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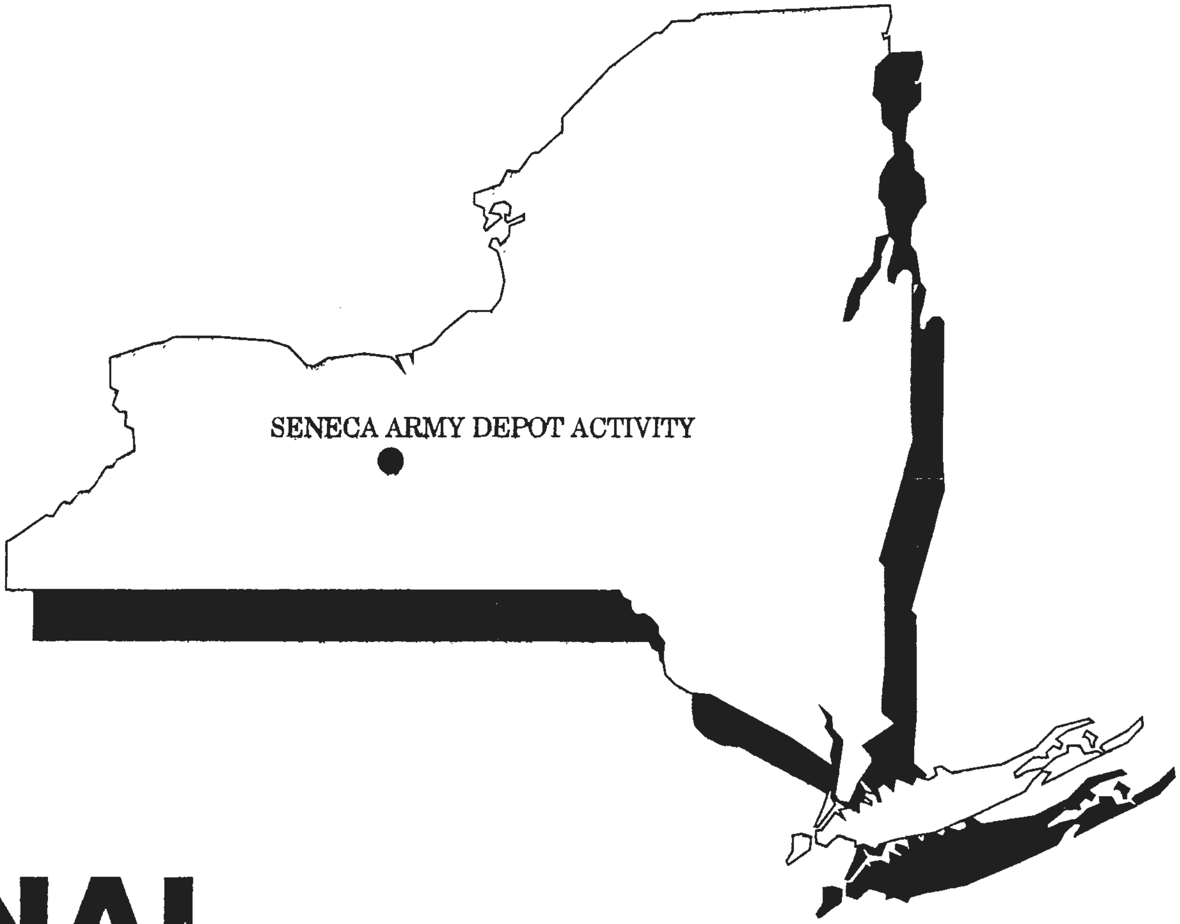
455-02



FINAL

SEAD-12 AND SEAD-63

PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT BUILDING 804 AND THE ASSOCIATED RADIOACTIVE WASTE BURIAL SITES (SEAD-12) AND THE MISCELLANEOUS COMPONENTS BURIAL SITE (SEAD-63)

SEPTEMBER 1997

PROJECT SCOPING PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
AT SEAD-12 & SEAD-63
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Prepared For:

Seneca Army Depot Activity
Romulus, New York

Prepared By:

Parsons Engineering Science, Inc.
Prudential Center
Boston, Massachusetts

727651

November 1996

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LIST OF ACRONYMS

1,2-DCA	1,2-Dichloroethane
1,2-DCE	1,2-Dichloroethylene (total)
AA	Atomic absorption
AEC	Atomic Energy Commission
AEHA	Army Environmental Hygiene Agency
AMC	U.S. Army Material Command
AN	Army-Navy
AOC	Areas of Concern
APCS	Air Pollution Control System
AQCR	Genesee-Finger Air Quality Control Region
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
BOD	Biological Oxygen Demand
CEC	Cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
cm	Centimeters
cm/sec	Centimeters per second
COD	Chemical Oxygen Demand
cpm	counts per minute
Cr	Chromium
$CaCO_3$	Calcium Carbonate
CRT	Cathode ray tube
DARCOM	Development and Readiness Command
DERA	Defense Environmental Restoration Account
DO	Dissolved oxygen
DOE	Department of Energy
DOT	Department of Transportation
DPM	Disintegrations Per Minute
DQO	Data Quality Objective
DRMO	Defense, Revitalization and Marketing Office
EM	Electromagnetic
EPA	Environmental Protection Agency
ESI	Expanded Site Inspections
FIDLER	Field Instrument for the Detection of Low Energy Radiations

LIST OF ACRONYMS
(CONT.)

FS	Feasibility Study
ft	Feet
ft/ft	Feet per foot
ft/sec	Feet per second
ft/yr	Feet per year
GA	Classification: The best usage of Class GA waters is as a source of potable water supply. Class GA waters are fresh groundwaters
GC	Gas chromatograph
gpm	Gallons per minute
GPR	Ground penetrating radar
GRI	Gas Research Institute
GSSI	Geophysical Survey Systems, Inc.
HSWA	Hazardous and Solid Waste Amendments
IAG	Interagency Agreement
Koc	Organic carbon coefficient
lb	pound
L/min	Liters per minute
MARSSIM	Multi Agency Radiological Survey and Site Investigation Manual
MCL	Maximum Contaminant Level
MDC	Minimum Detectable Concentration
mg/l	Milligram per liter
mg/kg	Milligrams per kilogram
MHz	Megahertz
Miniram	Miniature Real-Time Aerosol Meter
mL	Milliliter
mmhos/m	Millimhos per meter
mrem	milli roentgen equivalent man
mR	Micro Roentgen
MSL	Mean sea level
MW	Monitoring Well
NA	Not analyzed or not available
NBS	National Bureau of Standards
NRC	Nuclear Regulatory Commission
NGVD	National Geologic Vertical Datum
NO_2/N	Nitrite-Nitrogen

LIST OF ACRONYMS
(CONT.)

NO_3/N	Nitrate-Nitrogen
NPL	National Priority List
NRC	Nuclear Regulatory Commission
NTU	Nephelometric turbidity units
NYSDEC	New York State Department of Environmental Conservation
NYCRR	New York Code of Rules and Regulations
OB	Open Burning
OD	Open Detonation
OVM	Organic Vapor Meter
pCi	pico Curies
Pb	Lead
PAH	Polynuclear Aromatic Hydrocarbon
Parsons ES	Parsons Engineering Science, Inc.
PCB	Polychlorinated biphenyls
PID	Photoionization detector
ppm	parts per million
ppmv	parts per million per volume
PSCR	Preliminary Site Characterization Report
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
^{226}Ra	Radium-226
RAGS	EPA Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RF	Response factor
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
^{222}Rn	Radon Gas
ROD	Record of Decision
RQD	Rock Quality Designation
SB	Soil boring
SCS	Soil Conservation Service
SD	Sediment sample
SEAD	Seneca Army Depot (old name)
SEDA	Seneca Army Depot Activity

LIST OF ACRONYMS
(CONT.)

sec	Seconds
SOW	Statement of Work
SS	Soil sample
SVO	Semivolatile Organic Compounds
SW	Surface water sample
SWMU	Solid Waste Management Unit
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target analyte list
TCL	Target compound list
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total dissolved solids
TKN	Total Kjeldah Nitrogen
TOC	Total Organic Carbon
TOX	Total Organic Halogens
TRPH	Total Recovered Petroleum Hydrocarbons
TP	Test Pit
UCL	Upper Confidence Level
ug/g	Micrograms per gram
ug/kg	Micrograms per kilogram
ug/mg	Micrograms per milligram
ug/L	Micrograms per liter
uR	micro Roentgen
USACE	United States Army Corps of Engineers
USAEHA	United States Army Environmental Hygiene Agency
USATHAMA	United States Army Toxic and Hazardous Materials Agency
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
Vs	Volt Second

LIST OF ACRONYMS
(CONT.)

WL	Working Level (see page 3-7 for a definition)
WSA	Weapons Storage Area

1.0 INTRODUCTION

Sead-12 and SEAD-63 have been identified as sites where miscellaneous military components have been disposed. Expanded site inspections (ESI) performed at these sites in 1994 (Parsons ES, April 1995) indicate that the presence of cadmium in soils, radium-226 in soils, gross alpha and gross beta radiations in groundwater and polynuclear aromatic hydrocarbons (PAH's) and pesticides in sediments may present risks to human health and the environment.

This project scoping document will review the past studies performed at SEAD-12 and SEAD-63 and it will detail the work required to quantify the risk to human health and the environment from any potential constituents of concern found at these sites. In addition, this project scoping document will describe the types of surveys that will be performed to demonstrate that the Class One, Class Two, and Class Three radiological sites may be released from any radiological concerns using the guidelines of the Nuclear Regulatory Commission's (NRC) Manual for Conducting Radiological Surveys In Support Of License Termination (NUREG/CR 5849), the NRC's Working Draft Regulatory Guide on Release Criteria for Decommissioning (NUREG 1500), and the Multi Agency Radiological Survey and Site Investigation Manual (MARSSIM).

This project scoping document will also describe the data that is needed for a comprehensive evaluation of potential remedial actions.

1.1 PURPOSE OF REPORT

The purpose of this Project Scoping Plan is to outline the work proposed for a Remedial Investigation/Feasibility Study (RI/FS) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at SEAD-12 and SEAD-63. These sites are located at the Seneca Army Depot Activity (SEDA) in Romulus, New York. This Plan is based on the results and recommendations for SEAD-12 and SEAD-63 that were presented in the draft ESI Reports for Eight Moderately Low Priority SWMUs (Parsons ES, April 1995) and Seven Low Priority SWMUs (Parsons ES, April, 1995), respectively. The purpose of the RI/FS is to determine the nature and extent of environmental impacts, and to evaluate and select appropriate remedial actions. These actions will comply with applicable or relevant and appropriate requirements (ARARs) and take into account the risks to human health and the environment.

This work will be performed as part of the United States Army Corps of Engineers (USACOE) remedial response activities under CERCLA. It will follow the requirements of the New York State Department of Environmental Conservation (NYSDEC), the U.S. Environmental Protection Agency, Region II (EPA), and the Interagency Agreement (IAG).

This Project Scoping Plan provides site specific information for the RI/FS projects at SEAD-12 and SEAD-63. The Generic Installation RI/FS Workplan (Parsons ES, June 1995) is designed to serve as a foundation for this document and provides generic information that is applicable to all site activities at SEDA.

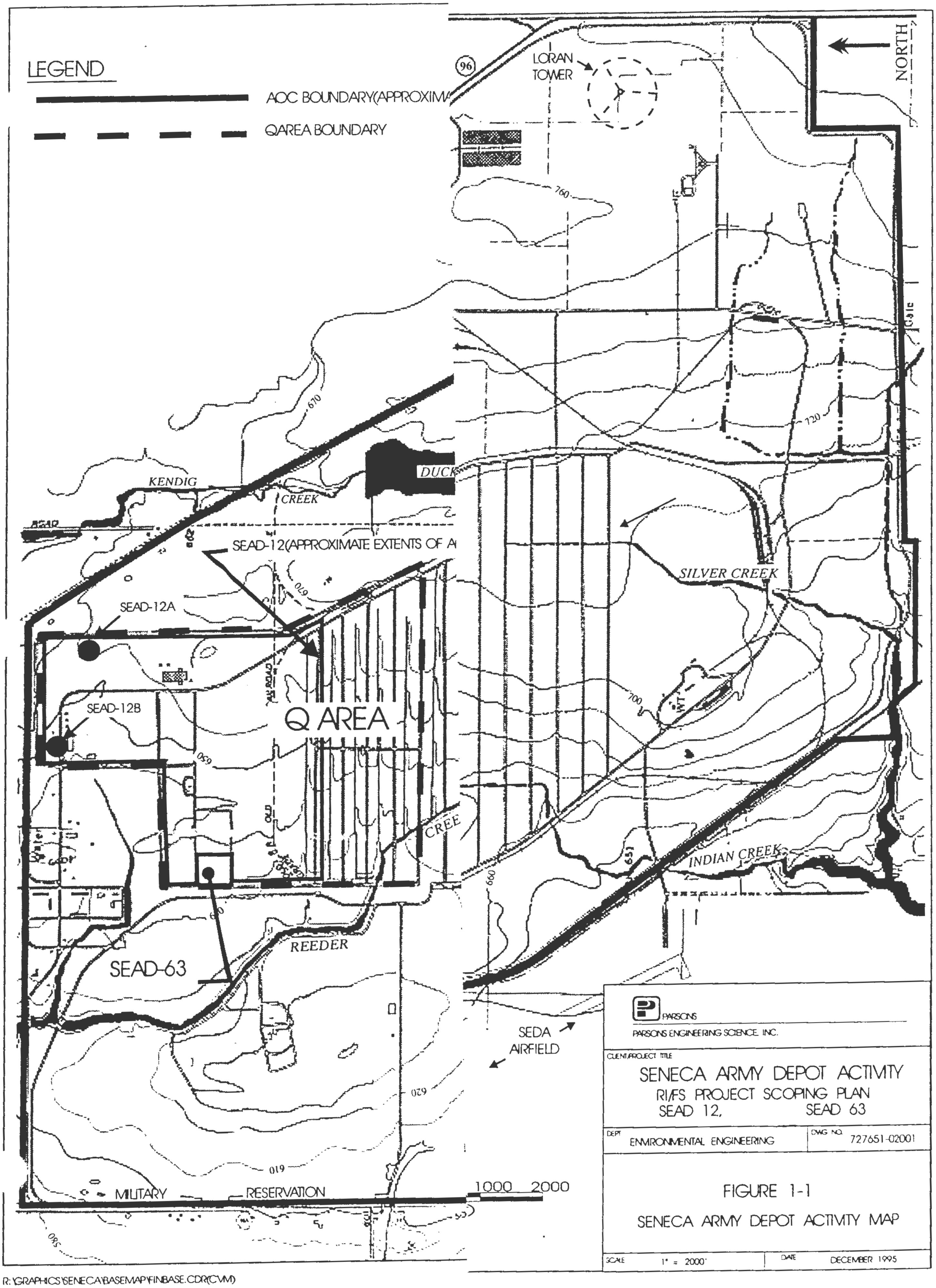
1.2 REPORT ORGANIZATION

The remaining sections of this report are organized to describe the overall site conditions, provide a scoping of the RI/FS, and to provide task plans for the RI and FS. Section 2.0 presents a description of regional geologic and hydrogeologic site conditions. Section 3.0 discusses scoping of the RI/FS including the conceptual site model, the results of previous investigations, identification of potential receptors and exposure scenarios, scoping of potential remedial action technologies, preliminary identification of ARARs, data quality objectives, and data gaps and needs. The task plans for the RI and FS are discussed in Sections 4.0 and 5.0, respectively. Section 6.0 discusses scheduling and staffing. Appendices A through M provide additional supplemental information to topics outlined in this report, and provide additional supportive information.

1.3 BACKGROUND - SEAD-12

During the ESI at SEDA in Romulus, N.Y., SEAD-12 was investigated as two SEADS: SEAD-12A and SEAD-12B. The site is located in the northern portion of SEDA within the former nuclear Weapons Storage Area (WSA) facility known as the Q Area, as shown in Figure 1-1. Due to the similar nature of the compounds detected at both sites and the history of the Q Area, the area of concern for SEAD-12 was expanded to include all of the grounds which are north of the storage igloos in the Q Area, excluding the area designated at SEAD-63, the Operations Pad. Figure 1-2 shows the redefined SEAD-12 AOC boundary. This area also includes those sites which were formerly designated as SEAD-12A and SEAD-12B during the ESI. Also included in the investigations of the RI/FS at SEAD-12 are Building 715 and Reeder Creek. Building 715 is a sewage treatment plant which is likely to have received waste waters from the buildings within the Q Area and Reeder Creek ultimately receives the surface water runoff from SEAD-12 as well as any discharge from Building 715.

The northeastern portion of SEAD-12 (designated as SEAD-12A during the ESI) was used for the disposal of laboratory and maintenance wastes and military components (Figure 1-2). The northern portion of SEAD-12 includes Buildings 803 and 804 (which were designated as SEAD-12B during the ESI), 802, 805, 806, 807, 810, 812, and 825 which were part of the



PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD 12, SEAD 63

DEPT ENVIRONMENTAL ENGINEERING

DWG NO. 727651-02001

FIGURE 1-1

SENECA ARMY DEPOT ACTIVITY MAP

SCALE 1" = 2000'

DATE DECEMBER 1995

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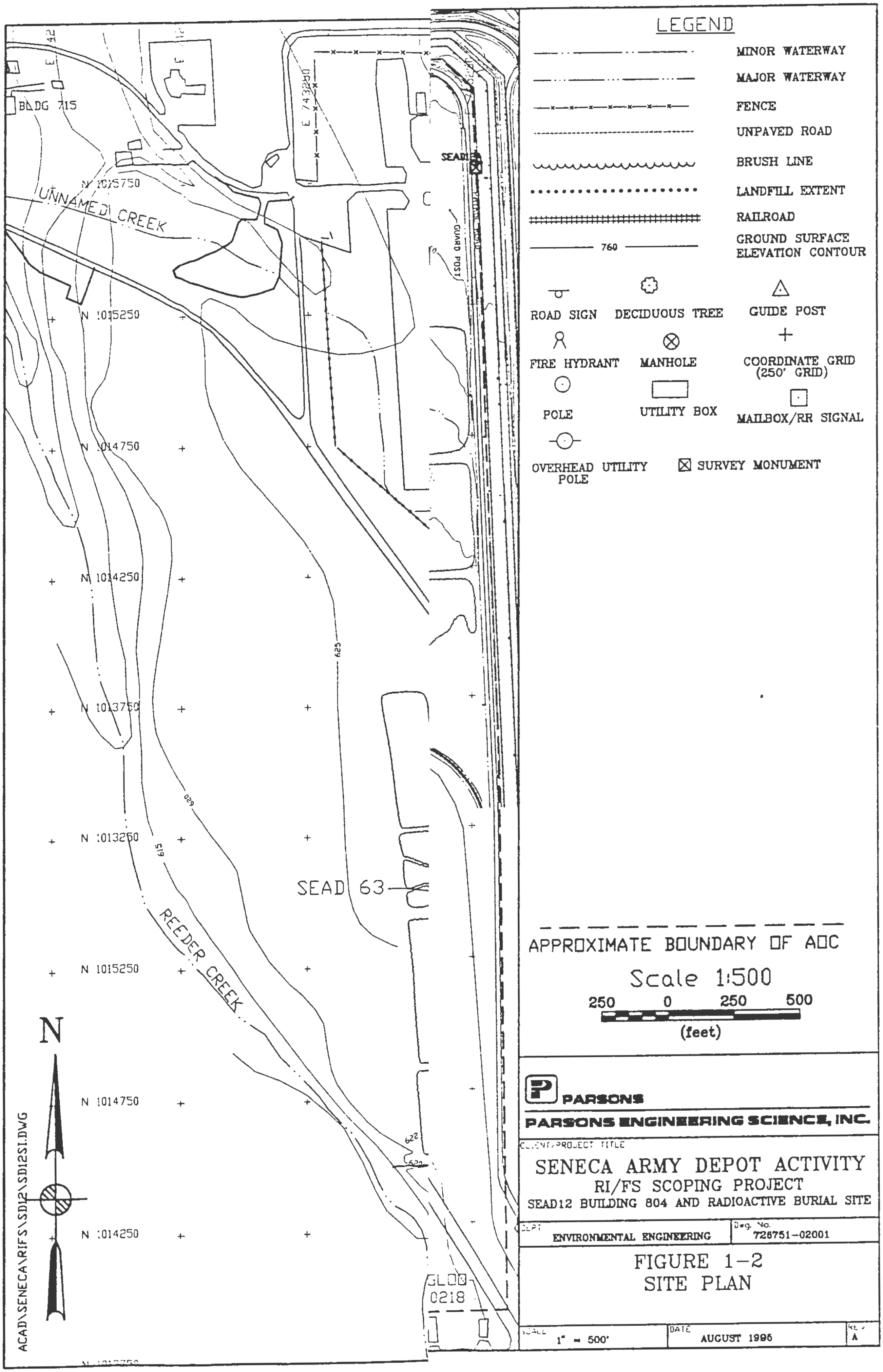


PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS SCOPING PROJECT
SEAD12 BUILDING 804 AND RADIOACTIVE BURIAL SITE

DEPT	Dwg. No.
ENVIRONMENTAL ENGINEERING	726751-02001

FIGURE 1-2
SITE PLAN

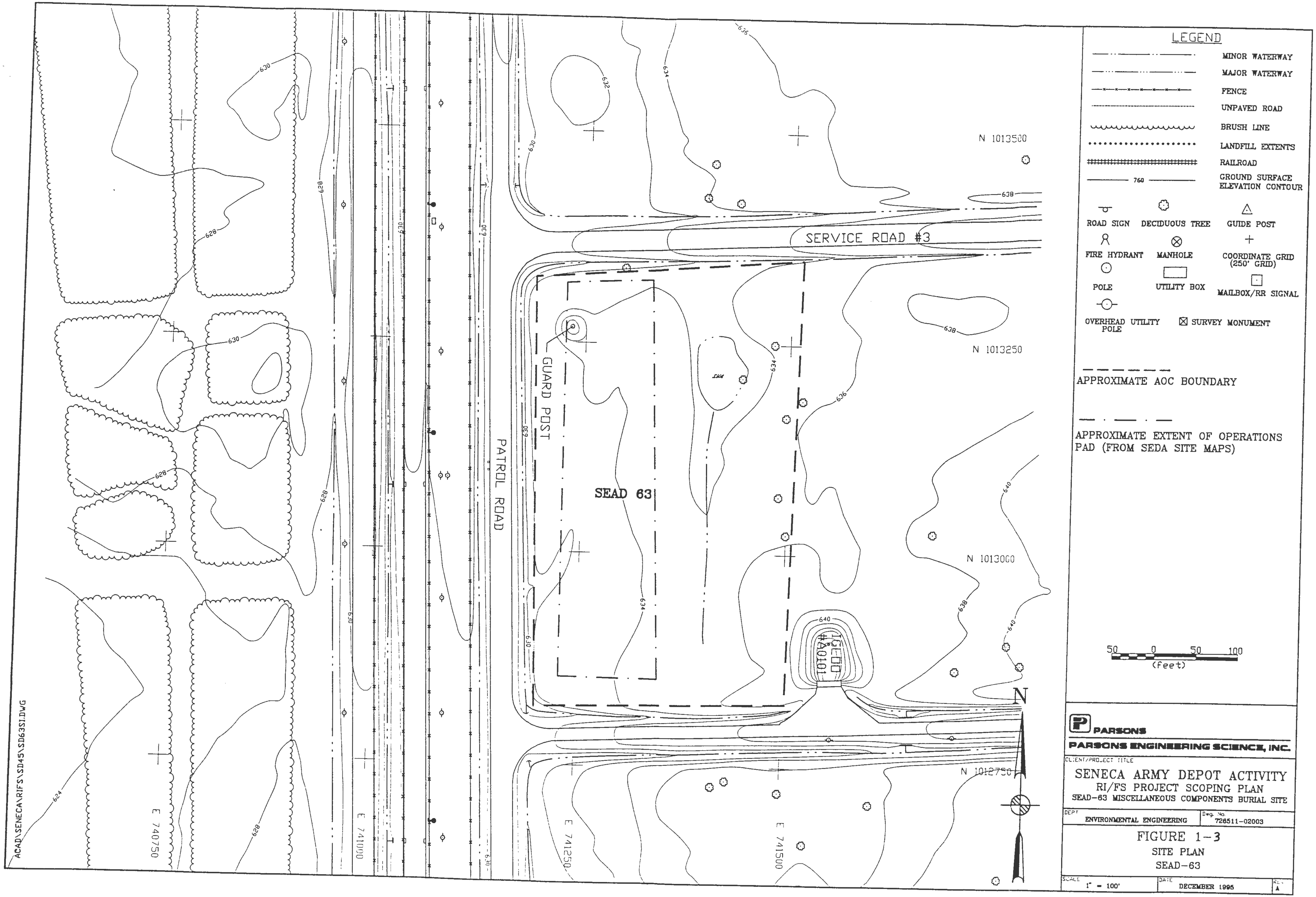
SCALE	DATE	REV
1" = 500'	AUGUST 1995	A

former WSA facility at SEDA. The eastern, western, and southern portions of SEAD-12 are primarily open fields and include Buildings 813 through 817, 819, and 823. These buildings were also part of the former WSA facility at SEDA. In accordance with the decision process outlined in the Interagency Agreement (IAG) between the USACOE, EPA, and NYSDEC, an Expanded Site Inspection (ESI) was performed at SEAD-12A and 12B in 1994. This investigation included sampling of surface and subsurface soils, groundwater, surface water and sediment to identify hazardous constituents or wastes that may have been released to the environment. The sampling data were compared to state and federal guidelines and standards to determine whether this AOC posed a potential threat or risk to human health and the environment. The draft final ESI report (Parsons ES, December 1995) indicated that impacts to soils, groundwater and sediment exceeding state and federal standards and guidelines had occurred at SEAD-12. As part of the ESI report a CERCLA RI/FS was recommended for SEAD-12. This RI/FS Project Scoping Plan along with the Generic Installation RI/FS Workplan outline the recommended approach and methodologies for completion of an RI/FS at SEAD-12 in accordance with EPA CERCLA guidelines.

1.4 BACKGROUND - SEAD-63

SEAD-63 is located in the northern portion of SEDA within the former nuclear Weapons Storage Area (WSA) facility know as the Q Area. The location of the site is shown in Figure 1-1. A detailed site map of SEAD-63 is shown in Figure 1-3. SEAD-63 is referred to as the Operations Pad on SEDA site maps. The "operations" that were performed at the Operations Pad are unknown.

In accordance with the decision process outlined in the Interagency Agreement (IAG) between the USACOE, EPA, and NYSDEC, an Expanded Site Inspection (ESI) was performed at SEAD-63 in 1994. This investigation included sampling of surface and subsurface soils, groundwater, surface water and sediment to identify hazardous constituents or wastes that may have been released to the environment. The sampling data were compared to state and federal guidelines and standards to determine whether this AOC posed a potential threat or risk to human health and the environment. The draft ESI report (Parsons ES, April 1995) indicated that impacts to soils, groundwater and sediment exceeding state and federal standards and guidelines had occurred at SEAD-63. As part of the ESI report a CERCLA RI/FS was recommended for SEAD-63. This RI/FS Project Scoping Plan along with the Generic Installation RI/FS Workplan outline the recommended approach and methodologies for completion of an RI/FS at SEAD-63 in accordance with EPA CERCLA guidelines.



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-63 MISCELLANEOUS COMPONENTS BURIAL SITE

DEPT ENVIRONMENTAL ENGINEERING

Dwg. No. 726511-02003

FIGURE 1-3
SITE PLAN
SEAD-63

SCALE 1" = 100'

DATE DECEMBER 1995

REV A

2.0 SITE CONDITIONS

2.1 PHYSICAL SETTING

The physical setting of SEDA is described in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

2.2 REGIONAL GEOLOGICAL SETTING

The geologic setting of SEDA is described in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

2.3 REGIONAL HYDROGEOLOGICAL SETTING

The hydrogeology of SEDA is described in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

3.0 SCOPING OF THE RI/FS

This section describes the current understanding of SEADs 12 and 63 based upon the results of draft ESI Reports (Parsons ES, April 1995). Models were developed describing all known contaminant sources and receptor pathways based upon actual sampling data. These conceptual models will be used to develop and implement additional studies which may be required to fully assess risks to human health and the environment. Other considerations which are discussed in this section are data quality objectives (DQOs) and potential remedial actions for SEADs 12 and 63. These considerations will also be integrated into the scoping process to ensure that adequate data is collected to complete the RI/FS process for these AOCs.

3.1 CONCEPTUAL SITE MODEL

The conceptual site models for SEADs 12 and 63 identify potential source areas, release mechanisms, potential exposure pathways, and receptors. The models take into account site conditions and accepted pollutant behavior to formulate an understanding of the site. These factors will serve as the basis for determining necessary additional studies for the RIs at these sites. The models were developed by evaluating the four following aspects:

- Historical usage and waste disposal practices.
- Physical site characteristics: This considers the physical aspects of environmental conditions and the effect these conditions may have on potential pollutant migration. These include soil characteristics, topography, subsurface geology, groundwater characteristics and local terrain.
- Environmental fate of constituents: This considers the fate and transport of residual materials in the environment based upon known chemical and physical properties.
- Current and Future land uses.

3.1.1 SEAD-12

This subsection presents the scoping of the RI/FS proposed for SEAD-12. This subsection will discuss the sites history, its known physical characteristics including results from previous investigations, and it will present a preliminary identification of potential receptors and exposure scenarios. This section presents all but one of the elements of the Historical Site Assessment (HSA) as defined in the Multi Agency Radiological Survey and Site Investigation Manual (MARSSIM). The one element of the HSA that is not discussed in this section is the classification of sites. Site classification is presented in Section 4.2.3, Radiological Investigations At SEAD-12.

3.1.1.1 Site History

The following SEAD-12 site history is derived from a report documenting historical information about the Deep Creek Air Force Station (now the Fairchild Air Force Base), a trip-report prepared by Sandia National Labs in 1994, reviews of all declassified and/or unclassified SEDA reports and maps that are currently known to exist, aerial photos dating from 1959, 1968, and 1985 and personal communications with SEDA personnel. The information contained in the Deep Creek Air Force Station report is thought to be pertinent to this site investigation because up to about 1962, all WSA facilities nation-wide were controlled and operated by the Atomic Energy Commission (AEC). Also, the design and construction of the buildings used for weapons storage and maintenance at the Deep Creek Air Force Station are identical to those at SEDA.

SEAD-12 occupies the area of the former SEDA Weapons Storage Area (WSA). The former WSA was constructed by the U.S. Army Corps of Engineers from mid 1955 to 1957. In 1957, the WSA became operational. The facility was operated jointly by the Army and the AEC up to 1962. After 1962, all activities in the WSA were transferred to full control of the Army. Activities at several of the facilities in the WSA, in particular Buildings 803, 804 and 819, are relatively well documented for the operational period prior to 1962. Activities and operating practices in the WSA after 1962 are currently classified or unknown.

The Radioactive waste Disposal Site

The northeast portion of the site, (designated as SEAD-12A during the ESI) was used for the disposal of laboratory and maintenance wastes and military components. This disposal site consisted of five disposal pits that were enclosed within a fenced area measuring approximately 100 feet (north-south) by 50 feet (east-west). This fenced area was known to SEDA personnel as the radioactive waste disposal area. It is worth noting that this type of fenced radioactive waste disposal area is found at the Deep Creek Air Station WSA, suggesting that the disposal practices of the AEC called for the segregation of radioactive and non-radioactive wastes. Based upon aerial photograph review only, this area appears to have been used from as early as 1959 through at least 1968. The site appears to have been inactive by 1985. The disposal pits themselves consisted of one vertical steel culvert and the four vertical concrete pipes buried in the ground; all were covered by concrete slabs. In August of 1986, the contents of all five disposal pits were containerized for disposal at a licensed nuclear waste facility. In December of 1987, the containers were shipped to an authorized off-site radioactive waste landfill in Barnwell, North Carolina.

Buildings 803, 804, and 805

Buildings 803, 804, and 805 are located in the northern portion of SEAD-12, and includes the area investigated as SEAD-12B during the ESI. This area was the site of the initial WSA operations. During the period from 1957 to 1962, Building 803 was used for the storage of removable nuclear capsules, Building 804 was used as a maintenance building for removable nuclear capsules, and Building 805 was used as a stores room. Maintenance activities involved disassembling of nuclear capsules for routine maintenance and cleaning, and for verification of the integrity of the fissile materials.

Wastes generated during the processes performed in Building 804 included swipes containing solvents and uranium oxides, butcher paper, gloves, and lead-wire seals. It is estimated that 5 gallons of trichloroethylene, 1 gallon of alcohol and 1 quart of acetone were used annually. From 1957 to 1962, these wastes were stored in a dry waste disposal pit, which was located 150 feet north and 28 feet east of Building 805 (the equipment building for Building 804). This dry waste disposal pit was lined with and covered by plywood. It was reported by former Sandia National Laboratory personnel that the wastes stored in this pit were removed and shipped for disposal whenever the pit was full. It is presumed that these wastes were shipped to Sandia National Laboratories in New Mexico for disposal, though this has not yet been confirmed. The dry waste disposal pit was reported to have been excavated by the AEC in 1957, presumably to empty it for continued use, and again prior to their leaving the site. No data or further information is available on these two excavation events. The dry waste disposal pit was later excavated by SEDA personnel in 1965 and 1986. Reports from the 1965 and 1986 excavations indicated that no buried wastes were found in the area of the dry waste disposal pit. There are no records of radiological surveys from the 1965 excavation. Field notes from the 1986 excavation indicate that some plywood was unearthed, and laboratory analyses from soil samples and plywood samples reported that there was no residual radioactivity present. A copy of these field notes and the available laboratory analyses are presented in Appendix H.

Building 804 also has a floor drain system which leads to an emergency holding tank (UST) located behind the building. The purpose of the UST was to contain any fissile material in case of an accidental release during maintenance of the nuclear capsules. There are no recorded releases of fissile materials at SEDA during the period from 1957 to 1962. In July of 1986, SEDA attempted to remove the tank. During this removal attempt, a portion of the top of the tank was ripped off. The tank was then backfilled in place. The field notes and analysis results from this excavation are included with those from the 1986 dry waste pit excavation in Appendix H.

Although the operations performed in Building 804 are not known for the period following 1962, advances in weapons design by the mid-1960's had phased out the use of removable nuclear component capsules and the maintenance activities associated with the nuclear capsules at Building 804 should have ceased. Further, SEDA personnel have indicated that the Army has never used Building 803 for nuclear capsule storage or Building 804 for nuclear capsule maintenance since 1962. Since at least the mid 1980s, Building 803 was used by the Army as a holding area for containerized radioactive wastes. Building 804 was occupied by the WSA Security Systems Maintenance Division.

Building 810

Building 810 was used as a transfer area for military items that entered and exited the WSA. It was used for this purpose from the inception of the WSA in 1957 to the final demilitarization of the WSA in 1996. All military items arriving at and leaving from the WSA were sealed in specially designed containers which were then packed in Department of Transportation compliant transport containers. The only area of Building 810 that would have had sealed military items present that could have had radioactive materials within them is the loading and unloading area of the Building. This area is located in the center of the northern portion of the building and measures approximately 50 feet by 28 feet. Also included in this area would be the exterior loading dock area, which measures approximately 50 feet by 16 feet. No other areas of Building 810 were used to store or hold shipping containers that could have contained radioactive materials.

Building 819

Building 819 and the ground in its immediate vicinity comprise a third area which was used in the initial WSA operations. For the operational period from 1957 to 1962, Building 819 was used as a quality assurance inspection laboratory and was used by Sandia National Laboratories under contract to the AEC. For the period after 1962, Building 819 was likely used for similar quality assurance inspection purposes. During a site visit to Building 819 in 1994, it was being used for the storage of office furniture. At present it is completely de-militarized.

Buildings 815 and 816

Buildings 815 and 816 were constructed to maintain non-nuclear components of the weapons stored in the WSA. Activities up to 1962 included inspection and testing of non-nuclear mechanical and electrical systems. Following 1962, and up to approximately 1992, these buildings were used for classified maintenance functions. The actual operations that occurred in these Buildings remains classified. Discussions with SEDA personnel indicate that any maintenance or quality assurance operations performed on military items that may have contained radioactive materials would have been done with those radioactive materials still sealed within those military items. The only radioactive material that would not have been considered sealed would have been metal parts that were fabricated with alloys containing U-238 and/or U-235. Once any maintenance or quality assurance operations were completed on any given military item, the item was immediately returned to and sealed in its shipping container. All military items were transported and stored in their sealed shipping containers. It is worth noting that it was not Army policy to wipe or perform a radiation surveys on the shipping containers and these activities were not performed at SEDA.

After approximately 1992, these buildings were used to de-militarize non-nuclear components as part of the nuclear stockpile reduction effort. At the time of this document being released, Buildings 815 and 816, as well as Buildings 803, 804, 805, 810.and 819 were completely de-militarized.

3.1.1.2 Physical Site Characterization

The physical site characterization of SEAD-12 was performed by reviewing and summarizing the findings of the ESI conducted at SEAD-12. The topics that were reviewed include: physical site setting, site geology, site conditions determined from geophysical investigations, site hydrology and hydrogeology, and the results of chemical analyses.

3.1.1.2.1 Physical Site Setting

SEAD-12 is located in the northern portion of SEDA. There are 16 buildings located in this area. SEAD-12 is approximately 4,400 feet long (along its north-south axis) and approximately 4,200 feet wide (along its east-west axis). The site plan is shown in Figure 1-2.

The topography of the northeastern portion of SEAD-12 is relatively flat and slopes gently to the northern and eastern boundaries of the site. The remainder of the site is also relatively flat and slopes towards the west. The site is grassy and is sparsely populated with deciduous trees throughout the area. A grove of hardwood trees occupies the eastern portion of SEAD-12. A stream runs east to west in the northern half of SEAD-12. This stream continues west and eventually drains into Reeder Creek.

The area investigated as SEAD-12A during the ESI occupies the northeastern corner of SEAD-12. SEAD-12A was approximately 1,000 feet long and 900 feet wide. This area is grassy and is sparsely populated with deciduous trees. Patrol Road bounds this area to the north and east.

The area investigated as SEAD-12B during the ESI is located in the northern portion of the Q Area. SEAD-12B included Buildings 803, 804, 805 and the area to the North and East of Building 804. This area was approximately 500 feet long and 300 feet wide. It was bordered to the north by Patrol Road and to the south by Service Road No. 1. A 5,000 gallon UST is located north of Building 804. A dry waste storage pit was thought to be located north of Buildings 804 and 805. The topography of the SEAD-12B area is relatively flat and vegetation is stressed, probably due to the amount of activity the region has received.

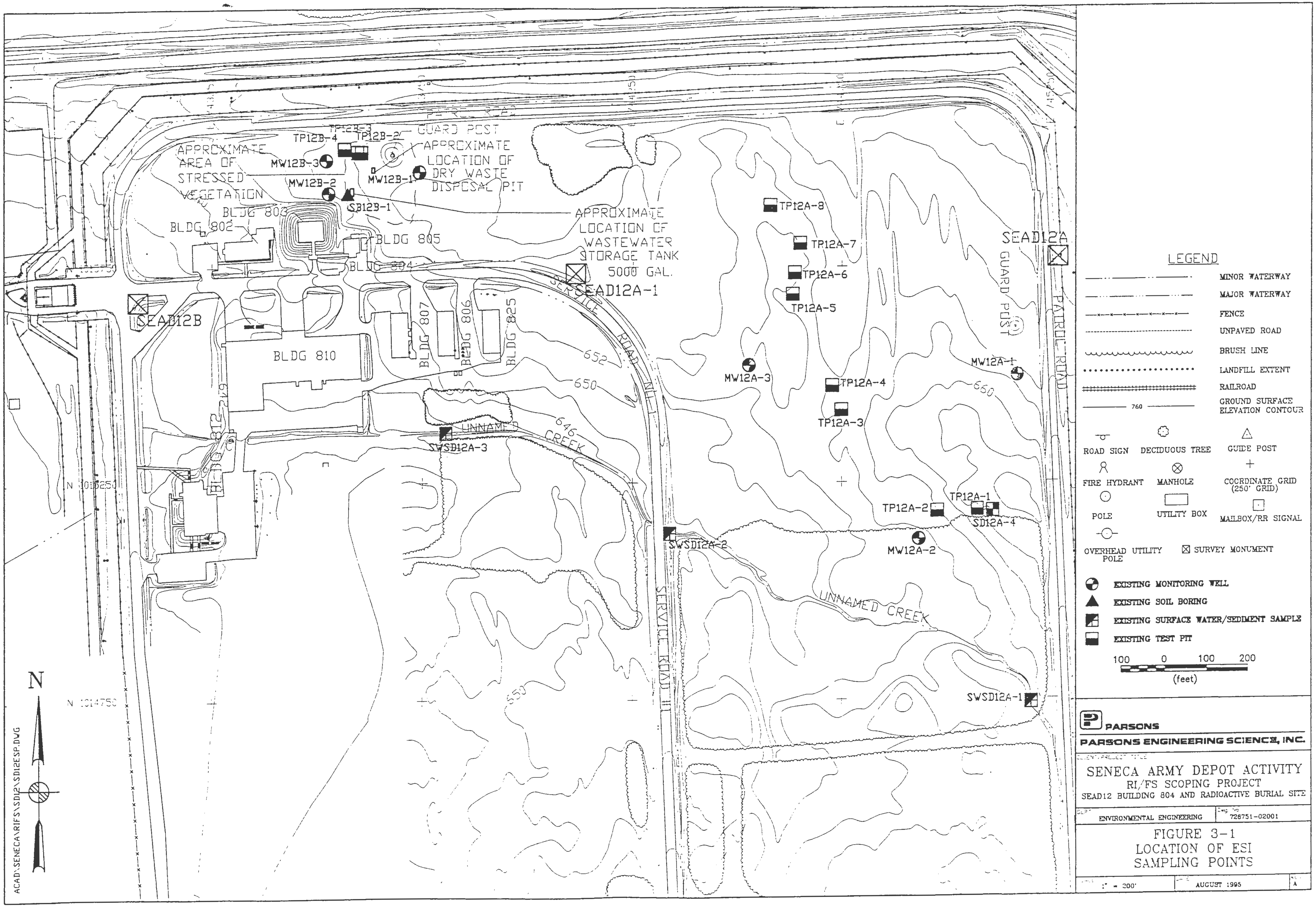
Access to SEAD-12 is restricted by clearance through Post #1, the main gate, Post #5, the restricted area gate, and Post #2, the truck entrance.

