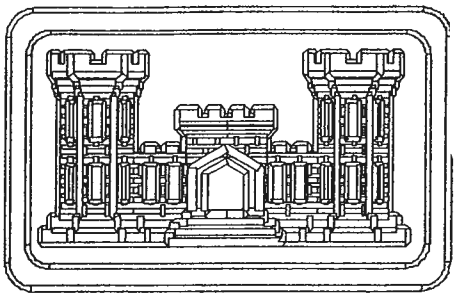

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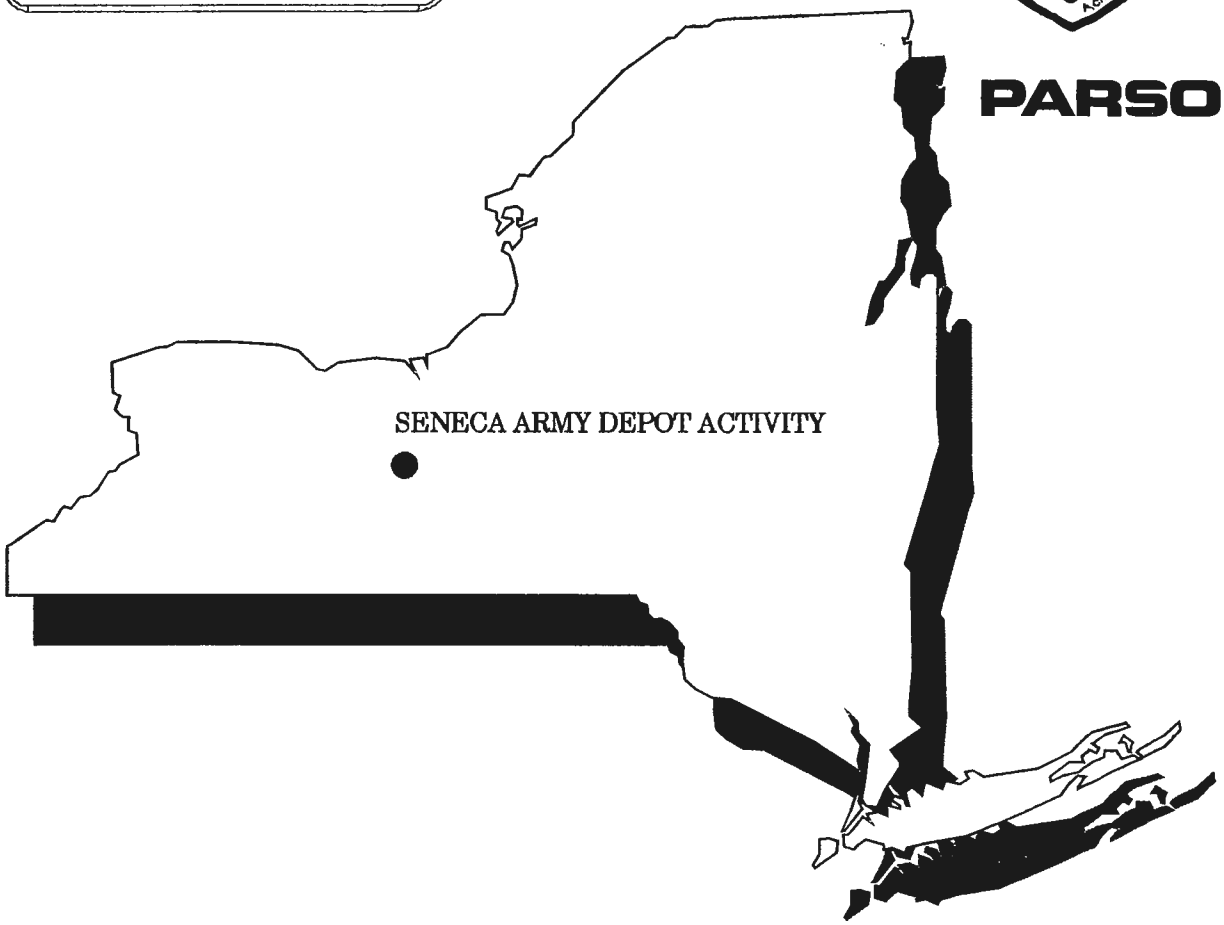

FINAL Findings Report
Small Arms Range
Lake Housing Area

SENECA ARMY DEPOT ACTIVITY (SEDA)

EPA Site ID# NY0213820830

NY Site ID # 8-50-006

Contract Number DACA87-95-D-0031 DO #27

March 2004

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

SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK 14541

and

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Listing of Acronyms

ASR	Archive Search Report
ASTM	American Society for Testing and Materials
AOC	Area of Concern
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liabilities Act
CERFA	Community Environmental Response Facilitation Act
CLP	Contract Laboratory Program
DID	Data Item Description
DoD	Department of Defense
EBS	Environmental Baseline Survey
EE/CA	Engineering Evaluation/Cost Analysis
EM	Electromagnetic
I.D.	Inside Diameter
LRA	Local Redevelopment Authority
mg/Kg	milligrams per Kilogram (mg/Kg)
mm	millimeter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MW	Monitoring Well
mV	millivolt
NGVD	National Geodetic Vertical Datum
NTU	Nephelometric Turbidity Units
NY	New York
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
OE	Ordnance and Explosives
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SEDA	Seneca Army Depot Activity
SOP	Standard Operating Procedures
SOW	Statement of Work
SWMU	Solid Waste Management Unit
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List

TDMD	Time Domain Metal Detector
TOC	Total Organic Carbon
TP	Test Pit
USEPA	United States Environmental Protection Agency

TABLE OF CONTENTS

Description **Page**

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

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 (NY). 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" (USEPA, 1988). The investigation 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. **Section 5** presents the references.

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 at it lowest point along the edge of Seneca Lake in the Lake Housing Area to a high of approximately 760 feet along the eastern edge of the Depot near the village of Romulus and NY State Route 96 according to the National Geodetic Vertical Datum (NGVD) of 1929.

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 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. 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). The aerial photographs taken in 1954, 1959, 1968, 1985, and the 1955 Sampson Air Force Base Master Plan Map are attached in **Appendix A**. 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, approximately 10 to 15 feet in height. It should be noted that the tower was identified as a miscellaneous structure built in 1942 in the 1955 Sampson Air Force Base Master Plan Map. 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. Excerpts from the ASR Report are attached in **Appendix B**.

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 suspected 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 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 according to the NGVD of 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.

Structures parallel to Scorpion Road were observed to the northeast of Scorpion Road on the aerial photograph taken in 1954, indicating the Small Arms Range existed in 1954. 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 the 1955 Sampson Air Force Base Master Plan Map (as attached in Appendix A), which clearly showed a rifle practice 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 northwest-to-southeast along the eastern side of the suspected site. The location of the berm structure is consistent with the location of the structures shown on the 1954 aerial photograph and the 1955 Sampson Air Force Base Master Plan Map. It is presumed that this structure may have been constructed to eventually be used as a target backstop berm at the range. This presumption is based on the fact that buildings are located to the southeast, southwest, and west of the suspected small arms range (see aerial photographs from 1954, 1959, 1968, 1985, as attached in Appendix A). Major roadways providing access and egress into and out of the Lake Housing Area are located to the south, southwest, and west of the suspected range. A small unpaved road is seen to the northwest of the suspected range. Therefore, it is reasonable to assume that the shooting would be

directed away from the surrounding activities, towards the area where conflicting activities would not interfere. Unoccupied land and the raven that contains Kendaia creek lie northeast of the suspected firing lines and berms, and therefore it is reasonable to assume that the logical direction of fire be toward northeast and that the berm found at the site was placed as a target backstop berm.

Additionally, several metal pipes 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 grid area covering the region to the west of the berm, as this was on the side of the 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 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. Locations of metal pipes are provided in Figures 3-1 and 3-2. 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 that 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).

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 2-4**). 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 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 American Society for Testing and Materials (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. Boring logs and well completion diagrams are presented in **Appendix C**. Well development reports are contained in **Appendix D**.

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 D.

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 top of bedrock and no fill material was detected in the test pits with the exception of a few vitrified clay tiles found in two test pits. The test pit results are provided in **Appendix E**. 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.

2.4.5 Data Validation

The soil and groundwater data packages submitted by the laboratory are CLP or CLP-type, including mass spectral identification charts, mass spectral tuning data, spike recoveries laboratory duplicate results, method blank results, instrument calibration, and holding times documentation.

Validation of soil and groundwater analytical data commensurate with the quality of the data packages was performed under the guidelines set forth in the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", 1999; "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", 1994; "Region 2 RCRA and CERCLA Data

Validation Standard Operating Procedures (SOPs)", and NYSDEC Contract Laboratory Program Analytical Services Protocol.

The data validation included performance of a completeness audit and a review of the following parameters, if applicable: holding times, sample reservations, percentage of solids, quality control (QC) results of calibration, equipment/rinsate blanks, trip blanks, method blanks, matrix spike/matrix spike duplicate (MS/MSD) analyses, laboratory control sample performances, lab and field duplicates, ICP serial dilution, and surrogate recoveries. In addition, in accordance with the Region 2 SOPs, raw data were spot checked to ensure that sample results reported by the laboratory were transcribed, calculated, and reported correctly.

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 as green on this figure. Items typically fired on a small arms range (ammunition up to 50 cal.) can produce electromagnetic responses that are just above background values (2-3 mV), so the data collected were contoured from –5 to 10 mV in order to differentiate anomalies of this magnitude from background. Therefore, responses greater than 10 mV appear pink on the map, while smaller anomalies appear as yellow or red.

Numerous large anomalies were detected in the geophysical investigation. These large anomalies are 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 based on the collected data from the site. Anomalies of greater than 80 mV are present at distances of over 150 feet from the berm and only approximately 50 feet from the assumed firing line. For comparison, the highest amplitude anomaly detected during the Geophysical Prove-Out conducted for the Ordnance and Explosive EE/CA (Parsons, 2000) was approximately 80 mV over a 155 millimeter (mm) shell simulant buried at 21 inches. An item the size of 155mm projectile would not be expected on a small arms range, and the areal extent of the 155mm anomaly detected in the prove-out was less than that of many of the unexplained anomalies in the Lake Housing Small Arms Range data. Accordingly, the geophysical survey did not identify any evidence indicative of a small arms range actually existing at this site.

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

3.2.1 Summary of Results

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 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.

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.

No bullets, bullet fragments, or shell casings were observed during surface soil sampling.

3.2.2 Comparison With Background

Metal concentrations detected in surface soil at the site were compared with the Seneca background data set. The Seneca soil background dataset is compiled from 57 soil samples collected from 20 locations at different depths. The background samples were collected within the Seneca Army Depot Site but from areas unrelated to site releases during the various site investigations conducted at SEDA (SEAD 25 RI, 25 ESIs, the Ash Landfill, and the OB Grounds). These background samples were combined into the background database so that statistical evaluation of the data would be representative of the variations in the Seneca soil. The background values calculated from this background dataset are representative of background of the Depot and have been assigned as background for all the sites at SEDA. The background data set and the locations from which the data were collected are provided in **Appendix F**. The overall background characterization completed at SEDA (e.g., sampling, comparison with the site data) is in compliance with the USEPA approach published in a document titled "Guidance for Characterizing Background Chemicals in Soil at Superfund Sites" (USEPA, 2001).

Only five of the concentrations measured for all metals were found at levels that surpassed the ninety-fifth percentile concentration computed from the Seneca background data set, which is consistent with NYSDEC's TAGM 4046. A summary of the 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.

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 E.

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 recommends no additional investigation at the site.

5 REFERENCES

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Table 3-1
Surface Soil Sampling Results

Small Arms Range, Lake Housing Area (SEAD-119B)
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 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-A2-24 SOIL 119-1004 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-A3-04 SOIL 119-1007 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-B1-37 SOIL 119-1002 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-B2-36 SOIL 119-1005 0 0.2 4/11/2002 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
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	19	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
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	19	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
2-Nitrotoluene	UG/KG	0	0%		0	0	19	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
3-Nitrotoluene	UG/KG	0	0%		0	0	19	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
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	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
Nitrobenzene	UG/KG	0	0%	200	0	0	19	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
Tetryl	UG/KG	0	0%		0	0	19	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
Antimony	MG/KG	0.74	84%	5.9	0	16	19	0.24	0.41	0.74	0.31	0.23 U
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
Barium	MG/KG	114	100%	300	0	19	19	98.2	92.5	99.9	114	95
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
Cadmium	MG/KG	0.52	100%	2.3	0	19	19	0.4	0.41	0.43	0.52	0.45
Calcium	MG/KG	80900	100%	121000	0	19	19	17600	5060	9680	5930	47200
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
Cobalt	MG/KG	17.3	100%	30	0	19	19	7.4	8.7	9.3	7.9	6.7
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
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
Iron	MG/KG	30000	100%	36500	0	19	19	17500	19200	20300	24200	18200
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
Magnesium	MG/KG	19200	100%	21500	0	19	19	4950	4230	5280	5010	19200
Manganese	MG/KG	769	100%	1060	0	19	19	454	482	531	422	530
Mercury	MG/KG	0.047	89%	0.1	0	17	19	0.038	0.033	0.047	0.047	0.031
Nickel	MG/KG	42.1	100%	49	0	19	19	17.7	19.4	21.8	26.1	17
Potassium	MG/KG	2670	100%	2380	2	19	19	1820	1860	2070	**2570**	1860
Selenium	MG/KG	0.31	16%	2	0	3	19	0.25 U	0.26 U	0.31	0.33 U	0.26
Silver	MG/KG	0.33	74%	0.75	0	14	19	0.25	0.24	0.26	0.26	0.32
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
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
Vanadium	MG/KG	31.8	100%	150	0	19	19	24.4 J	27 J	29.5 J	31.8 J	25.4 J
Zinc	MG/KG	104	100%	110	0	19	19	68.2 J	78.7 J	95 J	102 J	78.2 J
Other Analytes												
Total Organic Carbon	MG/KG	46600	100%	N/A/	N/A	19	19	33900	34100	33700	46600	38400