3.1.1.2.2 Site Geology

The discussions which follow describe the site geology which was determined for the areas of SEAD-12A and SEAD-12B only. Section 1.3 of this document (Background) describes the locations of these two areas in relation to the re-defined SEAD-12 boundaries.

Determination of the site geology was based on the drilling and test pit programs conducted for the ESI at SEAD-12. This program included 6 soil borings in which monitoring wells were installed and 11 test pits. The soil borings were drilled to a maximum depth of 21 feet below ground surface. In addition, 6 exploratory soil borings were performed at SEAD-12B in an attempt to sample the contents of the 5,000 gallon UST. These exploratory soil borings ranged in depth from 18 feet to 21 feet below ground surface. Only one of the six exploratory soil borings (SB12B-1) was sampled and its location surveyed. The locations of the borings, test pits and monitoring wells are shown in Figure 3-1. Soil boring logs and test pit logs are included in Appendix A.

Based on the results of the drilling and test pitting programs, fill material, till, weathered gray shale, and competent gray shale are the four major geologic units present on-site. Topsoil was present at all soil boring locations. The depths to the bottom of the fill, till, bedrock, and the thickness of the weathered shale at SEAD-12 are presented in the table below.



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RI/FS SCOPING PROJECT
SEAD12 BUILDING 804 AND RADIOACTIVE BURIAL SITE

DEPT	Dwg. No.
ENVIRONMENTAL ENGINEERING	728751-02001

FIGURE 3-1
LOCATION OF ESI
SAMPLING POINTS

SCALE	DATE	REV.
1" = 200'	AUGUST 1995	A

Boring Location	Depth to Bottom of Fill (feet)	Depth to Bottom of Till (feet)	Thickness of Weathered Shale (feet)	Depth to Bedrock (feet)
MW12A-1	NA	12	1.5	13.5
MW12A-2	NA	9.0	1	10
MW12A-3	NA	14	1.3	15
MW12B-1	NA	14.5	3	ND
MW12B-2	NA	13	1	ND
MW12B-3	NA	13	1	ND
TP12A-1	>5	ND	ND	ND
TP12A-2	>8	ND	ND	ND
TP12A-3	ND	ND	ND	ND
TP12A-4	ND	ND	ND	ND
TP12A-5	1.6	ND	ND	ND
TP12A-6	1.8	8.7	ND	ND
TP12A-7	NA	NA	ND	ND
TP12A-8	NA	ND	ND	ND
TP12B-2	3.6	ND	ND	ND
TP12B-3	2.8	ND	ND	ND
TP12B-4	NA	ND	ND	ND
SB12B-1	20	NA	NA	20

NA = Not Applicable
ND = Not Determined

The fill material was encountered in test pits TP12A-1 through TP12A-6, test pits TP12B-2 and TP12B-3, and in the exploratory soil boring SB12B-1. Fill material thickness ranged from 1.6 to over 8.0 feet in the test pit excavations. Twenty feet of fill was observed in the area of the 5,000 gallon UST (SB12B-1). The fill consisted of layers of waste material, till, shale fragments, and sand. The waste material was comprised of miscellaneous military components and batteries.

The till was characterized as brown or olive gray silt and very fine sand with small (less than 1 inch) fragments of shale. Clay lenses were observed occasionally. Larger shale fragments, thought to be rip-up clasts, were encountered in some of the soil borings. The till was observed to be 9.0 to 14.5 feet thick in all of the soil borings across the site.

The weathered shale that forms the transition between till and competent shale was observed at six of the seven soil borings, and ranged in thickness from approximately one to three feet. It is unknown if a weathered shale unit exists at soil boring location SB12B-1, since continuous sampling was not conducted at this location.

Competent gray shale was observed in all three soil borings conducted at SEAD-12A. The depths to bedrock ranged from 10 feet to 15 feet below ground surface. Competent shale was encountered in the exploratory borings performed at SEAD-12B at a depth of 20 feet below ground surface. Competent shale was not encountered in the soil borings conducted for the installation of the monitoring wells at SEAD-12B.

3.1.1.2.3 Geophysics

Seismic refraction surveys, electromagnetic (EM-31) surveys, and GPR surveys were performed at SEAD-12 as part of the geophysical investigations for the ESI.

The discussions which follow describe the results of the geophysical investigations which were performed in the areas of SEAD-12A and SEAD-12B only. Section 1.3 of this document describes the locations of these two areas in relation to the re-defined SEAD-12 boundaries.

Seismic Survey

Four seismic refraction profiles, each 120 feet long, were performed at the locations shown in Figure 3-2. The results of the seismic refraction survey conducted at SEAD-12 are shown in Table 3-1. The seismic refraction profiles indicated that 9.5 to 16.3 feet of till (1050 to 4800 ft./sec.) overlaid the bedrock surface (9500 to 13400 ft./sec.). In particular, the till material included loose, unsaturated till (1050 to 1170 ft./sec.); compact unsaturated till (3400 ft./sec.); and saturated till (4200 to 4800 ft./sec.).

Saturated till was detected beneath profiles P1, P3, and P4. At the location of profile P2, saturated till was not detected, however, a layer of compact till (3400 ft./sec.) was resolved at depths of 3.4 feet (at the western end of the seismic line) to 4.6 feet (at the eastern end of the seismic line).

Electromagnetic Survey

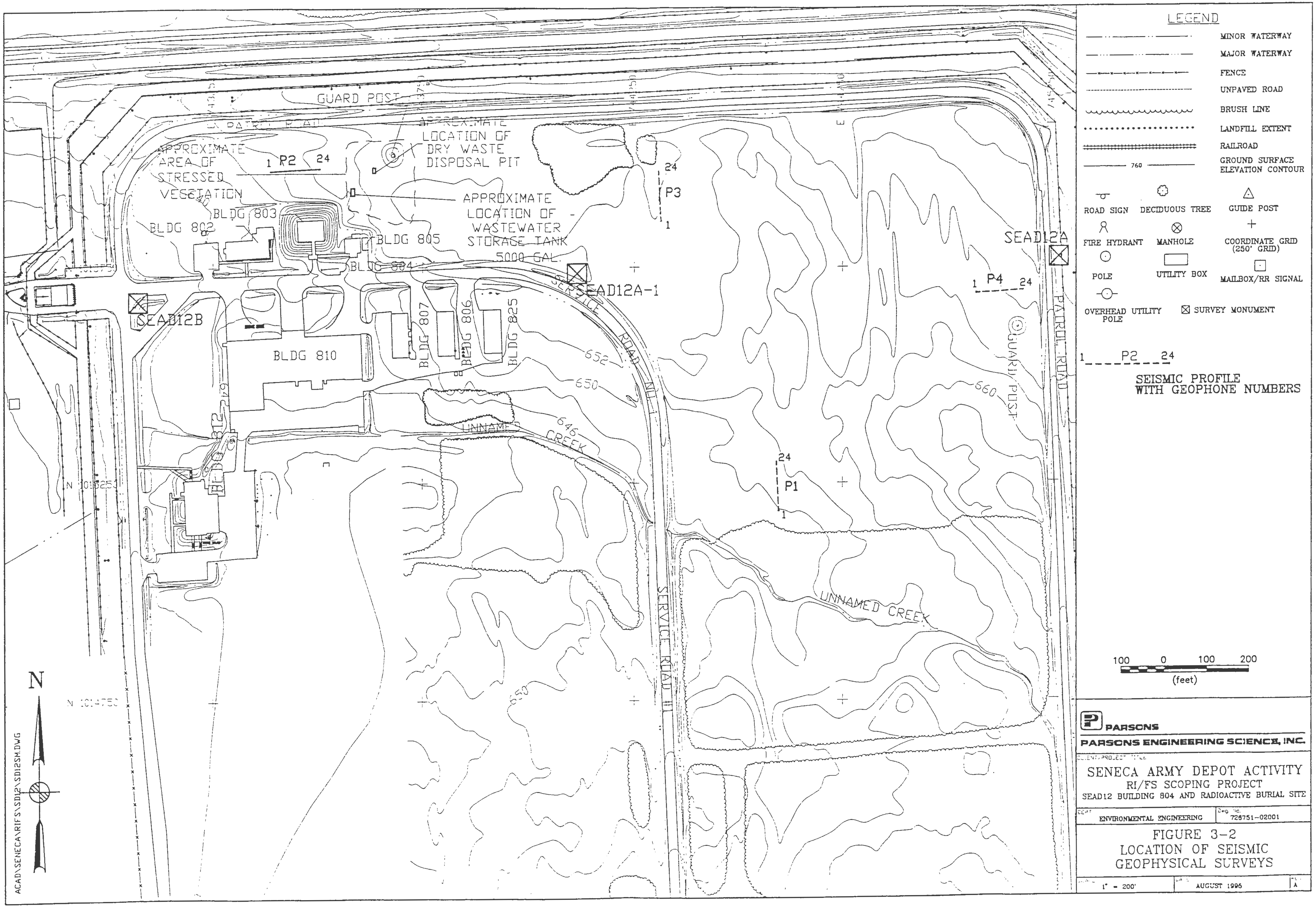
An electromagnetic (EM) survey was performed for the ESI at SEAD-12A and SEAD-12B along the transects shown in Figure 3-3. Figure 3-4 shows the results of the quadrature response for the

EM survey at SEAD-12A. The quadrature response is proportional to the apparent ground conductivity. Four distinct areas of apparent conductivity anomalies were defined by the EM-31 survey. Area 1, located along the southern boundary of SEAD-12A, measured approximately 90 feet long by 80 feet wide and was associated with the area where the contents of five disposal pits had been excavated and containerized in 1986. Area 2, also located along the southern boundary of SEAD-12A, was located 30 feet west of Area 1 and measured 60 feet in length by 45 feet in width. Area 3 was located in the central portion of the EM grid and was defined by a 135 foot long by 160 foot wide area of elevated ground conductivity. Area 4 was defined by a 390 foot long by 200 foot wide zone of elevated ground conductivity which had three distinct low conductivity anomalies associated to it.

Three additional zones of elevated apparent ground conductivities were observed along the western (2 zones) and northern (1 zone) boundaries of SEAD-12A. Each of these zones was correlated to marshy ground in areas of low-lying surface topography. A localized anomaly located near the center of the eastern boundary of SEAD-12A was correlated to a guard post. The north-south trending lineament running the full length of the eastern boundary of SEAD-12A was presumably associated to an underground utility or to increased ground conductivity from road salt runoff.

The in-phase response of the SEAD-12A survey is shown in Figure 3-5. The in-phase response reflects the presence of buried ferrous objects. These results show the same anomaly features for areas 1 through 3 as described above. Only three distinct in-phase anomalies were detected in Area 4. These three anomalies were associated to the 3 low ground-conductivity anomalies found in this area.

Figure 3-6 shows the results of the quadrature response for the EM survey at SEAD-12B. The results show an elevated apparent ground conductivity of the soils in the south central portion of the grid. This anomaly was presumably associated to the 5,000 gallon underground storage tank (UST), due to its proximity to the suspected location of the tank. Historical site plans showed the top of the UST to be located 18 feet below grade, close to 6 feet deeper than the typical penetration depth of the EM-31 survey instrument. Therefore, the increase in the apparent



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RI/FS SCOPING PROJECT
SEAD12 BUILDING 804 AND RADIOACTIVE BURIAL SITE

DEPT: ENVIRONMENTAL ENGINEERING
Dwg. No. 726751-02001

FIGURE 3-2
LOCATION OF SEISMIC
GEOPHYSICAL SURVEYS

SCALE: 1" = 200'
DATE: AUGUST 1995
REV. A

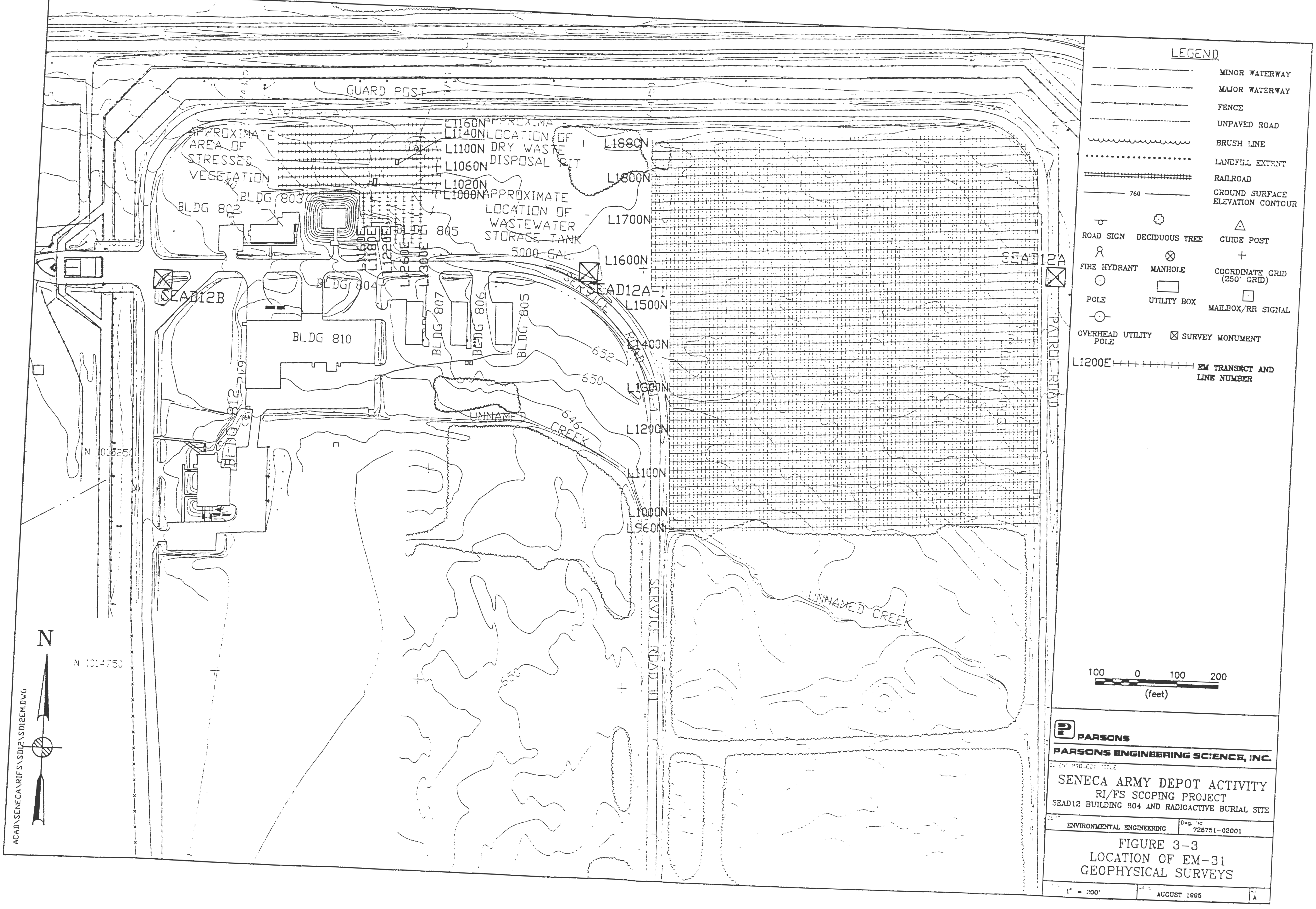
TABLE 3-1
SEAD-12
EXPANDED SITE INSPECTION
RESULTS OF SEISMIC REFRACTION SURVEY

			Water Table		Bedrock	
Profile	Distance[1]	Ground Elevation[2]	Depth	Elevation[2]	Depth	Elevation[2]
P1	-5	651.9	4.2	647.7	10.3	641.6
	57.5	653.1	4.3	648.8	9.5	643.6
	120.0	653.7			12.0	641.7
P2	-5	645.2	ND	ND	12.0	633.2
	57.5	647.3	ND	ND	13.4	632.9
	120.0	647.9	ND	ND	16.3	631.6
P3	-5	652.1	4.2	647.9	13.6	638.5
	57.5	652.0	3.8	648.2	13.2	638.8
	120.0	651.3	5.0	646.3	15.0	636.3
P4	-5	654.7	4.3	650.4	11.8	642
	57.5	653.8	3.8	650	13.2	640.6
	120.0	653.0	3.4	649.6	13.9	639.1

ND - Not Detected. Due to inherent limitations of the seismic refraction method, a thin layer of saturated till (less than 2 feet) overlying the bedrock surface would be undetectable.

[1] All distances are measured in feet along the axis of each seismic profile from geophone #1 of each profile. For profiles P1 and P3, geophone #1 is located at the southern endpoint of the axis, and for profiles P2 and P4, geophone #1 is located at the western end point. See Figure 3-2 for locations of seismic profiles.

[2] All elevations are accurate to within ± 2 feet.



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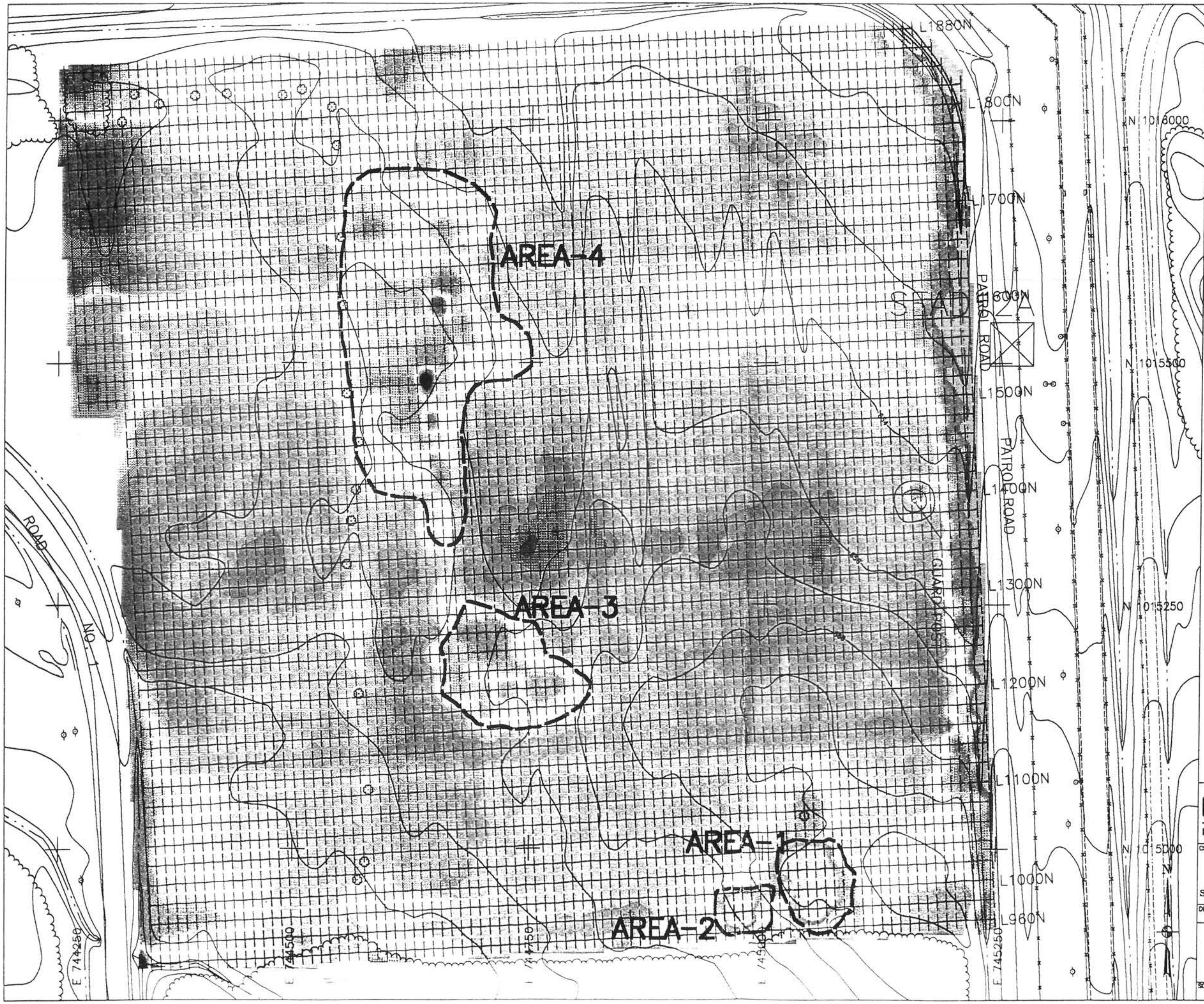
Dwg. No
728751-02001

FIGURE 3-3
LOCATION OF EM-31
GEOPHYSICAL SURVEYS

1" = 200'

DATE
AUGUST 1995

A



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SEAD-12 BUILDING 804 AND RADIOACTIVE BURIAL SITE

DEPT. ENVIROMENTAL ENGINEERING

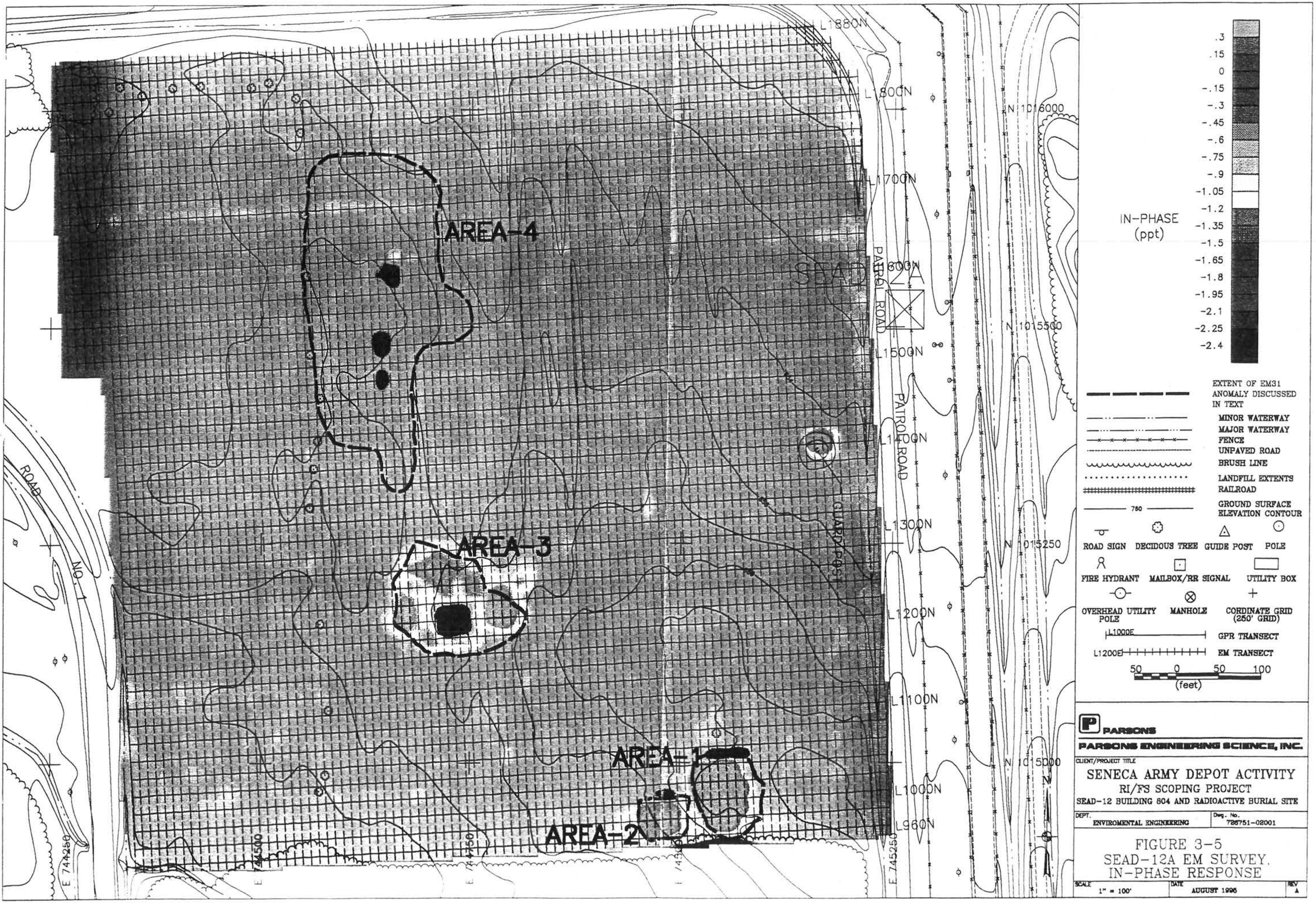
Dwg. No. 726751-02001

FIGURE 3-4
SEAD-12A EM SURVEY
QUADRATURE RESPONSE

SCALE 1" = 100'

DATE AUGUST 1995

REV A



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ENVIROMENTAL ENGINEERING	726751-02001

FIGURE 3-5
SEAD-12A EM SURVEY.
IN-PHASE RESPONSE

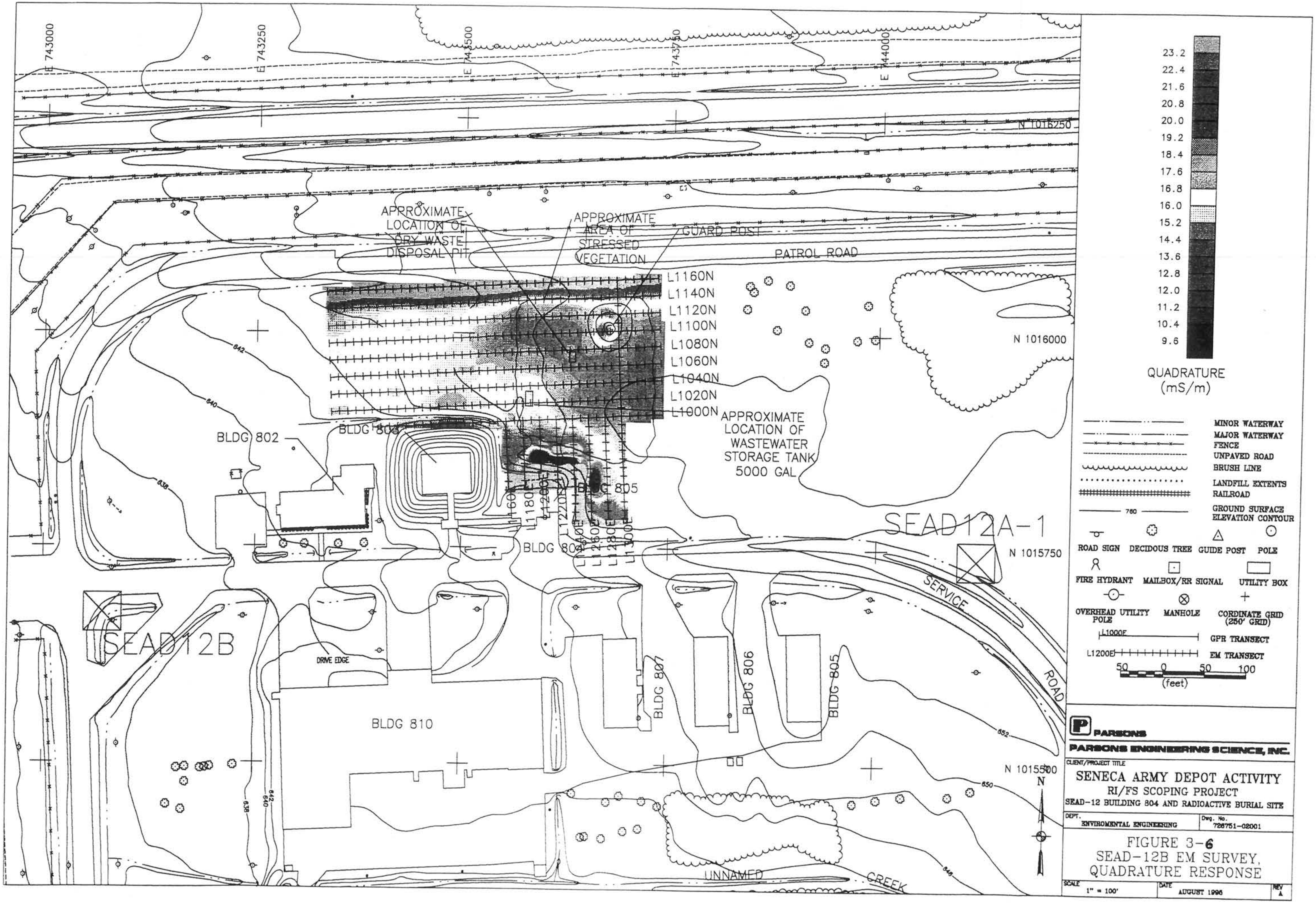
SCALE	DATE	REV
1" = 100'	AUGUST 1996	A

ground conductivity detected at this location was likely to be associated to the material used to backfill the UST tank rather than to a response to the tank itself. The pronounced apparent ground conductivity anomalies located along the southern and northern boundaries of the EM Grid were correlated to Buildings 803 and 804/805 and to presumed under ground utilities, respectively. A pronounced circular anomaly in the northeastern portion of the EM grid was correlated to a guard post. In general, the apparent ground conductivity showed an increase of approximately 2.5 mS/m in the western one third of the EM grid. This response may be due to an increase in the clay content of the soil or to a higher concentration of dissolved solids in the groundwater or soil moisture.

The in-phase response of the EM-31 survey at SEAD 12-B is shown in Figure 3-7. A pronounced anomaly was detected 7 feet east of the 5,000 gallon UST location shown on the historical site drawings of SEAD-12B. Two localized and negative in-phase response anomalies were detected to the north of the suspected UST location. The eastern-most of these anomalies roughly coincided with the location of the dry waste disposal pit shown on the historical site drawings of SEAD-12B. The remaining anomaly features observed in the in-phase response data show the same anomaly features as described in the quadrature response discussion for SEAD-12B.

Ground Penetrating Radar (GPR) Survey

A GPR survey was conducted at SEAD-12 along the transects shown in Figure 3-8 to further characterize the areas suspected of having buried wastes, and to provide a better definition of the buried metallic objects detected by the EM survey. Two disposal pits containing metallic debris were identified during the GPR survey at SEAD-12A. One pit (Disposal Pit A) was approximately 65 feet long by 40 feet wide and was situated in the area where the five disposal pits had been excavated and removed in 1986. The second pit (Disposal Pit B), which measured 40 feet by 15 feet, was located along the southern boundary of SEAD-12A, at the same location as one of the more pronounced EM anomalies. The GPR profiles acquired over the area of EM anomalies in the central portion of the EM grid (Area 3 described in the Electromagnetic Survey results) identified three buried cylindrical metallic objects measuring at least two feet in diameter and up to 6 feet in length. This area was identified as Disposal Pit C. Figure 3-9 shows two of the GPR profiles, Profiles A-A' and B-B' which were used to characterize these buried cylindrical objects. Figure 3-8 shows the location of the two profiles. These buried objects were further investigated with test pit TP12A-4.



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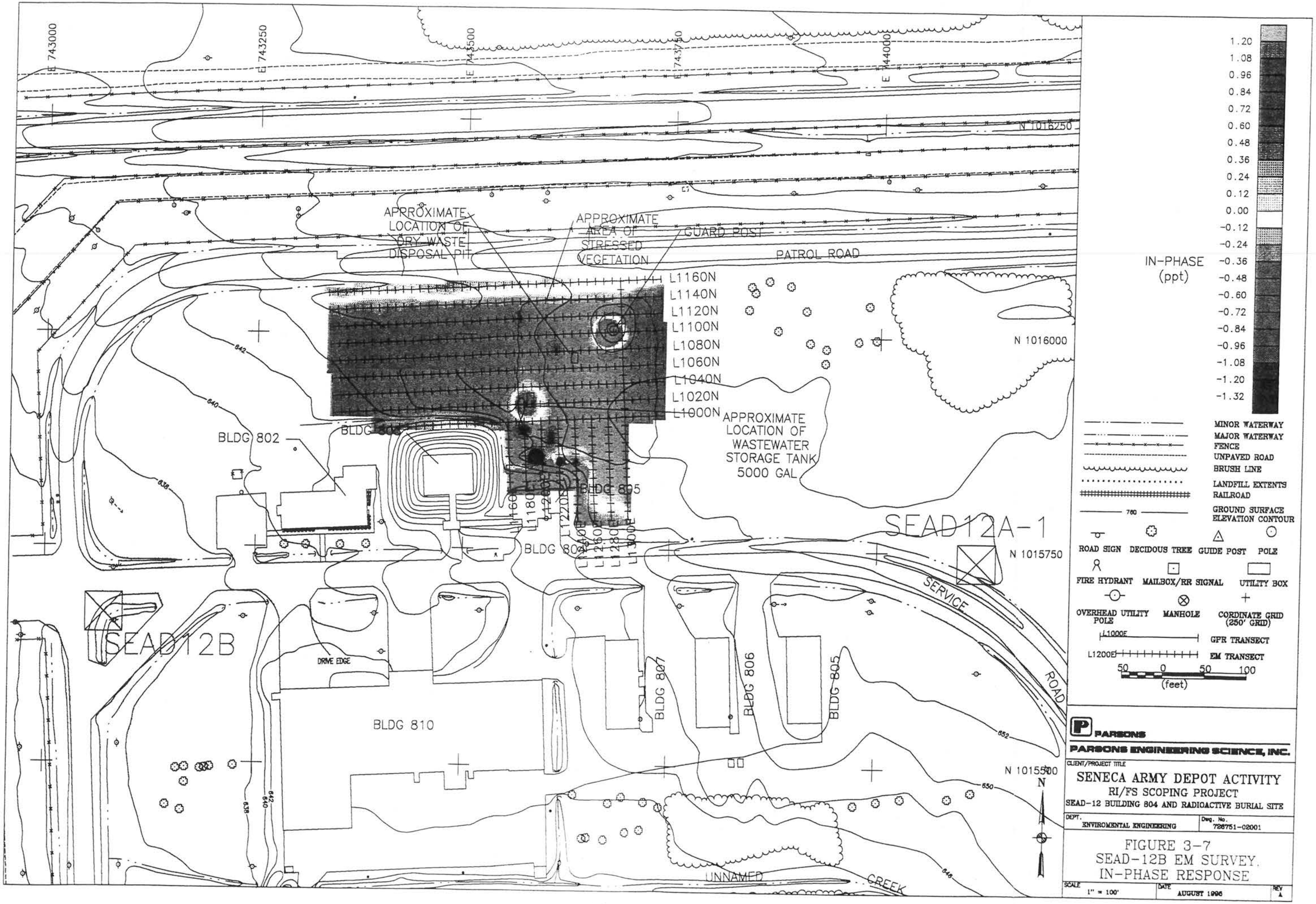
SENECA ARMY DEPOT ACTIVITY
RI/FS SCOPING PROJECT
SEAD-12 BUILDING 804 AND RADIOACTIVE BURIAL SITE

DEPT. ENVIRONMENTAL ENGINEERING	Dwg. No. 726751-02001

FIGURE 3-6
SEAD-12B EM SURVEY,
QUADRATURE RESPONSE

SCALE 1" = 100'	DATE AUGUST 1996	REV A



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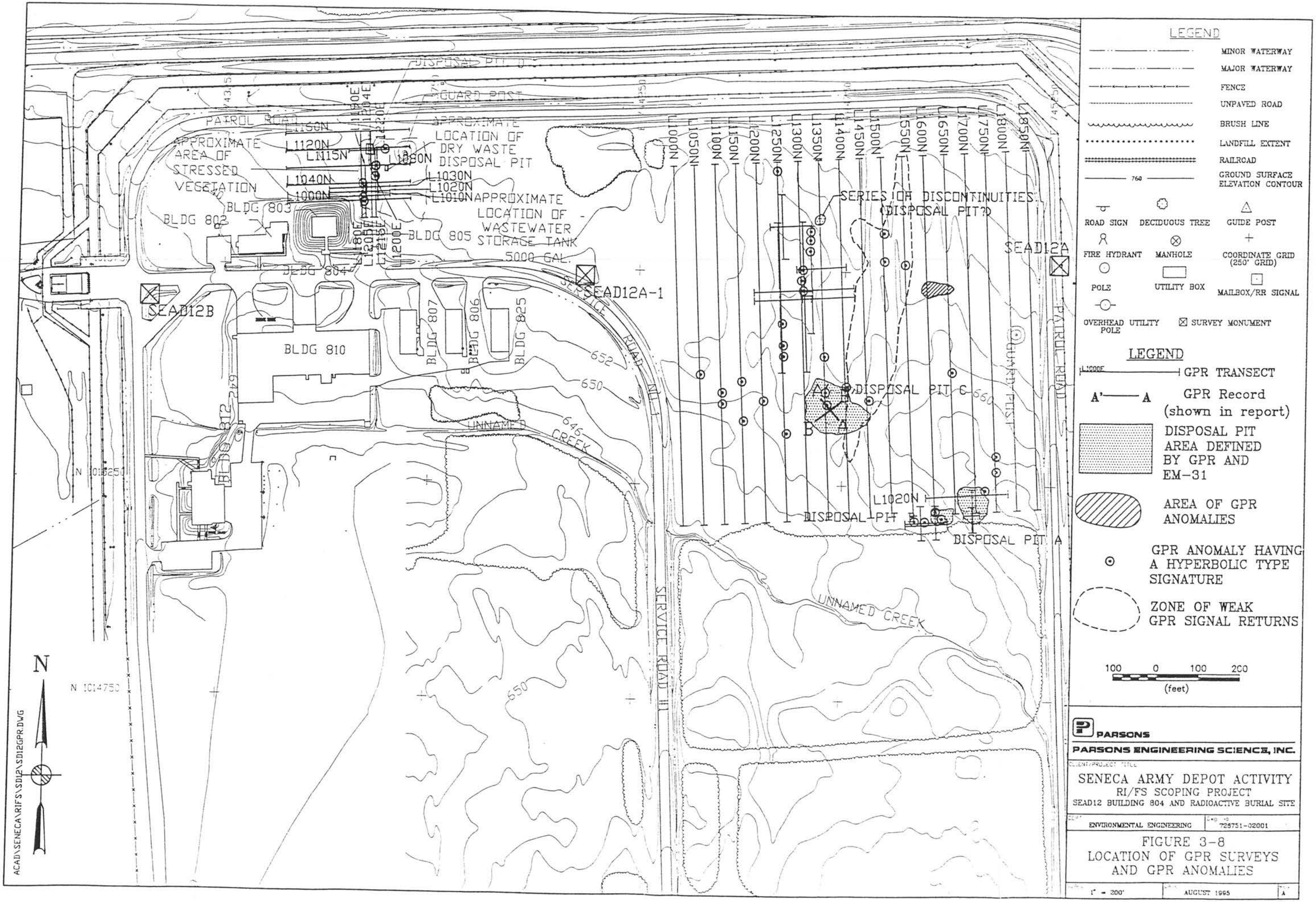
Dwg. No. 726751-02001

FIGURE 3-7
SEAD-12B EM SURVEY.
IN-PHASE RESPONSE

SCALE 1" = 100'

DATE AUGUST 1996

REV A



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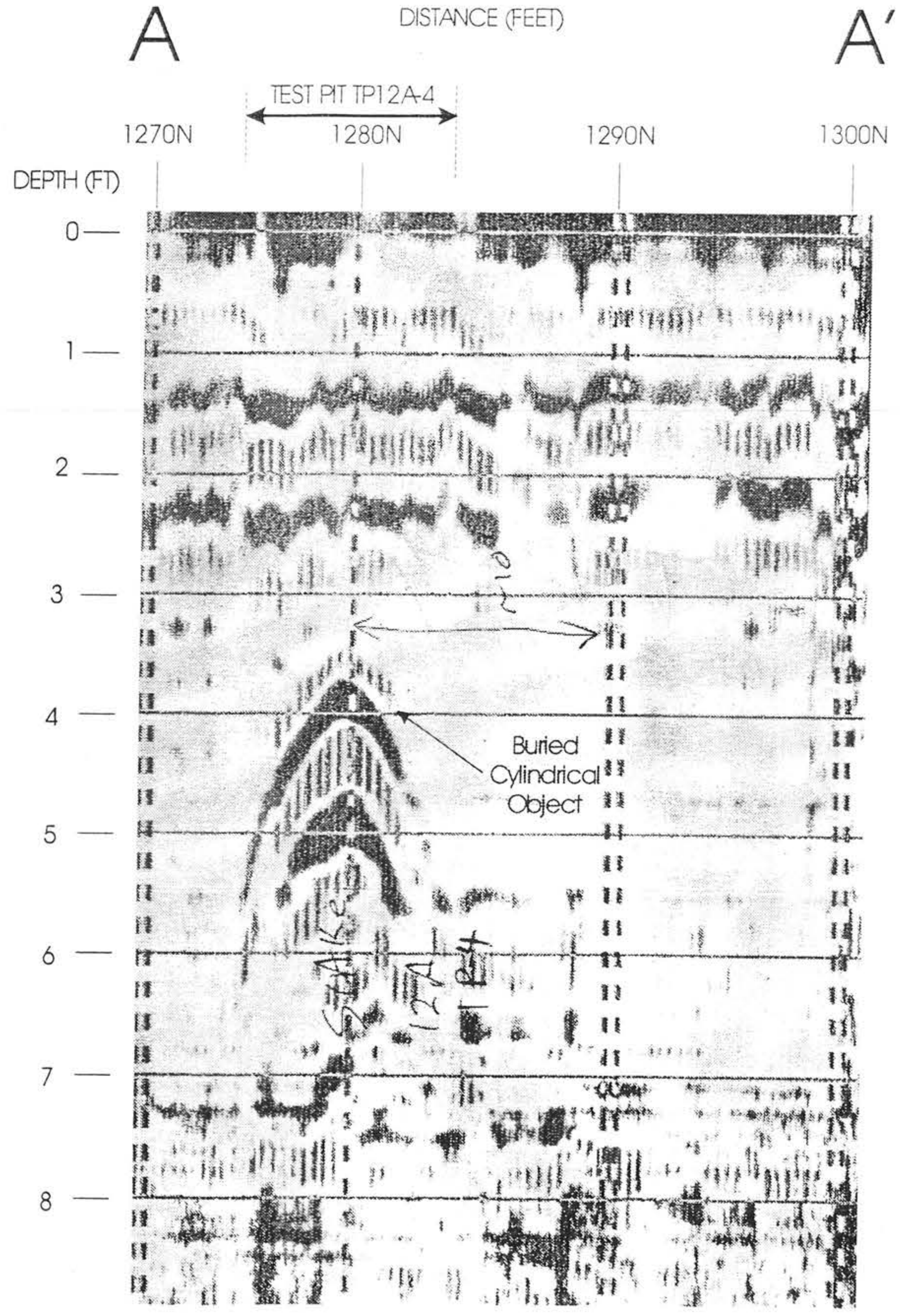
RI/FS SCOPING PROJECT
SEAD12 BUILDING 804 AND RADIOACTIVE BURIAL SITE

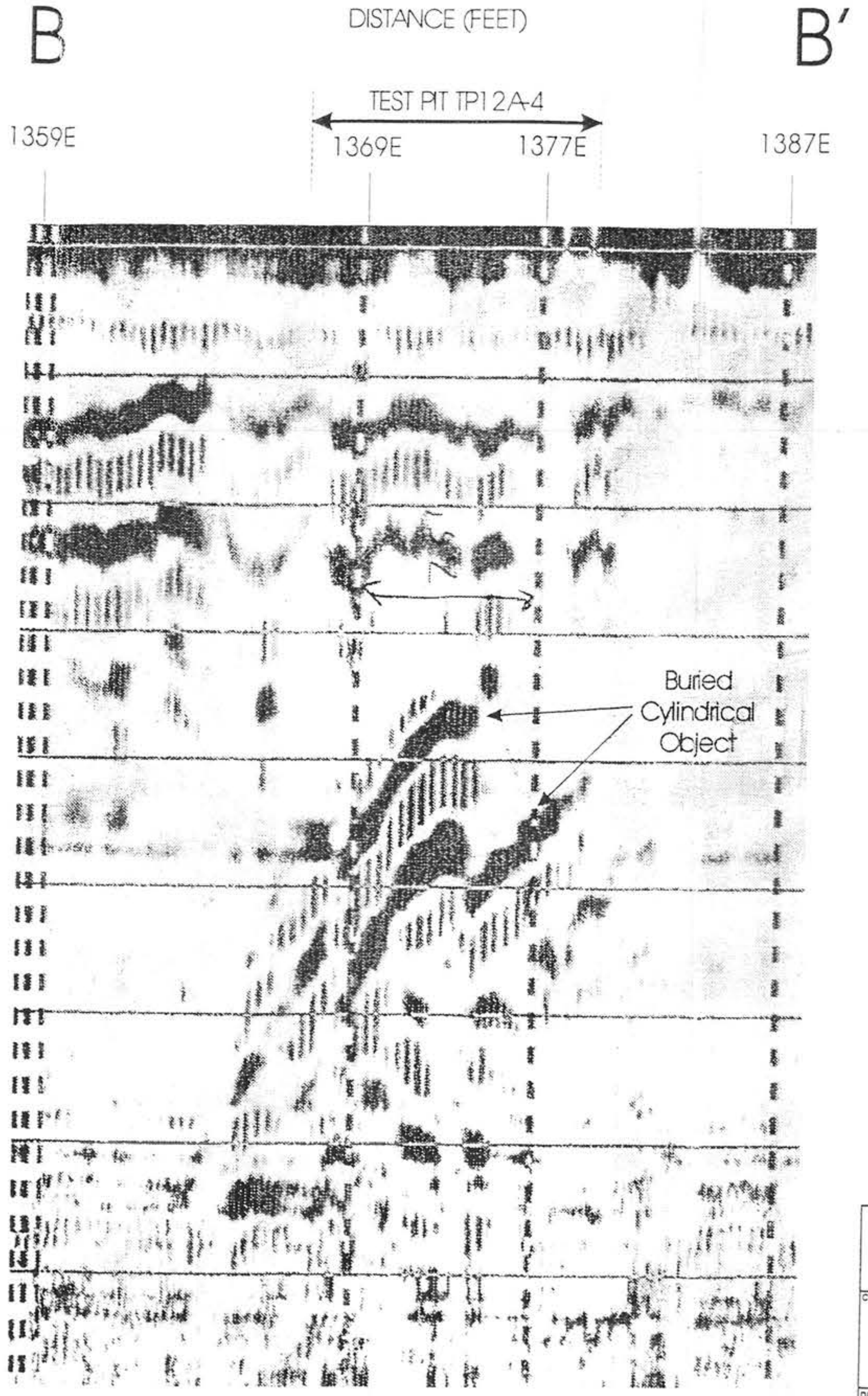
DEPT ENVIRONMENTAL ENGINEERING	Dwg No 728751-02001

FIGURE 3-8
LOCATION OF GPR SURVEYS
AND GPR ANOMALIES

1" = 200'	AUGUST 1995	A



GPR Profile A-A', Perpendicular to Long Axis of Buried Cylindrical Objects.



GPR Profile B-B', Parallel to Long Axis of Buried Cylindrical Objects

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SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD 12 RADIOACTIVE WASTE BURIAL SITE

DEPT ENVIRONMENTAL ENGINEERING
DWG NO 726511-02001

FIGURE 3-9
SEAD 12
GPR PROFILES A-A' AND B-B'

SCALE
DATE AUGUST 1995

R:\GRAPHICS\SENECA\RADAR\19-3-3-3.CDR

The GPR profiles acquired in the area of elevated ground conductivity in the north-central portion of the grid at SEAD-12A (Area 4 described in the electromagnetic survey results) revealed several isolated anomalies. None of these anomalies could be correlated to any of the localized EM anomalies situated within this area of elevated ground conductivity. Two hyperbolic reflections (characteristic signatures of buried cylindrical objects) were detected between the two southern-most localized EM anomalies. Both objects appeared to be no more than one foot in diameter and were buried at a depth of approximately 2 feet.

A series of discontinuities in the shallow subsurface stratigraphy was observed in the northern portion of SEAD-12A. These discontinuities appeared to be shallow disposal pits, however, no buried objects were observed and no EM-31 anomalies were detected in this area. A zone of GPR anomalies, measuring approximately 50 feet long by 7 feet wide, was detected in the north-central portion of SEAD-12A. This zone was characterized by small reflections in the 2 to 4 foot depth interval. Additionally, a region of weak GPR signal returns was detected immediately north of Disposal Pit C. This region extended to the north for a distance of approximately 600 feet and was approximately 100 to 150 feet wide. This region corresponded with an area of low lying topography with fine gravel at the ground surface.

The conductive nature of the soils at SEAD-12B limited the GPR signal penetration at this site to 5 feet below the ground surface. One suspected disposal area was detected by the GPR survey at SEAD-12B. The suspected disposal area (Disposal Pit D), located 65 feet north of the suspected 5,000 gallon UST location, measured 15 feet in length and 7 feet in width and was oriented in a north-south direction. The nature of the GPR signal reflections in this area indicated that several small reflectors were buried in the 1.5 to 4.2 foot depth interval. The extent and the nature of this GPR anomaly, as well as the lack of an associated EM response, identified this area as the most probable location of the dry waste disposal pit. A second area of GPR anomalies, measuring 10 feet in length and 4 feet in width, was located 25 feet north of the previously discussed suspected disposal area. This area also was not associated with any of the EM anomalies detected at SEAD-12B.

Test Pitting/Exploratory Soil Boring Program

A total of eleven test pits were excavated in SEAD-12 to characterize the sources of the geophysical anomalies. Eight test pits were located in the area of SEAD-12A and three were located in the area of SEAD-12B. Their locations are shown on Figure 3-1. Test pit logs are included in Appendix A. All eleven test pits were excavated in areas where EM and/or GPR anomalies had been identified.

Test pits TP12A-1 and TP12A-2 were excavated in the disposal pits identified by the EM and GPR surveys along the southern boundary of SEAD-12A (Disposal Pits A and B). Miscellaneous military components were found in both test pits. The excavations at TP12A-1 and TP12A-2 were stopped at depths of 5.5 and 8 feet, respectively, due to the presence of water within the fill material. The base of the fill material was not identified in either excavation. A zone of elevated beta and/or gamma radiation (40 to 75 μR per hour) was encountered in the 2 to 4 foot interval of TP12A-1. The source of the radiation appeared to be a black particulate in the soil which was caked to the disposed materials. Two soil samples, TP12A-1-1 and TP12A-1-2, were collected from this depth interval and submitted for chemical and radiochemical analyses. The results of those analyses are present in the Chemical Analysis Results section (Section 3.1.1.2.7) of this project scoping plan.

Test pits TP12A-3 and TP12A-4 were excavated in the disposal area identified by EM and GPR surveys in the central portion of SEAD-12A (Disposal Pit C). Miscellaneous military components were also unearthed in these two test pits. Several battery cells, containing a liquid which may have been a battery electrolyte were found among the fill material from the TP12A-3 excavation. Some of the battery cell casings were breached and contained various levels of liquid within them. The sources of the EM and GPR anomalies at the TP12A-4 location were found to be 5 foot lengths of corrugated pipes.

Test pits TP12A-5, TP12A-6, and TP12A-7 were excavated over the three localized in-phase response anomalies situated in the north-central portion of SEAD-12A. Test pit TP12A-8 was placed in a localized area of elevated ground conductivity also situated in the north-central portion of SEAD-12A.

A layer of fill was observed in the stratigraphy of the soils at test pits TP12A-5 and TP12A-6. The fill layer was 1.5 feet thick at the TP12A-5 location and 1.8 feet thick at the TP12A-6 location. The sources of the localized EM-31 anomalies associated to test pits TP12A-5 through TP12A-8 were not identified.

Test pit TP12B-2 was centered over the easternmost EM-31 in-phase anomaly at SEAD-12B. Several buried metal sign posts and one 3-foot square metal sign were excavated at this location. No markings were visible on either face of the metal sign. Test pit TP12B-3 was centered over the anomaly presumably associated with the dry waste disposal pit. No buried wastes were observed in this excavation, however, a layer of yellow-orange fine sand was observed in the 0.3 to 2.8 foot depth interval. Although the source of the small GPR reflectors observed at this location were not identified, the characteristics of the sand material excavated were unique to this test pit location. The sand material consisted of almost 100% sand with no visible silt or clay content. Test pit TP12B-4 intersected the northern most EM and GPR anomalies. Naturally layered silt and silt with sand was observed throughout this excavation.

Six exploratory soil borings were advanced at the suspected location of the 5,000 gallon underground storage tank in an attempt to sample the contents of the tank. At each location, the boring was augered to refusal. A penetrometer point was then used to hammer the base of the boring in an attempt to breach the 5,000 gallon UST. After the penetrometer point had descended approximately 3 inches, the penetrometer point was removed from the boring and a decontaminated split spoon was used to collect a sample of the material from the bottom of each soil boring. Competent shale was collected in the base of the split spoons from each of the six exploratory borings, indicating that the borings had not been placed over the UST. Sand and gravel from the 18 foot to 20 foot depth interval were collected from the boring located between the center of the in-phase response anomaly associated with the UST and the location of the UST shown on the historical site drawings for SEAD-12B. This subsurface soil sample location was identified as SB12B-1. The location of soil boring SB12B-1 is shown on Figure 3-1.

Soils excavated from the test pits and the exploratory borings were continuously screened for organic vapors with an OVM-580B and for radioactivity with a Victoreen-190 Radiation monitor (alpha-beta-gamma rate meter), a Ludlum-19 micro-R beta and gamma rate meter, and a Ludlum 2221 alpha scintillation meter. With the exception of the readings from test pit TP12A-1, no readings above background levels (0 ppm for the OVM, 10-15 μR per hour for the beta and gamma meters, and 6 counts per minute on the alpha meter) were observed during the excavations

3.1.1.2.4 Site Hydrology and Hydrogeology

The topography in the area of SEAD-12A generally slopes to the north and to the southwest. Surface water flow from precipitation events in this area is controlled by local topography and the drainage ditches which lie along the north, west and east perimeters of SEAD-12A. A small, sustained, west-flowing stream lies outside of the southern boundary of SEAD-12A. In each of these drainage pathways, the surface water flow is ultimately to the west into Reeder Creek. Figure 3-10 shows the surface water flow directions at the site.

The topography in the area of SEAD-12B slopes gently to the west. Surface water flow at SEAD-12B is to the west and is controlled by local topography and two shallow west-flowing drainage ditches. One drainage ditch parallels Patrol Road which borders SEAD-12B to the north and the second drainage ditch borders SEAD-12B to the south. Runoff in each of the two ditches ultimately flows to a small tributary of Reeder Creek. Surface water flow is shown in Figure 3-10.

The topography of the remainder of SEAD-12 slopes to the west. Surface water flow is controlled by local topography and the drainage ditches which border the roads within SEAD-12. Runoff in these drainage ditches ultimately flows into a small tributary of Reeder Creek. There are no sustained surface water bodies at SEAD-12.

As part of the ESI program, three monitoring wells were installed at SEAD-12A and three monitoring wells were installed at SEAD-12B. Groundwater elevations were measured in all six wells, and the results are presented in Table 3-1B. The groundwater elevations are shown on Figure 3-11. Based on these data, the groundwater flow direction is primarily to the west in the area of SEAD-12A and to the south in the area of SEAD-12B.

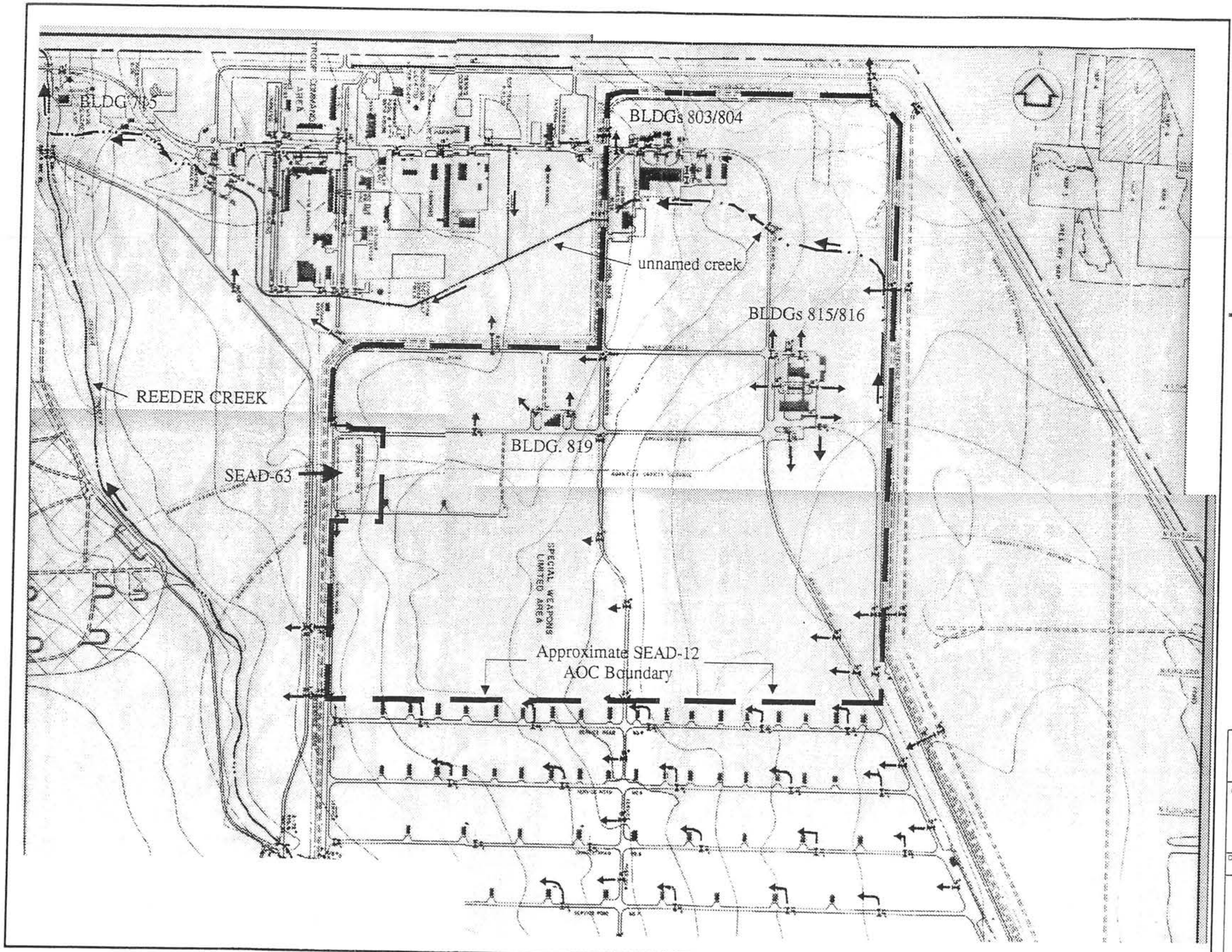
3.1.1.2.5 Aerial Photo Review

Aerial photographs taken in 1959, 1968, 1985, and 1993 were used to identify areas that may be of interest from a waste disposal or waste storage perspective. Figures 3-12 through 3-14 show the photographs that were examined. The aerial photograph review consisted of identifying areas where bare ground is visible and identifying features that might indicate that a known disposal area was in use.

TABLE 3-1B

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
GROUNDWATER ELEVATION SUMMARY FROM ESI

MONITORING WELL NUMBER	TOP OF PVC CASING ELEVATION (MSL)	WELL DEVELOPMENT			SAMPLING			WATER LEVEL MEASUREMENTS		
		DATE	DEPTH TO GROUNDWATER TOC (FT)	GROUNDWATER ELEVATION (MSL)	DATE	DEPTH TO GROUNDWATER TOC (FT)	GROUNDWATER ELEVATION (MSL)	DATE	DEPTH TO GROUNDWATER TOC (FT)	GROUNDWATER ELEVATION (MSL)
MW12A-1	658.32	6/22/94	6.30	652.02	7/20/94	6.33	651.99	7/6/94 7/26/94	4.30 6.98	654.02 651.34
MW12A-2	657.40	6/22/94	5.25	652.15	7/20/94	5.43	651.97	7/6/94 7/26/94	3.43 6.10	653.97 651.30
MW12A-3	657.44	6/22/94	6.06	651.38	7/20/94	6.02	651.42	7/6/94 7/26/94	4.10 6.63	653.34 650.81
MW12B-1	653.36	6/25/94	10.22	643.14	7/19/94	10.54	642.82	7/6/94	9.06	644.30
MW12B-2	649.93	6/23/94	7.15	642.78	7/19/94	7.18	642.75	7/6/94 7/26/94	5.73 7.82	644.20 642.11
MW12B-3	650.03	6/26/94	6.70	643.33	7/19/94	7.25	642.78	7/6/94 7/26/94	5.68 7.91	644.35 642.12



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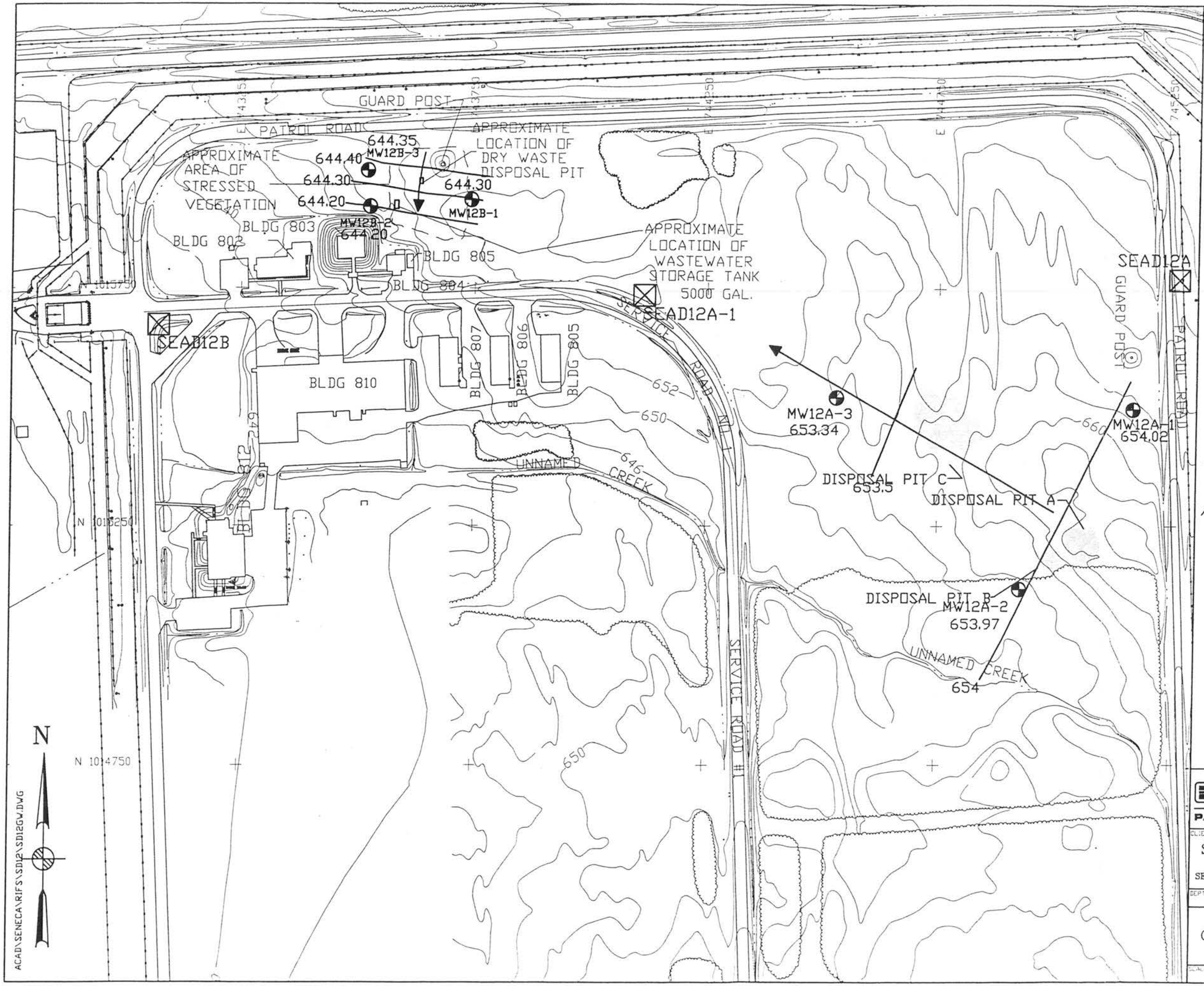
SENECA ARMY DEPOT
RI/FS PROJECT SCOPING PLAN
SEAD-12

DEPT ENVIRONMENTAL ENGINEERING
DWG NO

FIGURE 3-10
SURFACE WATER FLOW DIRECTIONS FOR SEAD-12

SCALE NA
DATE JUNE 1995



LEGEND

	MINOR WATERWAY
	MAJOR WATERWAY
	FENCE
	UNPAVED ROAD
	BRUSH LINE
	LANDFILL EXTENT
	RAILROAD
760	GROUND SURFACE ELEVATION CONTOUR

ROAD SIGN
DECIDUOUS TREE
GUIDE POST
FIRE HYDRANT
MANHOLE
COORDINATE GRID (250' GRID)
POLE
UTILITY BOX
MAILBOX/RR SIGNAL
OVERHEAD UTILITY POLE
☒ SURVEY MONUMENT

MW12A-1 654.02 **MONITORING WELL WITH WATER TABLE ELEVATION**

654 **GROUNDWATER ELEVATION CONTOUR (ARROW INDICATES DIRECTION OF FLOW)**

GROUNDWATER LEVEL MEASUREMENTS MADE ON 7/06/94

KNOWN DISPOSAL PIT AREA (PITS A,B, AND C)

100 0 100 200
(feet)

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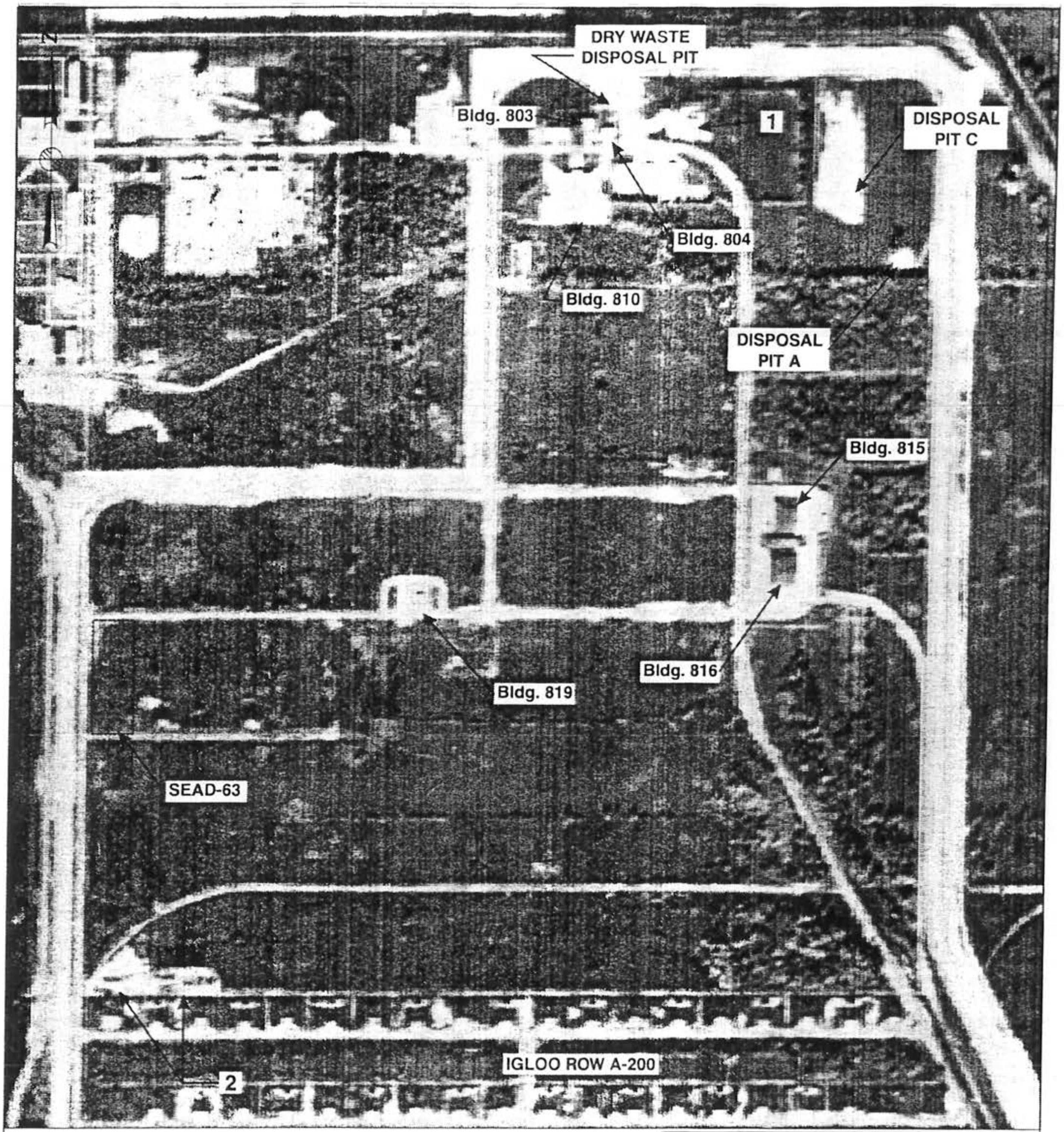
Dwg. No. 728751-02001

FIGURE 3-11
GROUNDWATER ELEVATION MAP

SCALE 1" = 200'
DATE AUGUST 1995
REV. A



2 PHOTO AREA NUMBER DISCUSSED IN REPORT

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RI/FS PROJECT SCOPING PLAN
SEAD12, SEAD14 AND SEAD63

ENVIRONMENTAL ENGINEERING

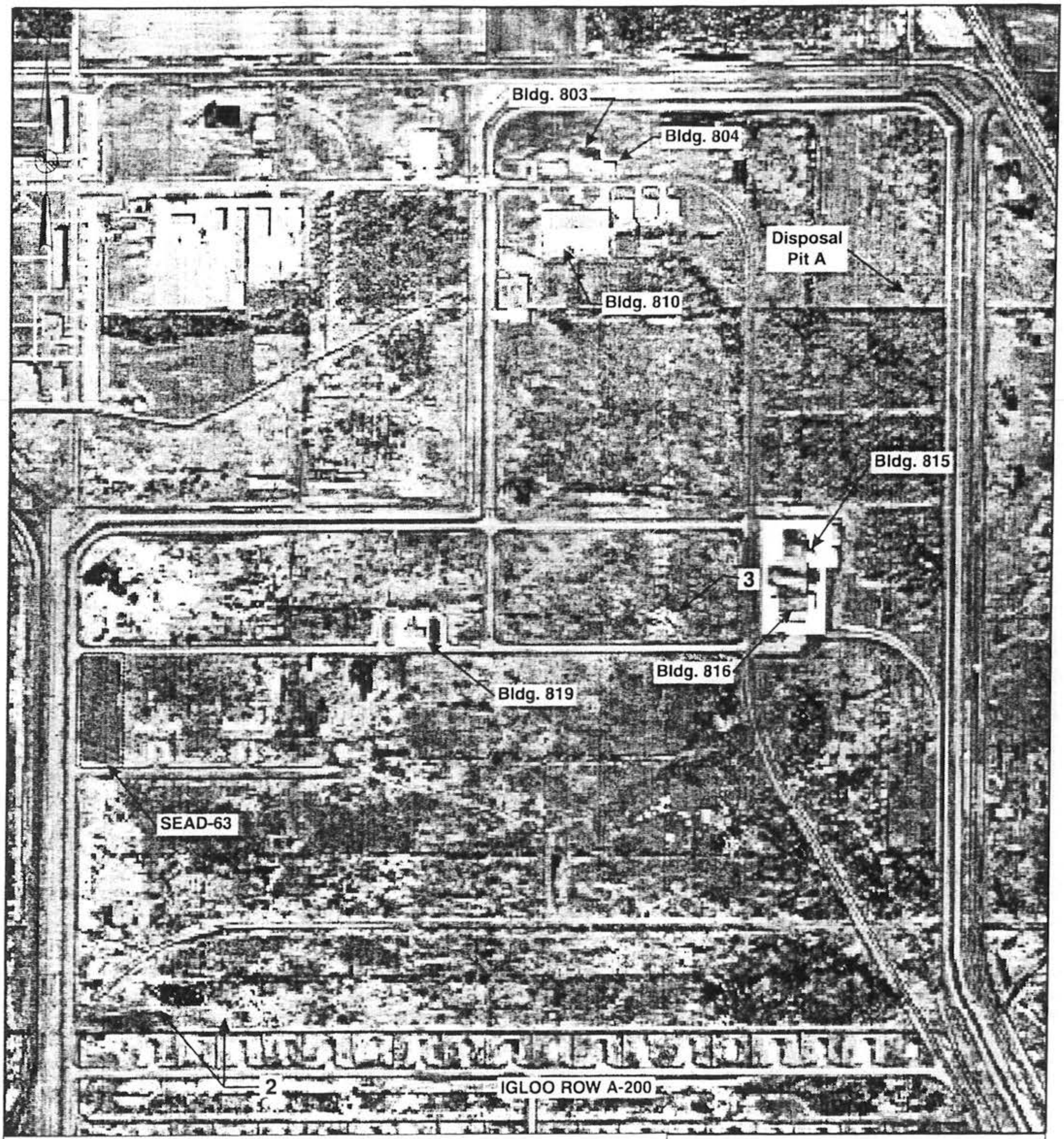
DWG NO. 730047-01001

FIGURE 3-12
SEAD 12 ARIAL PHOTO
1959

NONE

NOVEMBER 1996

R:\SENECA\SD12\AP1959.CDR



3 PHOTO AREA NUMBER DISCUSSED IN REPORT

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SENECA ARMY DDEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD12, SEAD14 AND SEAD63

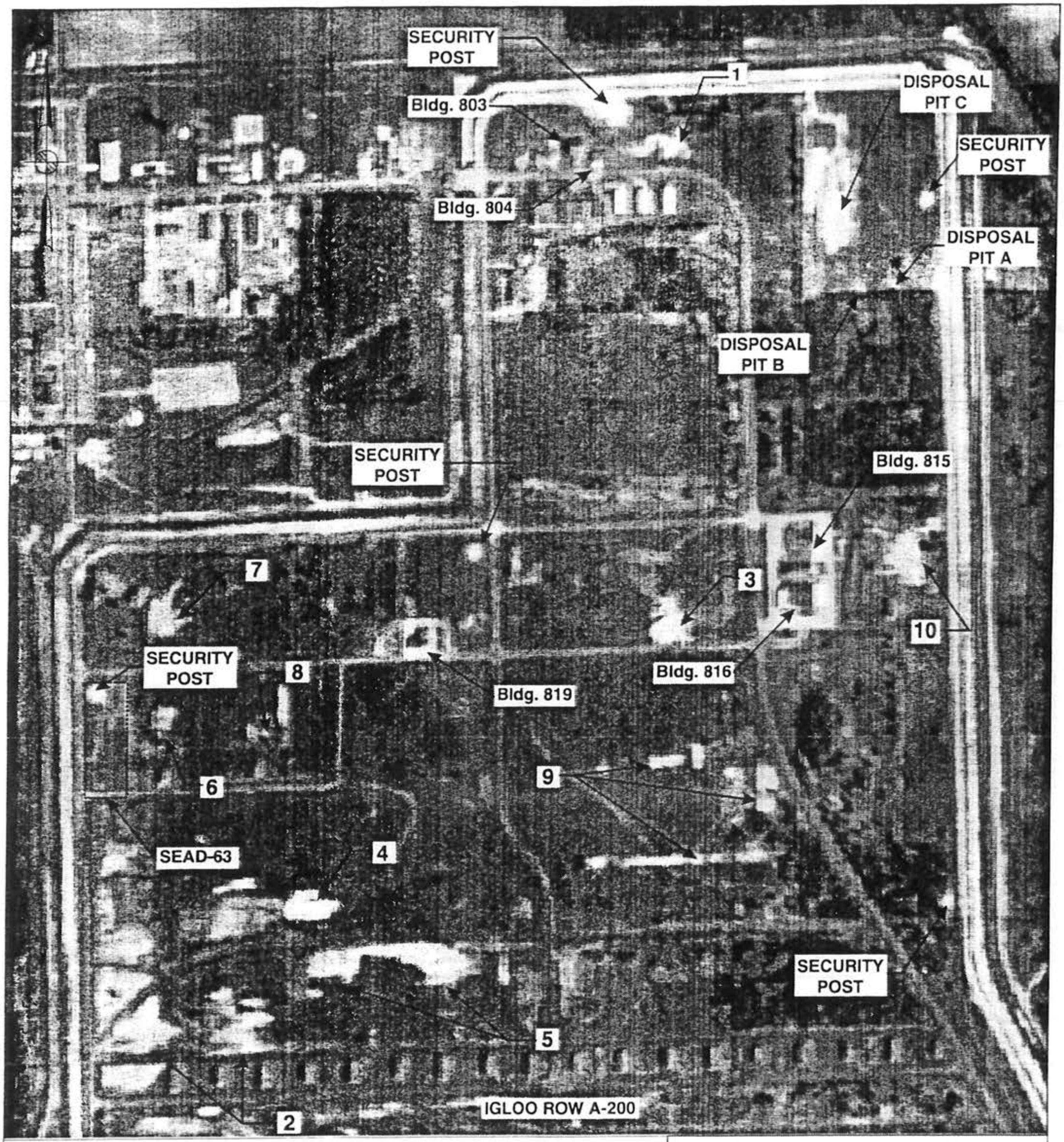
ENVIRONMENTAL ENGINEERING

DWG NO 730047-01001

FIGURE 3-13
SEAD 12 ARIAL PHOTO
1968

NONE

NOVEMBER 1996



4 PHOTO AREA NUMBER DISCUSSED IN REPORT

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RI/FS PROJECT SCOPING PLAN
SEAD12, SEAD14 AND SEAD63

DEPT ENVIRONMENTAL ENGINEERING	DWG NO. 730047-01001

FIGURE 3-14
SEAD 12 ARIAL PHOTO
1986

SCALE NONE	DATE NOVEMBER 1996

The 1959 aerial photograph (Figure 12) shows that the area known as the radioactive waste disposal area (identified as Disposal Pit A on the photograph) was in use, however, the resolution of the photograph does not allow any additional information to be derived. Also visible on this aerial photo is an area with no vegetation to the northwest of the radioactive waste disposal area (identified as Disposal Pit C on the photograph). Though no information about this area is available, the geophysical investigations conducted during the ESI revealed one large disposal site (Disposal Pit C discussed in the geophysical results section) in this area. To the north and east of Buildings 804 and 805 are two areas that are not vegetated (identified as Dry Waste Disposal Pit and Photo Area 1 on the aerial photograph). The area directly north of Building 804 was presumably associated with the Dry Waste Disposal Pit discussed in the Site History Section (Section 3.1.1.1). There is currently no information that describes the use or uses of the area to the east of Building 805 (Photo Area 1). At present, this area is poorly vegetated. The last area of no vegetation coverage that is visible on this photo (Photo Area 2) is an area in the southwest corner of the current AOC, immediately north of Igloos A0201and A0202. Again, there is no information available that describes the use or uses of this area. However, based upon current topography in this area, it appears to have been used as a borrow site for dirt and/or shale (for gravel). During a recent site visit, several shale bedrock outcrops were noted and by looking at the local topography, the area appears to have been excavated to about 7 feet below the surrounding lands.