Table 3-1
Surface Soil Sampling Results

Small Arms Range, Lake Housing Area (SEAD-119B)
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 119-1008 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-B3-09 SOIL 119-1000 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-B4-52 SOIL 119-1010 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-B5-52 SOIL 119-1011 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-Behind Berm SOIL 119-1016 0 0.2 4/11/2002 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
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	19	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
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	19	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
2-Nitrotoluene	UG/KG	0	0%		0	0	19	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
3-Nitrotoluene	UG/KG	0	0%		0	0	19	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
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	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
Nitrobenzene	UG/KG	0	0%	200	0	0	19	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
Tetryl	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U
Metals and Cyanide												
Aluminum	MG/KG	18100	100%	19300	0	19	19	15100	15500	15100	15700	13900
Antimony	MG/KG	0.74	84%	5.9	0	16	19	0.46	0.53	0.39	0.42	0.47
Arsenic	MG/KG	9.5	100%	8.2	1	19	19	5.2 J	4.3 J	5.1 J	5.3 J	5.3 J
Barium	MG/KG	114	100%	300	0	19	19	99.3	100	90.1	97.4	68.3
Beryllium	MG/KG	1.1	100%	1.1	0	19	19	0.83 J	0.75 J	0.76 J	0.79 J	0.78 J
Cadmium	MG/KG	0.52	100%	2.3	0	19	19	0.43	0.42	0.44	0.44	0.45
Calcium	MG/KG	80900	100%	121000	0	19	19	4920	4390	4950	5420	42900
Chromium	MG/KG	25.6	100%	29.6	0	19	19	20.1 J	20.6 J	20 J	20.4 J	22.7 J
Cobalt	MG/KG	17.3	100%	30	0	19	19	7.8	7.6	8.3	8.9	10.7
Copper	MG/KG	30.2	100%	33	0	19	19	16.3 J	16.9 J	15.5 J	16.3 J	16.9 J
Cyanide	MG/KG	0	0%	0.35	0	0	19	0.6 U	0.69 U	0.72 U	0.67 U	0.57 U
Iron	MG/KG	30000	100%	36500	0	19	19	20600	20800	19900	20100	26400
Lead	MG/KG	33.9	100%	24.8	2	19	19	24 J	24.3 J	22.7 J	21.7 J	11 J
Magnesium	MG/KG	19200	100%	21500	0	19	19	3990	3610	4140	4170	13900
Manganese	MG/KG	769	100%	1060	0	19	19	354	280	391	552	477
Mercury	MG/KG	0.047	89%	0.1	0	17	19	0.03	0.033	0.033	0.03	0.021
Nickel	MG/KG	42.1	100%	49	0	19	19	20	20.7	19.6	20.2	30.1
Potassium	MG/KG	2670	100%	2380	2	19	19	2120	2200	2040	2150	1810
Selenium	MG/KG	0.31	16%	2	0	3	19	0.26 U	0.3 U	0.25 U	0.29 U	0.24 U
Silver	MG/KG	0.33	74%	0.75	0	14	19	0.33	0.18 U	0.15 U	0.23	0.14 U
Sodium	MG/KG	99.1	26%	172	0	5	19	44.9 U	51.9 U	44.6 U	51 U	54.5
Thallium	MG/KG	0	0%	0.7	0	0	19	0.42 U	0.49 U	0.42 U	0.48 U	0.4 U
Vanadium	MG/KG	31.8	100%	150	0	19	19	29.5 J	26.1 J	29.4 J	29.3 J	22 J
Zinc	MG/KG	104	100%	110	0	19	19	73.3 J	64.9 J	104 J	91.2 J	74.2 J
Other Analytes												
Total Organic Carbon	MG/KG	46600	100%	N/A/	N/A	19	19	43400	40500	44500	39800	32100

Table 3-1
Surface Soil Sampling Results

Small Arms Range, Lake Housing Area (SEAD-119B)
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-Berm 0,0 SOIL 119-1012 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-Berm 0,150 SOIL 119-1014 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-Berm 0,250 SOIL 119-1015 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-Berm 0,75 SOIL 119-1013 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-C1-32 SOIL 119-1003 0 0.2 4/11/2002 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
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	19	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
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	19	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
2-Nitrotoluene	UG/KG	0	0%		0	0	19	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
3-Nitrotoluene	UG/KG	0	0%		0	0	19	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
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	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
Nitrobenzene	UG/KG	0	0%	200	0	0	19	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
Tetryl	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U	120 U
Metals and Cyanide												
Aluminum	MG/KG	18100	100%	19300	0	19	19	12100	14300	14200	11100	16100
Antimony	MG/KG	0.74	84%	5.9	0	16	19	0.54	0.4	0.33	0.48	0.44
Arsenic	MG/KG	9.5	100%	8.2	1	19	19	3.8 J	5.2 J	4.4 J	[redacted] J	4.3 J
Barium	MG/KG	114	100%	300	0	19	19	93.8	66.1	74.7	72.6	104
Beryllium	MG/KG	1.1	100%	1.1	0	19	19	0.74 J	0.84 J	0.9 J	0.72 J	0.98 J
Cadmium	MG/KG	0.52	100%	2.3	0	19	19	0.42	0.48	0.43	0.45	0.51
Calcium	MG/KG	80900	100%	121000	0	19	19	51800	39800	78200	80900	4500
Chromium	MG/KG	25.6	100%	29.6	0	19	19	18.9 J	25 J	24.2 J	18.2 J	22.9 J
Cobalt	MG/KG	17.3	100%	30	0	19	19	8.2	17.3	11.4	8.3	7.1
Copper	MG/KG	30.2	100%	33	0	19	19	18.6 J	18.8 J	20 J	30.2 J	16.5 J
Cyanide	MG/KG	0	0%	0.35	0	0	19	0.65 U	0.58 U	0.57 U	0.65 U	0.77 U
Iron	MG/KG	30000	100%	36500	0	19	19	19500	30000	26300	19800	21500
Lead	MG/KG	33.9	100%	24.8	2	19	19	10.6 J	12.6 J	6.4 J	11.1 J	20.2 J
Magnesium	MG/KG	19200	100%	21500	0	19	19	11000	9500	9790	15400	4380
Manganese	MG/KG	769	100%	1060	0	19	19	391	587	769	430	396
Mercury	MG/KG	0.047	89%	0.1	0	17	19	0.026	0.02 U	0.019 U	0.021	0.044
Nickel	MG/KG	42.1	100%	49	0	19	19	25.4	42.1 J	35.7	24.7	23.1
Potassium	MG/KG	2670	100%	2380	2	19	19	[redacted]	2120	2220	2330	2330
Selenium	MG/KG	0.31	16%	2	0	3	19	0.25 U	0.23 U	0.24 U	0.26 U	0.31
Silver	MG/KG	0.33	74%	0.75	0	14	19	0.31	0.3	0.32	0.29	0.21
Sodium	MG/KG	99.1	26%	172	0	5	19	71	93	99.1	78.4	53.5 U
Thallium	MG/KG	0	0%	0.7	0	0	19	0.42 U	0.39 U	0.4 U	0.43 U	0.5 U
Vanadium	MG/KG	31.8	100%	150	0	19	19	22.1 J	20 J	22 J	21.5 J	28.5 J
Zinc	MG/KG	104	100%	110	0	19	19	74.3 J	70.5 J	64.9 J	83.3 J	83 J
Other Analytes												
Total Organic Carbon	MG/KG	46600	100%	N/A/	N/A	19	19	34200	22800	26600	40200	45000

Table 3-1
Surface Soil Sampling Results

Small Arms Range, Lake Housing Area (SEAD-119B)
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-C2-05 SOIL 119-1006 0 0.2 4/11/2002 DU RI 1 Value (Q)	SEAD-119 SS119-C3-06 SOIL 119-1009 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-Creek, N D4 SOIL 119-1017 0 0.2 4/11/2002 SA RI 1 Value (Q)	SEAD-119 SS119-FL A1 SOIL 119-1018 0 0.2 4/11/2002 SA RI 1 Value (Q)
1,3,5-Trinitrobenzene	UG/KG	0	0%		0	0	19	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
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	19	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
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	19	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
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	19	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
4-Nitrotoluene	UG/KG	0	0%		0	0	19	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
HMX	UG/KG	0	0%		0	0	19	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
RDX	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U
Tetryl	UG/KG	0	0%		0	0	19	120 U	120 U	120 U	120 U
Metals and Cyanide											
Aluminum	MG/KG	18100	100%	19300	0	19	19	16000	9630	15600	14300
Antimony	MG/KG	0.74	84%	5.9	0	16	19	0.26 U	0.22	0.27 U	0.35
Arsenic	MG/KG	9.5	100%	8.2	1	19	19	4.1 J	2.6 J	4.4 J	4.6 J
Barium	MG/KG	114	100%	300	0	19	19	89.8	54	94.5	93.6
Beryllium	MG/KG	1.1	100%	1.1	0	19	19	0.84 J	0.44 J	0.81 J	0.78 J
Cadmium	MG/KG	0.52	100%	2.3	0	19	19	0.41	0.26	0.4	0.42
Calcium	MG/KG	80900	100%	121000	0	19	19	9650	2700	3430	10700
Chromium	MG/KG	25.6	100%	29.6	0	19	19	22.2 J	12.4 J	20.5 J	18.6 J
Cobalt	MG/KG	17.3	100%	30	0	19	19	7.2	4.1	8.4	9.1
Copper	MG/KG	30.2	100%	33	0	19	19	14.3 J	7.9 J	13.9 J	17 J
Cyanide	MG/KG	0	0%	0.35	0	0	19	0.75 U	0.75 U	0.69 U	0.73 U
Iron	MG/KG	30000	100%	36500	0	19	19	21200	19000	19300	18900
Lead	MG/KG	33.9	100%	24.8	2	19	19	15.8 J	12.9 J	18 J	33.9 J
Magnesium	MG/KG	19200	100%	21500	0	19	19	4350	2260	3940	6310
Manganese	MG/KG	769	100%	1060	0	19	19	373	162	400	542
Mercury	MG/KG	0.047	89%	0.1	0	17	19	0.034	0.015	0.032	0.032
Nickel	MG/KG	42.1	100%	49	0	19	19	21.9	10.3	21.3	19.6
Potassium	MG/KG	2670	100%	2380	2	19	19	2020	1160	2260	2000
Selenium	MG/KG	0.31	16%	2	0	3	19	0.29 U	0.19 U	0.3 U	0.26 U
Silver	MG/KG	0.33	74%	0.75	0	14	19	0.17 U	0.12	0.21	0.16 U
Sodium	MG/KG	99.1	26%	172	0	5	19	49.9 U	33.3 U	52.2 U	45.5 U
Thallium	MG/KG	0	0%	0.7	0	0	19	0.47 U	0.31 U	0.49 U	0.43 U
Vanadium	MG/KG	31.8	100%	150	0	19	19	27.8 J	18.2 J	26.9 J	26.5 J
Zinc	MG/KG	104	100%	110	0	19	19	75.5 J	43.2 J	78.4 J	87.2 J
Other Analytes											
Total Organic Carbon	MG/KG	46600	100%	N/A/	N/A	19	19	41400	36200	33600	37600

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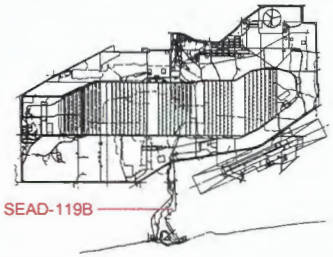


PARSONS

SENECA ARMY DEPOT ACTIVITY
SMALL ARMS RANGE
LAKE HOUSING AREA

Figure 2-2
Small Arms Range
Lake Housing Area

Job No.: 739855	Date: March 2004

LEGEND

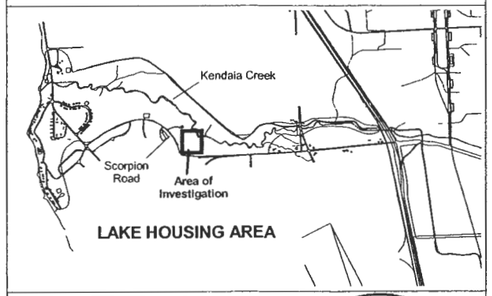
A1 — Geophysical grid w/ grid number

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
SMALL ARMS RANGE
LAKE HOUSING AREA

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

JOB NUMBER: 739855-01003 | DATE: March 2004

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o:\seneca\sco. oad\scorpion.apr

LEGEND

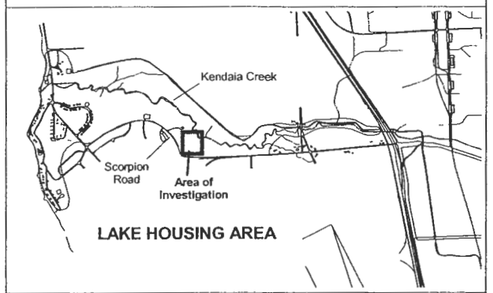
0001 ● Surface Soil Sample Location

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

SMALL ARMS RANGE
LAKE HOUSING AREA

FIGURE 2-4
MONITORING WELL AND SURFACE SOIL SAMPLE LOCATIONS

JOB NUMBER: 739855-01003 | DATE: March 2004

LEGEND

⊕ Known Geophysical Anomaly

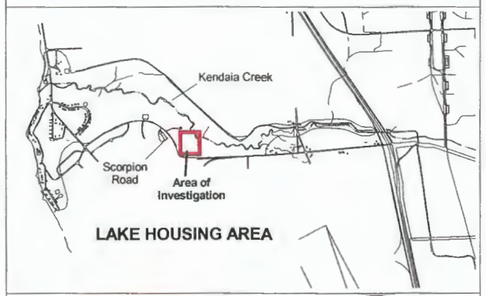
Note: Berm is approximately 4 ft wide by 4 ft high

EM-61 Response (mv)

> 10
5
0
< -5

N

50 0 50 100 Feet



PARSONS

SENECA ARMY DEPOT ACTIVITY
SMALL ARMS RANGE
LAKE HOUSING AREA

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

JOB NUMBER: 739855-01003 | DATE: March 2004

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LEGEND

⊕ Known Geophysical Anomaly

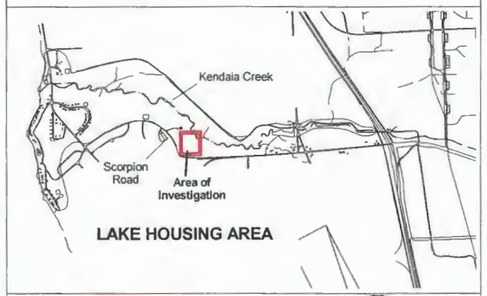
Note: Berm is approximately 4 ft wide by 4 ft high

EM-61 Response (mv)

> 10
5
0
< -5

N

50 0 50 100 Feet



PARSONS

SENECA ARMY DEPOT ACTIVITY
SMALL ARMS RANGE
LAKE HOUSING AREA

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

JOB NUMBER: 739855-01003 | DATE: March 2004

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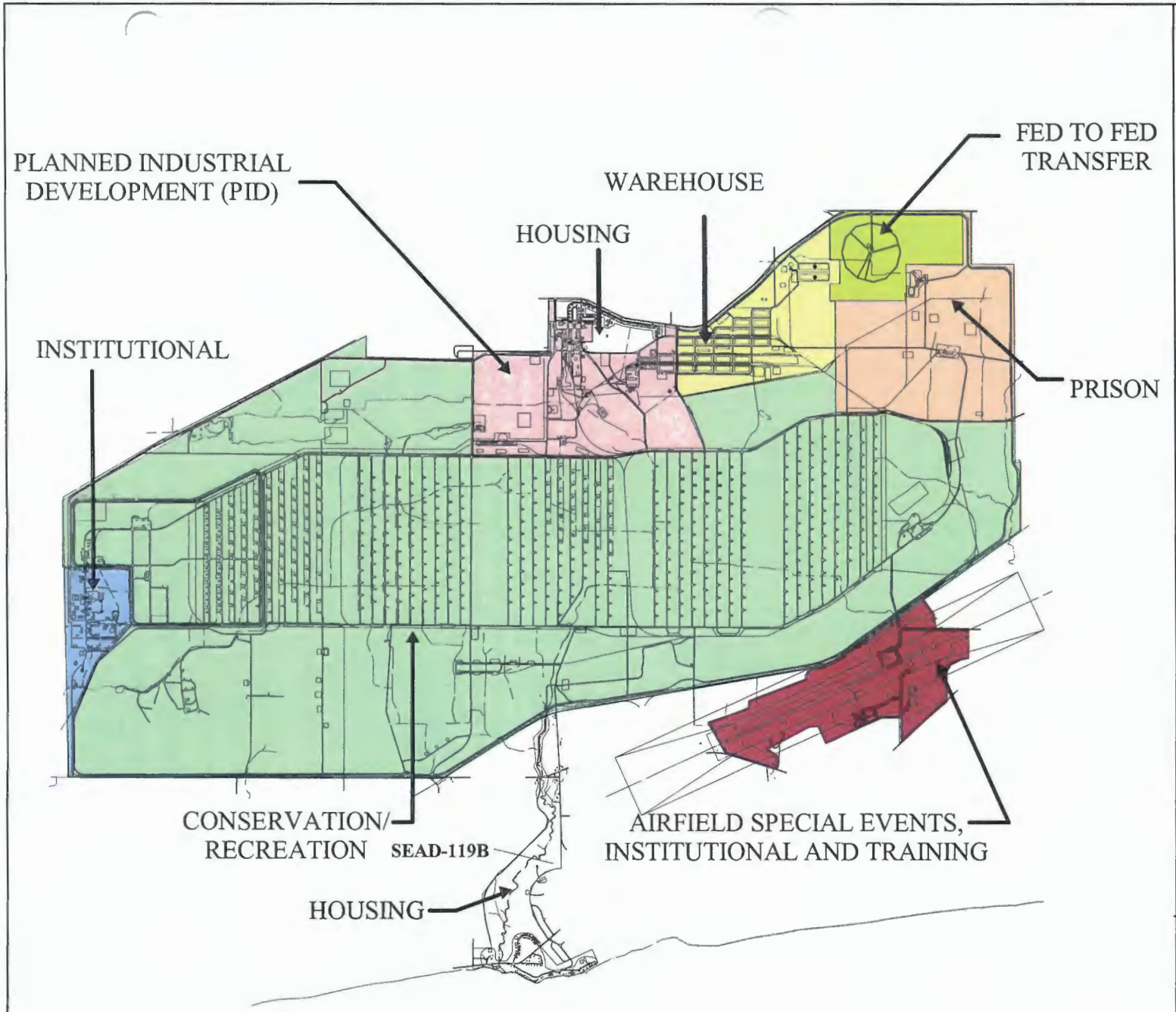


Airfield

Conservation

Federal

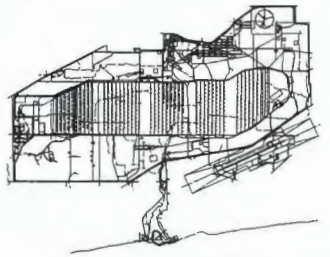
Industrial

Institutional

Prison

Warehouse

Housing



PARSONS

SENECA ARMY DEPOT ACTIVITY
SMALL ARMS RANGE
LAKE HOUSING AREA

Figure 2-1
Future Land Use

Project: 739855	Date: March 2004

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Appendix A

Aerial Photographs and Base Master Plan Map

List of Photographs and Map:

1) 1954 Aerial Photograph
2) 1959 Aerial Photograph
3) 1968 Aerial Photograph
4) 1985 Aerial Photograph
5) 1955 Sampson Air Force Base Master Plan Map

1954 Photo

Approximate scale – 1" = 1,500'

1959 Photo

Approximate Scale – 1" = 1,000'

1968 Photo

N

1985 Photo

Appendix B

Documentation

Archives Search Report Findings
US Army Corps of Engineers, 1998

US Army Corps
of Engineers
HUNTSVILLE ENGINEERING
AND SUPPORT CENTER

FINAL

U.S. Department of Defense

Base Realignment and Closure

Ordnance and Explosives

ARCHIVES SEARCH REPORT

FINDINGS

SENECA ARMY DEPOT

ROMULUS, SENECA COUNTY, NEW YORK

DECEMBER 1998

Prepared by

US ARMY CORPS OF ENGINEERS

ST. LOUIS DISTRICT

Photography Date	Approximate Scale	Source	Frame Identifier(s)
16 Apr 1995	1:40,000	ASCS	8776-15 thru 20

Photos were referenced using the following 1:24,000 USGS 7.5 Minute Series (topographic) Quadrangles:

Dresden, New York 1943 edition (photorevised 1978)
Geneva South, New York 1953 edition (photorevised 1978)
Ovid, New York 1970 edition
Romulus, New York 1953 edition

Aerial photography analysis focused initially on verification of all potential ordnance related areas found during historical research and interviews. Following this initial verification process, the areas requiring further action/investigation where analyzed in detail to determine if the aerial photography reveal more information about each area than was found in historical documents, drawings, and during interviews.

Areas Recommended For Further Action/Investigation

1) Burn Pads and Demolition Grounds. For all photo years, the size and shape of the burn pads and demolition grounds is essentially unchanged with the exception of the 1954 photos. The 1954 aerial photography indicate there may have been two other burn pads. These possible burn pads are still visible on the 1963 photos. By 1978, these possible burn pads are no longer visible (see Plate 5).

2) EOD Area #1. The first evidence of anything in this area appears on the 1963 photos. There are four possible shallow pits evenly spaced, (approximately 300' apart) along the west side of the access road. These possible shallow pits appear very faint on the 1978 photos. A berm is visible on the east side of the access road on the 1991 photos as well as 1994 and 1995 photos (see Plate 6).

3) Demo Range. The demo range cannot be specifically identified on any of the aerial photography. It appears as a densely wooded area on all photos.

4) Function Test Area and Nearby Pits. The function test area appears for the first time on the 1963 aerial photography. There are five structures at the end of the road and the entire area appears to be surrounded by firebreaks. The road to the function test area remains visible on all photos after 1963. The 1978 photos indicate two structures and the firebreaks are very faint. By 1991, the structures and firebreaks are no longer visible (see Plate 7).

The nearby pits appear for the first time on the 1978 photos. By 1991, there is a road turnout into this area. The 1991 photos indicate two pits with an earth mound near one of the pits (see Plate 7).

5) Burial Area near Indian Creek (see Plate 8). This area appears scarred on all aerial photography. The 1954 and 1963 photos indicate shallow depressions. It is not possible to distinguish any depressions after 1963 due to the scale of the aerial photography.

6) Popping Plants. The popping plants are verified by the aerial photography.

7) Grenade Range. The grenade range appears for the first time on the 1991 aerial photography. A tower and possible targets are visible.

8) Igloo Area. The igloo area is verified by the aerial photography.

9) 3.5" Rocket Range (see Plate 9). The berm associated with this range appears the first time on the 1954 aerial photography. There is a structure in front of the berm and there are ground scars just south and east of the berm on the 1954 and 1963 photos. After 1963, only the berm and the ground scars are visible on the aerial photography.

10) Liquid Propellant Storage Area. The liquid propellant storage area appears for the first time on the 1963 aerial photography. It remains visible on all photos after 1963.

11) EOD Area #3 (see Plate 9). This area appears for the first time on the 1954 aerial photography. It is a ground scarred area but also appears to be a shallow excavation. It is approximately 150' in diameter. The surrounding area is clear. It remains the same on the 1963 photos. By 1978, the surrounding area is becoming wooded. By 1991 and thereafter, the surrounding area is densely wooded.

12) EOD Area #2. Mr. Fisher, retired MSG, EOD, informed us of this area. It is now covered with water (duck pond). According to Mr. Fisher, explosive devices were used in this area, and non explosive metal projectiles were thrown into the water (see Plate 10).

Areas Not Recommended For Further Action/Investigation.

Ordnance related buildings and other structures are verified by the aerial photography but are not specifically discussed below.

1) Small Arms Ranges. The four small arms ranges are verified by the aerial photography.

2) Storage Pads. The storage pads are verified by the aerial photography.

3) Suspect Rail Car and Truck Areas. The suspect rail car area on the west side of the site is visible on aerial photography. The other suspect rail car spur and the suspect truck area are not visible on the photos.

4) Berms. Aside from the berms at small ranges, the 3.5" rocket range, the burn pads, and EOD ranges, there are no other berms visible on the photos.

5) Abandoned Powder Burn Area. This area appears for the first time on the 1954 aerial photography. It appears as a bermed area approximately 200' by 330'. There are three rectangular shapes just west of the berm that may be part of the powder burn area. By 1963, the features in this area are beginning to fade as if use has been discontinued. By 1978, the area appears to have returned to natural conditions (see Plate 11).

6) Propellant Charge Burn Area. The first evidence of any activity in this area appears in 1963. The area is lower than the road and it appears there is some ground scarring. It is essentially unchanged on the remaining photos.

7) Berm near the Bundle Ammunition Buildings (area described by Randy Battaglia). There is no evidence of a berm in the area described by Mr. Battaglia on any of the aerial photography.

There is a berm approximately 800' east of the area described by Mr. Battaglia. The berm is straight and approximately 400' long. It runs in a northeast-southwest direction. There are no roads leading to it or any improvements to suggest it was a range. It appears on all aerial photography and gradually became covered with trees over the years.

Other Possible Ordnance Related Areas

The aerial photography was analyzed in general to determine other possible areas of concern, such as other small arms ranges, EOD ranges, burial pits, etc. No other areas were noted.

6.0 SITE INSPECTION

6.1 General

This site visit was performed from 20-24 July 1998.

Corps of Engineers Participants:

Ted Moore	Project Manager
Hank Counts	UXO Specialist and Safety Officer
Jim Luebbert	Historian

SEAD Participant::

Tom Grasek

We coordinated the site visit with Mr. Steve Absolom, Base Environmental Coordinator. In addition to our inspection activities, we performed several interviews.

6.2 Analysis of Ordnance Activities

There are more than 500 ordnance related structures at SEAD. Our inspection strategy was to assume that the interiors of all structures would have to be properly cleared by SEAD personnel prior to disposal. In addition, ammunition is still being stored and disposed of. Our strategy was to inspect the areas surrounding buildings, but not the interior. An added note, assuming the interior of each building could be inspected in 15 minutes (including travel time and unlocking), it would have taken at least 4 weeks just to inspect building interiors.

The areas inspected are shown on Plate 3 and 14.

3.5" Rocket Range. We inspected the firing point, berm, and the areas in between. We did not find evidence of 3.5" rockets. We found spent small arms ammunition at the berm.

Bundle Ammunition Buildings. We found a blank 5.56mm round. These buildings appear to have been abandoned many years ago.

Surveillance Laboratory. We did not find ordnance in this area.

Original Popping Plant. There is spent small arms ammunition of every size and condition on the ground surrounding this building. This popping plant appears to have been abandoned many years ago.

Current Popping Plant. There is spent small arms ammunition of every size and condition on the ground surrounding this building.

Ordnance Repair Shops. We marked these on our map prior to knowing they are vehicle maintenance shops.

Small Arms Storage Building. We did not find ordnance in this area.

Warehouses. We selected a path that would sample the area between two rows of warehouses. We found spent 7.62mm ammunition near warehouses 327, 328, and 329.

Berm (Item 27 on Plate 3). There is no berm.

Fuze Storage Building (Item 41 on Plate 3). The building (shack) is still present. There is also a concrete slab and a metal pole. We did not find ordnance in this area.

Liquid Propellant Storage Area. We did not inspect this area during this visit. We visited this area during the kickoff trip and briefly walked the area. We did not find ordnance in this area.

Function Test Range. There are four pipes in the ground in this area that appear to have been used for tests. There is also a large berm next to the test area. We found four strands of what appears to be shot wires that lead to a box on a utility pole. We did not find ordnance near the pipes, but we found the remains of two 40mm grenades and 5.56mm blank ammunition on the road near the test area.

There is also an area on the right side of the road to the Function Test Range where there is a pit about 15' long X 5' wide X 3" deep that appears to have been used as a burn area. There was also an ammunition box in the hole. There is another pit that is now filled in with water and vegetation. We did not find ordnance in this area.

Ammunition Workshops (Item 16 on Plate 3). We found blank 5.56mm and 7.62mm ammunition and 7.62mm links in this area. We also got several 10+ hits on the Schoenstedt in the grassy areas near the buildings.

.45 Cal. Range. The range does not appear on drawings, but the drawings do show a range shack. The target berm is still present, but there is no evidence of the range shack. There are .38 cal and .45 cal projectiles in the berm. We did not find any other ordnance.

Suspect Rail Car Spur (Item 26 on Plate 3). We did not find evidence of a berm or ordnance.

Berm (Item 27 on Plate 3). There is no evidence of a berm or ordnance.

Suspect Rail Car Spur (Item 26, SW portion of site, Plate 3). The berm is still present. We did not find ordnance in this area.

Ammunition Workshops (Item 17 on Plate 3). We found blank 5.56mm and 7.62mm ammunition and a smoke grenade spoon in this area.

Rifle Range near the airfield. The rifle range clearly has been used for many years. There is a leadership reaction course, what appears to be a close combat range, and a gas chamber near the rifle range. We did not find ordnance in this area.

Skeet Range near the airfield. The range structures are still in place. We did not find ordnance related to the skeet range, but we found blank 5.56mm ammunition in the parking area near the range.

Landfill near the Burn Pits. We have verification the bum pits were used for trash. We did not inspect this area.

Burn Pit Area. We inspected this area and did not find ordnance. There were originally just burn pits in this area. An incinerator has been added.

Abandoned Powder Burn Pit. There are a hydrant and drain remaining in this area, but no evidence of powder burning activities.

Rifle Range near the Lake Housing Area. We found a tower and a small shack, but there is no target berm or evidence of ordnance in the area.

Magazine Area. We did not find ordnance in this area.

Suspect Truck Barricade. We did not find evidence of a barricade or ordnance.

Demo Range (Item 3 on Plate 3). It is near the EOD Area #1. We found a 75mm round in this area that had been split open using a shape charge.

EOD Area #1 (Item 2 on Plate 3). There is a berm where we found the remains of flares and small arms ammunition. There is a second area just across the road from the berm where there are shot holes and the remains of flares. We also found the remains of flares along the road that runs past the EOD area.

Grenade Range. This is a very well constructed range with numerous targets. We found the remains of several 40mm practice grenades. We did not find evidence of use of HE grenades.

Ammunition Disassembly Plant. There is a building, two berms, and a concrete shield. There are also small storage containers that were used by EOD. We did not find ordnance in this area.

Burn Pad Area. We inspected the burn pads and the areas outside and between the burn pads. We found the remains of small arms ammunition, fuzes, 3.5" rockets, igniter tubes, and trash. These items were found in and between the burn pads. In an area southwest of the two large burn pads, we found a 155mm projectile that had been split in half, base plates, and large solid metal projectiles. It is uncertain if these items had been buried at one time or if they are kickouts from the demolition pits.

There are shot wires at Burn Pad A. We got several 10+ hits in the open area between Burn Pads A and C.

Detonator Destruction Furnace. We did not find ordnance near this structure.

Demolition Pit Area. We did not go near the demolition pits but did walk the area in front of the pits on our way to Explosive Scrap Furnace. There are large amounts of kickout material surrounding the demolition pits.

Explosive Scrap Furnace. We did not find ordnance in this area.

Indoor Rifle Range (Building 744). We did not find ordnance in this area.

Igloos. We inspected the area in front of, and across the road from, two rows of igloos in the D igloo area. We got several 10+ hits along the ditch.

Loading/Unloading Platforms. We inspected the areas surrounding six loading platforms. We found the remains of spent fuzes and spent small arms ammunition near platform 2130.

Storage Sheds (X Sites). We did not find ordnance in these areas.

Open Storage Pads. We inspected a sampling of storage pads. We found a large amount of packing material on many of the pads, but we did not find ordnance.

Landing Zones. We inspected three landing zones. We did not find ordnance in these areas.

7.0 EVALUATION OF ORDNANCE PRESENCE

7.1 General

The condition of the interior of buildings is considered outside the scope of this report.

The National Guard, Army Reserves, and ROTC have used many areas of SEAD for training. Spent small arms ammunition can be found on many areas of the site as a result of these activities.

The only known CWM activities on the site are the storage of incendiary ammunition and the gas chamber near the airfield.

We found more than 30 drawings specifically showing one or more ordnance activities. Most of these drawings came from the drawing room at SEAD. These drawings are included in this report as a separate volume. There is a spreadsheet in Appendix E which indicates the title and date of the drawing and the ordnance activities shown on the drawing.

A mosaic of 1991 aerial photography has been used as the basis for Plates 3, 4, and 14.

7.2 Specific Areas of Concern

As stated earlier in this report, this is a complex site. Using historical documents and drawings, aerial photography, and interviews, we have compiled a list of ordnance related areas and activities. With just a couple of exceptions, we inspected (sample walked) every area on the list. All areas on the list are shown on Plate 3. The areas inspected are also shown on Plate 14.