The 1968 aerial photograph (Figure 3-13) shows that the area of the radioactive disposal pits (identified as Disposal Pit A on the photo) was probably active. The photograph reveals what is probably a fence surrounding the area and the location of the five disposal pits is visible. In addition, a sixth potential disposal area is visible, approximately 20 to 30 feet north of the five known disposal pits. This area would help explain the large aerial extent of the EM-31 response (approximately 90 feet long by 80 feet wide) recorded during the ESI. The area of no vegetation to the north and west of the radioactive waste disposal pits (identified as Disposal Pit C) and the area of no vegetation to the north and east of Buildings 803 and 804 (The Dry Waste Disposal Pit and Photo Area 1) that are visible on the 1959 photo appear to be vegetated in the 1968 photo, indicating that these areas were probably not in use at that time. The area in the southwest corner of the current AOC (Photo Area 2) appears to have been active, presumably still as a borrow area. A new area of disturbed grounds is visible in this photo (Photo Area 3) and is located immediately north of Service Road No. 3, approximately 350 feet east of Building 816. The use or function of this area is not discernible on the photo, and current SEDA personnel are not aware of this site having been used for any storage or disposal purposes. The 1985 aerial photograph (Figure 3-14) shows that the area of the radioactive disposal pits (Disposal Pit A on the photo) was not in use. The fence line noted in the 1968 photo is visible, however there are no indications of any bare grounds or poorly vegetated grounds within the fenced area. The areas identified as Disposal Pit B and Disposal Pit C during the ESI (and identified as such on the photo) are visibly unvegetated in this photo. The presumed borrow area in the southwest corner of the AOC (Photo Area 2) and the area immediately north of Service Road No. 3 (Photo Area 3) are also clearly unvegetated. New areas of poor or no vegetation are also visible and are identified on the photo as Photo Areas 4 through 10. At present, the reasons for these areas having little or no vegetation are unknown.

3.1.1.2.6 Radiation Protection Officer Records Review

At the present time, limited radiation survey and thermoluminescent dosimeter badge data are available. The data that is available includes incomplete records of radiation dose surveys and wipe tests that were performed in Buildings 803, 806, 810, 815, and 816 during the years of 1987 through 1995 and TLD dosimetry from 1984. These data were collected as part of SEDA's radiation protection programs. Additional radiation survey data may be available, however none has been located since the currently available data were found. Additional TLD data have been requested, and, if available, will be included in the final report of the remedial investigation. It should be noted that, at present, these are the only data known to document any radiation surveys that were performed at SEDA. The following paragraphs present the findings of the reviews of these records. Table 3-2A presents a summary of the data that are contained in the 1984 TLD records and Table 3-2B presents a summary of the data that are contained in the radiation survey records.

The summary of the TLD records for 25 of SEDA's permanent personnel are shown in Table 3-2A. The highest dose received by any individual was 0.876 rem, which was a dose measured from a damaged TLD badge. The data in this table is presented to illustrate that the people who worked in SEDA's WSA were exposed to levels of radiation that are below current federal radiation worker dose levels. It should be emphasized that the personnel exposures summarized in Table 3-2A occurred while those personnel were performing their duties on the military items that contained radioactive materials. More importantly, this data suggests that neither significant radioactive contamination nor significant radioactive releases had occurred, up to 1984, in the areas that were used for the WSA's operations.

Table 3-2A
Seneca Army Depot Activity
SEAD-12 and SEAD-63 RI/FS Project Scoping Plan
Summary of Thermoluminescent Detector Badges for Q-Area Personnel, 1983 to 1984

TOTAL ACCUMULATED REM-1983/1984	JOB TYPE	REMARKS
0.032	H	
0.034	H	
0.038	H	
0.041	H	
0.045	H	
0.053	H	
0.058	H	
0.072	H	
0.095	H	
0.105	H	
0.147	H	
0.013	S/H	
0.023	S/H	
0.045	M	
0.000	Q	
0.834	Q	Dosimeter Not Received
0.010	W	
0.037	W	
0.037	W	
0.039	W	
0.041	W	
0.049	W	
0.052	W	
0.053	W	
0.054	W	
0.075	W	
0.080	W	
0.088	W	
0.098	W	
0.102	W	
0.427	W	Dosimeter Not Received
0.876	W	Dosimeter Damaged
0.027	S/W	
0.031	S/W	

W= Worker: worked on the floor of Buildings 815,816, and/or 819
H= Handler : loaded/transported/unloaded items between igloos and Buildings
S= Supervisor
Q= Quality Assurance
M= Maintenance: handled/maintained/stored tools that were used in Buildings

Table 3-2B
SEAD-12
Seneca Army Depot Activity
Radiation Protection Officer's Radiological Survey data Summary

Year	Location	Period	Summary of Key Points
1995	Building 803	January	5 floor wipes, 25 container/floor wipes, all resutls reported as 0 alpha and 0 beta exposure rate measurements: 0.015 mR/hr (background) at all locations not occupied by a drum or box.
		June	12 locations surveyed: all alpha readings were below 1 cpm/100 cm^2, all beta below 1,000 cpm/100cm^2
		September	4 floor wipes, two floor alpha readings greater than zero, one 0.9 dpm/100cm^2, one 1.6 dpm; all floor beta readings 0 dpm/100cm^2. 27 drum/box/floor wipes, 12 drum/box/floor alpha readings above zero, min. 0.9dpm/100 cm^2, max 11.3 dpm/100^2; 4 drum/box/floor beta readings above zero, min. 3.7 dpm/100cm^2, max 42.2 dpm/100cm^2.
	Buildings 815/816	January	6 exposure rate measurements, 6 floor wipes: all exposure rate measurements 0.015 mR/hr (background), all wipes zero dpm/100cm^2 alpha and zero dpm/100cm^2 beta.
		February	5 exposure rate measurements, 5 floor wipes: all exposure rate measurements 0.015 mR/hr (background), one alpha wipe reading greater than zero dpm/100cm^2, one 3.1 dpm/100cm^2, all beta readings reported as 0 dpm/100cm^2
		March	7 exposure rate measurements, 7 floor wipes: four exposure rate measurements above 0.015 mR/hr: two 0.03 mR/hr readings, two 0.02 mR/hr readings. All wipes reported as zero alpha dpm/100cm^2 and zero beta dpm/100cm^2.
		April	7 exposure rate measurements, 7 floor wipes: all exposure rate measurements were 0.015 mR/hr. All wipes reported as zero alpha dpm/100cm^2 and zero beta dpm/100cm^2.
		October	7 exposure rate measurements, 7 floor wipes: all exposure rate measurements were 0.02 mR/hr. 5 wipes reported as zero alpha dpm/100cm^2 and 6 reported as zero beta dpm/100cm^2. One wipe reported as 1.6 dpm/100cm^2 alpha, one wipe reported as 1.2 dpm/100cm^2 alpha, and one wipe reported as 3.8 dpm/100cm^2 beta.
1994	Building 803	Full year	Several hundred exposure rate measurements and wipe tests performed. All exposure rate measurements at locations not being used for storage and all wipe tests equal to background exposure rate and below 20 dpm/100cm^2, respectively.
	Buildings 815/816	Full year	Approximately 100 exposure rate measurements and wipe tests performed. All but one location had exposure rate measurements equal to background values and a wipe test results that were below 20 dpm/100cm^2.
		March	One exposure rate reading of 0.15 mR/hr and corresponding wipe test results of 141.8 dpm/100cm^2 alpha and 262.9 dpm/100cm^2 beta.
1992	Building 803	Full year	Between 25 and 58 exposure rate measurements and wipe tests performed each month. All exposure measurements equal to background at locations not being used for storage. Most wipe test measurements equal to 0 dpm/100cm^2 alpha and 0 dpm/100cm^2 beta.
		Full year	Highest alpha wipe reading: 1 dpm/100cm^2 in Vault 1, 2 dpm/100cm^2 in Vault 2, 5 dpm/100cm^2 in Vault 3, and 7 dpm/100cm^2 in Vault 4.
		Full year	Highest beta wipe reading: 17 dpm/100cm^2 in Vault 1, 29 dpm/100cm^2 in Vault 2, 22 dpm/100cm^2 in Vault 3, and 10 dpm/100cm^2 in Vault 4.
	Buildings 815/816	Full year	7 exposure rate measurements and wipe tests performed each month. All exposure rate measurements equal to background. Most wipe test measurements equal to 0 dpm/100cm^2 alpha and 0 dpm/100cm^2 beta.
		Full year	Highest alpha wipe reading: 2 dpm/100cm^2
		Full year	Highest beta wipe reading: 27 dpm/100cm^2
1988	Building 803	Full Year	Between 11 and 23 exposure rate measurements and wipe tests performed monthly. All exposure rate measurements were between 0.02 and 0.09 mR/hr at locations that were not used for drum/box storage. All alpha and beta wipe tests were below the method LLD. The LLD was not provided.
	Building 815	Full year	10 wipe tests were collected monthly from the Building 815 hot room, all results were reported as less than the LLD.
	Building 810	Full year	10 wipe tests were collected monthly, all results were reported as less than the LLD.
1987	Building 803	Full year	Between 21 and 55 exposure rate and wipe tests performed monthly. All exposure rate measurements were between 0.01 and 0.329 mR/hr at locations that were not used for drum/box storage.
		Full year	All wipe tests were reported as less that the LLD except for the monthly measurements from two drum/floor wipe tests in vault 1 and two drum/floor wipe tests in vault 3
		Full year	Maximum wipe test reading approx. 120 dpm/100cm^2 alpha in vault 1 and approx. 350 dpm/100cm^2 alpha and 550 dpm/100cm^2 beta in vault 3.

The radiation survey records that are summarized in Table 3-2B contain data showing that Building 803 was used to temporarily store drums and boxes of radioactive wastes before they were shipped to licensed off-site radioactive waste disposal sites. The drums and boxes were stored in the vaults of Building 803 as far back as 1987, and as recent as December of 1995. As part of the radiation protection program for storing these drums and boxes, radiation exposure rate measurements were performed in the immediate vicinity of each drum and box, as well as at one location near the door of each vault being used and periodically at one or several areas on the vault floor where no drums or boxes were being stored. The radiation survey records also show that Buildings 815 and 816 were surveyed at least quarterly from as early as 1993.

The radiation surveys in all buildings consisted of taking exposure rate measurements using an AN/PDR Model 274 (1987 and 1988) or a Ludlum Model 3 (from 1990 to 1995) and then taking a 100 cm^2 wipe from each exposure rate measurement location. In Building 803, wipes of each drum or box and the floor immediately below each drum or box were taken. In Buildings 815 and 816, wipes were taken at various locations throughout the buildings, and typically between 5 and 12 locations were surveyed. The background and survey location exposure rate measurements were recorded on floor plan drawings and the wipes were labeled and sent to an Army laboratory for gross alpha and gross beta counting. The results of the gross alpha and beta counting were reported in several manners, the most common being a statement that the counting results were “less than the lower limit of detection (LLD)”. In most cases, the LLD was not reported along with the results.

3.1.1.2.7 Chemical Analysis Results

Soil, groundwater, surface water, and sediment were sampled from the areas of SEAD-12A and SEAD-12B as part of the ESI conducted at SEAD-12 in 1994. The results of the ESI investigation were presented in the report titled "Expanded Site Inspection, Eight Moderately Low Priority AOCs, SEADs 5, 9, 12 (A and B), (43, 56, 69), 44 (A and B), 50, 58, and 59" which was issued in April 1995. A total of 2 surface soil samples and 21 subsurface soil samples were collected at SEAD-12. Groundwater from six monitoring wells and surface water and sediment from the sustained creek in the northern half of SEAD-12 were also sampled as part of this investigation. The following sections describe the nature and extent of contamination identified at SEAD-12.

Soil

The analytical results for the 2 surface soil samples and the 21 subsurface soil samples (23 soil samples in total) collected as part of the investigation of SEAD-12 are presented in Tables 3-3A (SEAD-12A) and 3-3B (SEAD-12B). These data are compared to the criteria in the Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels (NYSDEC, 1994). The following sections describe the nature and extent of contamination in SEAD-12 soils. The sample locations are shown in Figure 3-1.

Volatile Organic Compounds

Four volatile organic compounds were detected in eight of the 23 soil samples collected. They were found at concentrations of 1J to 26 mg/kg which were well below their respective criteria.

Semivolatile Organic Compounds

A total of 22 semivolatile organic compounds (SVOs), primarily polynuclear aromatic hydrocarbons (PAHs), were found at varying concentrations in 13 of the 23 the soil samples collected at SEAD-12. Nine of the compounds had detection limits that exceeded the associated TAGM value. Some uncertainty may be associated with the compounds in which detection limits are above the TAGM value. This may be due to artifacts of variable sample weight, matrix effects, or instrument sensitivity.

The PAH compounds were detected in the subsurface soil samples collected from test pits TP12A-1, TP12A-6, TP12A-7, and in the surface soil sample collected from the MW12B-1 soil boring. The highest concentration of any PAH was 420 mg/kg of fluoranthene which was detected in sample TP12A-1-2. No PAHs were detected in the background soil samples collected from the MW12A-1 soil boring. The PAH compounds fluoranthene, phenanthrene, pyrene, benzo(a) anthracene, chrysene, benzo(b) and benzo(k)fluouranthene, and benzo(b)pyrene were detected in the surface soil sample collected from the MW12B-1 soil boring. None of the reported PAH concentrations in this sample exceeded their respective criteria. The only PAH compounds which exceeded their respective TAGM values were benzo(a)pyrene and dibenz(a,h)anthracene. The criteria for these two PAH compounds were exceeded in soil samples from each of test pits TP12A-1, TP12A-6, and TP12A-7.

TABLE 3-3A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL ANALYSIS RESULTS SEAD-12A ESI

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-12 2.5 06/24/94 TP12A-1-1 225531 45048	SOIL SEAD-12 3 06/24/94 TP12A-1-2 225532 45048	SOIL SEAD-12 6 06/22/94 TP12A-2-1 225398 44799	SOIL SEAD-12 5 06/22/94 TP12A-2-2 225399 44799	SOIL SEAD-12 2.5 06/22/94 TP12A-3-1 225400 44799	SOIL SEAD-12 6 06/22/94 TP12A-3-2 225401 44799
Methylene Chloride	ug/Kg	1	13%	100	0	12 U	11 U	14 U	12 U	1 J	1 J
Trichloroethene	ug/Kg	26	19%	700	0	3 J	26	14 U	12 U	13 U	11 U
Toluene	ug/Kg	2	6%	1500	0	12 U	11 U	14 U	12 U	13 U	11 U
Chlorobenzene	ug/Kg	5	13%	1700	0	12 U	11 U	14 U	12 U	13 U	11 U
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	300	13%	30	2	300 J	48 J	4500 U	390 U	430 U	370 U
4-Methylphenol	ug/Kg	140	6%	330	0	140 J	380 U	4500 U	390 U	430 U	370 U
2,4-Dimethylphenol	ug/Kg	25	6%	NA	NA	25 J	380 U	4500 U	390 U	430 U	370 U
2-Methylnaphthalene	ug/Kg	21	6%	36400	0	400 U	21 J	4500 U	390 U	430 U	370 U
Acenaphthylene	ug/Kg	33	6%	41000	0	400 U	33 J	4500 U	390 U	430 U	370 U
Acenaphthene	ug/Kg	44	6%	50000*	0	400 U	380 U	4500 U	390 U	430 U	370 U
Fluorene	ug/Kg	52	13%	50000*	0	400 U	52 J	4500 U	390 U	430 U	370 U
Phenanthrene	ug/Kg	340	25%	50000*	0	27 J	340 J	4500 U	390 U	430 U	370 U
Anthracene	ug/Kg	96	19%	50000*	0	400 U	96 J	4500 U	390 U	430 U	370 U
Carbazole	ug/Kg	40	6%	NA	NA	400 U	380 U	4500 U	390 U	430 U	370 U
Di-n-butylphthalate	ug/Kg	1700	44%	8100	0	79 J	1700	4500 U	390 U	430 U	370 U
Fluoranthene	ug/Kg	420	25%	50000*	0	40 J	420	4500 U	390 U	430 U	370 U
Pyrene	ug/Kg	380	25%	50000*	0	37 J	380	4500 U	390 U	430 U	370 U
Benzo(a)anthracene	ug/Kg	180	25%	224	0	21 J	180 J	4500 U	390 U	430 U	370 U
Chrysene	ug/Kg	240	25%	400	0	28 J	240 J	4500 U	390 U	430 U	370 U
bis(2-Ethylhexyl)phthalate	ug/Kg	860	19%	50000*	0	230 J	860	4500 U	390 U	430 U	370 U
Benzo(b)fluoranthene	ug/Kg	320	25%	1100	0	28 J	190 J	4500 U	390 U	430 U	370 U
Benzo(k)fluoranthene	ug/Kg	160	19%	1100	0	32 J	160 J	4500 U	390 U	430 U	370 U
Benzo(a)pyrene	ug/Kg	200	25%	61	3	30 J	200 J	4500 U	390 U	430 U	370 U
Indeno(1,2,3-cd)pyrene	ug/Kg	140	19%	3200	0	400 U	120 J	4500 U	390 U	430 U	370 U
Dibenz(a,h)anthracene	ug/Kg	99	19%	14	3	400 U	57 J	4500 U	390 U	430 U	370 U
Benzo(g,h,i)perylene	ug/Kg	120	19%	50000*	0	400 U	120 J	4500 U	390 U	430 U	370 U

TABLE 3-3A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL ANALYSIS RESULTS SEAD-12A ESI

COMPOUND	MATRIX	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
	DEPTH (FEET)					2.5	3	6	5	2.5	6
	SAMPLE DATE					06/24/94	06/24/94	06/22/94	06/22/94	06/22/94	06/22/94
	ES ID					TP12A-1-1	TP12A-1-2	TP12A-2-1	TP12A-2-2	TP12A-3-1	TP12A-3-2
	LAB ID					225531	225532	225398	225399	225400	225401
	SDG NUMBER					45048	45048	44799	44799	44799	44799
	UNITS										
PESTICIDES/PCB											
Aldrin	ug/Kg	0.79	6%	41	0	0.79 J	2 U	4.7 U	2 U	2.2 U	1.9 U
4,4'-DDE	ug/Kg	6.4	19%	2100	0	4 U	2.2 J	9 U	3.9 U	4.3 U	3.7 U
Endrin	ug/Kg	20	13%	100	0	4 U	3.8 U	20 J	3.8 J	4.3 U	3.7 U
4,4'-DDD	ug/Kg	5.1	6%	2900	0	4 U	3.8 U	9 U	3.9 U	4.3 U	3.7 U
4,4'-DDT	ug/Kg	3.8	13%	2100	0	4 U	3.8 U	9 U	2.1 J	4.3 U	3.7 U
alpha-Chlordane	ug/Kg	2.6	13%	NA	NA	2.1 U	1.5 J	4.7 U	2 U	2.2 U	1.9 U
gamma-Chlordane	ug/Kg	2.3	13%	540	0	2.1 U	2 U	4.7 U	2.1 J	2.2 U	1.9 U
Aroclor-1254	ug/Kg	2300	25%	10000(a)	0	49	73	2300	500	43 U	37 U
Aroclor-1260	ug/Kg	150	13%	10000(a)	0	40 U	38 U	150	31 J	43 U	37 U
METALS											
Aluminum	mg/Kg	18700	100%	14593	3	11400	11400	10900	17100	13200	9720
Antimony	mg/Kg	7.2	44%	3.59	1	0.31 J	1.9 J	7.2 J	1.9 J	0.25 UJ	0.27 UJ
Arsenic	mg/Kg	7.7	100%	7.5	1	3.8	5.2	4.7	4.9	5	3.7
Barium	mg/Kg	135	100%	300	0	96.3	93.3	81	73.6	89	73.6
Beryllium	mg/Kg	0.83	100%	0.73	4	0.5 J	0.62 J	0.74 J	0.74 J	0.71 J	0.49 J
Cadmium	mg/Kg	94.3	100%	1	5	7.8	94.3	27.3	37.3	3.6	0.68 J
Calcium	mg/Kg	86700	100%	101904	0	38900 J	81800 J	77700	10900	5600	85400
Chromium	mg/Kg	83.3	100%	22	5	27.5	83.3	16.5	32.4	18.1	14.8
Cobalt	mg/Kg	26.5	100%	30	0	9.9	9.4 J	13.1	26.5	10.2	8.3 J
Copper	mg/Kg	215	100%	25	6	25.7	215	43.6	128	18.6	18
Iron	mg/Kg	34500	100%	26627	2	20100	24200	19000	27500	24100	19400
Lead	mg/Kg	431	100%	21.86	5	18.9 J	366 J	20	20.2	25.7	10
Magnesium	mg/Kg	36100	100%	12222	5	8390	9310	5360	5290	4530	12700
Manganese	mg/Kg	939	100%	669	2	518	495	502	428	490	429
Mercury	mg/Kg	0.11	100%	0.1	1	0.04 J	0.05 J	0.04 J	0.03 J	0.06 J	0.02 J
Nickel	mg/Kg	201	100%	34	4	25.3	29.9	39	201	27.2	25
Potassium	mg/Kg	3670	100%	1762	7	1640 J	1490 J	1530 J	1370 J	1290 J	1700 J
Selenium	mg/Kg	1.9	69%	2	0	1.1	0.6 J	1.2	1	1.9	0.65 J
Silver	mg/Kg	11.9	19%	0.4	2	0.1 U	11.9	0.49 J	0.33 J	0.1 U	0.1 U
Sodium	mg/Kg	136	88%	104	6	45.2 J	101 J	46.2 J	66.8 J	30.3 J	129 J
Thallium	mg/Kg	0.98	56%	0.28	9	0.37 U	0.44 J	0.98 J	0.59 J	0.56 J	0.7 J
Vanadium	mg/Kg	36.4	100%	150	0	17.9	19.2	17.9	19.6	22.5	15.4
Zinc	mg/Kg	424	100%	83	7	95.4	285	93.3	424	112	53.8
OTHER ANALYSES											
Total Solids	%W/W					82.2	86.6	72.9	84.8	76.4	89.1

TABLE 3-3A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL ANALYSIS RESULTS SEAD-12A ESI

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-12 4 06/21/94 TP12A-4-1 224878 44799	SOIL SEAD-12 4 06/21/94 TP12A-4-2 224879 44799	SOIL SEAD-12 3 06/23/94 TP12A-5-1 225539 45048	SOIL SEAD-12 1 06/23/94 TP12A-6-1 225540 45048	SOIL SEAD-12 7 06/23/94 TP12A-6-2 225541 45048	SOIL SEAD-12 4 06/23/94 TP12A-7-1 225543 45048
Methylene Chloride	ug/Kg	1	13%	100	0	12 U	12 U	11 U	11 U	11 U	15 UJ
Trichloroethene	ug/Kg	26	19%	700	0	2 J	12 U	11 U	11 U	11 U	15 UJ
Toluene	ug/Kg	2	6%	1500	0	2 J	12 U	11 U	11 U	11 U	15 UJ
Chlorobenzene	ug/Kg	5	13%	1700	0	5 J	1 J	11 U	11 U	11 U	15 UJ
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	300	13%	30	2	390 U	400 U	370 U	380 U	370 U	540 U
4-Methylphenol	ug/Kg	140	6%	330	0	390 U	400 U	370 U	380 U	370 U	540 U
2,4-Dimethylphenol	ug/Kg	25	6%	NA	NA	390 U	400 U	370 U	380 U	370 U	540 U
2-Methylnaphthalene	ug/Kg	21	6%	36400	0	390 U	400 U	370 U	380 U	370 U	540 U
Acenaphthylene	ug/Kg	33	6%	41000	0	390 U	400 U	370 U	380 U	370 U	540 U
Acenaphthene	ug/Kg	44	6%	50000*	0	390 U	400 U	370 U	44 J	370 U	540 U
Fluorene	ug/Kg	52	13%	50000*	0	390 U	400 U	370 U	35 J	370 U	540 U
Phenanthrene	ug/Kg	340	25%	50000*	0	390 U	400 U	370 U	280 J	370 U	120 J
Anthracene	ug/Kg	96	19%	50000*	0	390 U	400 U	370 U	63 J	370 U	43 J
Carbazole	ug/Kg	40	6%	NA	NA	390 U	400 U	370 U	40 J	370 U	540 U
Di-n-butylphthalate	ug/Kg	1700	44%	8100	0	390 U	400 U	28 J	47 J	32 J	50 J
Fluoranthene	ug/Kg	420	25%	50000*	0	390 U	400 U	370 U	300 J	370 U	320 J
Pyrene	ug/Kg	380	25%	50000*	0	390 U	400 U	370 U	230 J	370 U	230 J
Benzo(a)anthracene	ug/Kg	180	25%	224	0	390 U	400 U	370 U	99 J	370 U	150 J
Chrysene	ug/Kg	240	25%	400	0	390 U	400 U	370 U	130 J	370 U	210 J
bis(2-Ethylhexyl)phthalate	ug/Kg	860	19%	50000*	0	390 U	400 U	370 U	380 U	370 U	540 U
Benzo(b)fluoranthene	ug/Kg	320	25%	1100	0	390 U	400 U	370 U	95 J	370 U	320 J
Benzo(k)fluoranthene	ug/Kg	160	19%	1100	0	390 U	400 U	370 U	76 J	370 U	540 UJ
Benzo(a)pyrene	ug/Kg	200	25%	61	3	390 U	400 U	370 U	92 J	370 U	180 J
Indeno(1,2,3-cd)pyrene	ug/Kg	140	19%	3200	0	390 U	400 U	370 U	69 J	370 U	140 J
Dibenz(a,h)anthracene	ug/Kg	99	19%	14	3	390 U	400 U	370 U	43 J	370 U	99 J
Benzo(g,h,i)perylene	ug/Kg	120	19%	50000*	0	390 U	400 U	370 U	29 J	370 U	98 J

TABLE 3-3A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL ANALYSIS RESULTS SEAD-12A ESI

COMPOUND	MATRIX	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
	DEPTH (FEET)					4	4	3	1	7	4
	SAMPLE DATE					06/21/94	06/21/94	06/23/94	06/23/94	06/23/94	06/23/94
	ES ID					TP12A-4-1	TP12A-4-2	TP12A-5-1	TP12A-6-1	TP12A-6-2	TP12A-7-1
	LAB ID					224878	224879	225539	225540	225541	225543
	SDG NUMBER					44799	44799	45048	45048	45048	45048
	UNITS										
PESTICIDES/PCB											
Aldrin	ug/Kg	0.79	6%	41	0	2 U	2 U	1.9 U	2 U	1.9 U	2.8 U
4,4'-DDE	ug/Kg	6.4	19%	2100	0	3.9 U	4 U	3.7 U	6.4	3.7 U	2.3 J
Endrin	ug/Kg	20	13%	100	0	3.9 U	4 U	3.7 U	3.8 U	3.7 U	5.4 U
4,4'-DDD	ug/Kg	5.1	6%	2900	0	3.9 U	4 U	3.7 U	5.1	3.7 U	5.4 U
4,4'-DDT	ug/Kg	3.8	13%	2100	0	3.9 U	4 U	3.7 U	3.8	3.7 U	5.4 U
alpha-Chlordane	ug/Kg	2.6	13%	NA	NA	2 U	2 U	1.9 U	2 U	1.9 U	2.6 J
gamma-Chlordane	ug/Kg	2.3	13%	540	0	2 U	2 U	1.9 U	2 U	1.9 U	2.3 J
Aroclor-1254	ug/Kg	2300	25%	10000(a)	0	39 U	40 U	37 U	38 U	37 U	54 U
Aroclor-1260	ug/Kg	150	13%	10000(a)	0	39 U	40 U	37 U	38 U	37 U	54 U
METALS											
Aluminum	mg/Kg	18700	100%	14593	3	9600	13400	9750	14000	8460	18600
Antimony	mg/Kg	7.2	44%	3.59	1	0.25 UJ	0.18 UJ	0.26 UJ	0.25 J	0.28 J	0.39 J
Arsenic	mg/Kg	7.7	100%	7.5	1	4.2	4.9	3.8	5.2	2.9	7.7
Barium	mg/Kg	135	100%	300	0	72	102	94.5	78.7	76.2	135
Beryllium	mg/Kg	0.83	100%	0.73	4	0.48 J	0.63 J	0.45 J	0.61 J	0.4 J	0.83 J
Cadmium	mg/Kg	94.3	100%	1	5	0.57 J	0.82	0.4 J	0.7 J	0.35 J	1 J
Calcium	mg/Kg	86700	100%	101904	0	82800	39100	78800 J	22000 J	62000 J	25400 J
Chromium	mg/Kg	83.3	100%	22	5	14.1	18.5	15.1	20.7	14	25
Cobalt	mg/Kg	26.5	100%	30	0	8.6 J	9.6	8.2 J	10.1	6.8 J	15.7
Copper	mg/Kg	215	100%	25	6	21.2	24.2	19.5	21.2	16.4	38.4
Iron	mg/Kg	34500	100%	26627	2	18700	23300	18900	26100	17100	34500
Lead	mg/Kg	431	100%	21.86	5	8.9	16.8	15.5 J	22.7 J	431 J	49 J
Magnesium	mg/Kg	36100	100%	12222	5	15700	9930	19100	6840	11600	10600
Manganese	mg/Kg	939	100%	669	2	395	419	394	524	358	857
Mercury	mg/Kg	0.11	100%	0.1	1	0.03 J	0.03 J	0.04 J	0.08 J	0.03 J	0.11
Nickel	mg/Kg	201	100%	34	4	24.8	30.9	24	28.4	22	39.4
Potassium	mg/Kg	3670	100%	1762	7	1990 J	2880 J	2350 J	1430 J	1700 J	3670 J
Selenium	mg/Kg	1.9	69%	2	0	0.95 J	1.6	0.54 U	1.2	0.48 U	1.2 J
Silver	mg/Kg	11.9	19%	0.4	2	0.1 U	0.07 U	0.1 U	0.08 U	0.09 U	0.13 U
Sodium	mg/Kg	136	88%	104	6	124 J	107 J	115 J	51.5 J	95 J	26.5 U
Thallium	mg/Kg	0.98	56%	0.28	9	0.41 J	0.56 J	0.38 U	0.48 J	0.34 U	0.98 J
Vanadium	mg/Kg	36.4	100%	150	0	16.2	21.5	17.5	22.7	14.1	36.4
Zinc	mg/Kg	424	100%	83	7	79.3	281	51.1	78.8	53.8	155
OTHER ANALYSES											
Total Solids	%W/W					84.8	83.4	88.7	87.1	89.1	61.4

TABLE 3-3A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL ANALYSIS RESULTS SEAD-12A ESI

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-12 7 06/24/94 TP12A-8-1 225533 45048	SOIL SEAD-12 0-0.2 06/10/94 MW12A-1-00 223886 44725	SOIL SEAD-12 4-6 06/10/94 MW12A-1-03 223887 44725	SOIL SEAD-12 8-9.5 06/10/94 MW12A-1-05 223888 44725
Methylene Chloride	ug/Kg	1	13%	100	0	11 U	13 U	11 U	11 U
Trichloroethene	ug/Kg	26	19%	700	0	11 U	13 U	11 U	11 U
Toluene	ug/Kg	2	6%	1500	0	11 U	13 U	11 U	11 U
Chlorobenzene	ug/Kg	5	13%	1700	0	11 U	13 U	11 U	11 U
SEMIVOLATILE ORGANICS									
Phenol	ug/Kg	300	13%	30	2	370 U	430 U	370 U	350 U
4-Methylphenol	ug/Kg	140	6%	330	0	370 U	430 U	370 U	350 U
2,4-Dimethylphenol	ug/Kg	25	6%	NA	NA	370 U	430 U	370 U	350 U
2-Methylnaphthalene	ug/Kg	21	6%	36400	0	370 U	430 U	370 U	350 U
Acenaphthylene	ug/Kg	33	6%	41000	0	370 U	430 U	370 U	350 U
Acenaphthene	ug/Kg	44	6%	50000*	0	370 U	430 U	370 U	350 U
Fluorene	ug/Kg	52	13%	50000*	0	370 U	430 U	370 U	350 U
Phenanthrene	ug/Kg	340	25%	50000*	0	370 U	430 U	370 U	350 U
Anthracene	ug/Kg	96	19%	50000*	0	370 U	430 U	370 U	350 U
Carbazole	ug/Kg	40	6%	NA	NA	370 U	430 U	370 U	350 U
Di-n-butylphthalate	ug/Kg	1700	44%	8100	0	52 J	430 U	370 U	350 U
Fluoranthene	ug/Kg	420	25%	50000*	0	370 U	430 U	370 U	350 U
Pyrene	ug/Kg	380	25%	50000*	0	370 U	430 U	370 U	350 U
Benzo(a)anthracene	ug/Kg	180	25%	224	0	370 U	430 U	370 U	350 U
Chrysene	ug/Kg	240	25%	400	0	370 U	430 U	370 U	350 U
bis(2-Ethylhexyl)phthalate	ug/Kg	860	19%	50000*	0	370 U	430 U	73 J	350 U
Benzo(b)fluoranthene	ug/Kg	320	25%	1100	0	370 U	430 U	370 U	350 U
Benzo(k)fluoranthene	ug/Kg	160	19%	1100	0	370 U	430 U	370 U	350 U
Benzo(a)pyrene	ug/Kg	200	25%	61	3	370 U	430 U	370 U	350 U
Indeno(1,2,3-cd)pyrene	ug/Kg	140	19%	3200	0	370 U	430 U	370 U	350 U
Dibenz(a,h)anthracene	ug/Kg	99	19%	14	3	370 U	430 U	370 U	350 U
Benzo(g,h,i)perylene	ug/Kg	120	19%	50000*	0	370 U	430 U	370 U	350 U

TABLE 3-3A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL ANALYSIS RESULTS SEAD-12A ESI

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-12 7 06/24/94 TP12A-8-1 225533 45048	SOIL SEAD-12 0-0.2 06/10/94 MW12A-1-00 223886 44725	SOIL SEAD-12 4-6 06/10/94 MW12A-1-03 223887 44725	SOIL SEAD-12 8-9.5 06/10/94 MW12A-1-05 223888 44725
PESTICIDES/PCB									
Aldrin	ug/Kg	0.79	6%	41	0	1.9 U	2.2 U	1.9 U	1.8 U
4,4'-DDE	ug/Kg	6.4	19%	2100	0	3.7 U	4.3 U	3.7 U	3.5 U
Endrin	ug/Kg	20	13%	100	0	3.7 U	4.3 U	3.7 U	3.5 U
4,4'-DDD	ug/Kg	5.1	6%	2900	0	3.7 U	4.3 U	3.7 U	3.5 U
4,4'-DDT	ug/Kg	3.8	13%	2100	0	3.7 U	4.3 U	3.7 U	3.5 U
alpha-Chlordane	ug/Kg	2.6	13%	NA	NA	1.9 U	2.2 U	1.9 U	1.8 U
gamma-Chlordane	ug/Kg	2.3	13%	540	0	1.9 U	2.2 U	1.9 U	1.8 U
Aroclor-1254	ug/Kg	2300	25%	10000(a)	0	37 U	43 U	37 U	35 U
Aroclor-1260	ug/Kg	150	13%	10000(a)	0	37 U	43 U	37 U	35 U
METALS									
Aluminum	mg/Kg	18700	100%	14593	3	6610	18700	11000	12400
Antimony	mg/Kg	7.2	44%	3.59	1	0.26 UJ	0.22 UJ	0.24 UJ	0.2 UJ
Arsenic	mg/Kg	7.7	100%	7.5	1	3.1	5.2	3.5	3.6
Barium	mg/Kg	135	100%	300	0	67.4	125	82.8	78.3
Beryllium	mg/Kg	0.83	100%	0.73	4	0.31 J	0.8 J	0.46 J	0.58 J
Cadmium	mg/Kg	94.3	100%	1	5	0.5 J	0.86	0.52 J	0.85
Calcium	mg/Kg	86700	100%	101904	0	86700 J	3370	71200	70300
Chromium	mg/Kg	83.3	100%	22	5	10.6	23.1	15.3	19.7
Cobalt	mg/Kg	26.5	100%	30	0	7.1 J	10.9	10.1	10.8
Copper	mg/Kg	215	100%	25	6	17.7	19.1	20.6	29.6
Iron	mg/Kg	34500	100%	26627	2	14400	23500	17400	22600
Lead	mg/Kg	431	100%	21.86	5	12.3 J	21.6	7.6	10.8
Magnesium	mg/Kg	36100	100%	12222	5	36100	3880	19200	12000
Manganese	mg/Kg	939	100%	669	2	326	939	414	409
Mercury	mg/Kg	0.11	100%	0.1	1	0.02 J	0.06 J	0.02 J	0.03 J
Nickel	mg/Kg	201	100%	34	4	18.9	25.7	23.7	35.5
Potassium	mg/Kg	3670	100%	1762	7	1480 J	2660 J	3460 J	2910 J
Selenium	mg/Kg	1.9	69%	2	0	0.54 U	1.2	0.5 U	0.41 U
Silver	mg/Kg	11.9	19%	0.4	2	0.1 U	0.09 U	0.09 U	0.08 U
Sodium	mg/Kg	136	88%	104	6	112 J	16.9 U	79.9 J	136 J
Thallium	mg/Kg	0.98	56%	0.28	9	0.38 U	0.32 U	0.35 U	0.29 U
Vanadium	mg/Kg	36.4	100%	150	0	11	33.1	21.7	20.2
Zinc	mg/Kg	424	100%	83	7	42.6	77.8	41.4	82.1
OTHER ANALYSES									
Total Solids	%W/W					89.8	76.8	89.6	93

NOTES:

a) The TAGM value for PCBs is 1000ug/Kg for surface soils and 10,000 ug/Kg for subsurface soils.
b) * = As per proposed TAGM, total VOCs < 10 ppm, total SVOs < 500 ppm, and individual SVOs < 50ppm.
c) NA = Not Available.
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.
g) R = The data was rejected during the data validation process.