The following is an area by area assessment of all ordnance related activities divided into areas requiring further action/investigation and areas that do not require further action/investigation.

Areas Recommended For Further Action/Investigation

Many of the areas recommended for further action have been previously identified and designated as solid waste management units (SWMU). These SWMU designations (SEAD numbers) are included where appropriate.

Note: All areas recommended for further action/investigation are shown on Plate 4.

1) Burn Pads (SEAD 23) and Demolition Grounds (SEAD 45) . These areas appear on drawings and aerial photography. They were the topic of several interviews and they have been the subject of several studies.

Conventional ammunition stored at SEAD has the potential to be destroyed in this area (up to the 200 lb explosive limit). During the site inspection we found the remains of ammunition ranging from small arms up to 155mm HE. We did not find live ordnance, but it is likely there is live ordnance in this area as a result of kickouts from the burn pads and the demolition grounds.

Drawings show the blast radius for the demolition grounds and the burn pads as 1800'. This radius is consistent with the distance from the demolition grounds where we found fragments.

In addition to the current burn pad configuration, aerial photography (1954) indicate there may have been two other burn pads. By 1978, these possible burn pads are no longer visible. See Plate 5.

2) EOD Area #1 (SEAD 57). This EOD area appears on drawings and aerial photography, was the topic of interviews, and is the subject of studies. It consists of a berm approximately 30' in diameter and 6' high.

According to former EOD personnel we interviewed, there was a 10 lb explosive limit. We found the remains of many flares in and surrounding the berm. We found spent small arms ammunition inside the berm. We also found shot holes on the opposite side of the access road from the berm which contained destroyed flares. We also found the remains of destroyed flares at the end of the access road past the berm. The blast radius for this EOD area is 1800'.

The berm at this EOD area does not appear on aerial photography until after 1978. There are four areas on the 1963 aerial photography that may be shot holes. They are on the south side of the access road. The second area is approximately the location where we found shot holes during the site inspection. See Plate 6.

3) Demo Range (No SEAD designation). This range appeared on a drawing entitled Seneca Army Depot General Site and Building Plan dated 14 January 1988. We were uncertain if demo meant demolition or demonstration. During our inspection we found a 75mm projectile in this area that had been split open. It is our assumption that it was a demolition area. It appears on the drawing as approximately 40 acres. The coordinates where the 75mm round was found are: N 42° 46.13', W 76° 53.06'.

4) Function Test Area (No SEAD designation) and Nearby Pits (SEAD 44, Location A) (see Plate 7). Information regarding the function test area came from interviews. The

road leading to this area appears on several drawings. The exact extent of function tests in this area is unknown but it is suspected that fuzes were tested. The remains of 40mm grenades can be seen on the road near the test area along with spent small arms ammunition. One interviewee reported finding live 40mm grenades in the area.

According to Mr. Conover, current employee at the demolition grounds, there was another test area near the function test area, but he was not able to find the area during our initial visit to the site. We found an area along the road to the function test area that may be it. There are two pits. One has an ammunition box in it. The other is full of water. We have no specific knowledge about these pits. The coordinates for the pits are: N 42° 42.46', W 76° 50.06'.

5) Burial Area near Indian Creek (No SEAD designation) (see Plate 8). Information about this area was provided by Mr. George, a former ammunition supervisor. He indicated there was an attitude that if an item could not be destroyed it should be buried. He believes ammunition and non ordnance items were buried in this area. The area shown on Plates 3 and 8 is the general location he marked on our inspection map. We did not see surface evidence of burial activities.

6) Popping Plants (SEAD 16 and 17). The popping plants appear on drawings and aerial photography, were the topic of interviews, and are the subject of HTRW studies listed in Section 2.0.

During the site inspection, we couldn't walk 10' feet in any direction without finding some variety of spent small arms ammunition near these facilities. Mr. George specifically mentioned the popping plants as an area that should be investigated further.

7) Grenade Range (No SEAD designation). The grenade range appears on drawings and aerial photography and was the subject of interviews. According to Mr. Conover, only 40mm practice grenades were used on this range. During our site inspection, we found several in tact 40mm practice projectiles. There are mannequins, wood structures, and armor vehicles set up on the range for targets. There are foxholes at the firing line. There is no evidence on the targets or on the ground that HE grenades were used.

8) Igloo Area (SEAD 53). There are over 500 igloos and they appear on every drawing and aerial photograph of the site. Although random tossing of ammunition is not part of ammunition handling procedures, we decided to randomly inspect the area near a few igloos (see Plate 14). We inspected a portion of Igloo area D, specifically the ditch across from the igloos and the area surrounding the igloos. We got several 10+ hits on the back side of the ditch using a Schoenstedt magnetometer.

9) 3.5" Rocket Range (SEAD 46) (see Plate 9). This range appears on drawings as a range but not specifically as a 3.5" rocket range. The interview with Mr. Battaglia, a New York District Corps of Engineers employee stationed at SEAD, raised the suspicion about 3.5" rockets and the interview with Mr. White confirmed that 3.5" rocket motors were tested in the area. Although the rocket motors were static fired according to Mr. White, spent rocket motors have been found scattered over the area. We did not find ordnance during our inspection of the area.

10) Liquid Propellant Storage Area (SEAD 43). This area appears on drawings and aerial photography and was brought up during interviews as an area that should be investigated further. We did not find ordnance during our visit to this area.

11) EOD Area #3 (No SEAD designation) (see Plate 9). This area was reported by Mr. Battaglia. It is a flat area roughly 150' in diameter and appears to be surrounded by a berm (except a portion of the south end is open). The area appears on aerial photography, but there is no evidence of a berm on the photos. Early photos show the surrounding area as clear. The most recent aerial photography show the surrounding area to be wooded which is consistent with the current conditions. Personnel from UXB, an ordnance removal contractor, told Mr. Battaglia the area was an EOD disposal area. We did not find ordnance, but the lack of vegetation within the flat area raises concern regarding how the area was used. The coordinates for EOD Area #3 are: N 42° 45.92', W 76° 50.75'. This area did not appear on any drawings.

12) EOD Area #2 (No SEAD designation) . Mr. Fisher, retired MSG, EOD, informed us of this area. It is now covered with water (duck pond). According to Mr. Fisher, explosive devices were used in this area, and non explosive metal projectiles were thrown into the water (see Plate 10). This area appears to be within the IRFNA Disposal Site (SEAD 13) but the EOD activities were not related to the IRFNA disposal activities.

Areas Not Recommended For Further Action/Investigation

1) Areas surrounding ordnance related buildings (Items 12, 13, 14, 15, 16, 17, 18, 23, 32 and 37 on Plate 3). The list of ordnance related buildings was developed from historical documents and drawings. The area surrounding these buildings was inspected to see if ammunition had been randomly tossed. All we found was spent small arms ammunition and a spoon from a smoke grenade at one location. It appears these items are the result of National Guard, Army Reserve, and ROTC use of the facility.

There is anecdotal evidence that a file cabinet containing spare ammunition was buried in the field east of Ammunition Workshop #1 (Item 16 on Plate 3). We did not find evidence of this burial area during the site visit. Mr. Schwartz, a Parsons Engineering

employee, reported surveying this area and finding no anomalies. There was no evidence of a burial area on aerial photography.

2) Small Arms Ranges. We developed the list of small arms ranges from drawings and aerial photography. We only found spent small arms ammunition at the small arms ranges.

3) Storage Pads and X sites. There are numerous pads that appear on drawings and aerial photography. These pads were used at least in part for open air ammunition storage. We inspected many of these storage pads and found some spent small arms ammunition and packing materials.

There are several storage sheds known as X sites. We inspected these sheds and only found packing materials.

4) Landing zones. Numerous landing zones appear on the drawing entitled Seneca Army Depot General Site and Building Plan (Culverts) dated 1 March 1990. We inspected three of the landing zones (see Plate 3). We did not find ordnance.

5) Suspect Rail Car and Truck Areas. Two suspect rail car areas and one suspect truck area appear on drawings. These were areas where rail cars and trucks were placed while problems with shipping documents or the vehicles were resolved. We did not find ordnance in these areas.

6) Berms. Two horseshoe shaped berms appear on drawings with no description of the intended use (Item 27 on Plate 3). There was no evidence of these berms visible on the aerial photography. We did not find either of the berms or ordnance during our inspection of these areas.

7) Drums reported by Randy Battaglia. We found one drum during our site inspection. It was marked as a carbine container. In a later conversation with Mr. Battaglia, he verified the drum we found was in the area he had indicated.

8) Abandoned Powder Burn Area (SEAD 24). This area appears on many drawings and aerial photography. We found water pipes and a drain, but there was no evidence of open burn operations or ordnance (see Plate 11).

9) Loading/unloading Platforms. These platforms appear on nearly all drawings. We inspected a random sampling of platforms looking for tossed ammunition. At platform 2130, we found spent fuzes and spent small arms ammunition that appeared to be burnt. It appears that items destroyed at the popping plants were loaded on to rail cars at this platform.

10) Propellant Charge Burn Area. Mr. Critchfield, retired military, informed us of this area. We did not find evidence of any burning activities in this area during our site inspection. It is now designated a fill area.

11) Ammunition Disassembly Plant. This facility appears on many drawings. It is located within the blast radius for EOD Area #1 and the demolition grounds. We did not find ordnance in the immediate vicinity of this facility during our site inspection.

12) Detonator Destruction Furnace (within SEAD 23) . This facility appears on a drawing. It is located near the burn pads and demolition grounds and is within the blast area of the demolition grounds. We did not find ordnance in the immediate vicinity of this structure during our site inspection.

13) Explosive scrap furnace (within SEAD 45) . This facility appears on a drawing. It is located near and within the blast radius of the demolition grounds. We did not find ordnance in the immediate vicinity of this structure during our site inspection.

14) Berm near the Bundle Ammunition Buildings (Item 35 on Plate 3). Mr. Battaglia reported this berm. There is no evidence of the berm on the aerial photography.

15) R&D Area/Fuze Storage (SEAD 44, Location B) (Item 41 on Plate 3). This area appears on the drawing entitled Seneca Army Depot, Basic Information Maps, General Recreation Plan (South), dated 15 July 1958. Building 603 was an R&D building and building S-615 was used for fuze storage. There is a locked metal shed remaining on the site along with a concrete pad and metal pole. We did not find ordnance in this area during the site inspection.

APPENDIX E

LETTERS / MEMORANDA / MISCELLANEOUS ITEMS

	Seneca Ord Depot Layout Map No 1	Seneca Ord Depot Layout Map No 18	Seneca Ord Depot Layout Map No 21	Seneca Ord Depot Layout Map No 28	Seneca Ord Depot Layout Map No 41	Seneca Ord Depot Layout Map No 43	Seneca Ord Depot Layout Map No 44	Seneca Ord Depot Layout Map No 46
	12 Mar 56	12 Mar 56	12 Mar 56	12 Mar 56	12 Mar 56	12 Mar 56	12 Mar 56	12 Mar 56
3.5" Rocket Range	X							
Bundle Ammo Buildings	X							
Surveillance Lab	X		X					
Popping Plant (O)	X		X					
Popping Plant								
Small Arms Storage	X							
Warehouses	X							
Berm (Brady Rd)						X		
Fuse Storage								
Liquid Propellant Storage	X							
Function Test Range								
Ammo Work Shops #2	X							
.45 Cal Range & Range Shack							X	
Suspect Rail Car Spur (Ovid Rd)								
Berm (Fayette Rd)								
Suspect Rail Car Spur (W Patrol Rd)	X						X	
Ammo Work Shops #1	X				X			
Small Arms Range (Airfield)								
Skeet Range (Airfield)								
Abandoned Landfill (Smith Farm Rd)								
Burning Pit (Smith Farm Rd)	X			X				
Abandoned Powder Burn Pit	X	X						
Rifle Range - Lake Housing Area	X							
Magazines	X							
Suspect Truck Barricade								
Demo Range								
EOD Area #1								
Grenade Range								
Ammo Disassembly Plant	X							
Burn Pads	X							X
Detonator Destruction Furnace	X							
Demolition Pits	X							X
Explosive Scrap Furnace								X
Indoor Rifle Range (Bldg 744)								
Storage Sheds - X Sites	X							
Loading/Unloading Platforms								
Storage Pads	X							
Landing Zones								
Igloos	X				X			
Military Training Areas								
SWMU Locations								
Q/D Data								
Radioactive Material Contamination								

	Seneca Ord Depot Layout Map No 47	Seneca Ord Depot Layout Map No 49	Seneca Ord Depot Layout Map No 57	Seneca Ord Depot Gen Info Map	Seneca Army Depot Reservation Map	Seneca Army Depot Gen Site and Bldg Plan	Seneca Army Depot General Site Map	Seneca Army Depot Gen Site and Bldg Plan
	12 Mar 56	12 Mar 56	12 Mar 56	15 Jul 58	15 Mar 72	25 Aug 77	27 Nov 81	28 Jun 84
3.5" Rocket Range								
Bundle Ammo Buildings				X	X	X	X	X
Surveillance Lab				X	X	X	X	X
Popping Plant (O)				X	X		X	X
Popping Plant				X			X	X
Small Arms Storage				X	X	X	X	X
Warehouses				X	X	X	X	X
Berm (Brady Rd)								
Fuse Storage				X			X	
Liquid Propellant Storage				X	X		X	X
Function Test Range				X	X		X	X
Ammo Work Shops #2				X	X		X	X
.45 Cal Range & Range Shack								
Suspect Rail Car Spur (Ovid Rd)								
Berm (Fayette Rd)							X	X
Suspect Rail Car Spur (W Patrol Rd)				X	X		X	X
Ammo Work Shops #1				X	X		X	X
Small Arms Range (Airfield)							X	X
Skeet Range (Airfield)							X	X
Abandoned Landfill (Smith Farm Rd)								X
Burning Pit (Smith Farm Rd)				X	X		X	X
Abandoned Powder Burn Pit				X	X		X	X
Rifle Range - Lake Housing Area								
Magazines				X	X	X	X	X
Suspect Truck Barricade								
Demo Range								
EOD Area #1								X
Grenade Range								
Ammo Disassembly Plant	X				X		X	X
Burn Pads	X		X		X		X	X
Detonator Destruction Furnace								
Demolition Pits					X		X	X
Explosive Scrap Furnace								
Indoor Rifle Range (Bldg 744)							X	X
Storage Sheds - X Sites	X	X					X	X
Loading/Unloading Platforms								
Storage Pads							X	X
Landing Zones								
Igloos				X	X	X	X	X
Military Training Areas								
SWMU Locations								
Q/D Data					X			
Radioactive Material Contamination						X		

	Seneca Army Depot Reservation Plan	Seneca Army Depot Airfield	Seneca Army Depot Gen Site and Bldg Plan	Seneca Army Depot Military Trng Areas	Seneca Army Depot Gen Site and Bldg Plan (Culverts)	Seneca Army Depot	Seneca Army Depot Site Plan Open Burn Grounds
	May 85	2 Jul 85	14 Jan 88	6 Jan 89	1 Mar 90	25 Sep 90	25 Mar 92
3.5" Rocket Range							
Bundle Ammo Buildings	X		X		X		
Surveillance Lab	X		X	X	X		
Popping Plant (O)	X		X		X		
Popping Plant	X		X		X		
Small Arms Storage	X		X		X		
Warehouses	X		X		X		
Berm (Brady Rd)							
Fuse Storage							
Liquid Propellant Storage	X		X		X		
Function Test Range	X		X		X		
Ammo Work Shops #2	X		X		X		
.45 Cal Range & Range Shack							
Suspect Rail Car Spur (Ovid Rd)							
Berm (Fayette Rd)	X		X		X		
Suspect Rail Car Spur (W Patrol Rd)	X		X		X		
Ammo Work Shops #1	X		X		X		
Small Arms Range (Airfield)	X	X	X		X		
Skeet Range (Airfield)	X	X	X		X		
Abandoned Landfill (Smith Farm Rd)	X		X		X		
Burning Pit (Smith Farm Rd)	X		X		X		
Abandoned Powder Burn Pit	X		X		X		
Rifle Range - Lake Housing Area							
Magazines	X		X		X		
Suspect Truck Barricade							
Demo Range			X				
EOD Area #1	X		X		X		
Grenade Range			X				
Ammo Disassembly Plant	X		X		X		
Burn Pads	X		X		X		X
Detonator Destruction Furnace							X
Demolition Pits	X		X		X		X
Explosive Scrap Furnace							
Indoor Rifle Range (Bldg 744)			X		X		
Storage Sheds - X Sites	X		X		X		
Loading/Unloading Platforms							
Storage Pads	X				X		
Landing Zones						X	
Igloos	X		X		X		
Military Training Areas				X			
SWMU Locations							
Q/D Data							
Radioactive Material Contamination							

	Seneca Army Depot SWMU Locations
3.5" Rocket Range	
Bundle Ammo Buildings	
Surveillance Lab	
Popping Plant (O)	
Popping Plant	
Small Arms Storage	
Warehouses	
Berm (Brady Rd)	
Fuse Storage	
Liquid Propellant Storage	
Function Test Range	
Ammo Work Shops #2	
.45 Cal Range & Range Shack	
Suspect Rail Car Spur (Ovid Rd)	
Berm (Fayette Rd)	
Suspect Rail Car Spur (W Patrol Rd)	
Ammo Work Shops #1	
Small Arms Range (Airfield)	
Skeet Range (Airfield)	
Abandoned Landfill (Smith Farm Rd)	
Burning Pit (Smith Farm Rd)	
Abandoned Powder Burn Pit	
Rifle Range - Lake Housing Area	
Magazines	
Suspect Truck Barricade	
Demo Range	
EOD Area #1	
Grenade Range	
Ammo Disassembly Plant	
Burn Pads	
Detonator Destruction Furnace	
Demolition Pits	
Explosive Scrap Furnace	
Indoor Rifle Range (Bldg 744)	
Storage Sheds - X Sites	
Loading/Unloading Platforms	
Storage Pads	
Landing Zones	
Igloos	
Military Training Areas	
SWMU Locations	X
Q/D Data	
Radioactive Material Contamination	

PHOTO # 31
OWER AND SHACK AT SMALL ARMS RANGE NEAR THE LAKE HOUSING AREA

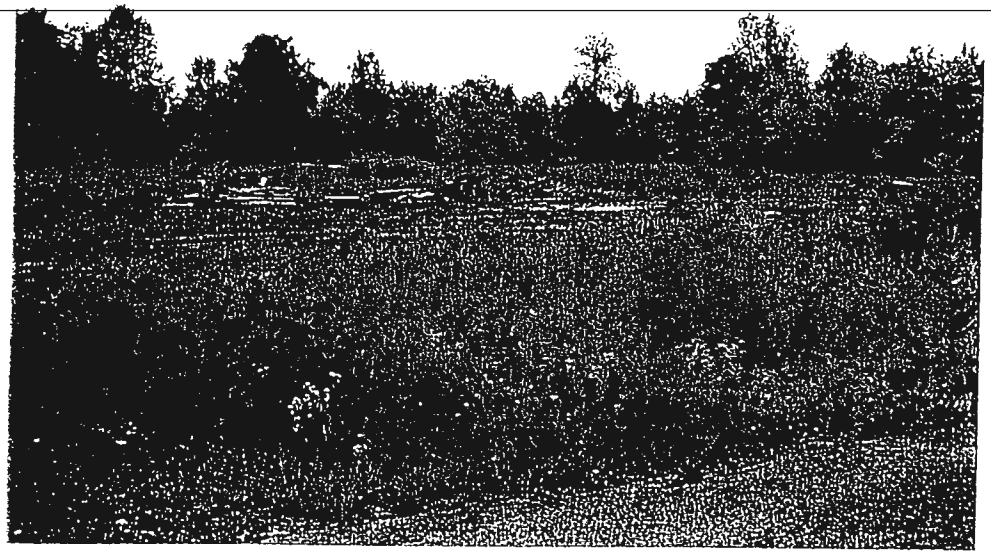
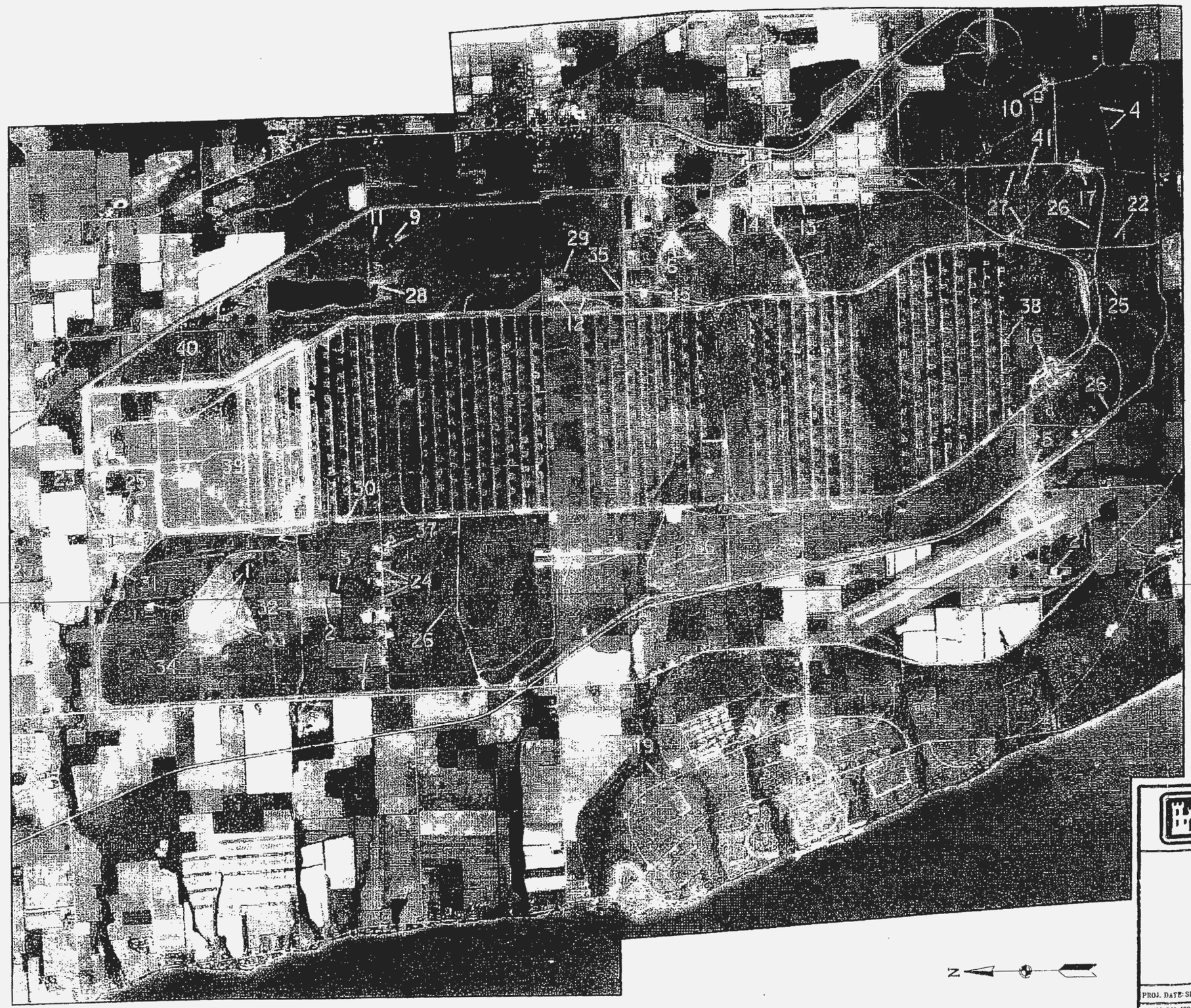


PHOTO # 32
TYPICAL STORAGE PAD



KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
1.	BURN PADS AND DEMOLITION GROUNDS
2.	EOD AREA *1
3.	DEMO RANGE
4.	FUNCTION TEST AREA AND NEARBY PITS
5.	INDIAN CREEK BURIAL AREA
6.	POPPING PLANTS
7.	GRENADE RANGE
8.	IGLOOS
9.	3.5" ROCKET RANGE
10.	LIQUID PROPELLANT STORAGE AREA
11.	EOD AREA *3
12.	BUNDLE AMMUNITION BUILDINGS
13.	WAREHOUSE BLDG *328
14.	SMALL ARMS STORAGE
15.	SURVEILLANCE LAB
16.	AMMUNITION WORKSHOPS *1
17.	AMMUNITION WORKSHOPS *2
18.	MAGAZINES
19.	LAKE HOUSING SMALL ARMS RANGE

(CONTINUED ON PLATE 3A)

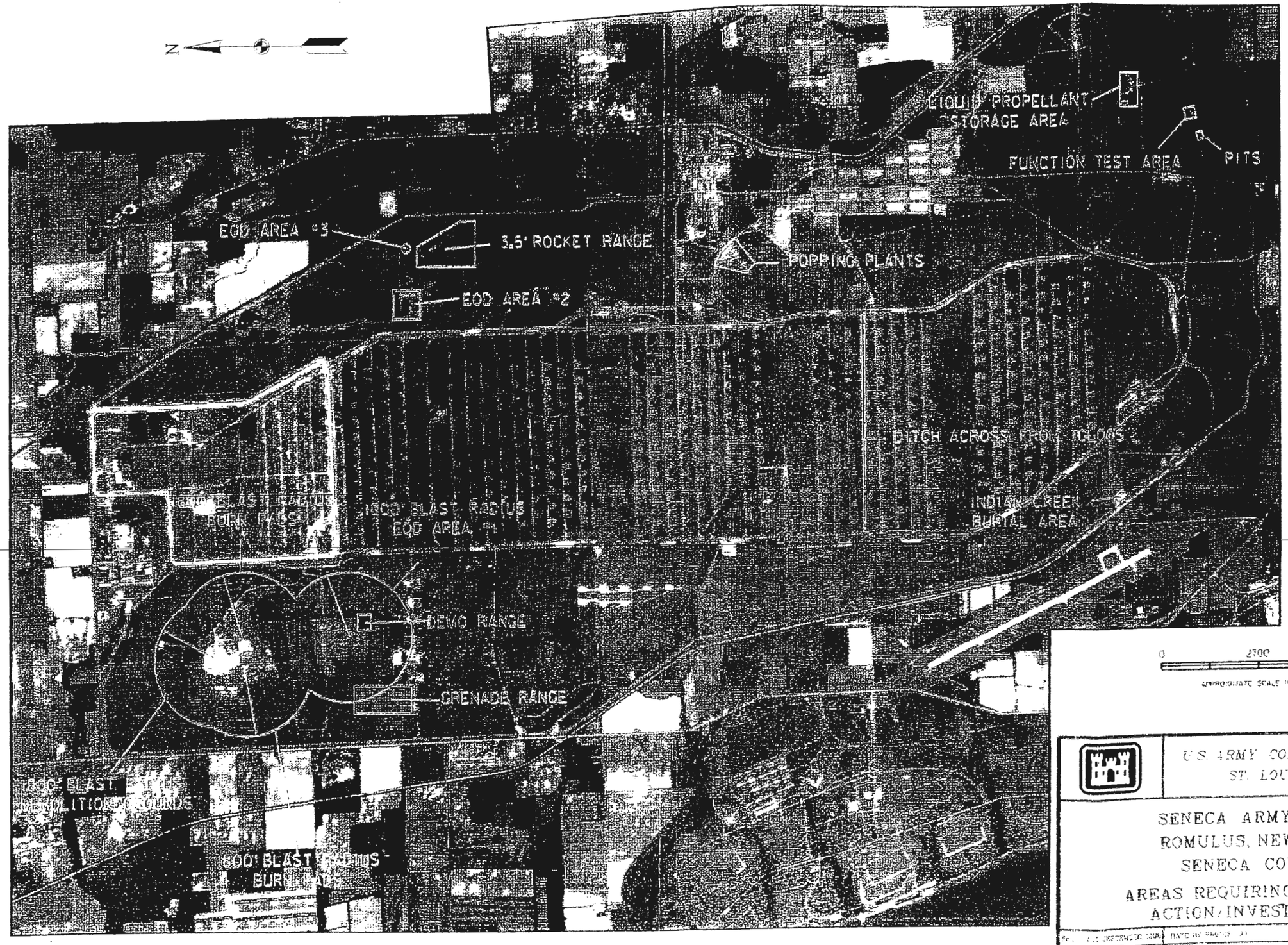
0 3000 6000

APPROXIMATE SCALE IN FEET

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

SENECA ARMY DEPOT
ROMULUS, NEW YORK
SENECA COUNTY
ORDNANCE ACTIVITIES

PROJ. DATE: SEPTEMBER, 1990	DATE OF PHOTO: 1991	PLATE NO. 3
14-DEC-1990 00:55	t:\oew98b\newyork\senecot\photos\plate3.dgn	

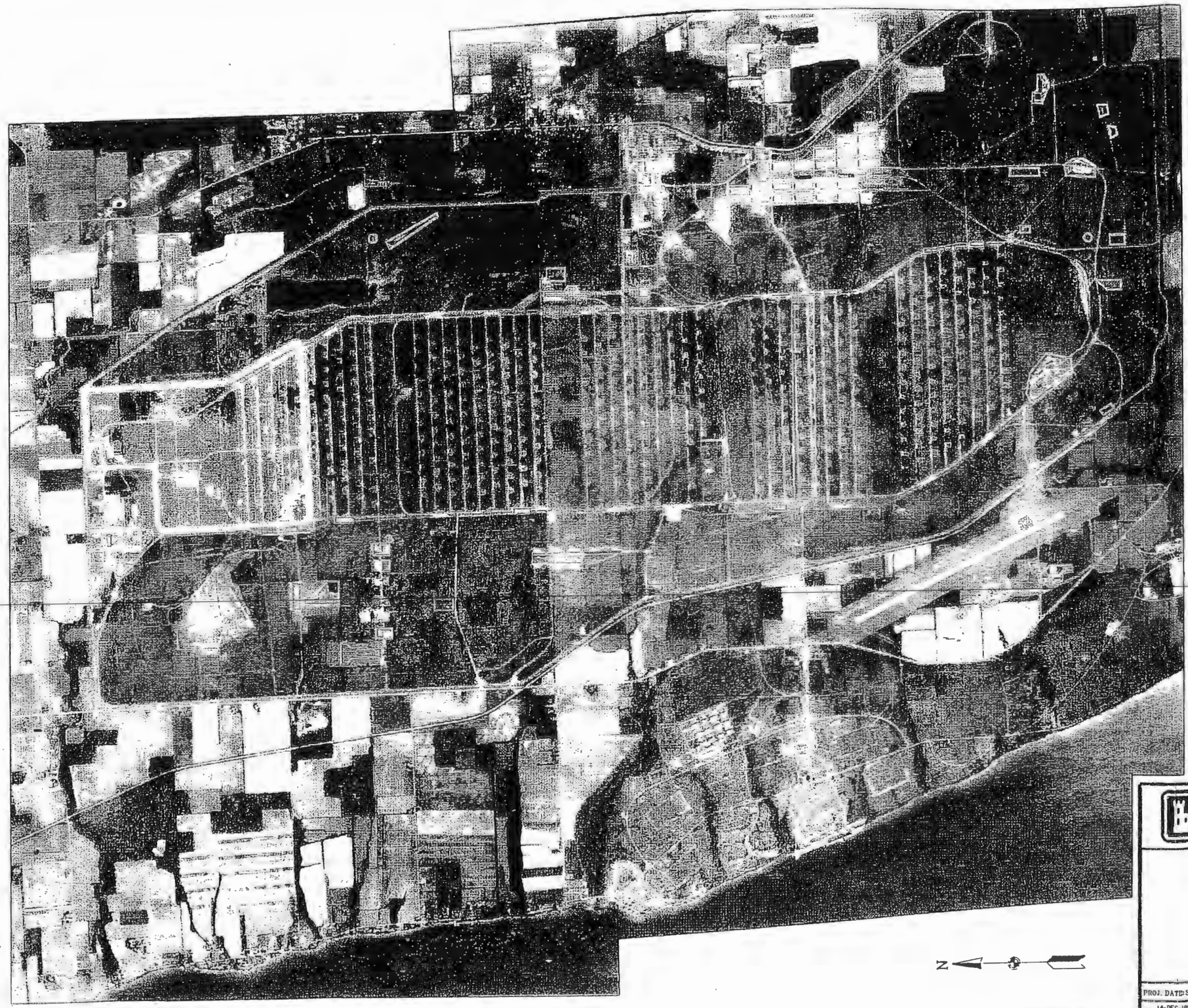


U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

SENECA ARMY DEPOT
ROMULUS, NEW YORK
SENECA COUNTY

AREAS REQUIRING FURTHER ACTION/INVESTIGATION

PLATE NO. 4



NOTE: AREAS ENCLOSED BY YELLOW LINES INDICATE AREAS INSPECTED.