TABLE 3-3B

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL ANALYSIS RESULTS SEAD-12B ESI

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-12 4 06/25/94 TP12B-1 225582 45058	SOIL SEAD-12 2.5 06/24/94 TP12B-2-1 225550 45058	SOIL SEAD-12 2.5 06/25/94 TP12B-3 225551 45058	SOIL SEAD-12 0-0.2 06/13/94 MW12B-1-00 224233 44799
VOLATILE ORGANICS									
Methylene Chloride	ug/Kg	1	14%	100	0	1 J	12 U	11 U	11 U
Carbon Disulfide	ug/Kg	1	14%	2700	0	11 U	12 U	11 U	11 U
2-Butanone	ug/Kg	3	14%	300	0	11 U	12 U	11 U	11 U
SEMIVOLATILE ORGANICS									
Phenanthrene	ug/Kg	34	14%	50000*	0	360 U	380 U	370 U	34 J
Di-n-butylphthalate	ug/Kg	53	29%	8100	0	44 J	380 U	53 J	360 U
Fluoranthene	ug/Kg	64	14%	50000*	0	360 U	380 U	370 U	64 J
Pyrene	ug/Kg	51	14%	50000*	0	360 U	380 U	370 U	51 J
Benzo(a)anthracene	ug/Kg	26	14%	224	0	360 U	380 U	370 U	26 J
Chrysene	ug/Kg	32	14%	400	0	360 U	380 U	370 U	32 J
bis(2-Ethylhexyl)phthalate	ug/Kg	83	29%	50000*	0	360 U	380 U	370 U	360 U
Benzo(b)fluoranthene	ug/Kg	34	14%	1100	0	360 U	380 U	370 U	34 J
Benzo(k)fluoranthene	ug/Kg	20	14%	1100	0	360 U	380 U	370 U	20 J
Benzo(a)pyrene	ug/Kg	20	14%	61	0	360 U	380 U	370 U	20 J
PESTICIDES/PCB									
4,4'-DDE	ug/Kg	2	14%	2100	0	3.6 UJ	3.8 U	3.7 U	2 J
Aroclor-1242	ug/Kg	17	29%	10000(a)	0	36 UJ	38 U	37 U	17 J
METALS									
Aluminum	mg/Kg	10800	100%	14593	0	7400	10300	6850	10800
Arsenic	mg/Kg	6.6	100%	7.5	0	4.4 J	4.6 J	3.3 J	6.6
Barium	mg/Kg	138	100%	300	0	78.3	90.5	36.5 J	102
Beryllium	mg/Kg	0.53	100%	.73	0	0.37 J	0.52 J	0.26 J	0.53 J
Cadmium	mg/Kg	0.63	100%	1	0	0.36 J	0.43 J	0.18 J	0.63 J
Calcium	mg/Kg	85300	100%	101904	0	85300	76400	45500	45900
Chromium	mg/Kg	16	100%	22	0	11.4	15.9	9.1	16
Cobalt	mg/Kg	9.7	100%	30	0	7.6 J	9.7	4.3 J	9.2
Copper	mg/Kg	30.4	100%	25	1	22.1	21.9	13.8	30.4
Iron	mg/Kg	23400	100%	26627	0	15600	20100	11700	23400
Lead	mg/Kg	17.1	100%	21.86	0	7.9	10.6	4.8	17.1
Magnesium	mg/Kg	22800	100%	12222	4	22800	16900	18300	11400
Manganese	mg/Kg	418	100%	669	0	340	383	337	418
Mercury	mg/Kg	0.5	100%	0.1	1	0.03 J	0.02 J	0.03 J	0.04 J
Nickel	mg/Kg	29	100%	34	0	19.9	29	9.2	28
Potassium	mg/Kg	2330	100%	1762	4	1940 J	2330 J	2150 J	1870 J
Selenium	mg/Kg	2.1	43%	2	1	0.48 U	0.5 U	0.54 U	1.3
Sodium	mg/Kg	252	100%	104	5	252 J	233 J	157 J	76.2 J
Thallium	mg/Kg	0.79	86%	0.28	6	0.39 J	0.79 J	0.46 J	0.41 J
Vanadium	mg/Kg	20.9	100%	150	0	14.8	18.5	15.4	20.9
Zinc	mg/Kg	62.7	100%	83	0	40.7 J	51.7 J	28.9 J	62.7
OTHER ANALYSES									
Total Solids	%W/W					91	86	88.8	91.4

TABLE 3-3B

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL ANALYSIS RESULTS SEAD-12B ESI

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-12 4-6 06/13/94 MW12B-1-03 224234 44799	SOIL SEAD-12 12-13.5 06/13/94 MW12B-1-07 224235 44799	SOIL SEAD-12 18-21 06/29/94 SB12B-1 225902 45062
VOLATILE ORGANICS								
Methylene Chloride	ug/Kg	1	14%	100	0	11 U	11 U	11 U
Carbon Disulfide	ug/Kg	1	14%	2700	0	11 U	11 U	1 J
2-Butanone	ug/Kg	3	14%	300	0	11 U	11 U	3 J
SEMIVOLATILE ORGANICS								
Phenanthrene	ug/Kg	34	14%	50000*	0	360 U	360 U	380 U
Di-n-butylphthalate	ug/Kg	53	29%	8100	0	360 U	360 U	380 U
Fluoranthene	ug/Kg	64	14%	50000*	0	360 U	360 U	380 U
Pyrene	ug/Kg	51	14%	50000*	0	360 U	360 U	380 U
Benzo(a)anthracene	ug/Kg	26	14%	224	0	360 U	360 U	380 U
Chrysene	ug/Kg	32	14%	400	0	360 U	360 U	380 U
bis(2-Ethylhexyl)phthalate	ug/Kg	83	29%	50000*	0	45 J	83 J	380 U
Benzo(b)fluoranthene	ug/Kg	34	14%	1100	0	360 U	360 U	380 U
Benzo(k)fluoranthene	ug/Kg	20	14%	1100	0	360 U	360 U	380 U
Benzo(a)pyrene	ug/Kg	20	14%	61	0	360 U	360 U	380 U
PESTICIDES/PCB								
4,4'-DDE	ug/Kg	2	14%	2100	0	3.6 U	3.6 U	3.8 U
Aroclor-1242	ug/Kg	17	29%	10000(a)	0	16 J	36 U	38 U
METALS								
Aluminum	mg/Kg	10800	100%	14593	0	8060	5940	9050 J
Arsenic	mg/Kg	6.6	100%	7.5	0	4.6	2.9	1.9 J
Barium	mg/Kg	138	100%	300	0	89.1	43.8	138 J
Beryllium	mg/Kg	0.53	100%	.73	0	0.4 J	0.27 J	0.44 J
Cadmium	mg/Kg	0.63	100%	1	0	0.52 J	0.32 J	0.29 J
Calcium	mg/Kg	85300	100%	101904	0	79400	51100	83400 J
Chromium	mg/Kg	16	100%	22	0	12.7	12	13.8 J
Cobalt	mg/Kg	9.7	100%	30	0	8.6 J	5.2 J	4.6 J
Copper	mg/Kg	30.4	100%	25	1	22.5	17.3	15.6 J
Iron	mg/Kg	23400	100%	26627	0	17200	13500	14100 J
Lead	mg/Kg	17.1	100%	21.86	0	10.3	7.3	7.5
Magnesium	mg/Kg	22800	100%	12222	4	16300	8320	12200 J
Manganese	mg/Kg	418	100%	669	0	388	244	366 J
Mercury	mg/Kg	0.5	100%	0.1	1	0.5	0.03 J	0.03 J
Nickel	mg/Kg	29	100%	34	0	23.5	19	18.2 J
Potassium	mg/Kg	2330	100%	1762	4	1660 J	1040 J	1650 J
Selenium	mg/Kg	2.1	43%	2	1	0.72 J	2.1	0.53 U
Sodium	mg/Kg	252	100%	104	5	135 J	77.3 J	115 J
Thallium	mg/Kg	0.79	86%	0.28	6	0.64 J	0.39 J	0.37 U
Vanadium	mg/Kg	20.9	100%	150	0	13.8	11.5	13.5 J
Zinc	mg/Kg	62.7	100%	83	0	50.5	36.2	46.7 J
OTHER ANALYSES								
Total Solids	%W/W					90.6	90.9	87.1

Five other SVOs were also detected: phenol, 4-methylphenol, 2,4-dimethylphenol, carbazole, bis(2-ethylhexyl)phthalate, and di-n-butylphthalate. Phenol was detected in two samples at concentrations above the TAGM value. The remaining compounds were detected at concentrations which were below their respective TAGM values.

Pesticides and PCBs

Seven pesticides and 3 PCBs were detected in the soil samples obtained from SEAD-12. All of the reported concentrations of these compounds were below the respective TAGM values. No pesticides or PCBs were detected in the background soil samples collected from the MW12A-1 soil boring. One pesticide (4-4' DDE) and one PCB (Aroclor-1242) were detected in 2 of the background soil samples collected from the MW12B-1 soil boring.

Metals

A variety of metals were found at concentrations which were slightly above their respective TAGM values. The majority of these exceedances appear to reflect natural variations in site soils. The exceptions to this were the metals cadmium, chromium, copper, lead, mercury, nickel, silver, thallium and zinc. All were reported at concentrations which were at least two times their respective TAGM values in one or more of the subsurface soil samples collected at SEAD-12. In particular, the concentrations of cadmium detected in the subsurface soil samples collected from test pit excavations TP12A-1 and TP12A-2 exceeded their respective TAGM values by at least an order of magnitude. For thallium, the detection limit in eight samples exceeded the TAGM value.

There were no significant concentrations of metals reported in the soil samples collected from the MW12A-1 background soil boring, the background surface soil sample MW12B-1-00 or the background subsurface soil sample MW12B-1-07. The background subsurface soil sample MW12B-1-03 (collected from the 4 to 6 foot depth interval) had reported concentrations of thallium and mercury which exceeded their respective criteria by at least a factor of two.

Radioactivity

Soils in the area of SEAD-12A where 5 disposal pits were excavated and removed in 1986 have been impacted by radium-226. Tables 3-4A and 3-4B present the results of the radioactivity analyses for soils at SEAD-12A and SEAD-12B. The radiochemical data from soil samples

TP12A-1-1 and TP12A-1-2 indicate that a release of radium-226 has occured in the disposal pit from which they were collected. The reported radium-226 levels were 8.3 pCi/g in sample TP12A-1-1 and 24 pCi/g in sample TP12A-1-2. The radiochemical data from the remaining surface and subsurface soil samples collected at SEAD-12 were comparatively low, and all were similar to the radionuclide levels detected in the background soil samples at the MW12A-1 location.

Groundwater

Groundwater samples from six monitoring wells were collected as part of the ESI conducted at SEAD-12. The groundwater monitoring well installation diagrams are presented in Appendix B. The summary of chemical analyses is presented in Tables 3-5A and 3-5B. The following sections describe the nature and extent of groundwater contamination identified at SEAD-12.

Volatile Organic Compounds

One volatile organic compound was detected in the groundwater sample collected at MW12A-3. Acetone was detected at an estimated concentration of 9Jmg/L. No VOCs were detected in the remaining 5 groundwater samples analyzed.

Semivolatile Organic Compounds

No semivolatile organic compounds were detected in the six groundwater samples collected at SEAD-12.

Pesticides and PCBs

No pesticides or PCBs were detected in the six groundwater samples collected at SEAD-12.

TABLE 3-4A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL RADIOACTIVITY ANALYSIS RESULTS SEAD-12A ESI

			MEDIA	SOIL	SOIL	SOIL	SOIL
			SWMU	SEAD-12A	SEAD-12A	SEAD-12A	SEAD-12A
			DEPTH (FT)	0-0.2	4-6	8-9.5	2.5
			DATE SAMPLED	6/10/94	6/10/94	6/10/94	6/24/94
			ES ID	MW12A-1-00	MW12A-1-03	MW12A-1-05	TP12A-1-1
			LAB ID	224295	224296	224297	225663
RADIONUCLIDE ANALYSIS	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g
GAMMA SPECTRAL							
Pb-210	100%	NA	NA	9.8	1.8	2.1	8.3
Ra-226	100%	6.3pCi/g (see notes below)	0	1.1	1.23	1.6	8.6
Ra-228	100%	NA	NA	1.12	0.98	1.12	1.07
Th-228	100%	NA	NA	1.5	1.13	1.8	1.33
U-235	100%	NA	NA	0.12	0.09	0.1	0.13
U-238	100%	NA	NA	1.16	0.77	0.52	1.39
GROSS ALPHA	100%	NA	NA	18	12	10	25
GROSS BETA	100%	NA	NA	33	26	30	39

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface is used as an ARAR ar some NPL sites.

TABLE 3-4A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL RADIOACTIVITY ANALYSIS RESULTS SEAD-12A ESI

			MEDIA	SOIL	SOIL	SOIL	SOIL
			SWMU	SEAD-12A	SEAD-12A	SEAD-12A	SEAD-12A
			DEPTH (FT)	3	6	5	2.5
			DATE SAMPLED	6/24/94	6/22/94	6/22/94	6/22/94
			ES ID	TP12A-1-2	TP12A-2-1	TP12A-2-2	TP12A-3-1
			LAB ID	225664	255657	225658	225659
RADIONUCLIDE ANALYSIS GAMMA SPECTRAL	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g
Pb-210	100%	NA	NA	17	2.4	3	2.4
Ra-226	100%	6.3pCi/g (see notes below)	0	24	2.3	2.6	1.7
Ra-228	100%	NA	NA	1.25	1.07	1.08	1.5
Th-228	100%	NA	NA	1.8	1.7	1.7	1.7
U-235	100%	NA	NA	0.31	0.37	0.13	0.18
U-238	100%	NA	NA	2.2	0.6	0.99	0.86
GROSS ALPHA	100%	NA	NA	88	28	22	29
GROSS BETA	100%	NA	NA	59	34	33	36

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface is used as an ARAR ar some NPL sites.

TABLE 3-4A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL RADIOACTIVITY ANALYSIS RESULTS SEAD-12A ESI

			MEDIA	SOIL	SOIL	SOIL	SOIL
			SWMU	SEAD-12A	SEAD-12A	SEAD-12A	SEAD-12A
			DEPTH (FT)	6	4	4	3
			DATE SAMPLED	6/22/94	6/21/94	6/21/94	6/23/94
			ES ID	TP12A-3-2	TP12A-4-1	TP12A-4-2	TP12A-5-1
			LAB ID	225660	224946	224947	225650
RADIONUCLIDE ANALYSIS GAMMA SPECTRAL	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g
Pb-210	100%	NA	NA	2.3	2	1.9	1.7
Ra-226	100%	6.3pCi/g (see notes below)	0	1.5	1.23	1.4	1.08
Ra-228	100%	NA	NA	1.22	1.22	0.94	0.97
Th-228	100%	NA	NA	1.55	2.3	1.22	0.9
U-235	100%	NA	NA	0.12	0.13	0.31	0.43
U-238	100%	NA	NA	0.91	1.29	0.48	0.6
GROSS ALPHA	100%	NA	NA	16	18	12	14
GROSS BETA	100%	NA	NA	33	23	27	28

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface is used as an ARAR ar some NPL sites.

TABLE 3-4A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL RADIOACTIVITY ANALYSIS RESULTS SEAD-12A ESI

			MEDIA	SOIL	SOIL	SOIL	SOIL
			SWMU	SEAD-12A	SEAD-12A	SEAD-12A	SEAD-12A
			DEPTH (FT)	1	7	4	7
			DATE SAMPLED	6/23/94	6/23/94	6/23/94	6/24/94
			ES ID	TP12A-6-1	TP12A-6-2	TP12A-7-1	TP12A-8-1
			LAB ID	225651	225652	225653	225665
RADIONUCLIDE ANALYSIS	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g
GAMMA SPECTRAL							
Pb-210	100%	NA	NA	2.6	1.9	4.6	2
Ra-226	100%	6.3pCi/g (see notes below)	0	1.5	1.29	1.7	1.4
Ra-228	100%	NA	NA	1.28	0.91	1.13	1.01
Th-228	100%	NA	NA	1.35	1.42	1.16	1.06
U-235	100%	NA	NA	0.33	0.25	0.11	0.08
U-238	100%	NA	NA	1.5	0.55	0.97	0.82
GROSS ALPHA	100%	NA	NA	21	16	27	11
GROSS BETA	100%	NA	NA	35	27	36	29

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface is used as an ARAR ar some NPL sites.

TABLE 3-4B

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL RADIOACTIVITY ANALYSIS RESULTS SEAD-12B ESI

			MEDIA	SOIL	SOIL	SOIL	SOIL
			SWMU	SEAD-12B	SEAD-12B	SEAD-12B	SEAD-12B
			DEPTH (FT)	4-6	4-6	12-13.5	18-21
			DATE SAMPLED	6/13/94	6/13/94	6/13/94	6/29/94
			ES ID	MW12B-1-03	MW12B-1-20	MW12B-1-07	SB12B-1
			LAB ID	224318	224320 MW12B-1-03DUP	224319	225920
RADIONUCLIDE ANALYSIS	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g
GAMMA SPECTRAL							
Pb-210	100%	NA	NA	1.5	1.6	2.5	1.7
Ra-226	100%	6.3pCi/g (see notes below)	0	1.8	1.22	1.25	1.5
Ra-228	100%	NA	NA	1.07	0.92	0.83	0.99
Th-228	100%	NA	NA	0.79	1.44	1.04	1.03
U-235	100%	NA	NA	0.3	0.82	0.07	0.34
U-238	100%	NA	NA	0.52	0.47	0.76	0.61
GROSS ALPHA	100%	NA	NA	10	6	12	17
GROSS BETA	100%	NA	NA	23	27	31	32

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface is used as an ARAR ar some NPL sites.

TABLE 3-4B

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SOIL RADIOACTIVITY ANALYSIS RESULTS SEAD-12B ESI

			MEDIA	SOIL	SOIL	SOIL	SOIL
			SWMU	SEAD-12B	SEAD-12B	SEAD-12B	SEAD-12B
			DEPTH (FT)	4	2.5	2.5	2.5
			DATE SAMPLED	6/25/94	6/24/94	6/25/94	6/25/94
			ES ID	TP12B-1	TP12B-2-1	TP12B-3	TP12B-53
			LAB ID	225671	225666	225667	225669
							TP12B-3D
RADIONUCLIDE ANALYSIS	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA				
GAMMA SPECTRAL				pCi/g	pCi/g	pCi/g	pCi/g
Pb-210	100%	NA	NA	1.9	1.8	1.6	2.7
Ra-226	100%	6.3pCi/g (see notes below)	0	1.09	1.28	0.75	1.29
Ra-228	100%	NA	NA	0.82	0.95	0.74	0.75
Th-228	100%	NA	NA	1.06	1.25	1.1	1.04
U-235	100%	NA	NA	0.25	0.07	0.1	0.15
U-238	100%	NA	NA	0.43	0.6	0.69	0.8
GROSS ALPHA	100%	NA	NA	14	14	12	13
GROSS BETA	100%	NA	NA	31	34	26	19

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface is used as an ARAR ar some NPL sites.

TABLE 3-5A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
GROUNDWATER ANALYSIS RESULTS SEAD-12A ESI

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	NUMBER ABOVE CRITERIA	WATER SEAD-12 07/20/94 MW12A-1 227608 45448	WATER SEAD-12 07/20/94 MW12A-2 227609 45448	WATER SEAD-12 07/20/94 MW12A-3 227610 45448
VOLATILE ORGANICS								
Acetone	ug/L	9	33%	NA	NA	10 U	10 U	9 J
METALS								
Aluminum	ug/L	5840	100%	NA	NA	5840	2910	1040
Barium	ug/L	146	100%	1000	0	94.2 J	79.1 J	146 J
Calcium	ug/L	123000	100%	NA	NA	123000	108000	109000
Chromium	ug/L	9.4	100%	50	0	9.4 J	4.1 J	1.7 J
Cobalt	ug/L	6.2	100%	NA	NA	6.2 J	2.4 J	1.1 J
Copper	ug/L	11.7	100%	200	0	11.7 J	4.5 J	1.3 J
Iron	ug/L	9830	100%	300	3	9830 J	4030 J	2140 J
Lead	ug/L	4.5	67%	25	0	4.5	2 J	0.89 U
Magnesium	ug/L	32800	100%	NA	NA	32800	17500	29900
Manganese	ug/L	237	100%	300	0	223	237	77
Mercury	ug/L	0.08	100%	2	0	0.08 J	0.05 J	0.06 J
Nickel	ug/L	17.3	100%	NA	NA	17.3 J	6.9 J	2.6 J
Potassium	ug/L	4730	100%	NA	NA	4180 J	2470 J	4730 J
Silver	ug/L	0.7	33%	50	0	0.5 U	0.7 J	0.5 U
Sodium	ug/L	9020	100%	20000	0	9020	5120	8770
Vanadium	ug/L	10	100%	NA	NA	10 J	4.9 J	2.2 J
Zinc	ug/L	50.3	100%	300	0	50.3	18.7 J	18.6 J
OTHER ANALYSES								
pH	Standard Units					7.9	7.4	7.1
Conductivity	umhos/cm					625	500	575
Temperature	°C					13.7	11.5	13.2
Turbidity	NTU					198	114	165

NOTES:
a) NY State Class GA Groundwater Regulations
b) NA = Not Available
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.

TABLE 3-5B

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
GROUNDWATER ANALYSIS RESULTS SEAD-12B ESI

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	NUMBER ABOVE CRITERIA	WATER SEAD-12 07/19/94 MW12B-1 227442 45332	WATER SEAD-12 07/19/94 MW12B-2 227443 45332	WATER SEAD-12 07/19/94 MW12B-3 227444 45332
METALS								
Aluminum	ug/L	9880	100%	NA	NA	4860 J	9880 J	6940 J
Antimony	ug/L	1.4	33%	3	0	1.4 J	1.3 U	1.3 U
Arsenic	ug/L	3.2	67%	25	0	3.2 J	3 J	2 U
Barium	ug/L	189	100%	1000	0	102 J	171 J	189 J
Beryllium	ug/L	0.71	100%	NA	NA	0.21 J	0.71 J	0.41 J
Cadmium	ug/L	0.27	67%	10	0	0.2 U	0.26 J	0.27 J
Calcium	ug/L	260000	100%	NA	NA	183000	260000	169000
Chromium	ug/L	18.5	100%	50	0	9.8 J	18.5	13.5
Cobalt	ug/L	15.2	100%	NA	NA	8 J	15.2 J	12 J
Copper	ug/L	25.1	100%	200	0	16.8 J	25.1	19 J
Iron	ug/L	20700	100%	300	3	10500	20700	14700
Lead	ug/L	18.8	100%	25	0	11	18.6	18.8
Magnesium	ug/L	71100	100%	NA	NA	46800	71100	37900
Manganese	ug/L	800	100%	300	3	536	800	522
Mercury	ug/L	0.08	100%	2	0	0.08 J	0.05 J	0.05 J
Nickel	ug/L	38.8	100%	NA	NA	24.4 J	38.8 J	32.5 J
Potassium	ug/L	13000	100%	NA	NA	13000 J	5510 J	2900 J
Silver	ug/L	2.7	100%	50	0	2.7 J	0.59 J	0.62 J
Sodium	ug/L	18500	100%	20000	0	18500	16400	4510 J
Thallium	ug/L	5	67%	NA	NA	2.8 J	1.9 U	5 J
Vanadium	ug/L	18.3	100%	NA	NA	9.5 J	18.3 J	12.7 J
Zinc	ug/L	55.7	100%	300	0	32.8	55.7	41.1
OTHER ANALYSES								
pH	Standard Units					5.6	6.9	8.2
Conductivity	umhos/cm					1100	875	1075
Temperature	°C					12.9	14	14.3
Turbidity	NTU					>1000	>1000	>1000

NOTES:
- a) NY State Class GA Groundwater Regulations
- b) NA = Not Available
- d) U = The compound was not detected below this concentration.
- e) J = The reported value is an estimated concentration.
- f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.

Metals

A total of 22 metals were detected in the groundwater samples collected at SEAD-12. Iron was detected at concentrations which were above the NY AWQS Class GA groundwater criteria of 300 mg/L in all six groundwater samples. The detected concentrations of iron ranged from 2,140 mg/L (MW12A-3) to 20,700 mg/L (MW12B-2). Manganese was detected at concentrations which were above the NY AWQS Class GA groundwater criteria of 300 mg/L in all 3 groundwater samples collected at SEAD-12B. The detected concentrations of manganese were 536 mg/L (MW12B-1), 800 mg/L (MW12B-2), and 522 mg/L (MW12B-3). No other significant concentrations of metals were detected in the groundwater samples collected at SEAD-12.

Radionuclides

The summary of radioactivity analysis results is presented in Tables 3-6A and 3-6B. Gamma radiation from radium-226 and 2 of its associated radionuclides were found at levels ranging from 56 pCi/L to 109 pCi/L in the groundwater sample collected from monitoring well MW12B-1, but were undetected in the duplicate sample that was also collected from this monitoring well. The current MCL for radium (sum of radium-226 and radium-228) is 5 pCi/L. The principal radionuclide uranium-235 was also detected at a level of 44 pCi/L in this sample, but was undetected in the duplicate sample. The specific activity of uranium-235 is 2,160 pCi/mg, therefore, the equivalent concentration of 44 pCi/L of uranium-235 is 20.4 ug/L. This concentration exceeded only the proposed MCL limit of 20 ug/L for uranium (total). Gamma radiation from potassium-40 was detected in all 3 groundwater samples from SEAD-12B and in one sample from SEAD-12A (MW12A-2) at levels ranging from 151 to 242 pCi/L. Gross alpha radiation was detected at various levels in all 6 groundwater samples. Exceedance of the New York State Class GA and the proposed Federal MCL criteria for gross alpha radiation (each 15 pCi/L) was detected in sample MW12A-2 and in all of the groundwater samples collected at SEAD-12B. These values are thought to be a result of the high turbidity in these groundwater samples (greater than 1,000 NTUs in all of the SEAD-12B groundwater samples and between 114 and 198 NTUs in the SEAD-12A groundwater samples). Gross beta radiation was detected in all 6 groundwater samples collected at SEAD-12 at levels ranging from 15 pCi/L to 130 pCi/L.

TABLE 3-6A

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
GROUNDWATER RADIOACTIVITY ANALYSIS RESULTS SEAD-12A ESI

					MEDIA SWMU DATE SAMPLED ES ID LAB ID	WATER SEAD-12A 7/20/94 MW12A-1 227883	WATER SEAD-12A 7/20/94 MW12A-2 227884	WATER SEAD-12A 7/20/94 MW12A-3 227885
RADIONUCLIDE ANALYSIS	REQUENCY OF ETECTIO	NY AWQS CLASS GA	EPA MCLs	FEDERAL HEALTH ADVISORY	NUMBER ABOVE CRITERIA	pCi/L	pCi/L	pCi/L
GAMMA SPECT								
K-40	50%	NA	NA	NA	NA	107.1U	193	110.8U
GROSS ALPHA	100%	15 pCi/L	15 pCi/L	15 pCi/L	1	15	38	5
GROSS BETA	100%	1000 pCi/L	4 mrem/year (note 4)	4 mrem/year (note 4)	3	39	130	15

NOTES:

1. U=not detected above this level.
2. The specific activity of uranium is 2.14 .Ci/ug.
3. The current radium-226 MCL is for the sum of Ra-226 and Ra-228. A new MCL of 20 pCi/L for each of these isotopes has been proposed, but is not yet adopted.
4. The 4 mrem/year MCL is intended to be used as a screening device to measure for man-made radionuclides

TABLE 3-6B

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
GROUNDWATER RADIOACTIVITY ANALYSIS RESULTS SEAD-12B ESI

					MEDIA	WATER			WATER	WATER	WATER
					SWMU	SEAD-12			SEAD-12	SEAD-12	SEAD-12
					DATE SAMPLED	7/19/94			7/19/94	7/19/94	7/19/94
					ES ID	MW12B-1			MW12B-5	MW12B-2	MW12B-3
					LAB ID	227878			227882 MW12B-1DUP	227880	227881
RADIONUCLIDE ANALYSIS GAMMA SPECTRAL	FREQUENCY OF DETECTION	NY AWQS CLASS GA	EPA MCLs	FEDERAL HEALTH ADVISORY	NUMBER ABOVE CRITERIA	pCi/L	ug/L		pCi/L	pCi/L	pCi/L
K-40	50%	NA	NA	NA	NA	242			149	151	209
Radium-226 @ 186 KeV		NA	5 pCi/L (note 3)	150 pCi/L	1	97			149.1U	149.5U	167.4U
Lead-214 @ 295.2 KeV		NA	NA	NA	NA	59			36.21U	36.65U	27.93U
Lead-214 @ 352 KeV		NA	NA	NA	NA	56			14.06U	13.76U	16.87U
Bismuth-214 @ 609.4 KeV		NA	NA	NA	NA	80			16.09U	15.68U	17.69U
Bismuth-214 @ 1120.4 KeV		NA	NA	NA	NA	109			54.55U	87.5U	91.26U
Bismuth-214 @ 1764.7 KeV		NA	NA	NA	NA	99			86.13U	89.26U	90.85U
Uranium-235 @ 143.8 KeV		5000 ug/L	20 ug/L	70 ug/L	1	44	20.4	see note	55U	54.28U	68.78U
GROSS ALPHA	100%	15 pCi/L	15 pCi/L	15 pCi/L	4	76			45	31	34
GROSS BETA	100%	1000 pCi/L	4 mrem/year (note 4)	4 mrem/year (note 4)	NA	130			76	120	116
TRITIUM	100%	1000 pCi/L	NA	NA		900			210	270	60

NOTES:

1. U=not detected above this level.
2. The specific activity of uranium is 2.16 uCi/ug.
3. The current radium-226 MCL is for the sum of Ra-226 and Ra-228. A new MCL of 20 pCi/L for each of these isotopes has been proposed, but is not yet adopted.
4. The 4 mrem/year MCL is intended to be used as a screening device to measure for man-made radionuclides

These levels of gross beta radiation are also believed to be the result of the high NTUs in the SEAD-12 groundwater samples. Tritium (oxide) analyses reported levels of tritium ranging from 60 to 900 pCi/L in the groundwater samples collected at SEAD-12B. The groundwater samples collected at SEAD-12A were not analyzed for tritium. Although there is no specific NYS Class GA standard for tritium, it is a beta radiation emmiter. Therefore, solely for the purposes of deteriming whether a threat existed (based upon the ESI data) from the tritium levels that were detected, those levels were compared against the NYS Class GA standard for Gross Beta radiation, which is 1,000 pCi/L. All of the detected levels of tritium were below that standard.

Surface Water

Three surface water samples were collected from the sustained unnamed creek flowing east to west in the northern half of SEAD-12. The location of the samples is shown in Figure 3-1. These samples were collected as part of the ESI conducted at SEAD-12. The summary of chemical analyses is presented in Table 3-7. The following sections describe the nature and extent of surface water contamination identified at SEAD-12.

Volatile Organic Compounds

No volatile organic compounds were detected in the surface water samples collected at SEAD-12.

Semivolatile Organic Compounds

A total of 7 semivolatile organic compounds were found in the surface water samples collected at SEAD-12. Pentachlorophenol was found at an estimated concentration of 2J mg/L in surface water sample SW12A-1. The New York State Class D surface water criteria for pentachlorophenol is 1 mg/L. The 6 remaining SVOs detected in the surface water samples include di-n-butylphthalate, pyrene, benzo(a)anthracene, chrysene, benzo(k)fluoranthene, and benzo(a)pyrene. There are no New York State Class D surface water criteria for these six SVOs. The reported concentrations of these SVOs ranged from 0.5J mg/L to 2 mg/L.

TABLE 3-7

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SURFACE WATER ANALYSIS RESULTS FROM ESI

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYS GUIDELINES CLASS D (a,b)	NUMBER ABOVE CRITERIA	WATER SEAD-12 06/24/94 SW12A-1 225429 44745	WATER SEAD-12 06/11/94 SW12A-2 223898 44745	WATER SEAD-12 06/11/94 SW12A-3 223899 44745
SEMIVOLATILE ORGANICS								
Pentachlorophenol	ug/L	2	33%	1	1	2 J	25 U	26 U
Di-n-butylphthalate	ug/L	2	67%	NA	NA	1 J	2 J	10 U
Pyrene	ug/L	1	33%	NA	NA	1 J	10 U	10 U
Benzo(a)anthracene	ug/L	0.5	33%	NA	NA	0.5 J	10 U	10 U
Chrysene	ug/L	0.5	33%	NA	NA	0.5 J	10 U	10 U
Benzo(k)fluoranthene	ug/L	1	33%	NA	NA	1 J	10 U	10 U
Benzo(a)pyrene	ug/L	0.6	33%	NA	NA	0.6 J	10 U	10 U
METALS								
Aluminum	ug/L	879	100%	NA	NA	175 J	86.7 J	879
Barium	ug/L	41.2	100%	NA	NA	28.6 J	30.9 J	41.2 J
Calcium	ug/L	85700	100%	NA	NA	85700	77400	83700
Chromium	ug/L	1.5	100%	3275	0	0.89 J	0.56 J	1.5 J
Cobalt	ug/L	0.81	100%	NA	NA	0.53 J	0.81 J	0.73 J
Copper	ug/L	2	100%	36.8	0	1.2 J	1.6 J	2 J
Iron	ug/L	966	100%	300	1	250	126	966
Magnesium	ug/L	18100	100%	NA	NA	15000	17600	18100
Manganese	ug/L	492	100%	NA	NA	20.1	492	104
Mercury	ug/L	0.11	67%	NA	NA	0.11 J	0.08 J	0.03 U
Nickel	ug/L	1.3	33%	50562	0	0.7 U	0.7 U	1.3 J
Potassium	ug/L	3360	100%	NA	NA	1610 J	3360 J	1650 J
Silver	ug/L	0.58	67%	15.4	0	0.57 J	0.58 J	0.5 U
Sodium	ug/L	70700	100%	NA	NA	7030	70700	6940
Thallium	ug/L	2	33%	20	0	1.9 U	2 J	1.9 U
Vanadium	ug/L	1.6	100%	190	0	0.98 J	0.86 J	1.6 J
Zinc	ug/L	12.9	100%	611	0	5.4 J	2.2 J	12.9 J
OTHER ANALYSES								
pH	Standard Units					7.9	6.8	5.6
Conductivity	umhos/cm					530	800	825
Temperature	°C					20.3	14	25
Turbidity	NTU					4.8	2.8	3.5

NOTES:

a) The New York State Ambient Water Quality standards and guidelines for Class D surface water.
b) Hardness dependent values assume a hardness of 217 mg/L.
c) NA = Not Available
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.

Pesticides and PCBs

No pesticides or PCBs were found in the surface water samples collected at SEAD-12.

Metals

A total of 17 metals were detected in the surface water samples collected at SEAD-12. Iron was detected at a concentration of 966 mg/L in surface water sample SW12A-3. The New York State guideline for iron in class D surface water is 300 mg/kg. The reported concentrations of chromium, copper, nickel, silver, thallium, vanadium, and zinc were below their respective criteria values. No criteria exist for the 9 remaining metals detected in the surface water samples collected at SEAD-12.

Radioactivity

Table 3-8 presents the radioactivity analysis results for the surface water samples collected at SEAD-12. No gamma emitting radionuclides from the uranium, actinium or thorium series were detected in the 3 surface water samples collected at SEAD-12. Gamma radiation from K-40 was detected in all of the surface water samples at levels ranging from 18 to 98 pCi/L. Gross alpha and gross beta radiation also were detected in all 3 surface water samples. Gross alpha radiation was detected at levels ranging from 2 to 12 pCi/L and gross beta radiation was detected at levels ranging from 9 to 16 pCi/L. No criteria exist for gross alpha or gross beta radiation in New York State Class C surface waters.

Sediment

Three sediment samples were also collected from the unnamed creek as part of the ESI conducted at SEAD-12. One sediment sample was also collected from within the depression at SEAD-12A where the 5 disposal pits had been excavated in 1986. The location of the sediment sampling points is shown in Figure 3-1. The summary of the chemical analyses is presented in Table 3-9. The following sections describe the nature and extent of sediment contamination identified at SEAD-12.

TABLE 3-8

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SURFACE WATER RADIOACTIVITY ANALYSIS RESULTS SEAD-12A ESI

			MEDIA	WATER	WATER	WATER	WATER
			SWMU	SEAD-12A	SEAD-12A	SEAD-12A	SEAD-12A
			DATE SAMPLED	6/24/94	6/24/94	6/11/94	6/11/94
			ES ID	SW12A-1	SW12A-20	SW12A-2	SW12A-3
			LAB ID	225648	225649 SW12A-1DUP	224301	224302
RADIONUCLIDE ANALYSIS	FREQUENCY OF DETECTION		NUMBER ABOVE CRITERIA	pCi/L	pCi/L	pCi/L	pCi/L
GAMMA SPECTRAL							
K-40	100%	No criteria for detected levels of radionuclides in New York state class D surface waters could be determined.	NA	55	98	74	18
GROSS ALPHA	100%		NA	11	12	2	5
GROSS BETA	100%		NA	16	12	9	10

TABLE 3-9
SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SEDIMENT ANALYSIS RESULTS FROM ESI

	MATRIX						SOIL	SOIL	SOIL	SOIL
	LOCATION						SEAD-12	SEAD-12	SEAD-12	SEAD-12
	DEPTH (FEET)						0-0.2	0-0.2	0-0.2	0-0.2
	SAMPLE DATE						06/22/94	06/11/94	06/11/94	06/11/94
	ES ID		FREQUENCY			NUMBER	SD12A-1	SD12A-2	SD12A-3	SD12A-4
	LAB ID		OF			ABOVE	225396	223908	223909	223910
	SDG NUMBER	MAXIMUM	DETECTION	LEVEL	SOURCE	CRITERIA	44799	44748	44748	44748
COMPOUND	UNITS			(a)						
SEMIVOLATILE ORGANICS										
Di-n-butylphthalate	ug/Kg	53	25%	1197	(c)	0	53 J	610 U	450 U	400 U
Fluoranthene	ug/Kg	26	25%	190	LEL	0	0 U	610 U	26 J	400 U
METALS										
Aluminum	mg/Kg	17400	100%	NA	NA	NA	17400	11800	13600	11700
Arsenic	mg/Kg	15.8	100%	6	LEL	1	15.8	4	5.8	4.1
Barium	mg/Kg	848	100%	NA	NA	NA	848	84.1	83.7	108
Beryllium	mg/Kg	1.2	100%	NA	NA	NA	1.2 J	0.62 J	0.66 J	0.54 J
Cadmium	mg/Kg	6.9	100%	0.6	LEL	4	3.8	0.62 J	0.65 J	6.9
Calcium	mg/Kg	29800	100%	NA	NA	NA	8060	8630	18200	29800
Chromium	mg/Kg	26.3	100%	26	LEL	1	26.3	19.1 J	22.2 J	18.9 J
Cobalt	mg/Kg	71.3	100%	NA	NA	NA	71.3	10.3 J	12.6	9.8 J
Copper	mg/Kg	29.7	100%	16	LEL	4	17.5	29.7	28.9	22.3
Iron	mg/Kg	76200	100%	20,000	LEL	4	76200	21800	30400	21600
Lead	mg/Kg	22.9	25%	31	LEL	0	22.9	18.8 R	15.6 R	14.2 R
Magnesium	mg/Kg	7620	100%	NA	NA	NA	5210	4900	7620	6300
Manganese	mg/Kg	13500	100%	460	LEL	2	13500 J	340	478	408
Mercury	mg/Kg	0.25	100%	.15	LEL	1	0.07	0.25	0.06 J	0.03 J
Nickel	mg/Kg	52.8	100%	16	LEL	4	52.8	31.8	38.8	26
Potassium	mg/Kg	1830	100%	NA	NA	NA	1810 J	1450 J	1830 J	1490 J
Selenium	mg/Kg	4.3	100%	NA	NA	NA	4.3	0.82 J	0.89	0.63 J
Silver	mg/Kg	0.44	25%	1	LEL	0	0.44 J	0.12 U	0.09 U	0.11 U
Sodium	mg/Kg	139	100%	NA	NA	NA	96.2 J	136 J	139 J	47.9 J
Vanadium	mg/Kg	40.1	100%	NA	NA	NA	40.1	21.7	23.7	20
Zinc	mg/Kg	222	100%	120	LEL	4	158	172	147	222
OTHER ANALYSES										
Total Solids	%W/W						76.8	54.2	72.9	83.2

NOTES:

a) Sediment results were compared to the lowest of several applicable New York State guidelines for sediment. These standards include: the lowest effect level (NYS LEL), human health bioaccumulation criteria (NYS HHB), benthic aquatic life acute toxicity critieria (NYS BALAT) and benthic aquatic life chronic toxicity ccriteria (NYS BALCT), and wildlife bioaccumulation criteria (NYS WB). These standards are presented in the NYSDEC Technical Guidance for Screening Contaminated Sediments, 1994.

b) LOT = Limit of Tolerance: Represents point at which significant effects on benthic species occur.

c) NYSDEC 1989 guideline for phthalates.

d) NA = Not Available.

e) U = The compound was not detected below this concentration.

f) J = The reported value is an estimated concentration.

g) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.

h) R = The data was rejected during the data validation process.

Volatile Organic Compounds

No volatile organic compounds were detected in the sediment samples collected at SEAD-12.

Semivolatile Organic Compounds

Two semivolatile organic compounds were detected in two of the sediment samples collected at SEAD-12. Di-n-butylphthalate was detected at a concentration of 53 mg/kg in sample SD12A-1. The NYSDEC sediment criteria for aquatic life for di-n-butylphthalate is 1,197 mg/kg. Fluoranthene was detected in sediment sample SD12A-3 at a concentration of 26 mg/kg. The criteria for detected concentrations of fluoranthene in sediment is 190 mg/kg. No other SVOs were detected in the sediment samples collected at SEAD-12.

Pesticides and PCBs

No pesticides or PCBs were detected in the sediment samples collected at SEAD-12.

Metals

A total of 21 metals were detected in the sediment samples collected at SEAD-12. Arsenic, cadmium, chromium, copper, iron, manganese, mercury, nickel, and zinc were detected at concentrations which exceeded their respective criteria in one or more of the sediment samples collected. The majority of these exceedances appear to reflect natural variations in site sediments. The exceptions to this are the metals arsenic, cadmium, iron, manganese, nickel and zinc, which were reported in samples SD12A-1 and SD12A-4 at concentrations which exceeded their respective criteria by at least a factor of 2.

Radioactivity

Table 3-10 presents the summary of radioactive analysis results for sediment collected at SEAD-12. The gamma spectral analyses of the sediment samples collected at SEAD-12 showed various levels of principal and associated radionuclides from three natural radioactive decay series including the thorium series, the uranium series and the actinium series. Radium-226 and its associated decay products were detected at levels ranging from 1.28 pCi/g to 4.1 pCi/g.

TABLE 3-10

SENECA ARMY DEPOT ACTIVITY
SEAD-12 RI/FS SCOPING PLAN
SEDIMENT RADIOACTIVITY ANALYSIS RESULTS SEAD-12A ESI

			MEDIA	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
			SWMU	SEAD-12A	SEAD-12A	SEAD-12A	SEAD-12A	SEAD-12A
			DEPTH (FT)	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
			DATE SAMPLED	6/22/94	6/22/94	6/11/94	6/11/94	6/11/94
			ES ID	SD12A-1	SD12A-20	SD12A-2	SD12A-3	SD12A-4
			LAB ID	225654	255656 SD12A-1DUP	224298	224299	224300
RADIONUCLIDE ANALYSIS GAMMA SPECTRAL	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
Pb-210	100%	NA	NA	2.2	2.3	4.1	2.2	2.1
Ra-226	100%	6.3pCi/g	0	2.3	2.1	1.34	1.7	1.28
Ra-228	100%	NA	NA	1.3	1.6	0.91	1.15	1
Th-228	100%	NA	NA	1.7	1.21	1.9	2.1	1.21
U-235	100%	NA	NA	0.31	0.1	0.1	0.41	0.18
U-238	100%	NA	NA	0.95	2	1.08	0.7	0.91
GROSS ALPHA	100%	NA	NA	25	24	12	17	14
GROSS BETA	100%	NA	NA	33	32	34	42	33

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface, is used as an ARAR ar some NPL sites.