0 3000 6000

APPROXIMATE SCALE IN FEET

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

SENECA ARMY DEPOT
ROMULUS, NEW YORK
SENECA COUNTY
AREAS INSPECTED

PROJ. DATE: SEPTEMBER, 1998	DATE OF PHOTO: 1991	PLATE NO. 14
14-DEC-1998 08:38	I:\ecw98\newyork\senecaphotos\plate14.dgn	

Appendix C

Boring Logs and Well Completion Diagrams

Contractor: SJB	**PARSONS**	BORING/ WELL NO. MW-119-1	Sheet 1 of 2
Driller: Walt Ketter	**DRILLING RECORD**		
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

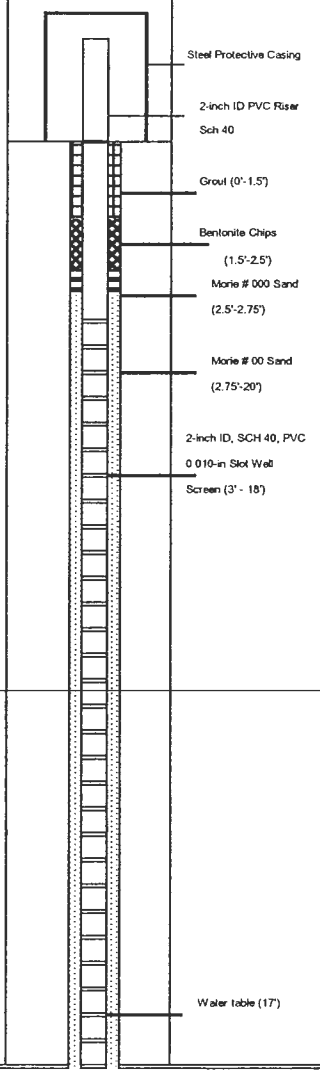
Date/Time Finish: August 6, 2002 -1755

Location Plan

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

Contractor: SJB Driller: Walt Ketter ctor: Ed Ashton Type: ATV-CME-850	**PARSONS** **DRILLING RECORD** **PROJECT NAME:** Seneca Army Depot-SEAD 119 **PROJECT NUMBER:** 739855.01002	**BORING/ WELL NO.** MW-119-1 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

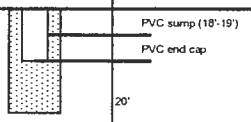
Date/Time Start: August 6, 2002 -1510

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							
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 pector: Ed Ashton g Type: ATV-CME-850	**PARSONS** **DRILLING RECORD**	**BORING/ WELL NO.** MW-119-2	Sheet 1 of 2
	PROJECT NAME: Seneca Army Depot-SEAD 119 **PROJECT NUMBER:** 739855.01002	**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

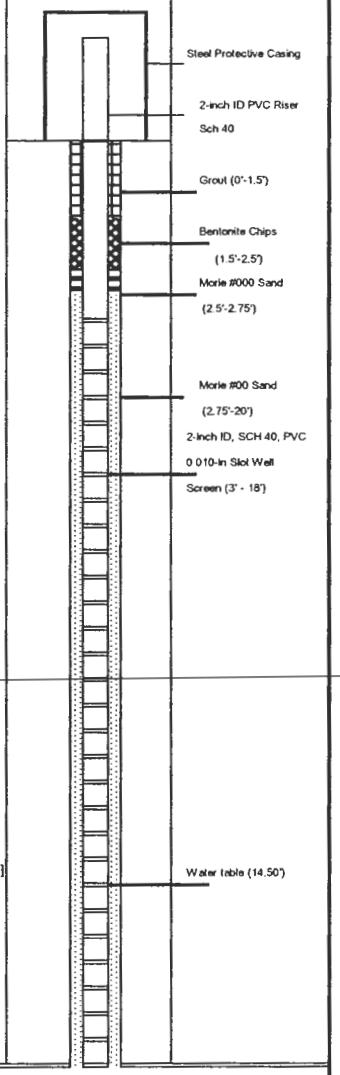
Date/Time Start: August 6, 2002 - 0940

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 ɔector: Ed Ashton ɡ 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.

Contractor: SJB Driller: Walt Ketter spector: Ed Ashton .g Type: ATV-CME-850	**PARSONS** **DRILLING RECORD** **PROJECT NAME:** Seneca Army Depot-SEAD 119 **PROJECT NUMBER:** 739855.01002	**BORING/ WELL NO.** MW-119-3 Sheet 1 of 1 **Location Description:** Former Small Arms Range Near Lake Shore Housing

GROUNDWATER OBSERVATIONS								
Water Level (bgs)	8.62'							
Date	8/8/02							
Time	0844							
Meas. From	TOC							

Weather: Cloudy - 80'F

Date/Time Start: August 5, 2002 - 1130

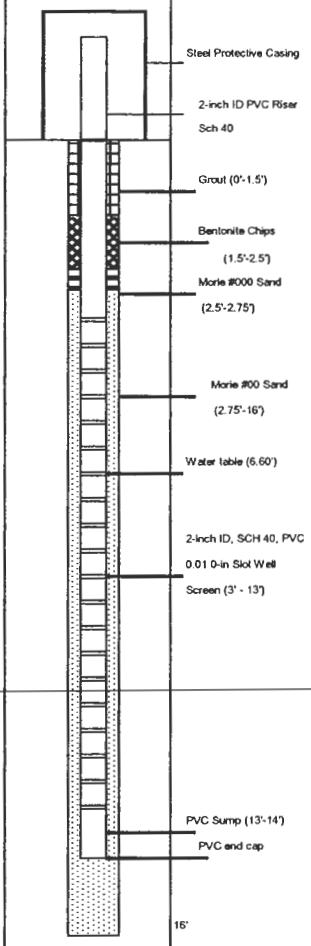
Date/Time Finish: August 5, 2002 - 1630

Location Plan N

See Site Plan

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+3					
+2					
+1					
0					
		3	50	NA	(0'-2'):Brown, silt with fine sand, roots, trace fine gravel, dry. (SM)
1		8			
		8			
2		10			
		18	50	NA	(2'-4'):Brown, silt with trace-fine sand, fragments of black shale,
3		25			dry. (ML/SM)-Till
		25			
4		37			
		13	80	NA	(4'-6'):Brown, silt with fine sand, trace-fine gravel, trace clay, dry.
5		16			(ML/SM)-Till
		16			
6		19			
		13	40	NA	(6'-7.5'): Same As Above With the Exception of Fragments of
7		21			Black Shale Present. (ML/SM)- Till
		32			Refusal at 7.5 feet. Drilled to 8 feet with HSAs.
8		50/.0			
		14	20	NA	(8'-8.8'): Same As Above. (ML/SM)-Till
9		50/.3			Refusal at 8.8 feet. Drilled to 10 feet with HSAs.
10					
		32	10	NA	(10'-10.9'):Brown, silt with black shale, trace fine sand, dry. (ML/SM)-Till
11		50/.4			~~Refusal at 10.9 feet. Drilled to 12 feet with HSAs.~~
12					
		34	10	NA	(12'-12.6'):Grey, silt with clay, black shale, moist to wet at 12.6 feet.
13		50/.1			(ML/SM)-Till.
					Refusal at 12.6 feet. Drilled to 14 feet with HSAs.
14					
		50/.0	0	NA	Refusal at 14.0 feet; Tip of spoon wet
15					Drilled to 16 feet with HSAs.
16					
					Boring terminated at 16 feet bgs.
17					
18					

SCHEMATIC



COMMENTS

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

COMMENTS:
No environmental samples collected.

Appendix D

Well Development Reports

WELL DEVELOPMENT REPORT

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

PROGRAM TYPE:	REMEDIAL INVESTIGATION	CREW INITIALS	START DATE	END DATE
AMU # (AREA):	SEAD- 119	BDA	8/8/02	8/8/02
PROJECT NO. (JOB #):	739855.0102			
DRILLING DATE:	8/6/02	MONITORING	BEFORE DEVELOPMENT	AFTER DEVELOPMENT
INSTALLATION DATE:	8/6/02	INSTRUMENT	OVM / RAD	OVM / RAD
SOP REFERENCE NO. & REV. NO.:	NA	READING	NA / NA	NA / NA
PUMP EQUIPMENT:	Waterra foot valve & 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):	19.5
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)
8/8/02	well development	1025	1027	0.50	7.03	0.48	66.0	>1,000
Purged	well dry. Let well recharge							
8/8/02	well development	1130	1135	0.50	7.71	0.41	62.1	>1,000
Purged	well dry a 2nd time. Let well recharge							
8/8/02	well development	1340	1345	0.50	7.63	0.40	62.8	>1,000
Purged	well dry a 3rd time.							
Note:	Purged 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 90% 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.

ESTIGATION DERIVED WASTE (IDW):

DATE	8/8/02		
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
MU # (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 again after recovered to within 90% 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
AMU # (AREA):	SEAD- 119	EA	8/8/02	8/8/02
PROJECT NO. (JOB #):	7398 55.01002			
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):	8.62
WELL INNER RISER DIAMETER (inches)	2	2	MEASURED POW DEPTH (feet from TOC):	16.0
WELL DIAMETER FACTOR (gal/ft)	0.163	0.163	WATER COLUMN (feet):	7.38
BORING DIAMETER (inches)	3.80	8.5	INSTALLED WATER DEPTH (feet from TOC):	6.60
BORING DIAMETER FACTOR (gal/ft)	0.5894	2.955	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)
8/8/02	well development	0850	-	1.50	7.13	0.39	64.2	>1,000
8/8/02	"	-	-	2.00	7.09	0.36	61.8	>1,000
8/8/02	"	-	0910	2.50	7.33	0.37	62.8	>1,000
Purged well dry. Let well recharge								→
8/8/02	well development	1100	-	3.00	7.25	0.37	65.0	>1,000
8/8/02	"	-	-	3.50	7.23	0.36	61.9	>1,000
8/8/02	"	-	-	4.00	7.20	0.36	60.6	>1,000
8/8/02	"	-	-	4.50	7.20	0.35	61.1	>1,000
8/8/02	"	-	1115	5.00	7.27	0.35	60.9	>1,000
Purged well dry second time. Let well recharge								→
8/8/02	well development	1245	-	5.50	7.69	0.38	70.9	>1,000
8/8/02	"	-	-	6.00	7.42	0.36	66.0	>1,000
8/8/02	"	-	-	6.50	7.39	0.36	64.5	>1,000
8/8/02	"	-	1307	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	8/8/02		
GALLONS OF WASTE WATER	7.00		
DRUM NO. & LOCATION	SEAD-119-35		

well was developed again after it recovered to within 80% of original SWV after it was purged dry.

Appendix E

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: 2/14/2003 11:30
COMPLETION DATE: 2/14/2003 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	2/14/2003 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'		
					Dark brown weathered shale, semi-brittle Refusal at 4'.	
5						
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: 2/14/2003 11:00
COMPLETION DATE: 2/14/2003 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	2/14/2003 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: 2/14/2003 12:35
COMPLETION DATE: 2/14/2003 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	2/14/2003 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						
7						
8						
9						
10						
11						
12						
13						
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: 2/14/2003 12:05
COMPLETION DATE: 2/14/2003 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	2/14/2003 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	
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

Appendix F

SEDA Background Data

TABLE
SOIL BACKGROUND DATA
SENECA ARMY DEPOT ACTIVITY

LOC_ID:	B-8-91		B-8-91		B-8-91		B-8-91		B-9-91		B-9-91		B-9-91		BK-1		BK-2		GB35		GB35	
QC CODE:	SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID:	RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1	
TOP:																						
BOTTOM:																						
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:	11/05/91		11/05/91		11/05/91		11/05/91		11/05/91		11/05/91		11/05/91		12/16/92		12/16/92		01/20/93		01/20/93	
SAMP ID:	S1105-24SOIL1		S1105-25SOIL1		S1105-26(1)SOIL1		S1105-27SOIL1		S1105-28SOIL1		S1105-29SOIL1		S1105-30RESOIL1		BK-1SOIL3		BK-2RESOIL3		GB35-1GRID		GB35-2GRID	
METALs	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aluminum	19200		20500		17700		12700		14800		8880		7160		19400		14400		18000		17600	
Antimony	10.3	UJ	8.8	UJ	8.2	UJ	8.4	UJ	9.9	UJ	9.9	UJ	7	UJ	7.9	U	7.2	U	5.8	UJ	6.8	J
Arsenic	5.1	J	6.1	J	6	J	4.2	J	4.3	J	3.8	J	4.4	J	3		2.7		6.2		7.7	
Barium	136	J	98.9	J	86.7	J	56.2	J	101	J	110	J	39.9	J	159		106		93.6		61.7	
Beryllium	1.4		1.2		1		0.78	J	1.1		0.76		0.52	J	1.1		0.81		0.85		0.74	
Cadmium	2.6		2.9		2.4		1.9		2.3		1.7		1.5		0.45	U	0.41	U	0.33	U	0.31	U
Calcium	5390		4870		3560		85900		45600		104000		101000		4590		22500		1590		17700	
Chromium	27.4	J	30.1	J	26.9	J	19.8	J	22.5	J	13.8	J	11.2	J	30		22.3		23.5		29.3	
Cobalt	13.8		18.4		14		14.2		13.7		10.7		8.1		14.4		12.3		9.4		16.3	
Copper	22.3		27.6		26		16.2		22.6		21.6		19.3		26.9		18.8		17.5		24.5	
Cyanide	0.6	U	0.63	U	0.67	U	0.58	U	0.7	U	0.63	U	0.62	U	0.57	U	0.61	U	0.78	U	0.71	U
Iron	37200		36100		32500		27400		31000		19600		17300		38600		26600		25200		34200	
Lead	14.5		11.4		13.6		10.1		10.8		10.1		7.8		15.8		18.9		14.4		5.4	
Magnesium	5850		7300		6490		6720		8860		17000		12600		5980		7910		3850		7790	
Manganese	1130		956		832		926		903		532		514		2380		800		701		646	
Mercury	0.09		0.06	J	0.06	J	0.05	J	0.08	J	0.04	J	0.05	J	0.13	J	0.11		0.06	J	0.03	U
Nickel	42.3		48.7		44.4		30.4		38.4		23.8		19		47.7		31		26.3		48.7	
Potassium	1910		2110		1760		1430		1320		1080		1050		1720		1210		1110		1110	
Selenium	0.17	UJ	0.21	UJ	0.2	UJ	0.61	UJ	0.21	UJ	0.65	UJ	0.21	UJ	0.73	J	0.94		0.23	UJ	0.23	UJ
Silver	1.6	U	1.3	U	1.2	U	1.3	U	1.5	U	1.5	U	1.1	U	0.47	U	0.43	U	0.34	U	0.32	U
Sodium	79.2	U	67.5	U	62.6	U	75.3	J	84.2	J	112	J	116	J	49.1	J	61.1	J	35.6	J	77.5	J
Thallium	0.47	U	0.58	U	0.57	U	0.34	U	0.59	U	0.36	U	0.6	U	0.42	U	0.38	U	0.55	U	0.54	U
Vanadium	32.2		25.4		26.4		15.7		19.7		19.5		12.9		28		22.4		27.1		22.3	
Zinc	85.1	J	94.2	J	85	J	75	J	126	J	84.3	J	74.8	J	98.6		63.7		55		83.4	