These values are slightly higher than the average of the soil levels for these radionuclides that were detected at the background MW12A-1 soil sampling location. Gross alpha and gross beta radiations were also detected in all of the sediment samples collected at SEAD-12. No criteria exist for reported levels of gross alpha or gross beta radiation in sediment, however, the levels of gross alpha and gross beta radiation detected in these samples showed no appreciable variances in the reported values.

3.1.1.3 Data Summary and Conclusions

The results of the historical data review and the ESI conducted at SEAD-12 indicate that past activities on site have impacted the soil, groundwater, and sediment quality.

The soil analysis results indicate that a release of radionuclides has occurred in one of the disposal pits, Disposal Pit A, identified in the northeastern portion of SEAD-12. In addition, elevated concentrations of cadmium, lead, and silver were found in the soil samples collected from test pit excavations TP12A-1, TP12A-2, TP12A-3, and TP12A-6. Concentrations of heavy metals above their criteria were present in all of the remaining soil samples collected at SEAD-12, though no consistent pattern in their occurrences was evident.

The results of the groundwater analyses of the SEAD-12A groundwater samples indicated that groundwater downgradient of disposal pits A and B in the area of MW12A-2 may be impacted by gross alpha radiation, though the high NTU of that sample may account for the high gross alpha radiation level that was detected. The results of the groundwater analyses of the SEAD-12B groundwater samples indicate that the groundwater at the MW12B-1 location may be impacted by a release of radionuclides. However, the low reported levels of the same radionuclides in the soil samples collected from the MW12B-1 soil boring and the absence of these radionuclides in the duplicate sample collected from this monitoring well indicate that these constituents are either present only in the groundwater at this location or these reported radionuclide levels are the result of analysis interference and/or sample contamination in the lab. The reported levels of gross alpha radiation were above their criteria in the upgradient and downgradient groundwater samples collected in the area of SEAD-12B, though these too may be the result of the very high NTU of this sample (greater than 1,000 NTUs).

The sediment samples collected at SEAD-12 had reported concentrations of cadmium and manganese which were found at elevated levels in samples SD12A-1 and SD12A-4. Sediment sample SD12A-1 also had reported concentrations of arsenic, iron, nickel, and zinc which exceeded their respective criteria by at least a factor of 2. The SD12A-1 sample location is situated upgradient of the SEAD-12A boundaries and is unlikely to have been affected by the constituents found within the area of SEAD-12A. Additional metals exceedances were noted in all of the sediment samples collected at SEAD-12, though no consistent pattern in their occurrences was evident. This was attributed to natural sediment variations.

3.1.2 SEAD-63

This subsection presents the scoping of the RI/FS proposed for SEAD-63. This subsection will discuss the site's history, its known physical characteristics including results from previous investigations, and it will present a preliminary identification of potential receptors and exposure scenarios. This section presents all but one of the elements of the Historical Site Assessment (HSA) as defined in the Multi Agency Radiological Survey and Site Investigation Manual (MARSSIM). The one element of the HSA that is not discussed in this section is the classification of sites. Site classification is presented in Section 4.3.2, Radiological Investigations At SEAD-63.

3.1.2.1 Site History SEAD-63

The site was used during the 1950s and 1960s as a disposal area for classified parts. Multiple disposal pits were excavated along a north-south line approximately 200 feet long. The individual pits were between 10 and 30 feet long and were likely to have been excavated down to the surface of the weathered shale. The number of actual disposal pits is unknown and the types of materials disposed of at this site were identified as metal parts by SEDA personnel. The documents related to the disposal of the metal parts at this site are classified and are not available for review. The SWMU Classification Report stated that "inert materials" were buried within the disposal pits.

3.1.2.2 Physical Site Characterization

The physical site characterization of SEAD-63 was performed by reviewing and summarizing the findings of the ESI conducted at SEAD-63. The individual topics which were reviewed included: physical site setting, site geology, site conditions (determined from geophysical investigations), site hydrology and hydrogeology, and the results of chemical analyses.

3.1.2.2.1 Physical Site Setting

SEAD-63 is approximately 480 feet long along its north-south axis and 300 feet wide along its east-west axis. The site is bound by Service Road No. 3 to the north, Patrol Road to the west, an unnamed road to the south, and by open grassland to the east. The site is mostly undeveloped except for a grass-covered igloo (Igloo A0101) in the southeast corner of the site and an elevated former machine-gun turret in the northwest corner of the site. In general, the western half of the site is less vegetated and appears to have been physically worn by vehicular traffic.

Topography on-site is generally flat with only a small westward slope. A slight ground depression, sloping south to north, is located in the northeastern quadrant of the site. Drainage swales are located adjacent to Service Road No. 3, Patrol Road and the unnamed road No. 1. All of the surface water runoff from these swales eventually flows into Reeder Creek which is located approximately 1500 feet southwest of SEAD-63. Reeder Creek flows west into Seneca Lake.

Access to SEAD-63 is restricted by clearance through Post #1, the main gate, Post #5, the restricted area gate, and Post #2, the truck entrance.

3.1.2.2.2 Site Geology

Determination of the site geology was based on the drilling and test pit programs conducted for the ESI at SEAD-63. This program included 3 soil borings in which monitoring wells were installed and 12 test pits. The soil borings were drilled to a maximum depth of 8.3 feet below ground surface. The locations of monitoring wells and test pits are shown in Figure 3-15. Soil boring logs and test pit logs are included in Appendix A.

Based on the results of the drilling and test pitting programs, fill material, till, weathered gray shale, and competent gray shale were the four major geologic units identified on-site. A thin topsoil layer (0.1 to 0.9 feet) was present at all three soil boring locations and 10 of the 12 test pit locations. The depths to the bottom of the fill, till, bedrock, and the thickness of the weathered shale at SEAD-63 are presented in the table below.

Boring Location	Depth to Bottom of Fill (feet)	Depth to Bottom of Till (feet)	Thickness of Weathered Shale (feet)	Depth to Bedrock (feet)
MW63-1	NA	5	3	8
MW63-2	NA	6.9	1.3	8.2
MW63-3	NA	6.7	1.6	8.3
TP63-1	>8	ND	ND	ND
TP63-2	1.1	ND	ND	ND
TP63-3	6.5	ND	ND	ND
TP63-4	5.0	ND	ND	ND
TP63-5	NA	ND	ND	ND
TP63-6	3	ND	ND	ND
TP63-7	2.6	ND	ND	ND
TP63-8	1.0	ND	ND	ND
TP63-9	2.6	ND	ND	ND
TP63-10	1.0	ND	ND	ND
TP63-11	3.8	ND	ND	ND
TP63-12	0.6	ND	ND	ND

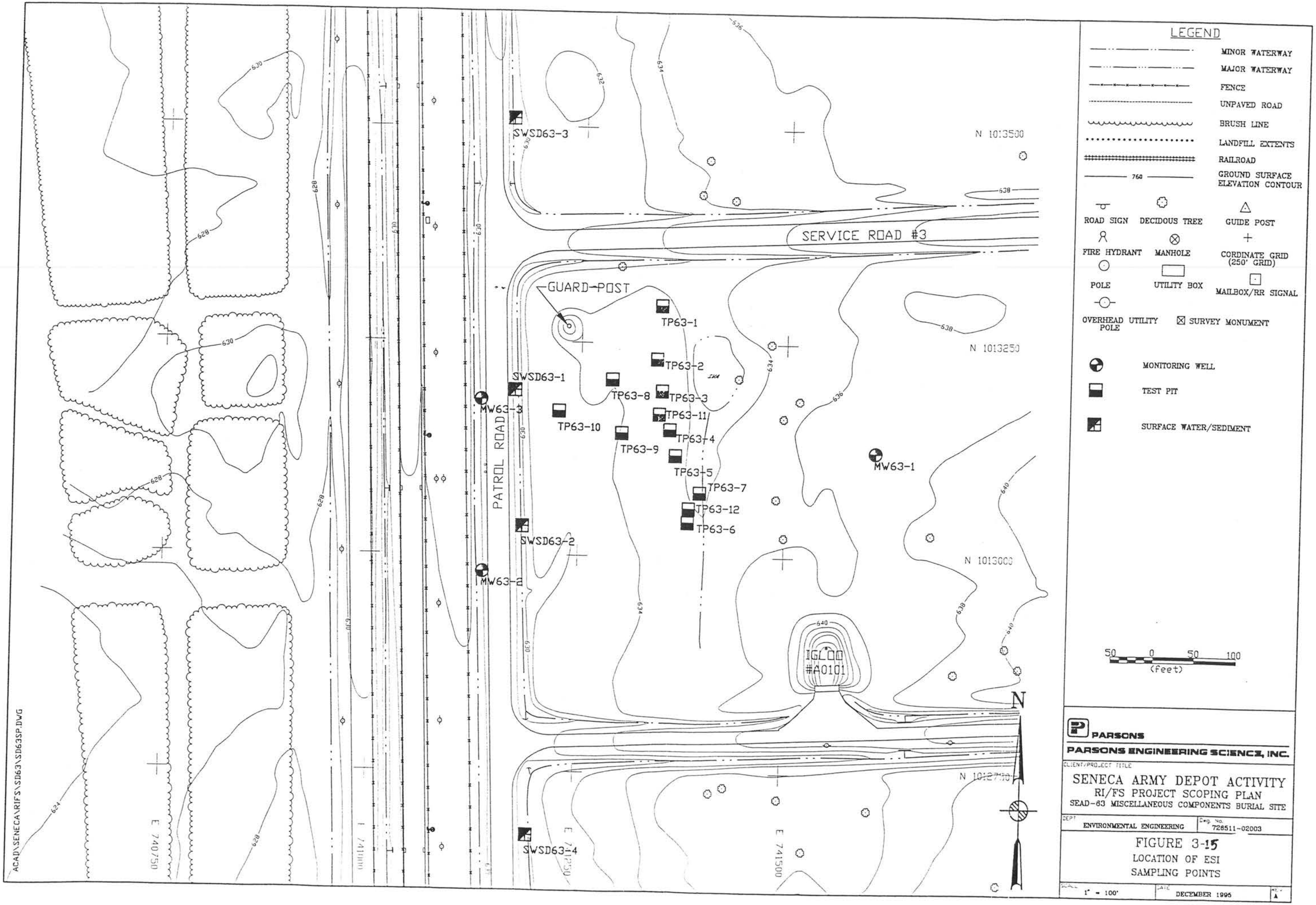
NA = Not Applicable
ND = Not Determined

The fill material was encountered in test pits TP63-1, TP63-3, TP63-4, TP63-7 and TP63-11 and two drums were found in test pit TP63-6. Fill material thickness ranged from 0.6 feet to over 8 feet. The fill consisted of waste material with trace amounts of till, gravel sized shale fragments and sand. The waste material was comprised of miscellaneous military components.

The till was characterized as brown or olive gray silt and very fine sand with small (less than 1 inch) fragments of shale. Clay lenses were observed occasionally. Larger shale fragments, thought to be rip-up clasts, were encountered in some of the soil borings. The till was observed to be 5.0 to 6.9 feet thick in the three soil borings performed at SEAD-63.

The weathered shale that forms the transition between till and competent shale was observed in all three of the soil borings and ranged in thickness from approximately 1.3 to 3 feet.

Competent gray shale was observed in all three soil borings. The depths to bedrock ranged from 8.0 to 8.3 feet below ground surface. In all three soil borings, competent shale was inferred by auger refusal.



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-63 MISCELLANEOUS COMPONENTS BURIAL SITE

DEPT ENVIRONMENTAL ENGINEERING	Dwg. No. 726511-02003

FIGURE 3-15
LOCATION OF ESI
SAMPLING POINTS

SCALE 1" = 100'	DATE DECEMBER 1995	REV. A

3.1.2.2.3 Geophysics

Seismic refraction surveys, electromagnetic (EM-31) surveys, and GPR surveys were performed at SEAD-63 as part of the geophysical investigations for the ESI.

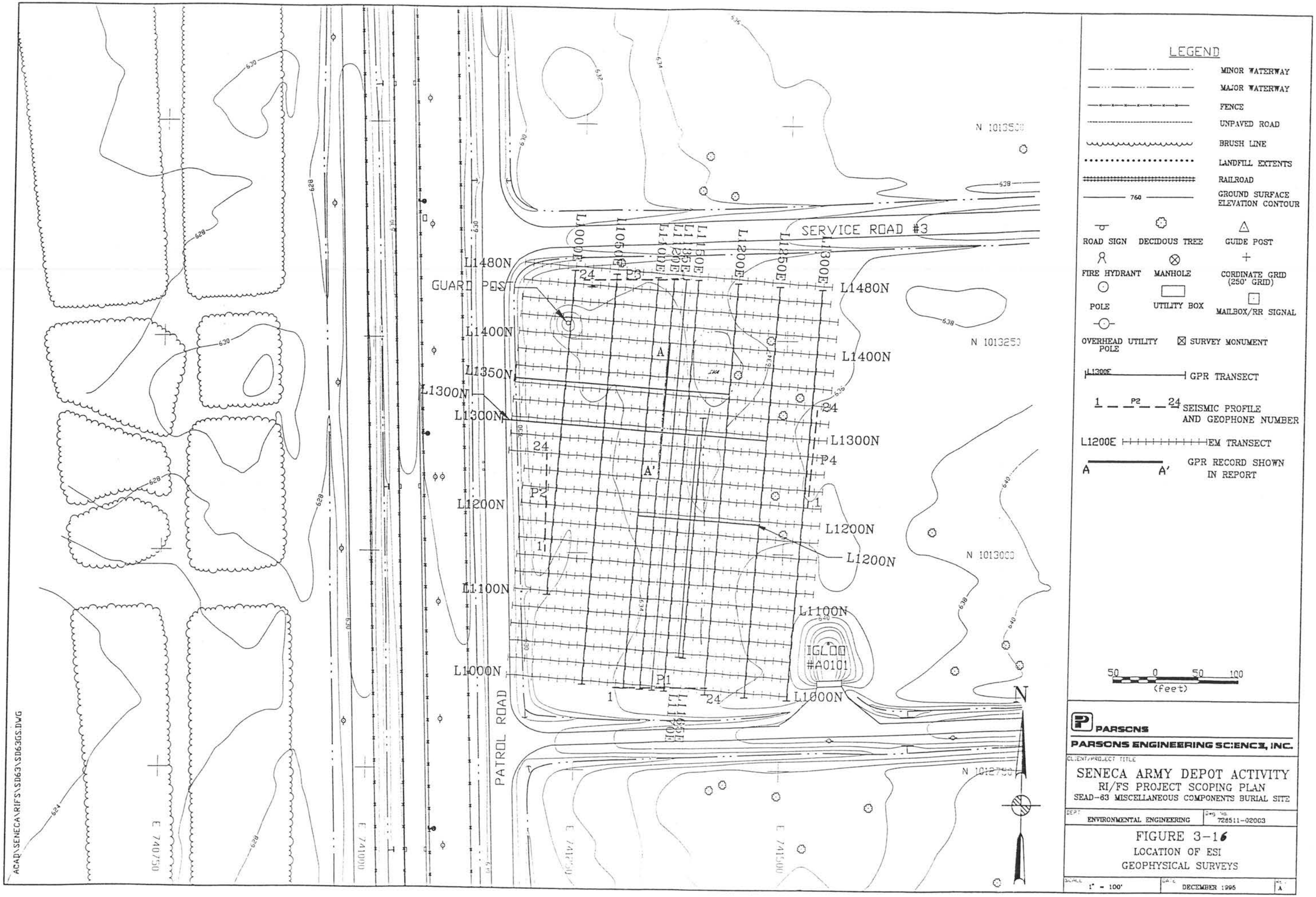
Seismic Survey

Four seismic refraction profiles, each 120 feet long, were performed at the locations shown in Figure 3-16. The results of the seismic refraction survey conducted at SEAD-63 are shown in Table 3-11. The seismic refraction profiles indicated that 6 to 9 feet of till (estimated at 1,600 ft/sec due to a frozen ground surface) overlaid the bedrock surface (11,200 to 13,400 ft./sec.). The mid-spread data of profile P3 revealed a compact 3,900 ft/sec till layer.

Saturated till was not detected by the seismic survey at SEAD-63.

Electromagnetic Survey

An electromagnetic (EM) survey was performed for the ESI at SEAD-63 along the transects shown in Figure 3-16. Figure 3-17 shows the results of the quadrature response for the EM survey at SEAD-63. The quadrature response is proportional to the apparent ground conductivity. A rectangular shaped conductivity anomaly measuring approximately 200 ft long by 30 ft wide, was detected in the central and northern portions of the grid. This anomaly was correlated to the suspected miscellaneous components burial sites. A square shaped anomaly, measuring approximately 120 ft by 120 ft, was observed in the northwestern portion of the EM-grid. This anomaly was presumably associated to the Operations Pad. The large conductivity anomaly at the southeastern corner of the grid corresponded to interference effects associated with Igloo A0101. A linear anomaly running the length of the western boundary of the grid was presumably associated with underground utilities. The guard post in the northwestern corner of the grid was also detected. In general, the ground in the western portion of the grid exhibited slightly higher apparent ground conductivities than the ground in the eastern portion.



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RI/FS PROJECT SCOPING PLAN
SEAD-63 MISCELLANEOUS COMPONENTS BURIAL SITE

DEPT
ENVIRONMENTAL ENGINEERING

Dwg. No.
726511-02003

FIGURE 3-16
LOCATION OF ESI
GEOPHYSICAL SURVEYS

SCALE
1" = 100'

DATE
DECEMBER 1995

REV.
A

TABLE 3-11
SEAD 63

RI/FS Project Scoping Plan
Results of ESI Seismic Refraction Survey

Profile	Distance[1]	Ground Elevation[2]	Bedrock	
			Depth	Elev[2].
P1	-5 120	634.3 635.5	6.0 5.1	628.3 630.4
P2	-5 57.5 120	632.6 632.4 632.1	9.9 7.8 6.7	622.7 624.6 625.4
P3	-5 57.5 120	633.4 632.8 633.6	8.3 8.2 6.9	625.5 624.6 626.7
P4	-5 120	636.9 635.7	8.2 7.1	628.7 628.6

[1] All distances are measured in feet along the axis of each seismic profile from geophone #1 of each profile. For profiles P1 and P3, geophone #1 is located at the western endpoint of the axis, and for profiles P2 and P4, geophone #1 is located at the southern end point. See Figure 3-2 for locations of seismic profiles.

[2] All elevations are accurate to within ± 2 feet.

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RI/FS PROJECT SCOPING PLAN
SEAD 63 MISCELLANEOUS COMPONENTS BURIAL SITE

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Dwg. No. 728511-02003

FIGURE 3-17
EM SURVEY QUADRATURE RESPONSE

SCALE 1" = 100'
DATE DECEMBER 1995
REV A

The in-phase response of the SEAD-12A survey is shown in Figure 3-18. The in-phase response reflects the presence of buried ferrous objects. These results show the same anomaly features for the burial sites, the guard post, and the presumed underground utility that were described above. The square shaped apparent conductivity anomaly presumably associated to the Operations Pad was undetected in the in-phase response data collected at SEAD-63.

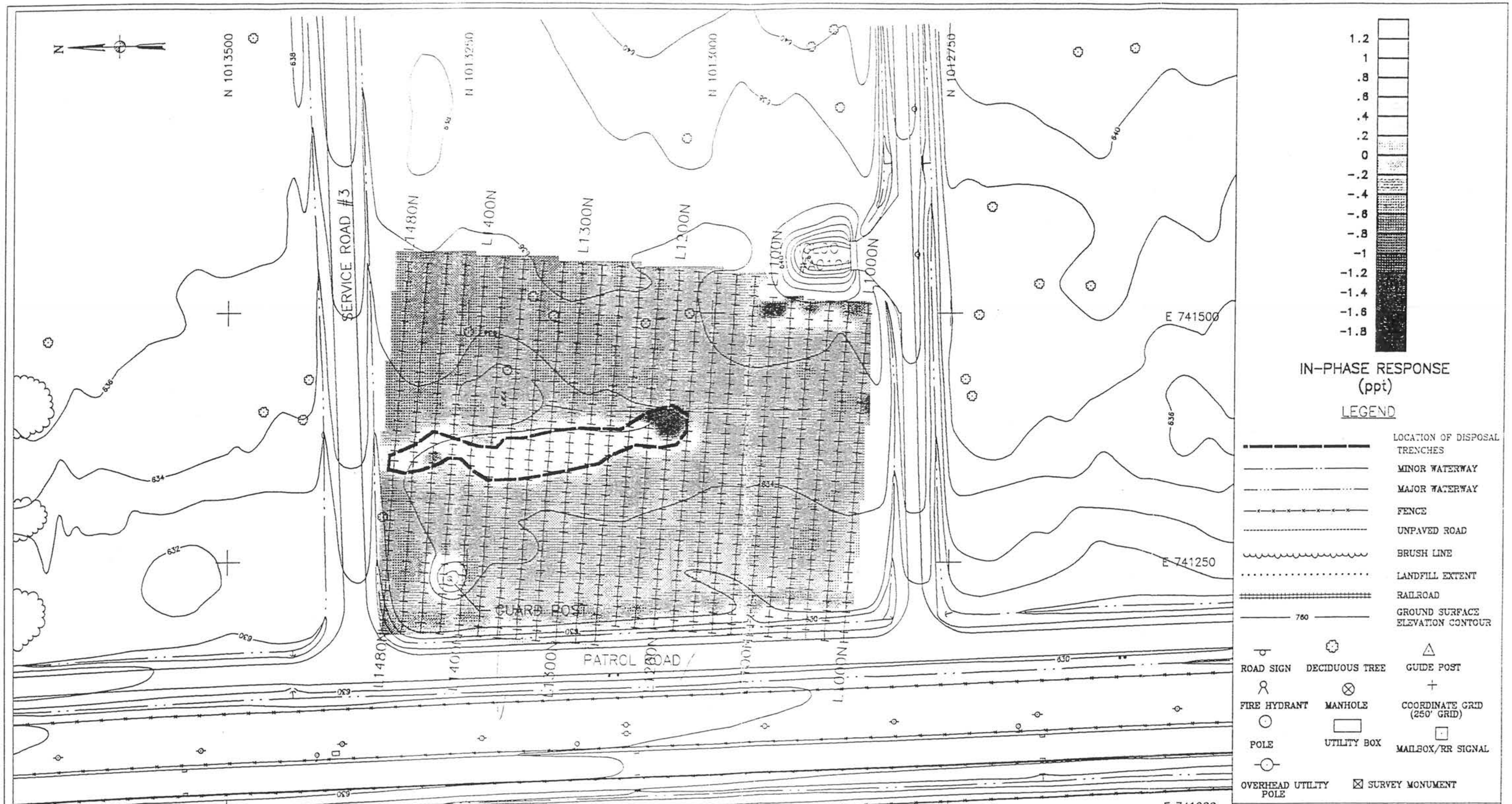
Ground Penetrating Radar (GPR) Survey

A GPR survey was conducted at SEAD-63 to further characterize the areas suspected of having buried wastes and to provide a better definition of the buried metallic objects detected by the EM survey. The GPR survey was performed along the transects shown in Figure 3-16. The GPR data identified several areas where the radar signal reflections from the base of the gravel fill and underlying layers disappeared. These areas correlated with the area of buried wastes identified by the EM survey. Figure 3-19 shows a typical GPR profile illustrating this type of anomaly.

Test Pitting Program

A total of twelve test pits were excavated in SEAD-63 to characterize the sources of the geophysical anomalies. Nine test pits were excavated in the area of the suspected burial pits identified by the in-phase response data and the GPR data (TP63-1 through TP63-7, TP63-11, and TP63-12). Three test pits were excavated in the square shaped area of increased apparent ground conductivities identified by the quadrature response data (TP63-8 through TP63-10). The test pit logs are presented in Appendix A.

Miscellaneous military components were found in test pits TP63-1, TP63-3, TP63-4, TP63-7, and TP63-11. Each of these excavations was characterized by dark gray shale gravel fill overlying the burial pits. Test pit TP63-6 identified two fifty-five gallon drums buried in an up-right position with their tops approximately one foot below grade. Both drums were in good condition and very little rust was noted on their surfaces. One of these drums had the words "BURIAL PIT" stenciled on its side. Soil sample TP63-6-1 was collected from the soils at the base of this drum. A layer of shale gravel up to 1 foot in thickness, was observed in test pits TP63-2, TP63-8, TP63-9, TP63-10 and TP63-12.



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RI/FS PROJECT SCOPING PLAN
SEAD 63 MISCELLANEOUS COMPONENTS BURIAL SITE

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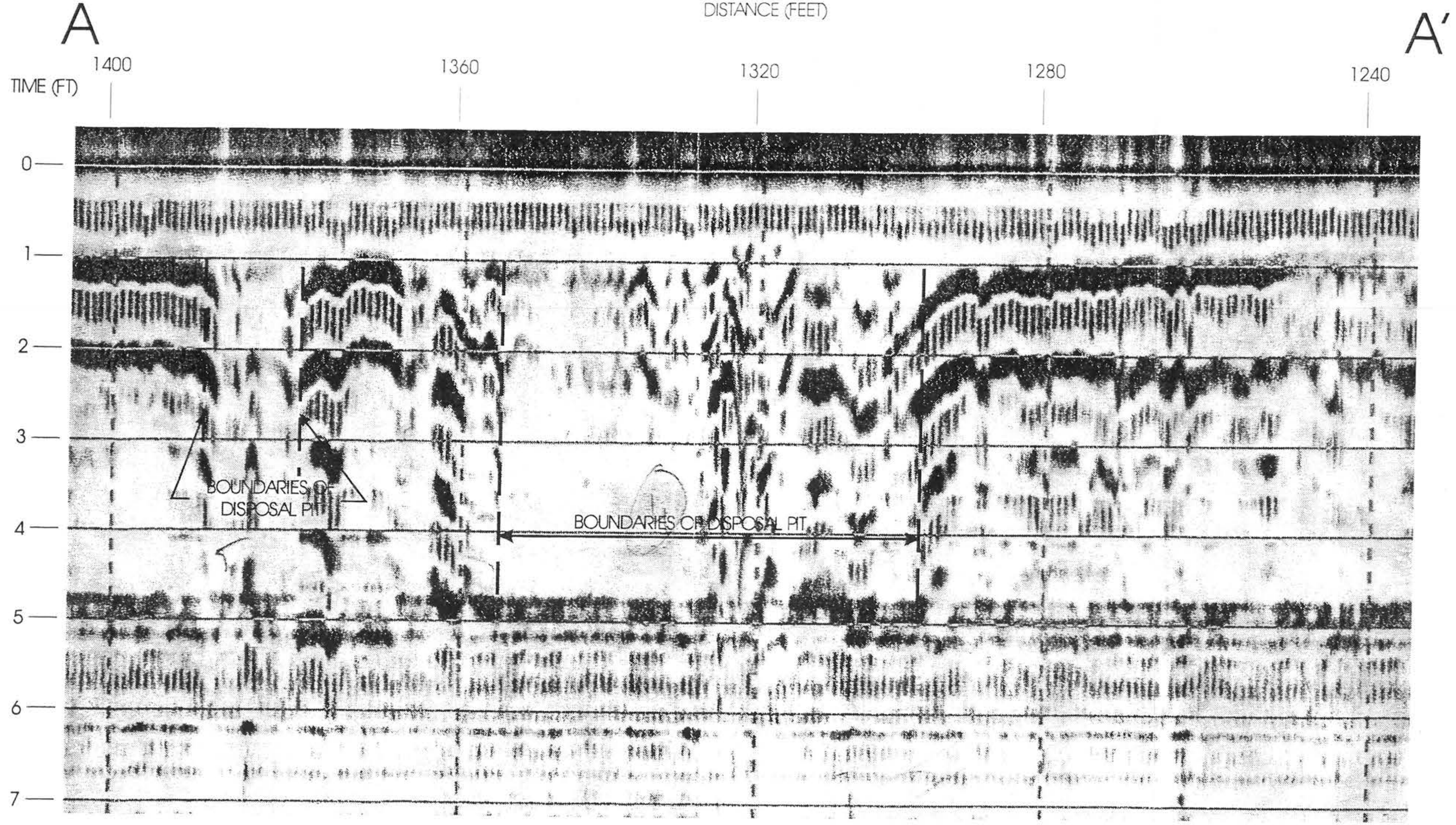
FIGURE 3-18
EM SURVEY, IN-PHASE RESPONSE

SCALE 1" = 100'
DATE DECEMBER 1995
REV 1



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RI/FS PROJECT SCOPING PLAN
SEAD 63 MISCELLANEOUS COMPONENTS BURIAL SITE

DEPT ENVIRONMENTAL ENGINEERING
DWG NO. 727651-02003

FIGURE 3-19
GPR PROFILE A-A'

SCALE
DATE DECEMBER 1995

R:\GRAPHICS\SENECA\RADAR\FIG3-3-3.CDR

Soils excavated from the test pits and the exploratory borings were continuously screened for organic vapors with an OVM-580B and for radioactivity with a Victoreen-190 Radiation monitor (alpha-beta-gamma rate meter), a Ludlum-19 micro-R beta and gamma rate meter, and a Ludlum 2221 alpha scintillation meter. No readings above background levels (0 ppm for the OVM, 10-15 μR per hour for the beta and gamma meters, and 6 counts per minute on the alpha meter) were observed during the excavations.

3.1.2.2.4 Site Hydrology and Hydrogeology

Surface water flow from precipitation events is controlled by local topography and the drainage ditches along the northern, western, and southern boundaries of the site. Surface water flow directions in these drainage pathways are shown in Figure 3-10.

As part of the ESI program, three monitoring wells were installed at SEAD-63. Groundwater elevations were measured in all three wells, and the results are presented in Table 3-12. The groundwater elevations are shown on Figure 3-20. Based on these data, the groundwater flow direction is primarily to the west and no appreciable changes in the groundwater flow direction were observed over the one month period from June 25, 1994 to July 26, 1994, when groundwater elevations were measured at SEAD-63.

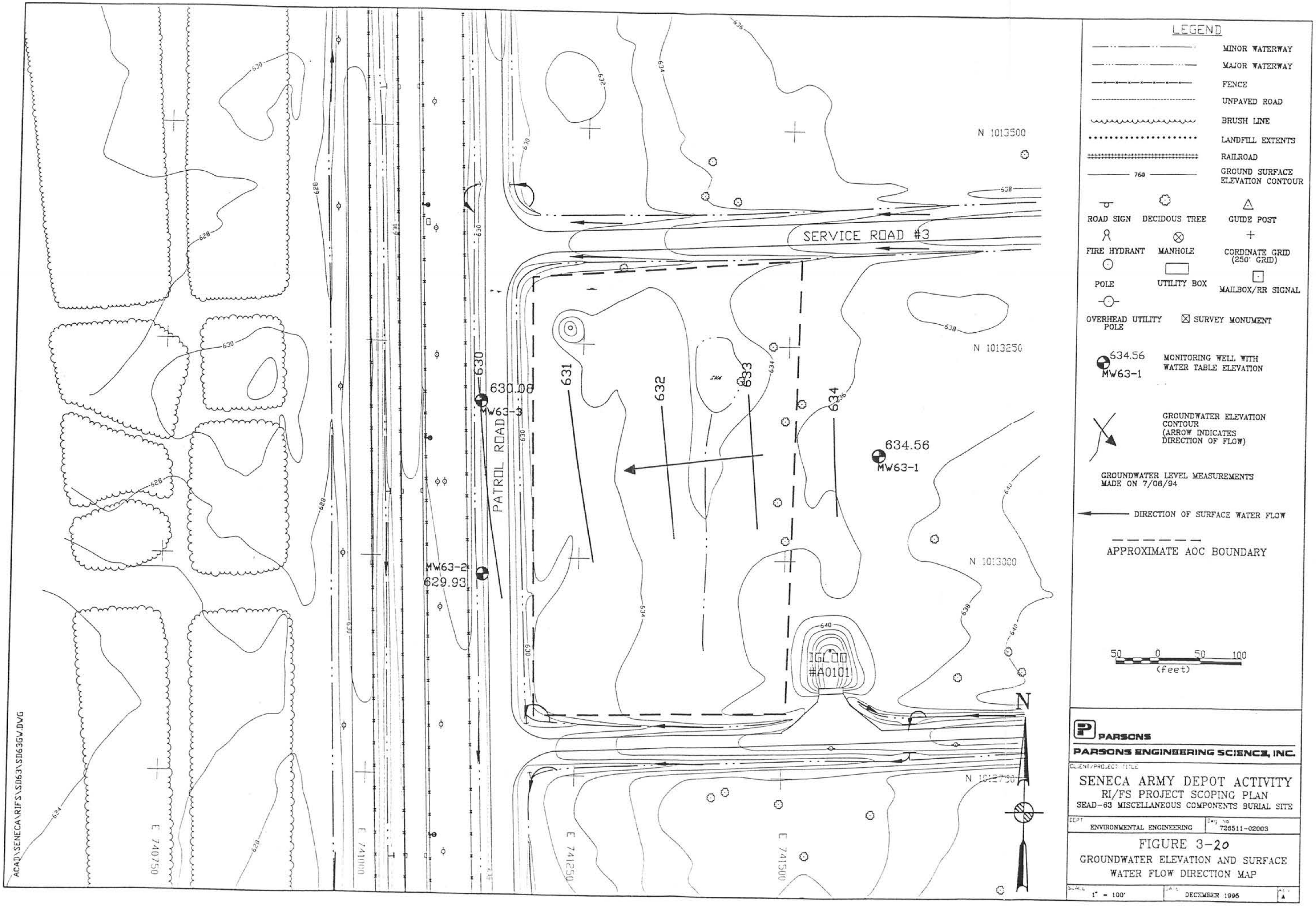
3.1.2.2.5 Chemical Analysis Results

Soil, groundwater, surface water, and sediment were analyzed as part of the ESI conducted at SEAD-63 in 1994. The results of the ESI investigation were presented in the report titled "Expanded Site Inspection, Seven Low Priority AOCs, SEADs 60, 62, 63, 64 (A,B,C, and D), 67, 70 and 71" which was issued in April 1995. A total of 12 subsurface soil samples, 3 groundwater

TABLE 3-12

SENECA ARMY DEPOT ACTIVITY
SEAD-63 RI/FS PROJECT SCOPING PLAN
ESI MONITORING WELL WATER LEVEL SUMMARY

MONITORING WELL NUMBER	TOP OF PVC CASING ELEVATION (MSL)	WELL DEVELOPMENT			SAMPLING			WATER LEVEL MEASUREMENTS		
		DATE	DEPTH TO GROUNDWATER TOC (FT)	GROUNDWATER ELEVATION (MSL)	DATE	DEPTH TO GROUNDWATER TOC (FT)	GROUNDWATER ELEVATION (MSL)	DATE	DEPTH TO GROUNDWATER TOC (FT)	GROUNDWATER ELEVATION (MSL)
MW63-1	639.69	6/26/94	5.98	633.71	7/11/94	5.54	634.15	7/6/94 7/26/94	5.13 6.39	634.56 633.30
MW63-2	632.32	6/25/94	2.98	629.34	7/11/94	3.06	629.26	7/6/94 7/26/94	2.39 4.02	629.93 628.30
MW63-3	633.19	6/26/94	4.15	629.04	7/11/94	4.19	629.00	7/6/94 7/26/94	3.11 5.21	630.08 627.98



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-63 MISCELLANEOUS COMPONENTS BURIAL SITE

DEPT ENVIRONMENTAL ENGINEERING

DWG NO 726511-02003

FIGURE 3-20

GROUNDWATER ELEVATION AND SURFACE WATER FLOW DIRECTION MAP

SCALE 1" = 100'

DATE DECEMBER 1996

REV A

samples, and 4 surface water and sediment samples were collected as part of the ESI at SEAD-63. The following sections describe the nature and extent of contamination identified at SEAD-63.

Soil

The analytical results for 12 subsurface soil samples collected as part of the investigation of SEAD-63 are presented in Table 3-13. These data are compared to the criteria in the Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels (NYSDEC, 1994). The following sections describe the nature and extent of contamination in SEAD-63 soils. The sample locations are shown in Figure 3-15.

Volatile Organic Compounds

Five volatile organic compounds were detected in two of the 12 soil samples collected. All were found at low concentrations and all were below their respective TAGM values. The volatiles detected were acetone, 2-butanone, benzene, toluene, and xylenes (total). All five volatiles were detected in the sample from TP63-8 and only the latter three were detected in the sample from TP63-9.

Semivolatile Organic Compounds

A total of 12 semivolatile organic compounds (SVOs) were found in the subsurface soil samples analyzed. Only one SVO compound, dibenz(a,h) anthracene, was detected in a single sample (TP63-9) at an estimated concentration of 28J mg/kg which exceeded its associated TAGM value of 14 mg/kg. All of the remaining concentrations of SVOs detected in the soil samples from SEAD-63 were below their respective TAGM values.

TABLE 3-13

SENECA ARMY DEPOT ACTIVITY
SEAD-63 RI/FS PROJECT SCOPING PLAN
ESI SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-63 3 06/25/94 TP63-1 225583 45058	SOIL SEAD-63 2 06/26/94 TP63-2 225561 45062	SOIL SEAD-63 6.5 06/26/94 TP63-3 225562 45062	SOIL SEAD-63 3 06/26/94 TP63-4 225563 45062	SOIL SEAD-63 2 06/26/94 TP63-5 225564 45062	SOIL SEAD-63 3 06/27/94 TP63-6 225565 45062
VOLATILE ORGANICS											
Acetone	ug/Kg	160	8%	200	0	13 U	12 U	25 U	11 U	12 U	11 U
2-Butanone	ug/Kg	46	8%	300	0	13 U	12 U	13 U	11 U	12 U	11 U
Benzene	ug/Kg	4	17%	60	0	13 U	12 U	13 U	11 U	12 U	11 U
Toluene	ug/Kg	23	17%	1500	0	13 U	12 U	13 U	11 U	12 U	11 U
Xylene (total)	ug/Kg	14	17%	1200	0	13 U	12 U	13 U	11 U	12 U	11 U
SEMIVOLATILE ORGANICS											
Phenanthrene	ug/Kg	31	8%	50000*	0	420 U	390 U	1800 U	1000 U	410 U	380 U
Di-n-butylphthalate	ug/Kg	87	8%	8100	0	87 J	390 U	1800 U	1000 U	410 U	380 U
Fluoranthene	ug/Kg	63	17%	50000*	0	420 U	390 U	1800 U	1000 U	410 U	380 U
Benzo(a)anthracene	ug/Kg	30	8%	224	0	420 U	390 U	1800 U	1000 U	410 U	380 U
Chrysene	ug/Kg	31	17%	400	0	420 U	390 U	1800 U	1000 U	410 U	380 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	92%	50000*	0	420 U	290 J	230 J	590 J	1800 J	200 J
Benzo(b)fluoranthene	ug/Kg	38	17%	1100	0	420 U	390 U	1800 U	1000 U	410 U	380 U
Benzo(k)fluoranthene	ug/Kg	43	17%	1100	0	420 U	390 U	1800 U	1000 U	410 U	380 U
Benzo(a)pyrene	ug/Kg	45	17%	61	0	420 U	390 U	1800 U	1000 U	410 U	380 U
Indeno(1,2,3-cd)pyrene	ug/Kg	37	8%	3200	0	420 U	390 U	1800 U	1000 U	410 U	380 U
Dibenz(a,h)anthracene	ug/Kg	28	8%	14	1	420 U	390 U	1800 U	1000 U	410 U	380 U
Benzo(g,h,i)perylene	ug/Kg	31	8%	50000*	0	420 U	390 U	1800 U	1000 U	410 U	380 U
PESTICIDES/PCB											
4,4'-DDE	ug/Kg	4.4	25%	2100	0	4.2 UJ	3.9 UJ	4.5 UJ	4.4 J	4.1 UJ	3.8 UJ
4,4'-DDD	ug/Kg	2	8%	2900	0	4.2 UJ	3.9 UJ	4.5 UJ	2 J	4.1 UJ	3.8 UJ
4,4'-DDT	ug/Kg	3.3	8%	2100	0	4.2 UJ	3.9 UJ	4.5 UJ	3.3 J	4.1 UJ	3.8 UJ
METALS											
Aluminum	mg/Kg	18000	100%	14593	7	16800	14800 J	16500 J	12300 J	15300 J	13200 J
Antimony	mg/Kg	0.29	17%	3.59	0	0.25 UJ	0.26 UJ	0.32 UJ	0.18 UJ	0.27 UJ	0.22 UJ
Arsenic	mg/Kg	6.1	100%	7.5	0	6.1 J	5.4	4.5	4	4.9	4.5
Barium	mg/Kg	115	100%	300	0	88.9	65.3 J	115 J	63.2 J	75.4 J	75.9 J
Beryllium	mg/Kg	0.8	100%	0.73	3	0.71 J	0.74 J	0.8 J	0.53 J	0.69 J	0.64 J
Cadmium	mg/Kg	24	100%	1	4	0.47 J	0.26 J	3.6	24	0.52 J	0.55 J
Calcium	mg/Kg	41500	100%	101904	0	6810	3830 J	15500 J	28400 J	40500 J	41500 J
Chromium	mg/Kg	43.5	100%	22	9	26.8	22.9 J	31.8 J	43.5 J	23.2 J	22.1 J
Cobalt	mg/Kg	14.4	100%	30	0	14.3	11.6	13.7	13.5	12.4	13.7
Copper	mg/Kg	49.6	100%	25	11	32	27.1 J	33.5 J	49.6 J	35.1 J	37.4 J
Iron	mg/Kg	34300	100%	26627	9	34300	30100 J	31200 J	28000 J	28100 J	28000 J
Lead	mg/Kg	38.3	100%	21.86	7	27.4	18.5	24.9	38.3	22.3	20.7
Magnesium	mg/Kg	9400	100%	12222	0	6010	4530 J	6790 J	9400 J	8310 J	9180 J
Manganese	mg/Kg	728	100%	669	1	484	278 J	728 J	396 J	403 J	438 J
Mercury	mg/Kg	0.49	92%	0.1	1	0.06 J R	0.05 J	0.49	0.03 J	0.06 J	0.03 J
Nickel	mg/Kg	48.4	100%	34	8	41.8	31.5 J	38.7 J	44.2 J	42 J	45.7 J
Potassium	mg/Kg	2160	100%	1762	4	2160 J	1180 J	1850 J	1250 J	2150 J	1670 J
Selenium	mg/Kg	1.6	100%	2	0	0.89 J	1.5	1.6	0.91	1.5	0.95
Sodium	mg/Kg	138	83%	104	5	115 J	50.6 J	88.4 J	124 J	138 J	132 J
Thallium	mg/Kg	0.51	42%	0.28	5	0.51 J	0.38 U	0.47 U	0.45 J	0.3 J	0.36 J
Vanadium	mg/Kg	28.4	100%	150	0	28.2	25.2 J	27.2 J	16.8 J	22.4 J	19.3 J
Zinc	mg/Kg	131	100%	83	6	91.3 J	74.8 J	108 J	100 J	88.9 J	82.4 J
OTHER ANALYSES											
Total Solids	%W/W					79.4	83.7	73.4	92.4	81.2	87.4

TABLE 3-13

SENECA ARMY DEPOT ACTIVITY
SEAD-63 RI/FS PROJECT SCOPING PLAN
ESI SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-63 1.5 06/27/94 TP63-7 225566 45062	SOIL SEAD-63 1.5 06/27/94 TP63-8 225596 45062	SOIL SEAD-63 2.5 06/27/94 TP63-9 225597 45062	SOIL SEAD-63 1.5 06/28/94 TP63-10 225803 45062	SOIL SEAD-63 3 06/28/94 TP63-11 225804 45062	SOIL SEAD-63 5 06/28/94 TP63-12 225805 45062
VOLATILE ORGANICS											
Acetone	ug/Kg	160	8%	200	0	12 U	12 U	160	12 U	11 U	12 U
2-Butanone	ug/Kg	46	8%	300	0	12 U	12 U	46	12 U	11 U	12 U
Benzene	ug/Kg	4	17%	60	0	12 U	2 J	4 J	12 U	11 U	12 U
Toluene	ug/Kg	23	17%	1500	0	12 U	6 J	23	12 U	11 U	12 U
Xylene (total)	ug/Kg	14	17%	1200	0	12 U	14	11 J	12 U	11 U	12 U
SEMIVOLATILE ORGANICS											
Phenanthrene	ug/Kg	31	8%	50000*	0	380 U	390 U	31 J	410 U	370 U	390 U
Di-n-butylphthalate	ug/Kg	87	8%	8100	0	380 U	390 U	400 U	410 U	370 U	390 U
Fluoranthene	ug/Kg	63	17%	50000*	0	380 U	38 J	63 J	410 U	370 U	390 U
Benzo(a)anthracene	ug/Kg	30	8%	224	0	380 U	390 U	30 J	410 U	370 U	390 U
Chrysene	ug/Kg	31	17%	400	0	380 U	23 J	31 J	410 U	370 U	390 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	92%	50000*	0	80 J	71 J	41 J	67 J	240 J	360 J
Benzo(b)fluoranthene	ug/Kg	38	17%	1100	0	380 U	21 J	38 J	410 U	370 U	390 U
Benzo(k)fluoranthene	ug/Kg	43	17%	1100	0	380 U	21 J	43 J	410 U	370 U	390 U
Benzo(a)pyrene	ug/Kg	45	17%	61	0	380 U	24 J	45 J	410 U	370 U	390 U
Indeno(1,2,3-cd)pyrene	ug/Kg	37	8%	3200	0	380 U	390 U	37 J	410 U	370 U	390 U
Dibenz(a,h)anthracene	ug/Kg	28	8%	14	1	380 U	390 U	28 J	410 U	370 U	390 U
Benzo(g,h,i)perylene	ug/Kg	31	8%	50000*	0	380 U	390 U	31 J	410 U	370 U	390 U
PESTICIDES/PCB											
4,4'-DDE	ug/Kg	4.4	25%	2100	0	3.8 UJ	3.9 UJ	4 UJ	4.1 U	1.8 J	2.5 J
4,4'-DDD	ug/Kg	2	8%	2900	0	3.8 UJ	3.9 UJ	4 UJ	4.1 U	3.7 U	3.9 U
4,4'-DDT	ug/Kg	3.3	8%	2100	0	3.8 UJ	3.9 UJ	4 UJ	4.1 U	3.7 U	3.9 U
METALS											
Aluminum	mg/Kg	18000	100%	14593	7	11700 J	16500 J	13800 J	18000 J	13200 J	15200 J
Antimony	mg/Kg	0.29	17%	3.59	0	0.23 J	0.3 UJ	0.3 UJ	0.31 UJ	0.23 UJ	0.29 J
Arsenic	mg/Kg	6.1	100%	7.5	0	4.2	5.2	3.6	5.3	4.3	4.6
Barium	mg/Kg	115	100%	300	0	45.8 J	59.5 J	87 J	72.4 J	60 J	71.1 J
Beryllium	mg/Kg	0.8	100%	0.73	3	0.54 J	0.64 J	0.66 J	0.71 J	0.62 J	0.75 J
Cadmium	mg/Kg	24	100%	1	4	0.56 J	0.24 J	0.35 J	0.39 J	4.2	4.9
Calcium	mg/Kg	41500	100%	101904	0	39800 J	5440 J	7410 J	14200 J	27500 J	26000 J
Chromium	mg/Kg	43.5	100%	22	9	19.1 J	21.5 J	19 J	24.6 J	25.4 J	40.3 J
Cobalt	mg/Kg	14.4	100%	30	0	10.7	9.7 J	10 J	12.7	12.4	14.4
Copper	mg/Kg	49.6	100%	25	11	35.3 J	20.2 J	28.3 J	27.3 J	32.9 J	39.1 J
Iron	mg/Kg	34300	100%	26627	9	25000 J	25000 J	22700 J	28500 J	28100 J	30600 J
Lead	mg/Kg	38.3	100%	21.86	7	15.6	15.5	22.3	17.1	24.8	33.4
Magnesium	mg/Kg	9400	100%	12222	0	8160 J	4400 J	4450 J	5520 J	7970 J	8020 J
Manganese	mg/Kg	728	100%	669	1	359 J	350 J	497 J	452 J	458 J	449 J
Mercury	mg/Kg	0.49	92%	0.1	1	0.04 J	0.06 J	0.07 J	0.05 J	0.04 J	0.05 J
Nickel	mg/Kg	48.4	100%	34	8	39.1 J	23.9 J	26.8 J	33.5 J	41.3 J	48.4 J
Potassium	mg/Kg	2160	100%	1762	4	1310 J	1530 J	1670 J	2000 J	1460 J	1700 J
Selenium	mg/Kg	1.6	100%	2	0	0.74	1.3	1.3	1.1 J	1.1	1.1
Sodium	mg/Kg	138	83%	104	5	124 J	50.6 J	45.4 U	46.7 U	84.8 J	58.8 J
Thallium	mg/Kg	0.51	42%	0.28	5	0.29 J	0.44 U	0.44 U	0.45 U	0.33 U	0.32 U
Vanadium	mg/Kg	28.4	100%	150	0	16.8 J	27.6 J	23.1 J	28.4 J	18.7 J	21.1 J
Zinc	mg/Kg	131	100%	83	6	95.7 J	68.6 J	79 J	63.4 J	76.3 J	131 J
OTHER ANALYSES											
Total Solids	%W/W					85.8	85.2	81.9	79.6	90.2	83.7

NOTES:
a) The TAGM value for PCBs is 1000ug/Kg for surface soils and 10,000 ug/Kg for subsurface soils.
b) * = As per proposed TAGM, total VOCs < 10 ppm, total SVOs < 500 ppm, and individual SVOs < 50 ppm.
c) NA = Not Available.
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.
g) R = The data was rejected during the data validation process.

Pesticides and PCBs

Three pesticide compounds were detected in three of the 12 soil samples collected. The pesticides detected were 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT. All three of these pesticides were detected at concentrations which were below their respective TAGM values.

No PCBs were detected in any of the soil samples.

Metals

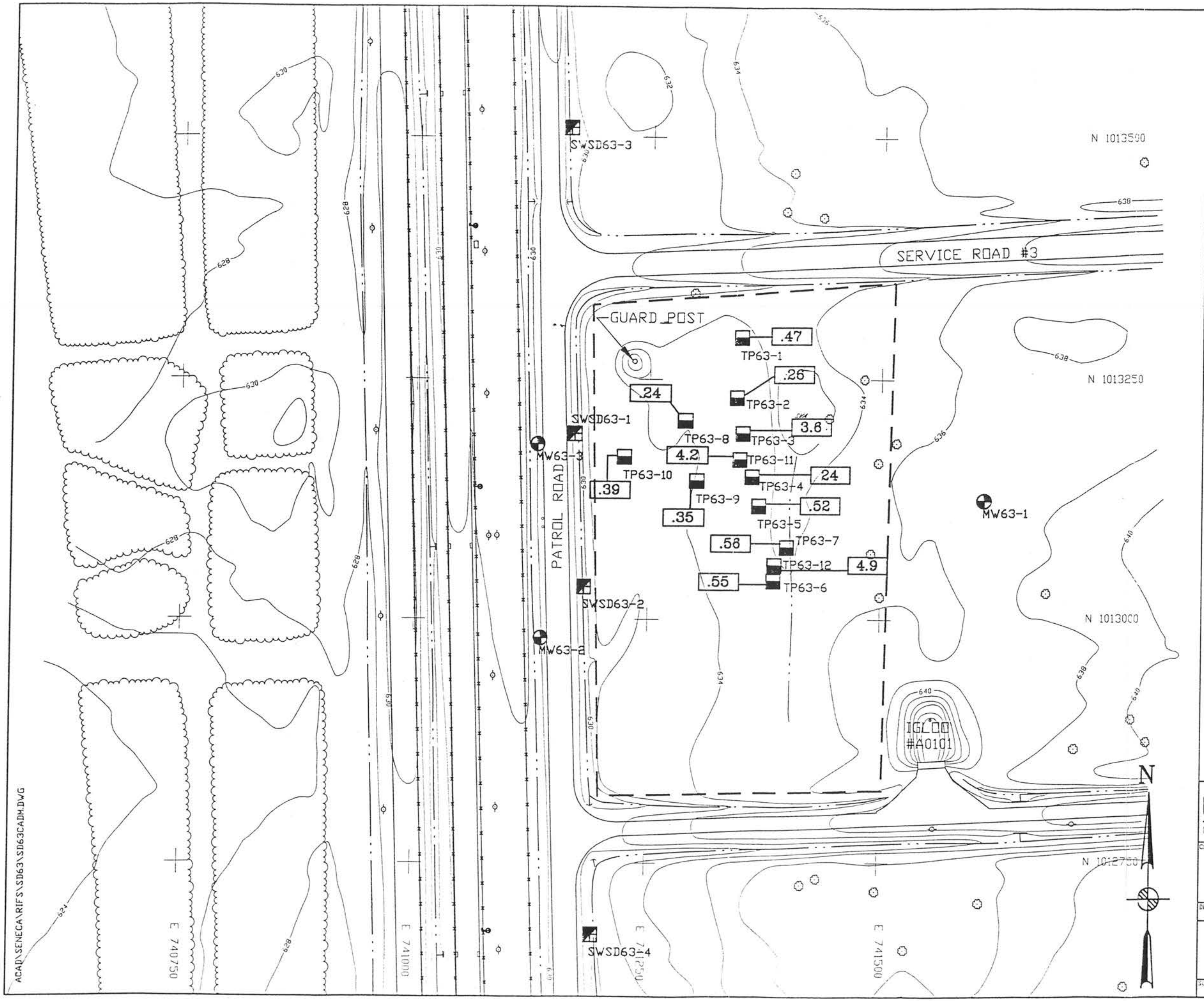
A variety of soil samples were found to contain metals at concentrations that exceeded the associated TAGM values. Of the 22 metals reported, 14 were found in one or more soil samples at concentrations above the TAGM values. Of the metals that exceeded the TAGM, cadmium and mercury were the only metals which exceeded their TAGM values by more than a factor of 2.

The concentrations of cadmium in samples TP63-3, TP63-4, TP63-11 and TP63-12 were three to twenty-four times the TAGM value of 1 mg/kg. The concentrations of cadmium in subsurface soils are shown in Figure 3-21.

The concentration of mercury in sample TP63-3 (0.49 mg/kg) was the only detected concentration of this element which exceeded the TAGM value of 0.1 mg/kg.

Radioactivity

The gamma spectral analyses of the soil samples from SEAD-63 are shown in Table 3-14. Where appropriate, the data from these analyses were compared to the UMTRCA criterion soils to a depth of 15cm.



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PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-63 MISCELLANEOUS COMPONENTS BURIAL SITE

DEPT	Dwg. No.
ENVIRONMENTAL ENGINEERING	726511-02003

FIGURE 3-21
CADMIUM IN SUBSURFACE
SOILS

SCALE	DATE	REV
1" = 100'	DECEMBER 1996	A

TABLE 3-14

SENECA ARMY DEPOT ACTIVITY
SEAD-63 RI/FS PROJECT SCOPING PLAN
ESI SOIL RADIOACTIVITY ANALYSIS RESULTS

			MEDIA	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			SWMU	SEAD-63	SEAD-63	SEAD-63	SEAD-63	SEAD-63	SEAD-63	SEAD-63
			DEPTH (FT)	3	2	6.5	3	2	3	1.5
			DATE SAMPLED	6/25/94	6/26/94	6/26/94	6/26/94	6/26/94	6/27/94	6/27/94
			ES ID	TP63-1	TP63-2	TP63-3	TP63-4	TP63-5	TP63-6	TP63-7
			LAB ID	225672	225673	225674	225675	225676	225677	225678
RADIONUCLIDE ANALYSIS GAMMA SPECTRAL	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
Pb-210	100%	NA	NA	2.2	2.2	2	2.2	2.5	2	2.4
Ra-226	100%	6.3pCi/g (see notes)	0	1.9	1.6	1.4	1.6	1.8	1.7	1.7
Ra-228	100%	NA	NA	1.6	1.4	1.6	1.7	1.39	1.8	2.3
Th-228	100%	NA	NA	1.6	1.7	1.3	1.4	1.5	1.4	1.7
U-235	100%	NA	NA	0.14	0.09	0.3	0.23	0.16	0.15	0.24
U-238	100%	NA	NA	0.71	1.24	0.66	1.2	1.5	0.7	1.37
GROSS ALPHA	100%	NA	NA	21	20	20	14	15	19	16
GROSS BETA	100%	NA	NA	43	34	28	42	34	39	38

			MEDIA	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			SWMU	SEAD-63	SEAD-63	SEAD-63	SEAD-63	SEAD-63	SEAD-63	SEAD-63
			DEPTH (FT)	1.5	1.5	2.5	1.5	3	3	5
			DATE SAMPLED	6/27/94	6/27/94	6/27/94	6/28/94	6/28/94	6/28/94	6/28/94
			ES ID	TP63-57	TP63-8	TP63-9	TP63-10	TP63-11	TP63-511	TP63-12
			LAB ID	225680 TP63-7DUP	225682	225683	225821	225822	225825 TP63-11DUP	225824
RADIONUCLIDE ANALYSIS GAMMA SPECTRAL	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
Pb-210	100%	NA	NA	1.9	1.9	2.4	2.7	2.6	2.6	2.6
Ra-226	100%	6.3pCi/g (see notes)	0	1.9	1.9	2	1.4	1.9	1.8	1.6
Ra-228	100%	NA	NA	1.6	1.6	1.33	1.3	1.5	1.7	1.5
Th-228	100%	NA	NA	1.4	1.5	1.35	1.27	1.9	2	1.6
U-235	100%	NA	NA	0.37	0.48	0.11	0.13	0.14	0.14	0.2
U-238	100%	NA	NA	0.88	0.74	1.32	1.36	0.69	1.5	0.73
GROSS ALPHA	100%	NA	NA	20	15	18	25	11	15	14
GROSS BETA	100%	NA	NA	31	28	29	41	43	46	48

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface, is used as an ARAR ar some NPL sites.

The levels of radionuclides in each of the 12 test pit soil samples were very similar to those that were detected in the soil samples collected at the MW12A-1 background location. None of the radium-226 levels exceeded the UMTRCA criterion, and the range and distribution of the detected levels for all of the radionuclides are only slightly above those that were observed in the background data from the MW12A-1 sampling location. The detected levels of ^{226}Ra ranged from 1.4 to 2 pCi/g, the detected levels of lead-210 ranged from 2 to 2.7 pCi/g, the detected levels of thorium-228 ranged from 1.27 to 2 pCi/g, the detected levels of uranium-235 ranged from .09 to .48 pCi/g, and the detected levels of uranium-235 ranged from 0.66 to 1.5 pCi/g. These levels are roughly equivalent to the average levels of these radionuclides (between 0.9 pCi/g and 0.7 pCi/g) in the soils of the continental United States (Shapiro, 1990).

Gross alpha and gross beta radiations were also detected in all 12 test pit samples. The levels of both alpha and beta radiations in these samples showed no appreciable variance in the reported values.

Groundwater

Groundwater samples from three monitoring wells were collected as part of the ESI conducted at SEAD-63. The groundwater monitoring well installation diagrams are presented in Appendix B.

The summary of chemical analyses is presented in Table 3-15. The following sections describe the nature and extent of groundwater contamination identified at SEAD-63.

Volatile Organic Compounds

No volatile organic compounds were detected in the groundwater samples collected at SEAD-63.

Semivolatile Organic Compounds

Only one semivolatile organic compound, phenol, was detected in one of the three groundwater samples collected at SEAD-63. The phenol concentration of 2J mg/L detected in sample MW63-3 is above the TAGM value of 1 mg/L.

T LE 3-15

SENECA ARMY DEPOT ACTIVITY
SEAD-63 RI/FS PROJECT SCOPING PLAN
ESI GROUNDWATER ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	NUMBER ABOVE CRITERIA	WATER SEAD-63 07/11/94 MW63-1 226665 45282	WATER SEAD-63 07/11/94 MW63-2 226666 45282	WATER SEAD-63 07/11/94 MW63-3 226667 45282
SEMIVOLATILE ORGANICS								
Phenol	ug/L	2	33%	1	1	11 UJ	11 U	2 J
METALS								
Aluminum	ug/L	747	100%	NA	NA	747	376	743
Barium	ug/L	83	100%	1000	0	72.6 J	71.2 J	83 J
Calcium	ug/L	295000	100%	NA	NA	89400	132000	295000
Chromium	ug/L	1.1	100%	50	0	1.1 J	0.91 J	1.1 J
Cobalt	ug/L	6.2	100%	NA	NA	6.2 J	2.4 J	6.2 J
Copper	ug/L	2.6	100%	200	0	2.1 J	1.4 J	2.6 J
Iron	ug/L	1260	100%	300	3	1260	603	1020
Lead	ug/L	1.1	33%	25	0	1.1 J	0.89 U	0.9 U
Magnesium	ug/L	54600	100%	NA	NA	16400	20000	54600
Manganese	ug/L	1070	100%	300	3	548	1070	408
Nickel	ug/L	10.6	100%	NA	NA	9.7 J	4.3 J	10.6 J
Potassium	ug/L	5340	100%	NA	NA	3870 J	2360 J	5340
Sodium	ug/L	146000	100%	20000	0	5710	5860	146000
Vanadium	ug/L	1.5	100%	NA	NA	1.5 J	0.81 J	1.5 J
Zinc	ug/L	11.6	100%	300	0	7.1 J	6.2 J	11.6 J
OTHER ANALYSES								
pH	Standard Units					7.3	7.3	6.8
Conductivity	umhos/cm					445	650	2100
Temperature	°C					15.2	17.6	18.4
Turbidity	NTU					115	60	68

NOTES:
a) NY State Class GA Groundwater Regulations
b) NA = Not Available
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration,
but was not detected due to problems with the analysis.
g) R = The data was rejected during the data validation process.
h) Federal Primary and Secondary(*) Drinking Water Maximun contaminant Levels
(40 CFR 141.61-62 and 40 CFR 143.3)
i) ** the value is an action level, reported in Drinking Water Regulations and Health Adviseries,USEPA, May 1994

Pesticides and PCBs

No pesticides or PCBs were detected in the six groundwater samples collected at SEAD-63.

Metals

Numerous metals were detected in the groundwater samples. Two metals, iron and manganese, were found in all three groundwater samples at concentrations above their respective state and/or federal criteria value. Iron was found in all three of the monitoring wells at concentrations between 603 mg/L and 1260 mg/L, which exceeded the state (and federal) criteria value of 300 mg/L. Manganese was found in all three of the monitoring wells at concentrations between 408 mg/L and 1070 mg/L, which exceeded the NY AWQS standard of 300 mg/L.

No other significant concentrations of metals were detected in the groundwater samples collected at SEAD-63.

Radionuclides

The summary of radioactivity analysis results is presented in Table 3-16. No radionuclides from the uranium, thorium or actinium series were detected in the three groundwater samples submitted for gamma spectral analysis. Gamma radiation from K-40 was also undetected in the three groundwater samples.

Gross alpha radiation was detected at various levels in all three groundwater samples. Exceedance of the radiological criteria for gross alpha radiation (15 pCi/L) was detected in the groundwater from MW63-1 (27 pCi/L) and MW63-3 (130 pCi/L). These high gross alpha radiation levels may be the result of the high NTUs in these samples (between 60and 115 NTUs). Gross beta radiations were also detected in all three groundwater samples, ranging in levels from 7 to 130 pCi/L. The higher levels of gross beta radiations detected may also be due to the high NTUs of these samples. None of the groundwater samples exceeded the NYS Class GA standard of 1,000 pCi/L of gross beta radiation.

TABLE 3-16

SENECA ARMY DEPOT ACTIVITY
SEAD-12 and 63 RI/FS SCOPING PLAN
GROUNDWATER RADIOACTIVITY ANALYSIS RESULTS SEAD-63 ESI

						MEDIA SWMU DATE SAMPLED ES ID LAB ID	WATER SEAD-63 7/11/94 MW63-1 226695	WATER SEAD-63 7/11/94 MW63-2 226696	WATER SEAD-63 7/11/94 MW63-3 226697
RADIONUCLIDE ANALYSIS	FREQUENCY OF DETECTION	NY AWQS CLASS GA	EPA MCLs	FEDERAL HEALTH ADVISORY	10 CFR 20 Appendix B Table 2	NUMBER ABOVE CRITERIA	pCi/L	pCi/L	pCi/L
GAMMA SPECTRAL									
K-40	50%	NA	NA	NA	4,000	0	ND	ND	ND
GROSS ALPHA	100%	15 pCi/L	15 pCi/L	15 pCi/L	NA	2	27	4	130
GROSS BETA	100%	1000 pCi/L	4 mrem/year (note 2)	4 mrem/year (note 2)	NA	NA	51	7	130

NOTES:

1. U=not detected above this level.
2. The 4 mrem/year MCL is intended to be used as a screening device to measure for man-made radionuclides

Surface Water

Four surface water samples were collected from the drainage ditch along Patrol Road. The location of the samples is shown in Figure 3-15. These samples were collected as part of the ESI conducted at SEAD-63. The summary of chemical analyses is presented in Table 3-17. The following sections describe the nature and extent of surface water contamination identified at SEAD-63.

Volatile Organic Compounds

No volatile organic compounds were detected in the surface water samples collected at SEAD-63.

Semivolatile Organic Compounds

Eleven semivolatile organic compounds were found in the surface water samples collected at SEAD-63; none were detected at concentrations which exceeded their respective New York state guideline values. Most of the semivolatiles were found in samples SW63-1 and SW63-3, each of which contained four and seven, respectively, types of compounds. None of the compounds detected in these two samples were common to both samples with the exception of bis(2-ethylhexyl)phthalate.

Pesticides and PCBs

No pesticides or PCBs were found in the surface water samples collected at SEAD-63.

Metals

Numerous metals were detected in the surface water samples collected at the site. Iron was the only metal found at concentrations above its associated criteria value of 300 mg/L. Iron was detected at a concentration of 9,050 mg/L in sample SW63-7 and a concentration of 856 mg/L in samples SW63-4.

TABLE 3-17

SENECA ARMY DEPOT ACTIVITY
SEAD-63 RI/FS PROJECT SCOPING PLAN
ESI SURFACE WATER ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYS GUIDELINES CLASS D (a)	NUMBER ABOVE CRITERIA	WATER SEAD-63 06/14/94 SW63-1 224159 44745	WATER SEAD-63 06/12/94 SW63-2 224080 44745	WATER SEAD-63 06/14/94 SW63-3 224160 44745	WATER SEAD-63 06/13/94 SW63-4 224081 44745
SEMIVOLATILE ORGANICS									
Phenol	ug/L	0.8	50%	5	0	10 U	0.8 J	10 U	0.8 J
Pentachlorophenol	ug/L	1	25%	1	0	1 J	27 U	25 U	27 U
Fluoranthene	ug/L	0.7	25%	NA	NA	0.7 J	11 U	10 U	11 U
Pyrene	ug/L	0.5	25%	NA	NA	0.5 J	11 U	10 U	11 U
bis(2-Ethylhexyl)phthalate	ug/L	68	50%	NA	NA	1 J	11 U	68	11 U
Benzo(b)fluoranthene	ug/L	0.9	25%	NA	NA	10 U	11 U	0.9 J	11 U
Benzo(k)fluoranthene	ug/L	1	25%	NA	NA	10 U	11 U	1 J	11 U
Benzo(a)pyrene	ug/L	1	25%	NA	NA	10 U	11 U	1 J	11 U
Indeno(1,2,3-cd)pyrene	ug/L	0.9	25%	NA	NA	10 U	11 U	0.9 J	11 U
Dibenz(a,h)anthracene	ug/L	0.8	25%	NA	NA	10 U	11 U	0.8 J	11 U
Benzo(g,h,i)perylene	ug/L	0.8	25%	NA	NA	10 U	11 U	0.8 J	11 U
METALS									
Aluminum	ug/L	3630	100%	NA	NA	111 J	3630	235	332
Arsenic	ug/L	3.8	25%	360	0	2 U	3.8 J	2 U	2 U
Barium	ug/L	91.4	100%	NA	NA	27.9 J	91.4 J	26.4 J	43.1 J
Cadmium	ug/L	0.78	25%	9.4	0	0.2 U	0.78 J	0.2 U	0.2 U
Calcium	ug/L	220000	100%	NA	NA	89100	220000	75300	122000
Chromium	ug/L	5.6	100%	3275	0	0.88 J	5.6 J	1 J	0.68 J
Cobalt	ug/L	7.2	75%	NA	NA	1.2 J	7.2 J	0.5 U	0.99 J
Copper	ug/L	7.9	100%	36.8	0	4.8 J	7.9 J	5.8 J	2.8 J
Iron	ug/L	9050	100%	300	1	148	9050	282	856
Lead	ug/L	20	25%	220	0	0.9 U	20	0.9 U	0.9 U
Magnesium	ug/L	33700	100%	NA	NA	12900	33700	9640	18700
Manganese	ug/L	2300	100%	NA	NA	101	2300	7.3 J	1200
Mercury	ug/L	0.1	75%	NA	NA	0.03 U	0.04 J	0.1 J	0.03 J
Nickel	ug/L	18.8	100%	50562	0	2.5 J	18.8 J	2.3 J	2 J
Potassium	ug/L	7910	100%	NA	NA	3420 J	7910	4200 J	1660 J
Silver	ug/L	0.89	50%	15.4	0	0.89 J	0.5 U	0.53 J	0.5 U
Sodium	ug/L	59300	100%	NA	NA	59300	30700	55100	25400
Thallium	ug/L	1.9	25%	20	0	1.9 J	1.9 U	1.9 U	1.9 U
Vanadium	ug/L	8.9	100%	190	0	1.6 J	8.9 J	1.4 J	1.1 J
Zinc	ug/L	99	100%	611	0	2.5 J	99	2.2 J	12.2 J
OTHER ANALYSES									
pH	Standard Units				0	7.2	7.4	8	7.2
Conductivity	umhos/cm					800	100	700	650
Temperature	°C					27.5	26	28	19
Turbidity	NTU					6	212	8.8	33

NOTES:

a) The New York State Ambient Water Quality standards and guidelines for Class D surface water.
b) Hardness dependent values assume a hardness of 217 mg/L.
c) NA = Not Available
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.
g) R = The data was rejected during the data validation process.
h) Acute and chronic pentachlorophenol criteria are pH-dependent. The calculated criteria for these samples were within this range.

Radioactivity

Table 3-18 presents the radioactivity analysis results for the surface water samples collected at SEAD-63. No gamma emitting radionuclides from the actinium, uranium or thorium series were detected in the four surface water samples submitted for radiological analysis. Gamma radiation from K-40 was detected in all of the surface water samples at levels ranging from 21 pCi/L to 210 pCi/L.

Gross alpha and gross beta radiation were detected in all four surface water samples. The levels of gross alpha and gross beta radiations in samples SW63-1, SW63-3, and SW63-4 were comparatively low (between 4 and 11 pCi/L gross alpha and between 10 and 23pCi/L gross beta). The levels of gross alpha and gross beta in sample SW63-2 were significantly higher, 107 pCi/L of gross alpha radiation and 180 pCi/L of gross beta radiation. These high concentrations are thought to be the result of the high NTU reading of this sample, over 200 NTUs. The other three samples had NTUs of 33 or less.

Sediment

As part of the ESI conducted at SEAD-63, four sediment samples were collected at the same locations as the four surface water samples. The location of the sediment sampling points is shown in Figure 3-15. The summary of the chemical analyses is presented in Table 3-19. The following sections describe the nature and extent of sediment contamination identified at SEAD-63.

Volatile Organic Compounds

Three volatile organic compounds were detected at low concentrations in samples SD63-2 and SD63-3. Acetone, 2-butanone, and toluene were detected at concentrations of 150J mg/kg, 35J mg/kg and 14J mg/kg, respectively, in sample SD63-3. The compound 2-butanone was found in SD63-2 at a concentration of 8J mg/kg. No criteria exist for the occurrence of these VOCs in sediments.

TABLE 3-18

SENECA ARMY DEPO ACTIVITY
SEAD-63 RI/FS PROJECT S OPING PLAN
ESI SURFACE WATER RADIOACTIVI Y ANALYSIS RESULTS

			MEDIA	WATER	WATER	WATER	WATER
			SWMU	SEAD-63	SEAD-63	SEAD-63	SEAD-63
			DATE SAMPLED	6/14/94	6/12/94	6/14/94	6/13/94
			ES ID	SW63-1	SW63-2	SW63-3	SW63-4
			LAB ID	224321	224314	224322	224315
RADIONUCLIDE ANALYSIS	FREQUENCY OF DETECTION		NUMBER ABOVE CRITERIA	pCi/L	pCi/L	pCi/L	pCi/L
GAMMA SPECTRAL							
K-40	100%	No criteria governing the levels of radionuclides could be determined for New York state class C surface waters.	NA	50	210	72	21
GROSS ALPHA	100%		NA	4	107	3	11
GROSS BETA	100%		NA	12	180	10	23

TABLE 3-19

SENECA ARMY DEPOT ACTIVITY
SEAD-63 RI/FS PROJECT SCOPING PLAN
ESI SEDIMENT ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	LEVEL (a)	SOURCE	NYSDEC SEDIMENT CRITERIA FOR WILDLIFE (a)	LOT (b)	NUMBER ABOVE CRITERIA	SOIL SEAD-63 0-0.2 06/13/94 SD63-1 224082 44748	SOIL SEAD-63 0-0.2 06/12/94 SD63-2 224083 44748	SOIL SEAD-63 0-0.2 06/13/94 SD63-3 224084 44748	SOIL SEAD-63 0-0.2 06/13/94 SD63-4 224085 44748
VOLATILE ORGANICS												
Acetone	ug/Kg	150	25%	NA	NA	NA	NA	NA	15 U	23 UJ	12 UJ	150 J
2-Butanone	ug/Kg	35	50%	NA	NA	NA	NA	NA	15 U	8 J	12 UJ	35 J
Toluene	ug/Kg	14	25%	NA	NA	NA	NA	NA	15 U	18 UJ	12 UJ	14 J
SEMIVOLATILE ORGANICS												
Phenanthrene	ug/Kg	270	100%	120,000	NYSBALCT	NA	NA	0	49 J	120 J	50 J	270 J
Anthracene	ug/Kg	46	25%	NA	NA	NA	NA	NA	480 U	700 UJ	390 U	46 J
Carbazole	ug/Kg	34	25%	NA	NA	NA	NA	NA	480 U	700 UJ	390 U	34 J
Fluoranthene	ug/Kg	720	100%	102,000	NYSBALCT	NA	NA	0	110 J	240 J	100 J	720 J
Pyrene	ug/Kg	600	100%	NA	NA	NA	NA	NA	100 J	220 J	110 J	600 J
Benzo(a)anthracene	ug/Kg	350	100%	1300	NYSHHB	NA	NA	0	69 J	140 J	70 J	350 J
Chrysene	ug/Kg	540	100%	1300	NYSHHB	NA	NA	0	110 J	200 J	110 J	540 J
bis(2-Ethylhexyl)phthalate	ug/Kg	25	25%	199,500	NYSBALCT	NA	NA	0	25 J	700 UJ	390 U	720 UJ
Di-n-octylphthalate	ug/Kg	19	25%	NA	NA	NA	NA	NA	480 U	700 UJ	19 J	720 UJ
Benzo(b)fluoranthene	ug/Kg	860	100%	1300	NYSHHB	NA	NA	0	130 J	380 J	110 J	860 J
Benzo(k)fluoranthene	ug/Kg	470	100%	1300	NYSHHB	NA	NA	0	89 J	180 J	66 J	470 J
Benzo(a)pyrene	ug/Kg	540	100%	1300	NYSHHB	NA	NA	0	73 J	170 J	79 J	540 J
Indeno(1,2,3-cd)pyrene	ug/Kg	320	100%	1300	NYSHHB	NA	NA	0	46 J	83 J	42 J	320 J
Dibenz(a,h)anthracene	ug/Kg	140	25%	NA	NA	NA	NA	NA	480 U	700 UJ	390 U	140 J
Benzo(g,h,i)perylene	ug/Kg	230	100%	NA	NA	NA	NA	NA	38 J	71 J	37 J	230 J
PESTICIDES/PCB												
Endosulfan I	ug/Kg	7.5	50%	30	NYSBALCT	NA	NA	0	2.5 UJ	7.5 J	4.6 J	3.7 UJ
4,4'-DDE	ug/Kg	9.2	50%	10	NYSHHB	10	NA	0	4.9 UJ	6 J	3.9 UJ	9.2 J
4,4'-DDD	ug/Kg	3.9	25%	10	NYSHHB	10	NA	0	4.9 UJ	7 UJ	3.9 UJ	3.9 J
Endosulfan sulfate	ug/Kg	5.2	25%	NA	NA	NA	NA	NA	4.9 UJ	7 UJ	3.9 UJ	5.2 J
4,4'-DDT	ug/Kg	4.3	25%	10	NYSHHB	10	NA	0	4.9 UJ	7 UJ	3.9 UJ	4.3 J
Endrin ketone	ug/Kg	9.4	25%	NA	NA	NA	NA	NA	4.9 UJ	7 UJ	3.9 UJ	9.4 J
METALS												
Aluminum	mg/Kg	11700	100%	NA	NA	NA	NA	NA	7590	11700 J	11100	11000 J
Arsenic	mg/Kg	4.3	100%	6	LEL	NA	33	0	4.1	3.7 J	4.3	2.4 J
Barium	mg/Kg	90.6	100%	NA	NA	NA	NA	NA	36.3 J	63.5 J	37.2	90.6 J
Beryllium	mg/Kg	0.59	100%	NA	NA	NA	NA	NA	0.44 J	0.59 J	0.52 J	0.54 J
Cadmium	mg/Kg	0.83	100%	.6	LEL	NA	10	2	0.6 J	0.83 J	0.38 J	0.68 J
Calcium	mg/Kg	101000	100%	NA	NA	NA	NA	NA	101000	89800 J	31500	34100 J
Chromium	mg/Kg	20.3	100%	26	LEL	NA	111	0	13.8 J	19.1 J	20.3 J	18.2 J
Cobalt	mg/Kg	11.9	100%	NA	NA	NA	NA	NA	10.6 J	11.9 J	11.2	10.5 J
Copper	mg/Kg	35.6	100%	16	LEL	NA	114	4	25.2	35.6 J	32.7	30.7 J
Iron	mg/Kg	26500	100%	20000	LEL	NA	40000	1	17100	19200 J	26500	18700 J
Magnesium	mg/Kg	15000	100%	NA	NA	NA	NA	NA	15000	13900 J	6210	8590 J
Manganese	mg/Kg	801	100%	460	LEL	NA	1100	2	449	653 J	260	801 J
Mercury	mg/Kg	0.12	100%	0.15	LEL	NA	2	0	0.04 J	0.06 J	0.03 J	0.12 J
Nickel	mg/Kg	44.2	100%	16	LEL	NA	90	4	29.8	35 J	44.2	32.8 J
Potassium	mg/Kg	2570	100%	NA	NA	NA	NA	NA	1370 J	2570 J	1340 J	1670 J
Selenium	mg/Kg	1.1	50%	NA	NA	NA	NA	NA	0.62 U	0.68 UJ	1.1	0.97 J
Sodium	mg/Kg	197	100%	NA	NA	NA	NA	NA	121 J	194 J	197 J	119 J
Vanadium	mg/Kg	27.5	100%	NA	NA	NA	NA	NA	19.9	27.5 J	19.1	21.2 J
Zinc	mg/Kg	325	100%	120	LEL	NA	800	2	105	133 J	68	325 J
OTHER ANALYSES												
Total Solids	%W/W								68.1	46.7	85.1	46.2

NOTES:

a) Sediment results were compared to the lowest of several applicable New York State guidelines for sediment. These standards include: the lowest effect level (NYS LEL), human health bioaccumulation criteria (NYS HHB), benthic aquatic life acute toxicity critieria (NYS BALAT) and benthic aquatic life chronic toxicity ccriteria (NYS BALCT), and wildlife bioaccumulation criteria (NYS WB). These standards are presented in the NYSDEC Technical Guidance for screening contaminated sediments, 1994.

b) LOT = Limit of Tolerance: Represents point at which significant effects on benthic species occur.

c) NYSDEC 1969 guideline for phthalates.

d) NA = Not Available.

e) U = The compound was not detected below this concentration.

f) J = The reported value is an estimated concentration.

g) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.

h) R = The data was rejected during the data validation process.

Semivolatile Organic Compounds

A total of 15 SVOCs were identified in the four sediment samples collected at SEAD-63 at concentration below their respective criteria values in all four sediment samples.

Pesticides and PCBs

Six pesticide compounds were detected in three of the sediment samples. Three of the six compounds (endosulfan, 4,4'-DDE, and 4,4'-DDD) exceeded their respective NYSDEC criteria values. All of the reported concentrations of these three pesticides exceeded their respective criteria values by at least an order of magnitude.