TABLE
SOIL BACKGROUND DATA
SENECA ARMY DEPOT ACTIVITY

LOC_ID:	GB35		GB36		GB36		MW-36		MW-34		SB24-5		SB24-5		SB24-5		MW25-1		MW25-1		MW25-6	
QC CODE:	DU		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID:	RI PHASE1		RI PHASE1		RI PHASE1		RI Phase 1 Step 1		RI PHASE1		ESI		ESI		ESI		ESI		ESI		RI ROUND1	
TOP:							-1				-1		-1		-1		0		2		0	
BOTTOM:							-1				-1		-1		-1		2		4		0.17	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:	01/20/93		01/20/93		01/20/93		01/11/93		11/20/91		12/02/93		12/02/93		12/02/93		12/03/93		12/03/93		09/25/95	
SAMP ID:	GB35-6DUGRID		GB36-1GRID		GB36-2GRID		MW36-3GRID		S2011121MW34GRID		SB24-5-1		SB24-5-3		SB24-5-5		SB25-6-01		SB25-6-02		SB25-7-00	
METALs	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aluminum	16200		18100		16200		12700		16100		16200		10100		13700		10600		7070		12500	
Antimony	6.3	J	5.9	J	5.8	UJ	5.7	UJ	5.7	J	12.5	UJ	5.8	UJ	11.3	UJ	4.2	U	3	U	0.4	
Arsenic	5.3		4.6		9.7		2.9	J	6.3	U	4.2		3.3		5		8.3		4.8		4.3	
Barium	61.7		74.8		50.8		46.9	J	67.5		117		58.3		67.2		59.1		35		71.3	
Beryllium	0.77		0.77		0.65		0.59		0.86		0.98	J	0.48	J	0.62	J	0.48	J	0.35	J	0.56	
Cadmium	0.35	U	0.3	U	0.33	U	0.33	U	2.3		0.78	U	0.36	U	0.7	U	0.41	U	0.29	U	0.05	U
Calcium	1370		1660		22900		4170		28600		4540		74200		49000		82500		122000		47400	J
Chromium	25.1		24.8		27.4		23.3	J	26.6		24.5		16.9		23.1		16.9		11.3		16.9	J
Cobalt	10.3		20.4		13.2		18.6		17		16		8.2		12		11.2		6.6	J	8	
Copper	17.2		17.7		17.5		19.2	J	32.7		28.4		20.9		22.2		20.2	J	12	J	15.7	
Cyanide	0.82	U	0.7	U	0.68	U	0.56	U	0.54	U	0.6	U	0.51	U	0.57	U	0.58	U	0.64	U	0.44	U
Iron	30800		26100		30700		27500		35000		33600		21300		26700		21400		15800		20500	
Lead	19.1		12.7		6.2		20.2		11.9		45.5	J	8.7	J	7.9	J	9.5		13.8		11.1	
Magnesium	4490		4490		7150		5750		6850		5150		12100		11400		19600		22800		11700	
Manganese	775		426		507		540		803		1080		400		450		722	J	610	J	452	
Mercury	0.07	J	0.02	J	0.02	J	0.02	J	0.07	R	0.07	JR	0.06	JR	0.04	JR	0.03	J	0.04	U	0.03	
Nickel	28.3		28.3		42.8		43.3	J	49.3	J	37.3		26.4		35.2		26.8		18		22.3	
Potassium	975		1400		1100		754		1290		1170	J	993		1660		1480		1060		1110	
Selenium	0.21	UJ	0.2	UJ	0.18	UJ	0.19	UJ	0.18	UJ	0.15	UJ	0.23	UJ	0.22	UJ	0.97	J	0.63	J	0.63	U
Silver	0.36	U	0.31	U	0.34	U	0.34	U	0.87	J	1.6	U	0.73	U	1.4	U	0.82	U	0.59	U	0.89	U
Sodium	34.6	J	46.6	J	97.6	J	31.6	U	55.2	J	50.9	J	153	J	139	J	269	J	186	J	59.9	
Thallium	0.5	U	0.46	U	0.43	U	0.45	U	0.51	U	0.16	U	0.25	U	0.24	U	0.24	UJ	0.21	UJ	1.2	
Vanadium	26.1		27.8		19.7		16.2	J	22.3		29.9		14.4		19.5		18.5		12		21	
Zinc	53.1		59.2		74.1		34.7	J	95.7		85.7		62.8		63.2		71.6	J	40.6	J	54.1	

TABLE
SOIL BACKGROUND DATA
SENECA ARMY DEPOT ACTIVITY

LOC_ID:	MW25-6		MW25-6		MW25-6		MW64A-1		MW64A-1		MW64A-1		MW64B-1		MW64B-1		MW64B-1		MW64B-1		MW67-2	
QC CODE:	SA		SA		DU		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID:	RI ROUND1		RI ROUND1		RI ROUND1		ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI	
TOP:	4		6		0		0		2		4		0		4		6		6		0	
BOTTOM:	6		8		0.17		0.2		4		6		0.2		6		8		8		0.2	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:	09/25/95		09/25/95		09/25/95		04/02/94		04/02/94		04/02/94		05/13/94		05/13/94		05/13/94		05/13/94		03/30/94	
SAMP ID:	SB25-7-03		SB25-7-04		SB25-7-10		MW64A-1-1		MW64A-1-2		MW64A-1-3		MW64B-1-1		MW64B-1-2		MW64B-1-3		MW64B-1-04		MW67-2-1	
METALs	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aluminum	8020		7550		12500		16100		19800		12600		13400		8870		7620		7620		16700	
Antimony	0.42	UJ	0.44	U	0.4	UJ	0.23	J	0.2	UJ	0.2	UJ	0.3	J	0.15	UJ	0.15	UJ	0.15	UJ	0.27	J
Arsenic	4.1		3.4		4.3		7.1		8.2		5		5.5		4.3		5.5		5.5		4.4	
Barium	58		52		71.3		83.7		91.2		62.3		75.5		70.8		76.7		76.7		114	
Beryllium	0.43		0.39		0.56		0.68	J	0.74	J	0.53	J	0.56	J	0.43	J	0.37	J	0.37	J	0.67	J
Cadmium	0.06	U	0.06	U	0.05	U	0.11	J	0.02	U	0.12	J	0.63	J	0.64	J	0.54	J	0.54	J	0.2	J
Calcium	120000	J	133000	J	47400	J	7210		4300		72400		5530		70000		75900		75900		3580	
Chromium	13.7	J	12.4	J	16.9	J	23		25		19		17.5		14.1		13.5		13.5		19.5	
Cobalt	8.2		6.9		8		11.8		11.3		9.1	J	7.2	J	10		7.4	J	7.4	J	7.5	J
Copper	17.7		16.4		15.7		25.5		21		23.7		18.9		20.2		17.6		17.6		16.5	
Cyanide	0.57	U	0.51	U	0.444	U	0.66	U	0.56	U	0.55	U	0.6	U	0.5	U	0.48	U	0.48	U	0.64	U
Iron	18900		15400		20500		28500		28000		22600		20900		18400		17100		17100		20500	
Lead	7		6.5		11.1		21.6		13.6		15.4		21.4		8.8		8.3		8.3		17.5	
Magnesium	17400		20700		11700		5480		5010		14800		3720		18900		21500		21500			
Manganese	735		402		452		558		604		402		207		434		389		389		438	
Mercury	0.02		0.01		0.03		0.05	J	0.03	J	0.02	J	0.05	J	0.02	J	0.01	U	0.01	U	0.04	
Nickel	26.4		22.4		22.3		32.2		28.6		26.7		19.8		28.2		22.6		22.6		18.7	
Potassium	1280		1430		1110		2590	J	2260	J	2700	J	1700		1630		1650		1650		1780	J
Selenium	0.7	U	0.74	U	0.66	U	0.96		1.7		0.34	U	0.99	J	0.26	U	0.57	J	0.57	J	0.81	
Silver	0.98	U	1	U	0.92	U	0.12	U	0.14	U	0.14	U	0.16	UJ	0.11	UJ	0.11	UJ	0.11	UJ	0.11	U
Sodium	89.1		110		57.5		27.5	U	31.8	U	92.1	J	35.9	U	96.8	J	79.6	J	79.6	J	25.1	U
Thallium	1.1		0.6	U	1.2		0.42	J	0.32	U	0.32	U	0.41	J	0.24	U	0.24	U	0.24	U	0.48	J
Vanadium	13.4		13.7		21		27.6		32.2		22.8		23.3		14.8		14.2		14.2		28.2	
Zinc	64.9		65.1		54.1		104		87.1		64.9		72.2		59		45.6		45.600		64.8	

TABLE
SOIL BACKGROUND DATA
SENECA ARMY DEPOT ACTIVITY

LOC_ID:	MW67-2		MW67-2		MW70-1		MW70-1		MW70-1		SB11-3		SB11-3		SB11-3		SB13-1		SB13-1		SB13-1	
QC CODE:	SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID:	ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI	
TOP:	2		4		0		2		4		0		2		10		0				6	
BOTTOM:	4		5		0.2		4		6		2		4		12		2				8	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:	03/30/94		03/30/94		05/11/94		05/11/94		05/11/94		11/02/93		11/02/93		11/03/93		12/08/93				12/08/93	
SAMP ID:	MW67-2-2		MW67-2-3		MW70-1-1		MW70-1-2		MW70-1-3		SB11-3-1		SB11-3-2		SB11-3-6		SB13-1-1		SB13-1-2		SB13-1-3	
METALs	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aluminum	14900		9460		12200		9480		11000		17600		6330		10900		18300		8250		11700	
Antimony	0.22	J	0.2	UJ	0.23	UJ	0.21	UJ	0.19	UJ	10.8	UJ	8	UJ	7.6	UJ	5.1	J	3.7	UJ	2.8	UJ
Arsenic	4.5		4.2		5.4		4.1		5.7		5.6	R	3.4	R	6	R	7		6.2		5.7	
Barium	105		80.8		67.5		56.6		79.9		113		57.4		62.7		106		88.1		33.9	
Beryllium	0.61	J	0.4	J	0.44	J	0.41	J	0.54	J	0.85	J	0.34	J	0.47	J	0.92	J	0.42	J	0.54	J
Cadmium	0.11	J	0.12	J	0.57	J	0.43	J	0.8	J	0.67	U	0.5	U	0.48	U	0.45	U	0.36	U	0.27	U
Calcium	79000		77800		3600		51600		48600		4950		91300		48600		3570		87700		50300	
Chromium	22.5		14.8		13.7		14.7		17.8		24		11.1		18.6		29.4		13.3		19.6	
Cobalt	10.4	J	9.7	J	5.5	J	7.1	J	21		11.3		6.5	J	10.1		12		7.2	J	11.1	
Copper	20.3		20.5		12.4		19.7		33.5		20		12.2		21.7		11.6		18.4		17.6	
Cyanide	0.5	U	0.54	U							0.57	U	0.47	U	0.53	U	0.61	U	0.5	U	0.53	U
Iron	24400		18700		17700		16000		26400		27200		13200		28300		32500		17400		24700	
Lead	9.3		8.5		20.7		9.1		13.6		27.9		11.4		10.1		15	R	9	R	11.7	R
Magnesium					2830		13600		7980		4160		12900		10100		5890		20800		12600	
Manganese	528		411		233		470		1040		674		356		434		451		517		404	
Mercury	0.01	J	0.02	J	0.1	J	0.03	J	0.02	J	0.05	J	0.04	U	0.03	U	0.03	J	0.07	J	0.02	U
Nickel	32.3		25.9		12.3		17.6		52.4		28.3		16.7		29.5		34.9		24		33.1	
Potassium	3160	J	1970	J	982	J	1590		1350		2110		1110		1230		2190		1390		1270	
Selenium	0.36	U	0.34	U	1	J	0.64	J	0.32	U	0.24	J	0.13	UJ	0.21	UJ	0.26	J	0.56	J	0.51	J
Silver	0.15	U	0.14	U							1.4	UJ	1	UJ	0.97	UJ	0.9	U	0.71	U	0.54	U
Sodium	112	J	107	J	36.4	U	126	J	165	J	66.3	J	136	J	146	J	80.6	J	155	J	134	J
Thallium	0.34	U	0.32	U							0.19	U	1.5	U	0.23	U	0.43	J	0.43	J	0.64	J
Vanadium	24.8		16.5		23.3		17.2		17.6		31.8		13.3		17		32.7		13.3		16.3	
Zinc	62		60.1		55.4		42.4		116		83.2	R	65	R	77.3	R	81.9		56.2		45.8	

TABLE
SOIL BACKGROUND DATA
SENECA ARMY DEPOT ACTIVITY

LOC_ID:	MW13-6		MW13-6		MW13-6		SB17-1		SB17-1		SB17-1		SB26-1		SB26-1		SB4-1		SB4-1		SB4-1	
QC CODE:	SA		SA		SA		SA		SA		SA		SA		SA		SA		DU		SA	
STUDY ID:	ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI		ESI	
TOP:	0		4		6		0		2		4		0		2		0		0		4	
BOTTOM:	2		6		8		2		4		6		2		4		2		2		6	
MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:	12/15/93		12/15/93		12/15/93		12/01/93		12/01/93		12/01/93		11/17/93		11/17/93		12/06/93		12/06/93		12/06/93	
SAMP ID:	SB13-6-1		SB13-6-3		SB13-6-4		SB17-1-1		SB17-1-2		SB17-1-3		SB26-1-1		SB26-1-2		SB4-1-1		SB4-1-10		SB4-1-2	
METALs	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aluminum	16000		13500		10200		13700		18100		8700		5560		9040		14800		21000		15300	
Antimony	3.2	UJ	2.5	UJ	2.9	UJ	11.7	UJ	11.8	UJ	9	UJ	7.3	UJ	6.7	UJ	4.8	UJ	3.8	UJ	5	UJ
Arsenic	4.6		2.7		2.3		4.3		5.2		3.4		3.2		5.3		6.2		4.2		3.9	
Barium	103		60.4		56.8		107		114		59.4		73.2		43.7		72		97.7		40.4	J
Beryllium	0.92		0.71		0.58	J	0.7	J	0.9	J	0.42	J	0.35	J	0.41	J	0.73	J	0.64	J	0.74	J
Cadmium	0.31	U	0.25	U	0.28	U	0.73	U	0.74	U	0.56	U	0.46	U	0.42	U	0.47	U	0.37	U	0.49	U
Calcium	5140		31800		45200		2870		20900		72800		293000		47300		4280		2460		30900	
Chromium	21.5		23.5		17.8		17.6		25.1		13.9		10.3		15.7		23.2		27.9		27.6	
Cobalt	10.6		15		11.3		9.9	J	13.3		8.8		5.9	J	9.5		11.3		5.9	J	16.5	
Copper	16		27.4		14.5		46.4		26.9		20		9.7		14.3		14.1		15.1		62.8	
Cyanide	0.6	U	0.53	U	0.51	U	0	NA	0	NA	0	NA	0.48	U	0.57	U	0.52	U	0.53	U	0.53	U
Iron	25300		26900		20700		25100		29900		18800		8770		19100		27500		19500		34300	
Lead	13.8		11.6		11.7		266		11.4	J	7.5	J	6.33		8.5		17.7	J	9.8	J	7.5	J
Magnesium	3750		6640		5220		3330		8490		18100		29100		9160		4270		4460		7130	
Manganese	934		508		556		547		487		391		309		551		615	JR	119	JR	337	R
Mercury	0.03	J	0.01	U	0.01	U	0.05	J	0.06	J	0.03	UJ	0.02	U	0.02	U	0.05	J	0.04	J	0.04	J
Nickel	22.7		41.9		33		19.1		42		25.2		31.6	R	23.9		27.8		25.1		47.6	
Potassium	1330		1120		1000		626	J	1560		1090		1710		901		1250		2490		1300	
Selenium	1.2		0.11	J	0.24	J	0.25	UJ	0.24	UJ	0.14	UJ	0.13	UJ	0.26	J	0.4	J	0.23	J	0.09	U
Silver	0.62	U	0.49	U	0.56	U	1.5	U	1.5	U	1.1	U	0.92	UJ	0.85	UJ	0.93	U	0.74	U	0.98	U
Sodium	61.9	J	116	J	141	J	46.2	J	74.6	J	137	J	192	J	108	J	43.8	U	39.2	J	105	J
Thallium	0.18	U	0.14	U	0.23	U	0.28	UJ	0.26	UJ	0.15	UJ	0.73	U	0.17	U	0.23	U	0.23	U	0.16	U
Vanadium	29.9		18.5		13.8		23.1		27		13.9		12.7		14.4		28.6		31		22.2	
Zinc	62.5		64.7		39.3		93.4		80.2		57.1		283	R	90.6		79.6		72.1		102	

TABLE
SOIL BACKGROUND DATA
SENECA ARMY DEPOT ACTIVITY

LOC ID:	SB4-1		TP57-11	
QC CODE:	SA		SA	
STUDY ID:	ESI		ESI	
TOP:	8		3	
BOTTOM:	10		3	
MATRIX:	SOIL		SOIL	
SAMPLE DATE:	12/06/93		11/08/93	
SAMP ID:	SB4-1-3		TP57-11	
METALs	VALUE	(Q)	VALUE	(Q)
Aluminum	19200		14600	
Antimony	2.8	UJ	11.3	UJ
Arsenic	21.5		5.9	
Barium	81.2		120	
Beryllium	1		0.81	J
Cadmium	0.27	U	0.71	U
Calcium	14400		22300	
Chromium	32.7		20.1	
Cobalt	29.1		8.8	J
Copper	21.6		21.7	
Cyanide	0.47	U	0.54	U
Iron	37900		24900	
Lead	9.1	J	11.3	
Magnesium	8040		5360	
Manganese	795	R	329	
Mercury	0.04	J	0.04	J
Nickel	62.3		25.7	
Potassium	2030		1430	
Selenium	0.14	U	0.46	J
Silver	0.64	J	1.4	UJ
Sodium	91.6	J	93	J
Thallium	0.24	U	0.17	U
Vanadium	29.3		27.8	
Zinc	115		57.9	

Appendix G

Response to Comments

Response to the Comments from the U.S. Environmental Protection Agency

Subject: DRAFT FINDINGS REPORT SUSPECTED SMALL ARMS RANGE AT THE LAKE HOUSING AREA SENECA ARMY DEPOT ACTIVITY

Comments Dated: fax received June 25, 2003

Date of Comment Response: September 5, 2003

Gannett Fleming, Inc., performed a technical review of the document titled *Draft Findings Report, Suspected Small Arms Range, Lake Housing Area, Seneca Army Depot Activity, Romulus, New York*, dated April 2003. The report was prepared by Parsons Engineering Science, Inc. (Parsons) for the U. S. Army Corps of Engineers, Huntsville District under Contract No. DACA87-95-D-0031.

The following documents were reviewed in connection with this technical review:

- Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final, EPA, October 1988.
- Department of the Army Training Circular TC 25-8: Training Ranges, February 1992.

GF reviewed the report for technical content, completeness, conformance with State and Federal regulations, and conformance with available guidance documents. GF performed this technical review for the United States Environmental Protection Agency under ROC Contract 68-W-00-105, WA 203.

GENERAL COMMENTS

1. It is possible that the assumptions of locations of berms, firing lanes, and firing lines that are presented in this document are not correct. Review of current Army small arms range design documents indicate that typically, small arms ranges are surrounded by berms on at least three sides, usually four. At this site, other berms could have been bulldozed, as was supposed by the Army Corps of Engineers in the 1998 Archives Search Report (ASR). For this reason, the existing berm found by Parsons in March 2002 is not necessarily a target backstop berm. Furthermore, the observation towers built at small arms ranges are nearly always located behind the firing line for safety purposes, not to the side of the firing lanes (and range in general) as has been assumed in this report. If the location of the firing line and the direction of fire were different than has been assumed in this report, then contamination from this use would not be expected at the eastern portion of the site. It is possible that the anomalies detected by the EM-61 are in fact debris from use of the site as a range. Additional review of these resources is necessary to make this determination.

Response: Disagreed with the comment. The Army has assembled, reviewed and summarized known information and data for this site. The reviewer's comments appear to discredit this effort and provide conjecture that requires the Army to attempt to prove the negative. The Army will not respond to conjecture, but will resummarize available information and data and provide copies of available documentation as clarification.

1) The Army questions and disagrees with the reviewer's selection and use of a 1992 Army Training Circular as the benchmark for their comments. The suspect range was reported to have existed in 1954 and was identified as abandoned during the 1998 field survey conducted by the Army. A range constructed in the early 1950s would not necessarily conform to Army specifications documented in 1992. Nevertheless, other recent references with regard to range structures were consulted. According to the Military Handbook for Range Facilities and Miscellaneous Training Facilities published by the Naval Facilities Engineering Command (NAVFACENGCOM) in 1992, earth berms should be used to the rear of target areas and earth berms ***may be*** *used on sides of the range to protect timber, game, recovery metal salvage, and possible reduction of impact areas. Although this is a Navy Handbook and like the 1992 Army Training Circular, this handbook may not necessarily represent the range structures in the 1950s, this handbook indicated that ranges with only target backstop berm could have existed.*

2) As presented in Section 2.3 of the report, the 1955 Sampson Air Force Base Master Plan Map depicts what appears to be four firing lines located northeast, and running parallel to Scorpion Road. A copy of the applicable portion of the 1955 map has been included in Appendix D of the report.

According to the aerial photographs from 1954, 1959, 1968, and 1985, buildings are located to the southeast, southwest, and west of the suspected small arms range. Major roadways providing access and egress into and out of the Lake Housing Area are located to the south, southwest, and west of the suspected range. A small unpaved road is seen to the northwest of the suspected range. Therefore, it is reasonable to assume that the shooting would be directed away from the surrounding activities, towards the area where conflicting activities would not interfere. Unoccupied land and the ravine that contains Kendaia Creek lie northeast of the suspected firing lines and berms, and therefore it is reasonable to assume that the logical direction of fire would be towards the northeast. Copies of the available aerial photographs have been added to Appendix D of the report. Based on the above summarized information, the Army believes it is reasonable to assume that the berm found at the site was placed as a target backstop berm, and that the direction of fire was from the southwest towards the northeast.

3) The tower was identified as a miscellaneous structure built in 1942 in the 1955 Sampson Air Force Base Master Plan Map. It is not clear what the tower was used for. According to

the Military Handbook published by the Naval Facilities Engineering Command (NAVFACENGCOM) titled for Range Facilities and Miscellaneous Training Facilities", a control tower could be located as close as practicable to the midpoint of the length of the area.

Based on the above discussion, the Army considers its discussion regarding the location and orientation of the berm and firing lanes appropriate. Furthermore, the analysis of data developed during the site investigation (as summarized as follows) indicates that there is no potential source area at the site.

1) The geophysical survey and the subsequent test pitting did not identify any evidence indicative of a small arms range.

2) No bullets or cartridge casings were found at the site.

3) There is no historical evidence to suggest that the area had ever been used as an active small arms range.

4) Among the 19 soil samples collected and analyzed, 11 samples were randomly collected from the grids. No explosive compounds were detected in any soil samples. Arsenic, lead, and potassium were detected exceeding the 95th percentile in one, two, and two samples, respectively. However, no metals were detected in any samples exceeding the maximum background concentrations.

To conclude, the findings at the site indicate that there is no potential source area for surface or near-surface soil contamination or groundwater contamination.

It should be noted that the statement in this comment "At this site, other berms could have been bulldozed, as was supposed by the Army Corps of Engineers in the 198 Archives Search Report (ASR)" is not correct. The ASR report indicated no berms were found at the site. As presented in the Findings Report, it was USEPA's supposition that the berm was bulldozed.

2. Include as appendices the following documents and/or items: copies of the 1959 and 1968 aerial photographs; a copy of the appropriate portion of the Base Master Plan map on which the small arms range and rifle range were clearly visible; and a copy of the 1998 ASR that is referenced in Section 2.2 and other places in this Findings Report. This ASR will be particularly typically contains a site map and layout, a review of historical ordnance present at the site, a visual site inspection, and an evaluation of ordnance hazards.

Response: Agreed. The referenced documents and items (i.e., the 1954, 1959, and 1968 aerial photographs, the appropriate portion of the 1955 Sampson Air Force Base Master Plan Map, and excerpts of the 1998 ASR) have been included in the report.

SPECIFIC COMMENTS

1. **Section 2.4.1, Surface Soil Sampling, Page 2-7.** Text in the *Draft Workplan for the Environmental Baseline Survey (EBS) at the Former Small Arms Range at the Lake Housing Site* (July 2001) indicated that Level 3 data packages were planned for most analyses, and Level 4 data packages for metals analyses. No mention is made in that document of any data validation to be performed on these data packages, nor is discussion included in this Findings Report related to data validation performed on the soil samples collected at the area of the suspected Small Arms Range. Data validation commensurate with the quality of data packages should be performed (EPA Tier II and III). A discussion of the data validation of these samples should be included in this section.

   In addition, the text in this section indicates that soil samples were collected at the 18 sample locations at depths of zero to two inches. As noted in previous EPA comments on the *Draft Workplan for the Environmental Baseline Survey (EBS) at the Former Small Arms Range at the Lake Housing Site*, this shallow sample depth is not adequate to assess surficial impacts from suspected previous site uses as a firing range. As referenced in Section 2.2, the 1998 Archives Search Report concluded that bulldozing may have taken place at the site after the suspected range was no longer in use. This type of intrusive earth moving would have disturbed at least several inches of soil. Furthermore, Parsons observed that the site was vegetated with brush and considered portions to be "heavily wooded". A large amount of organic matter deposited after the Small Arms Range became inactive (potentially nearly 50 years) may be present in the first few inches of soil, as supported by the elevated TOC concentrations in the soil samples (Section 3.2). To collect representative samples, the surficial soil samples should therefore have been collected at depths of zero to at least six inches rather than zero to two inches. Additional investigation should be considered.

   Response: Acknowledged. A discussion of the data validation has been included in Section 2.4.5.

   Soil samples were collected from a depth of 0 to 2 inches below existing vegetative overgrowth. In many cases, existing root networks associated with the vegetation extended 2 or more inches beneath the surface. Therefore, the soil samples are obtained from a depth of 2 to 4 or more inches beneath the surface. The Army considers this to be consistent with the EPA and NYSDEC requirements for surface soil sampling.

   In addition, there is no evidence that berms be bulldozed at the site. It should be noted that the statement in this comment "the 1998 Archives Search Report concluded that bulldozing may have taken place at the site after the suspected range was no longer in use" is not correct. The ASR report indicated no berms were found at the site. As presented in the Findings Report, it was USEPA's supposition that the berm was bulldozed.

2. **Section 2.4.3.1, Introduction, Page 2-8.** The second sentence of the first paragraph references Figure 2-3, but it appears that the reference should be to Figure 2-4. Revise appropriately.

Response: Agreed. The reference has been changed from Figure 2-3 to Figure 2-4.

3. **Section 2.4.4, Test Pits, Page 2-11.** This section includes a description of material encountered in the test pits as "natural fill". However, review of the test pit logs in Appendix C shows that only test pit TP-02 was observed to contain any fill materials. Include a description for the characterization as "natural fill", as it seems to be a contradictory term.

Response: Agreed. The text has been revised to reflect that all test pits were excavated to the top of bedrock and no fill material was detected in the test pits with the exception of a few vitrified clay tiles found in two test pits.

4. **Section 3.1, Geophysical Results, Page 3-1.** The discussion of results of the geophysics indicates that "anomalies greater than 80 mV are present..." within the investigation grid. However, review of Figures 3-1 and 3-2 shows results no higher than 10 mV, as represented by pink shading. If the scale on the figures was somehow zeroed to the data, please indicate this in the text. If not, clarify the reference to 80 mV in the text or correct the scale on the figures, whichever is appropriate.

Response: Acknowledged. It should be noted that Figure 3-1 provides contour with EM-61 response equal to or greater than 10 mV, as anything above 10 mV is generally not expected at a small arms range. The contour with EM-61 response equal to or greater than 80 mV is not presented in the figure. The scale in Figures 3-1 and 3-2 has been revised to reflect the above discussion.

5. **Section 3.2, Surface Soil Samples, Pages 3-1 and 3-2.** The "Seneca background data set" is not referenced in this report. It appears that the site data is compared to the overall Seneca site surface soil data, but that is not necessarily appropriate, if, for example, this overall soil data shows large variability, spatially or temporarily. Additional discussion and documentation should be added.

Also, document in this section whether ordnance materials or bullet fragments were encountered in the surface soils during the process of removing vegetation or collecting and compositing the soil samples.

Response: Acknowledged. An introduction of the Seneca background data set has been included in Section 3.2.

The text has been revised to reflect that no bullets, bullet fragments, or shell casings were observed during any phase of the work.

6. **Figure 2-3.** Revise this figure to indicate the general topography of the site.

Response: Acknowledged. It should be noted that the general topography of the site and its vicinity is shown in Figure 2-2 of the report. No map showing the detail topography of the suspected Small Arms Range (i.e., with relatively low interval for the elevation contour) is available.

7. **Figure 2-4.** Revise this figure to include the direction of groundwater flow at the site, as well as general topography.

Response: Acknowledged. As discussed in the preceding response, no map showing the detail topography of the suspected Small Arms Range (i.e., with relatively low interval for the elevation contour) is available. Groundwater elevations were not measured and therefore, groundwater direction was not shown on Figure 2-4. As discussed in Section 2.4.3.3 of the report, both USEPA and NYSDEC approved the Army's request that groundwater sampling and analysis requirement be waived for this site. It should be noted that preliminary groundwater elevation data collected during the development of the wells indicate that the local groundwater flows from the area of Scorpion Road northeast towards Kendaia Creek.

8. **Figures 3-1 and 3-2.** Please clarify the anomalies identified as "steel pipes" on these two figures. Are these the same objects that are referred to as "metal posts" in the Physical Site Characterization in Section 2.3? If they are different objects, revise the text to provide a description and presumed purpose of these steel pipes.

Response: Acknowledged. The steel pipes and metals posts are the same objects. The Army believes that these pipes may have once been used either to hold target lines or to mark firing lines. Figures 3-1 and 3-2 and the text have been revised to reflect the above discussion.