Metals

Nineteen metals were detected in the four sediment samples collected at SEAD-63. Cadmium, copper, iron, manganese, mercury, nickel, and zinc were the only metals detected at concentrations which exceeded their respective NYSDEC criteria values. Cadmium, mercury, and iron were detected at concentrations which exceeded their respective criteria values by a factor of 1.09 or less. Copper, manganese, nickel, and zinc were detected in three to four of the sediment samples at concentrations which exceeded their respective criteria values by a factor of 3.8 or less.

Radioactivity

Table 3-20 presents the summary of the radioactivity analysis results for the sediment samples collected at SEAD-63. The gamma spectral analyses of the sediment samples collected at SEAD-63 showed various levels of principal and associated radionuclides from three natural radioactive decay series including the thorium series, the uranium series and the actinium series. The range and distribution of the detected levels for all of the radionuclides are similar to those that would be expected for background data.

Gross alpha and gross beta radiation were also detected in all of the sediment samples collected at SEAD-63. No criteria exist for reported levels of gross alpha or gross beta radiation in sediment, however, the levels of gross alpha and gross beta radiation detected in these samples showed no appreciable variances in the reported values.

TABLE 3-20

SENECA ARMY DEPOT ACTIVITY
SEAD-12 and 63 RI/FS SCOPING PLAN
SEDIMENT RADIOACTIVITY ANALYSIS RESULTS SEAD-63 ESI

			MEDIA	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
			SWMU	SEAD-63	SEAD-63	SEAD-63	SEAD-63	
			DEPTH (FT)	0-0.2	0-0.2	0-0.2	0-0.2	
			DATE SAMPLED	6/13/94	6/12/94	6/13/94	6/13/94	
			ES ID	SD63-1	SD63-2	SD63-3	SD63-4	
			LAB ID	224313	224309	224310	224311	
RADIONUCLIDE ANALYSIS GAMMA SPECTRAL	FREQUENCY OF DETECTION	UMTRCA 40 CFR 192	NUMBER ABOVE CRITERIA	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
Pb-210	100%	NA	NA	4.9	3.9	3.5	3.9	2.1
Ra-226	100%	6.3pCi/g (see notes)	0	1.4	1.27	1.94	1.8	1.28
Ra-228	100%	NA	NA	0.88	0.91	1.37	1.22	1
Th-228	100%	NA	NA	1.5	1.33	1.6	1.9	1.21
U-235	100%	NA	NA	0.12	0.27	0.18	0.26	0.18
U-238	100%	NA	NA	0.82	0.48	0.98	0.52	0.91
GROSS ALPHA	100%	NA	NA	17	18	19	17	14
GROSS BETA	100%	NA	NA	30	35	42	39	33

NOTES

1 A background value of 1.3 pCi/g for radium-226 in soil was calculated from the mean of the three soil samples collected from the ESI background location MW12A-1.

2. The UMTRCA regulation that limits the concentration of Ra-226 in soils to background plus 5pCi/g, averaged over the first 15 cm of soil below the surface, is used as an ARAR ar some NPL sites.

3.1.2.3 Data Summary and Conclusions

The results of the ESI conducted at SEAD-63 indicate that past activities on site have impacted the soil, groundwater, and sediment quality.

Soil

The soil analysis results indicate that a release of cadmium has occurred in several areas which were investigated by test pits during the ESI at SEAD-63. Cadmium concentrations in four test pit samples exceeded the TAGM value of 1 mg/kg by up to an order of magnitude. Mercury was detected in one test pit sample (TP63-3) at a concentration of 0.49 mg/kg, exceeding the TAGM value of 0.1 mg/kg.

Concentrations of heavy metals above their criteria were present in all of the soil samples collected at SEAD-63. No consistent pattern in their occurrences was evident and these elevated concentrations were attributed to natural soil variations. Radioactivity analysis results indicated that the soils of SEAD-63 have possibly been impacted by Ra-226, although the levels of radiation from this radionuclide were only slightly above the background levels that were found at the MW12A-1 sampling location. Because a valid background radionuclide data set is not yet available for SEDA, it is not possible to discern whether the slightly elevated concentrations of Ra-226 detected at SEAD-63 are due to a low level impact from past on-site activities, or if these slightly elevated concentrations are simply due to natural fluctuations in the background levels of Ra-226 at the SEDA facility.

Volatile organic compounds, semivolatile organic compounds, and pesticides are present at low concentrations and only one semivolatile compound, dibenz(a,h)anthracene, was found at a concentration which slightly exceeded its associated TAGM value by a factor of 2.

Groundwater

Radioactivity analysis results indicate that the groundwater in MW63-3 (located hydraulically downgradient of the disposal pits) may be impacted by gross alpha and gross beta radiation. The level of gross alpha radiation in this well was an order of magnitude above the NYS AWQS Class GA and federal drinking water criteria, however, this may be due to the high NTU of the sample. Gross beta radiation levels detected in the groundwater samples collected from groundwater monitoring wells MW63-3 and MW63-1 (considered to be the background location for the purposes of the ESI) may be similarly impacted, though the elevated gross beta levels may be due solely to the high NTUs of those groundwater samples.

Other constituents that were detected include one semivolatile organic compound and metals. Phenol was detected at a concentration of 2J mg/L, exceeding its criteria value of 1 mg/L. Concentrations of heavy metals above their criteria were present in all of the groundwater samples collected at SEAD-63. No consistent pattern in their occurrences was evident and these elevated concentrations of heavy metals were attributed to natural groundwater variations.

Sediment

Sediment at the site has been impacted by semivolatile organic compounds (mostly PAHs) and pesticides. The PAHs benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)anthracene, chysene, benzo(a)pyrene, and indeno(1,2,3-cd) pyrene were detected at concentrations ranging from 42J mg/kg to 860J mg/kg in all four sediment samples. The NYSDEC criteria value for all six of these PAHs is 13 mg/kg. The pesticides endosulfan and 4,4-DDE were found at concentrations which were an order of magnitude above their respective NYSDEC criteria values in two of the sediment samples; and 4,4-DDD was found at a concentration which was an order of magnitude above its associated NYSDEC criteria value in one sample.

3.1.3 Environmental Fate of Constituents

The potential contaminants of concern at SEADs 12 and 63 are volatile organic compounds, semi-volatile organic compounds, pesticides, metals and radionuclides.

The following discussion is meant to present general information on the fate of these potential contaminants of concern, and where possible, site-specific characteristics are presented. Further discussion of heavy metals and volatile organic compounds, and all contaminants of concern at SEDA (except radionuclides), is provided in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

3.1.3.1 Volatile Organic Compounds

The following information was obtained from the document, "Management and Manufactured Gas Plant Sites, Volume III, Risk Assessment," Gas Research Institute (GRI), May 1988, GRI-

87/0260.3. A summary of fate and transport parameters for volatile organics is presented in Table 3-21.

Volatile organic compounds tend to have a low residence time in surface soil and surface water environments. These chemicals can be persistent in groundwater. However, there is evidence that non-chlorinated volatile organic compounds may degrade rapidly in the vadose zone above groundwater plumes. (Gas Research Institute, Management of Manufactured Gas Plant Sites, Volume III, Risk Assessment, May 1988, GRI-87/0260.3). Major exposure routes of interest include the ingestion of groundwater and the inhalation of the gases. The latter can be important in situations involving the excavation of pits or the entrainment of soil gas into buildings.

There is little potential for these chemicals to accumulate in aquatic or terrestrial biota.

Because it is not the intent of this section to discuss the persistence of all volatile organic compounds, only selected volatile organics that are commonly found or are suspected to have been released to the environment at SEADs 12 and 63 are discussed below.

Volatile organic chlorinated (aliphatic) compounds associated with SEAD-12 are TCE and the breakdown products of TCE, including cis- and trans- 1,2-dichloroethene (1,2-DCE), 1,1-dichloroethene (1,1-DCE) and vinyl chloride. Since vinyl chloride is a gas at ambient temperatures, it is likely that the much of the degradation of TCE ceases upon the formation of vinyl chloride, since it would be slowly released into the atmosphere. Common aromatic volatile organic compounds are benzene, toluene, ethylbenzene and xylenes (BTEX) which are associated with petroleum hydrocarbons, including gasoline. The chemical/physical properties of these chemical constituents and the media (soil, sediment, surface water, and groundwater) which have been impacted are necessary to fully evaluate the fate and transport. Meaningful chemical-specific properties are solubility, volatility, degradability, and adsorptivity. These properties are discussed below. Table 3-21 summarizes the chemical specific properties of TCE and its breakdown products. Media specific properties include organic carbon content, porosity, moisture content, bulk density, groundwater velocity, and dispersivity.

TABLE 3 - 21

SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR SELECTED ORGANIC COMPOUNDS

SENECA ARMY DEPOT

COMPOUND	SOLUBILITY (mg/l)	VAPOR PRESSURE (mmHg)	HENRY'S LAW CONSTANT (atm-m^3/mol)	Koc (ml/g)	Kow	HALF - LIFE (days)	BCF
Volatile Organic Compounds							
Methylene Chloride	20000	438	2.03E-03	8.80E+00	2.00E+01	1-3	0.8
Acetone	infinite	288	2.06E-05	2.80E-01	5.75E-01		0.03
1,2-Dichloroethene (total)	6300	5.3	6.60E-03	5.90E+01	1.23E+02		4.5
Carbon Disulfide	2940	366	1.32E-02	5.40E+01	1.00E+02		7.9
Chloroform	8200	208	2.87E-03	4.70E+01	9.33E+01		4.5-6
2-Butanone	353000	70.6	4.35E-05	9.40E-01	1.95E+00		0.09-1.86
1,2-Dichloroethane	8520	80	9.78E-04	1.40E+01	3.02E+01	2-18	1.4-2
Trichloroethene	1100	75	9.10E-03	1.26E+02	2.40E+02	3-300	13-39
Vinyl chloride	2670	2300	8.19E-02	5.70E+01	2.40E+01		
1,1-Dichlroethene	2250	500	3.40E-02	6.50E+01	5.30E+01		
Tetrachloroethene	150	19	2.59E-02	3.64E+02	3.98E+02	1-13	49-66
Toluene	535	30	6.37E-03	3.00E+02	5.37E+02	3-39	2.6-27.1
Chlorobenzene	490	8.8	3.46E-03	3.33E+02	6.92E+02		10-33
Xylene (total)	0.3	9	6.91E-03	6.91E+02	1.45E+03		70
Semivolatile Organic Compounds							
Phenol	93000	0.341	4.54E-07	1.42E+01	2.88E+01	3-5	1.4-2
2-Methylphenol	25000	0.24	1.50E-06	2.74E+02	8.91E+01	1-3	
4-Methylphenol		0.11	4.43E-07	2.67E+02	8.51E+01	1-3	
2,4-Dimethylphenol	4200	0.0573	2.38E-06	2.22E+02	2.63E+02	1-3	9.5-150
Benzoic Acid	2700			2.48E+02	7.41E+01		
Naphthalene	31.7	0.23	1.15E-03	1.30E+03	2.76E+03	1-110	44-95
2-Methylnaphthalene	25.4	0.0083	5.80E-05	8.50E+03	1.30E+04	1-3	
2-Chloronaphthalene	6.74	0.017	4.27E-04	4.16E+03	1.32E+04		
2,6-Dinitrotoluene	1320	0.018	3.27E-06	9.20E+01	1.00E+02	4	4.6
Acenaphthene	3.42	0.00155	9.20E-05	4.60E+03	1.00E+04		
Dibenzofuran				4.16E+03	1.32E+04		
2,4-Dinitrotoluene	240	0.0051	5.09E-06	4.50E+01	1.00E+02	5	
Diethylphthalate	896	0.0035	1.14E-06	1.42E+02	3.16E+02	1-3	14-117

TABLE 3 - 21

SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR SELECTED ORGANIC COMPOUNDS

SENECA ARMY DEPOT

COMPOUND	SOLUBILITY (mg/l)	VAPOR PRESSURE (mmHg)	HENRY'S LAW CONSTANT (atm-m³/mol)	Koc (ml/g)	Kow	HALF - LIFE (days)	BCF
Fluorene	1.69	0.00071	6.42E-05	7.30E+03	1.58E+04		
N-Nitrosodiphenylamine	113		1.40E-06	6.50E+02	1.35E+03	4	65-217
Hexachlorobenzene	0.006	0.000019	6.81E-04	3.90E+03	1.70E+05		
Phenanthrene	1	0.00021	1.59E-04	1.40E+04	2.88E+04	1-200	
Anthracene	0.045	0.000195	1.02E-03	1.40E+04	2.82E+04		
Di-n-butylphthalate	13	0.00001	2.82E-07	1.70E+05	3.98E+05	1-3	89-1800
Fluoranthene	0.206	0.0177	6.46E-06	3.80E+04	7.94E+04	140-440	
Pyrene	0.132	2.50E-06	5.04E-06	3.80E+04	7.59E+04	9-1900	
Butylbenzylphthalate	2.9	8.60E-06	1.20E-06	2.84E+04	5.89E+04		663
Benzo(a)anthracene	0.0057	1.50E-07	1.16E-06	1.38E+06	3.98E+05	240-680	
Chrysene	0.0018	6.30E-09	1.05E-06	2.00E+05	4.07E+05	160-1900	
Bis(2-Ethylhexyl)phthalate	0.285	2.00E-07	3.61E-07	5.90E+03	9.50E+03	Neg. Deg.	
Di-ni-octylphthalate	3			2.40E+06	1.58E+09		
Benzo(b)fluoranthene	0.014	5.00E-07	1.19E-05	5.50E+05	1.15E+06	360-610	
Benzo(k)fluoranthene	0.0043	5.10E-07	3.94E-05	5.50E+05	1.15E+06	910-1400	
Benzo(a)pyrene	0.0012	0.000568	1.55E-06	5.50E+06	1.15E+06	220-530	
Indeno(1,2,3-cd)pyrene	0.00053	1.00E-10	6.86E-08	1.60E+06	3.16E+06	600-730	
Dibenz(a,h)anthracene	0.0005	5.20E-11	7.33E-08	3.30E+06	6.31E+06	750-940	
Benzo(g,h,i)perylene	0.0007	1.03E-10	5.34E-08	1.60E+06	3.24E+06	590-650	

Notes:

Koc = organic carbon partition coefficient
Kow = octanol-water partition coefficient
BCF = bioconcentration factor
Neg. Deg. = Negligible Biodegradation

References:

1. IRP Toxicology Guide
2. Basics of Pump-and-Treat Ground-Water Remediation Technology (EPA, 1990).
3. Handbook of Environmental Fate and Exposure Data (Howard, 1989).
4. Soil Chemistry of Hazardous Materials (Dragun, 1988)
5. Hazardous Waste Treatment, Storage, and Disposal Facilities, Air Emissions Models (EPA, 1989).
6. USATHAMA, 1985
7. Values for Koc not found were estimated by: logKoc = 0.544logKow + 1.377 (Dragun, 1988).

Aliphatic (chlorinated) Volatile Organics

Table 3-21 presents the information which will serve as a basis for predicting the likely environmental fate of the chlorinated substances at SEDA. The most volatile of the chlorinated compounds being examined at this site is vinyl chloride, which is one of the breakdown products of TCE. Vinyl chloride has a vapor pressure of 2300 millimeters mercury (mm Hg) at 20°C. TCE has a vapor pressure of 59 mm Hg at 20°C. Consequently, volatilization represents a significant environmental pathway, provided that there is an ample amount of air space in the soil through which the vapor can migrate. Volatile constituents enter the air through void spaces in the soil above the saturated zone which may then leave the system through the ground surface.

An important chemical specific property which can be used to understand the potential for chemical migration is Henry's Law. At low concentrations and equilibrium, Henry's Law states that the concentration in the vapor phase is directly proportional to the concentration in the aqueous phase. The Henry's constant is the proportionality factor between the vapor and liquid phase concentrations. Henry's constants for selected organic compounds of concern detected are presented in Table 3-21. Generally, for compounds with a Henry's constant less than 5×10^{-3} atm-m^3/mole, volatilization is not expected to be a significant environmental pathway (Dragun, 1988). TCE and its four breakdown products all have Henry's Constants greater than 5×10^{-3} atm-m^3/mole which suggests that volatilization will be a significant mechanism in the partitioning of these volatile chlorinated compounds.

Compounds in soil are only mobile in the aqueous and air phases. Compounds enter the groundwater as precipitation migrates through the soil and mixes with these materials, eventually recharging to groundwater. The solubilities for these compounds range from 1,100 mg/l for TCE to 6,300 mg/l for trans 1,2 DCE which is sufficient to cause impacts to the groundwater. A review of the melting points and boiling points indicate that vinyl chloride is a gas at ambient temperatures, and TCE and the DCE isomers are liquids at room temperature. The affinity of a compound to sorb to the organic fraction of soil is estimated from the organic carbon partition coefficient (K_{oc}). The K_{oc} is the ratio of the amount of the compound present in the organic fraction to that present in the aqueous fraction, at equilibrium. K_{oc} values are presented in Table 3-21 for TCE and its breakdown products. The relationship between K_{oc} and mobility is presented in Table 3-22. Compounds with a K_{oc} between 500 mL/g and 2,000 ml/g are generally considered low mobility compounds and those with a K_{oc} value greater than 2,000 ml/g are considered to be immobile (Dragun, 1988). TCE, the DCE isomers and vinyl chloride all have K_{oc} values less than 500 mL/g and are therefore considered to be mobile. K_{oc} values are

TABLE 3-22

RELATIVE RELATIONSHIPS BETWEEN K_{oc} AND MOBILITY

K_{oc}	Mobility Class
>2000	I - Immobile
500-2000	II - Low Mobility
150-500	III - Intermediate Mobility
50-150	IV - Mobile
<50	V - Very Mobile

K_{oc} - Organic carbon partition coefficient

Source: The Soil Chemistry of Hazardous Materials; James Dragun, Ph.D; The Hazardous Materials Control Research Institute; 1988.

generally determined by experiment, but are often estimated using octanol-water partition coefficients (K_{OW}). Octanol-water partition coefficients are determined in the laboratory and then converted to K_{OC} via empirical relationships.

Understanding the type of soils present is useful for estimating the mobility of compounds. The site soils, clay loams, generally have low permeabilities and high water retention capacities. Therefore dissolved materials tend to move much slower through clay soils than sandy soils. Since adsorption of solutes on soils is controlled by the amount of organic carbon in the soil, soils with a higher organic content will adsorb more organics than soils which are low in carbon but rich in clay. Generally, surface soils, i.e. soils in the agricultural A horizon, have a higher organic content than deeper soils, i.e. soils in the B and C horizon, due to the presence of decomposing plant matter at the surface. In general, the larger the amount of organic matter in the soil, the less mobile the compounds of concern will be.

Compounds degrade through a variety of mechanisms including biodegradation, hydrolysis, photodecomposition, and are converted to other organic degradation products. Biodegradation is considered to be the most likely transformation pathway for TCE, since the reaction kinetics are the fastest of the mechanisms considered. Known biological breakdown products of TCE include vinyl chloride and 1,2-DCE. The degradation rate, which is a measure of how fast a compound degrades, is influenced by several factors including: solubility, which determines the availability of the compound to the bacteria, temperature, oxygen concentrations, moisture content, substrate concentrations and toxicity, which is a measure of how toxic the compound is to the bacteria. For estimating simplicity, degradation can be assumed to be a first order reaction, which will allow degradation rates to be expressed as first order rate constants or half lives. A half-life refers to the time it would take for half of the mass of the organic constituent to degrade to either an intermediate compound or to carbon dioxide and water. A detailed analysis of biodegradation would evaluate the complete pathway. Half-lives for selected organic compounds that have a potential to be detected at SEAD-12 are shown in Table 3-21. The first order degradation rate is often assumed to be independent of the mass of the constituent present in order to facilitate modeling, but in reality, as the mass of a compound decreases, the degradation rate will also decrease.

3.1.3.2 Semi-Volatile Organic Compounds

PAH Compounds

The following information was obtained from the document, "Management of Manufactured Gas Plant Sites, Volume III, Risk Assessment," GRI, May 1988, GRI-87/0260.3. PAH compounds have a high affinity for organic matter and low water solubility. Water solubility tends to decrease and affinity for organic material tends to increase with increasing molecular weight. Therefore, naphthalene is much more soluble in water than is benzo(a)pyrene. When present in soil or sediments, PAHs tend to remain bound to the soil particles and dissolve only slowly into groundwater or the overlying water column. Because of the high affinity for organic matter, the physical fate of the chemicals is usually controlled by the transport of particulates. Thus, soil, sediment and suspended particulate matter (in air) represent important media for the transport of the chemicals.

Because of their high affinity for organic matter, PAH compounds are readily taken up (bioaccumulated) by living organisms. However, organisms have the potential to metabolize the chemicals and to excrete the polar metabolites. The ability to do this varies among organisms. Fish appear to have well-developed systems for metabolizing the chemicals. The metabolites are excreted. Shellfish (bi-valves) appear to be less able to metabolize the compounds. As a result, while PAH compounds are seldom high in fish tissues, they can be high in shellfish tissues.

Several factors can degrade PAH compounds in the environment. Biodegradation on soil microorganisms is an important process affecting the concentrations of the chemicals in soils, sediment and water. Volatilization may also occur. This mechanism is effective for the lighter molecular weight compounds. However, the volatilization of higher molecular weight PAH compounds occurs slowly.

3.1.3.3 Pesticides

This section discusses only selected pesticides that are suspected to be applicable to SEAD-63. It is not meant to present a complete summary of all possible pesticides and PCBs that could be found at SEAD-63.

Endosulfan

The following information was obtained from "Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Vol. III, Pesticides (ed. Philip H. Howard, Lewis Publishers, 1991).

Endosulfan is used as an insecticide against a variety of insects on a variety of crops. Technical endosulfan is composed of a-endosulfan and b-endosulfan. Release of endosulfan isomers to soil will most likely result in biodegradation and in hydrolysis, especially under alkaline conditions. Endosulfan isomers on the soil surface may photolyze. Volatilization and leaching are not expected to be significant due to the high estimated soil-sorption coefficients of the isomers. When release to water, endosulfan isomers are expected to hydrolyze readily under alkaline conditions, and more slowly at neutral and acidic pH values (a half-lives=35.4 and 150.6 days for pH 7 and 5.5, respectively; b half-lives=37.5 and 187.3 days for pH 7 and 5.5, respectively). Volatilization and biodegradation are also expected to be significant. Endosulfan released to the atmosphere will react with photochemically generated hydroxyl radicals with an estimated half-life of 1.23 hr. Bioconcentration of endosulfan is expected to be significant. Isomers of endosulfan are contaminants in air, water, sediment, soil, fish and other aquatic organisms, and food. Human exposure results primarily from food, and by occupational exposure.

DDD

The following information was obtained from "The Installation Restoration Program Toxicology Guide," Vol. III, Arthur D. Little, Inc. June 1987.

DDD, no longer manufactured commercially, is still found as an impurity in the pesticide DDT and the miticide dicofol. It is also the major breakdown product of DDT under anaerobic conditions. The p,p' isomer of DDD is the third largest component of the technical DDT product after the two DDT isomers accounting for >4% of the mixture. It is present in somewhat lower concentrations in dicofol. In one study of several dicofol products, DDD was present in amounts ranging from 0.1 to 2.5% of the amount of dicofol.

Like DDT, DDD is expected to be highly immobile in the soil/groundwater environment when present at low dissolved concentrations. Bulk quantities of DDD dissolved in an organic solvent could be transported through the unsaturated zone as a result of a spill or the improper disposal of excess formulations. However, the extremely low solubility of DDD and its strong tendency to sorb to soil organic carbon results in a very slow transport rate in soils.

In general, transport pathways can be assessed by using an equilibrium partitioning models. These calculations predict the partitioning of low soil concentrations of DDD among soil particles, soil water, and soil air. Due to its strong sorption to soil, virtually all of the DDD partitions to the soil particles of unsaturated top soil and negligible amounts to the soil air or water. Even in saturated deep soil, which is assumed to contain no soil air, and a smaller organic carbon fraction, almost all of the DDD is retained on the soil.

DDD, like DDT, is characterized by a strong tendency to sorb to soil organic carbon. While only one measured K_{OC} value for DDD was found (log $K_{OC} = 5.38$) it is consistent with the value obtained for DDT, as would be expected based on the similarity of their structures and their octanol water partition coefficients (DDD log $K_{OW} = 5.56$). As with all neutral organic chemicals, the extent of DDD sorption is proportional to the soil organic carbon content. In soils with little organic carbon (e.g., clays) the extent of sorption may also depend upon such soil properties as surface area, cation exchange capacity, and degree of hydration.

The sorption of DDD to soils is lessened and thus its mobility is enhanced by the presence of dissolved organic matter in solution. The apparent solubility of DDT was increased several times in solutions containing humic and fulvic acids. Because the sorption behavior of DDD is expected to be much like that of DDT, its mobility in natural waters may be several times greater than predicted (though probably still small) if dissolved organic matter is present. In waters containing large concentrations of dissolved organic matter, such as swamps and bogs, this may be especially important.

The vapor pressures of the p,p' and o,p' - isomers of DDD at $30^{o}C$ have been measured as 1.3×10^{-9} and 2.5×10^{-9} atm, respectively. The Henry's law constant estimated by use of the average vapor pressure of the two isomers and an aqueous solubility of 20 ppb is $3.1 \times 10^{-5} \times$atm m^3/mol. This value is almost identical to that for DDT and roughly an order of magnitude less than that for DDE.

Experimental evidence indicates that DDT volatilization from water occurs at about one-third the rate for DDT, which may seem at odds with the similar estimates for the Henry's law constants for these two compounds. Given the uncertainties involved in measuring both the aqueous solubilities and the vapor pressures of these compounds, from which H is estimated, the findings cannot be considered inconsistent. Using a factor of one-third for the difference in the rate of volatilization of DDD and DDT, a volatilization half-life for DDD ranging from a day to less than a month has been estimated.

Volatilization of DDD from soils can be expected to be much slower than from water because of the strong tendency of DDD to sorb to soil. Using wet river bed quartz sand in 15 mm deep petri dishes, Ware et at. measured volatilization losses of p,p'-DDD (present initially at 10 ppm) that corresponded to a volatilization half-life of roughly 170 days, slightly more than twice that for p,p'-DDT under the same conditions. Because these experiments were conducted with a relatively thin layer of soil with a small organic carbon fraction, the actual volatilization rate of DDD in the field would be expected to be lower. If the relative volatilization rates of DDD and DDT in the field were the same as those observed by Ware et al., the volatilization half-life of DDD from soil could be assumed to be double the value of one to several years for DDT.

Hydrolysis of DDD can be expected to be extremely slow under environmental conditions. Over the pH range typical of natural waters (pH 5-9), Wolfe et al. found the pseudo-first-order rate constant (k_{obs}) at 27°C could be expressed as:

$$k_{obs} = 1.1 \times 10^{-10} + 1.4 \times 10^{-3} \times [OH^-]$$

where k_{obs} is in s^{-1} and $[OH^-]$, the concentration of the hydroxide ion, in moles/liter. Hydrolysis half-lives of roughly 1.6, 88, and 190 years at pH 9, 7, and 5, respectively, correspond to the rate constant estimated from this equation. These estimates are consistent with the observations of Eichelberger and Lichtenberg that no DDD, initially present in river water at 20 ppb, degraded over an eight week period (within 2.5%).

No information was found on the photolysis of DDD in natural waters. Direct photolysis of DDD (i.e., in pure water) is believed to be slower than that for DDT which is estimated to have a half-life of over 150 years. However, DDT in natural water has been estimated to have a photolysis half-life of 5 days when exposed to sunlight in mid-June; DDD might be expected to have a similar half-life based on the similar structure of the two chemicals.

Data on the biodegradation of DDD are limited. In aquatic systems, biotransformation is believed to be slow, although a model ecosystem study has shown DDD to be more biodegradable than either DDT or DDE. The ketone analogue of DDD (i.e., p,p'-dichlorobenzophenone) has been suggested as the end product of the biodegradation of DDD in the environment. DDD undergoes dehydrochlorination to 2,2-bis-(p-chlorophenyl)-1-

chloroethylene, reduction to 2,2-bis-(p-chlorophenyl)-1-chlorethane, dehydrochlorination to 2,2-bis-(p-chlorophenyl)-ethylene, reduction to 1,1-bis-(p-chlorophenyl)-ethane and eventual oxidation to bis-(p-chlorophenyl)-acetic acid (DDA), the ultimate excretory product of higher animals. DDD has also been observed to degrade in anaerobic sewage sludge.

The above discussion of fate pathways suggests that DDD is moderately volatile, very strongly sorbed to soil, and has a high potential for bioaccumulation. Information on the fate and transport parameters (i.e., solubility, vapor pressure, Henry's Law Constant, K_{OC}, K_{OW}, half-life and BCF) are provided in Table 3-23.

DDE

The following information was obtained from "The Installation Restoration Program Toxicology Guide," Vol. III, Arthur D. Little, Inc. June 1987.

The presence of DDE in the environment is primarily the result of the use of the insecticide DDT and the miticide dicofol. DDE is the principal degradation product of DDT under aerobic conditions, and it has been found to equal roughly 1-3% of the weight of dicofol in the technical mixture. Like DDT, DDE exists as both an o,p' and a p,p' isomer, with the o,p' and the p,p' isomers of DDT degrading to the respective DDE isomer. Because technical DDT consists of 65-80% p,p' - DDT and 15-21% o,p' - DDT, the p,p' - DDE isomer might be expected to predominate in the environment. In dicofol, however, the o,p' isomer typically makes up 80-90% of the DDE present. The two isomers of DDE are considered individually below where data are available. Like DDT, DDE is expected to be highly immobile in the soil/groundwater environment when present at low dissolved concentrations. Bulk quantities of DDE dissolved in an organic solvent (e.g., as a contaminant in dicofol) could be transported through the unsaturated zone as a result of a spill or improper disposal of excess formulations. However, the extremely low solubility of DDE and its strong tendency to sorb to soils would result in a very slow transport rate in soils.

In general, transport pathways can be assessed by using an equilibrium partitioning model. These calculations predict the partitioning of low soil concentrations of DDE among soil particles, soil water and soil air. Due to its strong tendency to sorb to soil, virtually all of the DDE partitions to the soil particles of unsaturated topsoil, with negligible amounts associated with the soil water or air. Even in saturated deep soil, which is assumed to contain no soil air and a smaller organic carbon fraction, almost all of the DDE is retained on the soil.

TABLE 3 - 23

SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR SELECTED PESTICIDE COMPOUNDS

SENECA ARMY DEPOT ACTIVITY

COMPOUND	SOLUBILITY (mg/l)	VAPOR PRESSURE (mmHg)	HENRY'S LAW CONSTANT (atm-m^3/mol)	Koc (ml/g)	Kow	HALF - LIFE (days)	BCF
alpha-BHC							
beta-BHC	0.24	2.80E-07	4.47E-07	3.80E+03	7.94E+03	Neg. Deg.	
delta-BHC	31.4	1.70E-05	2.07E-07	6.60E+03	1.26E+04	Neg. Deg.	
gamma-BHC (Lindane)	7.8	0.00016	7.85E-06	1.08E+03	7.94E+03	Neg. Deg.	250
gamma-Chlordane							
Heptachlor	0.18	0.0003	8.19E-04	1.20E-04	2.51E+04	Neg. Deg.	3600-37000
Aldrin	0.18	6.00E-06	1.60E-05	9.60E+04	2.00E+05	Neg. Deg.	3890-12260
Endosulfan I	0.16	0.00001	3.35E-05	2.03E+03	3.55E+03		
Heptachlor epoxide	0.35	0.0003	4.39E-04	2.20E+02	5.01E+02	Neg. Deg.	851-66000
Dieldrin	0.195	1.78E-07	4.58E-07	1.70E+03	3.16E+03	Neg. Deg.	3-10000
4,4'-DDE	0.04	6.50E-06	6.80E-05	4.40E+06	1.00E+07	Neg. Deg.	110000
Endrin	0.024	2.00E-07	4.17E-06	1.91E+04	2.18E+05	Neg. Deg.	1335-49000
Endosulfan II	0.07	0.00001	7.65E-05	2.22E+03	4.17E+03		
4,4'-DDD	0.16	2.00E-09	3.10E-05	2.40E+05	3.60E+05	Neg. Deg.	
Endosulfan sulfate	0.16			2.33E+03	4.57E+03		
4,4'-DDT	0.005	5.50E-06	5.13E-04	2.43E+05	1.55E+06	Neg. Deg.	38642-110000
Endrin aldehyde							
Endrin ketone							
alpha-Chlordane	0.56	0.00001	9.63E-06	1.40E+05	2.09E+03	Neg. Deg.	400-38000

Notes:

Koc = organic carbon partition coefficient
Kow = octanol-water partition coefficient
BFC = bioconcentration factor
Neg. Deg. = Negligible Biodegration

References:

1. IRP Toxicology Guide
2. Basics of Pump-and-Treat Ground-Water Remediation Technology (EPA, 1990).
3. Handbook of Environmental Fate and Exposure Data (Howard, 1989).
4. Soil Chemistry of Hazardous Materials (Dragun, 1988)
5. Hazardous Waste Treatment, Storage, and Disposal Facilities, Air Emissions Models (EPA, 1989).
6. USATHAMA, 1985
7. Values for Koc not found were estimated by: logKoc = 0.544logKow + 1.377 (Dragun, 1988).

DDE is characterized by a strong tendency to sorb to organic matter in soils and in sediments. Only one value, log K_{OC} = 5.17 was found in the literature for the soil organic carbon partition coefficient. A log K_{OC} value of roughly 5 has been suggested based on log K_{OW} measurements of 5.69 for the p,p' isomer and 5.78 for the o,p' isomer. Using the geometric mean of these K_{OW} values and a regression equation, a log K_{OC} value of 5.41 is estimated. As with all neutral organic chemicals, the extent of sorption is proportional to the soil organic carbon content. In soils with little organic carbon (e.g., clays), the extent of sorption may also depend upon soil properties such as surface area, cation exchange capacity, and degree of hydration.

The apparent sorption of DDE to soils and sediments (like that of DDT), is lessened, and thus its mobility is enhanced by the presence of dissolved organic matter. DDT concentrations were found to be higher in aqueous solutions containing humic and fulvic acids. Because the sorption behavior of DDE is expected to be much like that of DDT, its mobility in natural waters may be several times greater than predicted (though probably still small) if dissolved organic matter is present. In waters containing large concentrations of dissolved organic matter such as swamps and bogs, this may be especially important.

The vapor pressure of p,p'- isomer of DDE at 20°C has been given as 8.7×10^{-9} atm and that of the o,p' isomer as 8.2×10^{-9} atm. A somewhat lower value of roughly eight times the vapor pressure of DDT has been suggested. Using the average vapor pressures for the two isomers to estimate the Henry's law constant, a value of 1.9×10^{-4} atm×m^3/mol is obtained.

This estimate is roughly an order of magnitude larger than the Henry's law constant for DDT. Because volatilization losses for DDT are expected to be important, the same is also true for DDE. DDE has been found to volatilize from distilled and natural waters five times faster than DDT. In soils, volatilization of DDE is much slower. Using wet river bed, quartz sand in 15 mm deep petri dishes, Ware et al. measured volatilization losses of p,p'-DDE (present initially at 10 ppm) that corresponded to a half-life of roughly 40 days. This value may be more indicative of an upper limit of the volatilization rate because soils of higher organic matter content would tend to sorb more of the DDE, and the rate of volatilization would be expected to be lower from thicker layers of soil. In the same study and under the same conditions, the o,p' isomer of DDT took 50% longer to reach half its initial concentration; p,p'-DDT took twice as long. This suggests that the volatilization of DDE in the field may occur at a rate somewhat greater than that for DDT, which has been found to have a volatilization half-life of one to several years. The observation that the volatilization rate of DDE from soil is not several times the rate for DDT, given that it has an order of magnitude larger Henry's law constant, may be explained by its strong sorption to soil, which tends to impede volatilization.

DDE is the hydrolysis product of DDT and is quite resistant to further hydrolysis. A hydrolysis half-life of over 120 years at pH 5 and 27°C has been given. Thus, hydrolysis is not expected to be an environmentally significant process.

Several studies have examined the aqueous photolysis of DDE. Zepp and Schlotzhauer found that DDE in the aqueous phase of sediment suspensions exposed to ultraviolet light of wavelength > 300 nm had a half-life of roughly 13 to 17 hours. Under the same conditions, DDE equilibrated with sediment for 60 days (i.e., sorbed to the sediment) photodegraded much more slowly. To reach 25% of its initial concentration, roughly seven half-lives were needed instead of the expected two, and little further degradation occurred. The authors suggested that over time, part of the DDE diffused into the sediment particles and became unavailable for photolysis. Chen et al. found the thin film photodegradation rate of p,p'-DDE to be about 90% of that for p,p'-DDT, and the half-life of DDE in aquatic systems at 40°N.

3.1.3.4 Heavy Metals

Fate and Transport Factors

In general, metals tend to be persistent and relatively insoluble in the environment. The behavior of heavy metals in soil is unlike organic compounds. For example, volatilization of metals from soil is not considered a realistic mechanism for contaminant migration and is not considered here. However, leaching and sorption will be considered.

Leaching of heavy metals from soil is controlled by numerous factors. The most important consideration for leaching of heavy metals is the chemical form (base metal or cation) present in the soil. The leaching of metals from soil is substantial if the metal exists as a soluble salt. Metallic salts have been identified as a component of such items as tracer ammunition, ignitor compositions, incendiary ammunition, flares, colored smoke and primer explosive compositions. In particular, barium nitrate, lead stearate, lead carbonate, and mercury fulminate are potential heavy metal salts or complexes which are components of ammunition that may have been tested or disposed of at SEDA. During the burning of these materials, a portion of these salts oxidize to their metallic oxide forms. In general, metal oxides are considered less likely to leach metallic ions than metallic salts. Upon contact with surface water or precipitation, the heavy metal salts may be dissolved, increasing their mobility and increasing the potential for leaching to the groundwater.

Heavy metals may also exist in the base metallic form as a component of the projectiles tested or disposed of at SEDA. Bullets are composed mainly of lead, which may contain trace amounts of cadmium and selenium. Objects composed of these metals, such as bullets or projectiles, will dissolve slowly.

Oxidation and reduction, another mechanism, involves valence state changes to the metal ions and has a large influence on fate mechanisms. A good example of the variation in contaminant fate and transport due to oxidation and reduction changes is iron. Iron (Fe) normally exists in one of two valence states, +2 and +3 [Fe(II) and Fe(III)]. Fe(II) is more soluble than Fe(III); therefore, it has a greater mobility. The valence can also affect the toxicity of a compound. For example, chromium +6 is more toxic than chromium +3.

Soil pH can also affect metal migration. If the soil pH is greater than 6.5, most metals are fairly immobile, particularly those normally present as cations. At higher pH values, metals form insoluble carbonate and hydroxide complexes. In acidic soils (pH less than 5), metals are more mobile. For example, the surface soil at the OB Grounds (which has undergone an RI/FS), has pH values ranging from 5 to 8.4 (SCS, 1972). The subsurface soil is more alkaline with measured pH values ranging from 7 to 9. Therefore, metals identified at the OB Grounds, and possibly those identified at these sites, would be expected to be present primarily in insoluble forms.

Fate and Transport of Selected Metals

Additional information regarding the fate and transport of several of the metals (including copper, mercury, and zinc), which were detected in SEAD 12 and/or 63 media at concentrations that were at least two times their criteria, is presented below.

Copper is considered to be among the more mobile of the heavy metals in water and soil. Seasonal fluctuations have been observed in surface water copper concentrations, with higher levels in fall and winter, and lower levels in the spring and summer. Several processes determine the fate of copper in aquatic environments, such as formation of complexes, especially with humic substances; sorption to hydrous metal oxides, clays, and organic materials; and bioaccumulation. Organic complexes of copper are more easily adsorbed on clay and other surfaces than the free form. The aquatic fate of copper is highly dependent on factors such as pH, oxidation-reduction potential, concentration of organic matter, and the presence of other metals. With regard to the latter, it has been demonstrated that co-precipitation of copper with hydrous oxides of iron effectively scavenges copper from solution, although in most surface waters organic materials prevail over inorganic ions in complexing copper. Copper is not expected to volatilize from water. Since copper is an essential nutrient, it is strongly accumulated by all plants and animals, but is probably not biomagnified. The degree of persistence of copper in soil depends on the soil characteristics and the forms of copper present. For example, organic complexing agents can bind with copper to reduce its mobility. Copper can form various inorganic complexes which also reduce its mobility. Copper is not expected to volatilize from soil.

Elemental mercury is insoluble in water and binds tightly to soil particles giving it a relatively low mobility. Bacterial and fungal organisms in sediment are capable of methylating mercury. Methyl mercury which is soluble in water, is a mobile substance and can then be ingested or absorbed. Until altered by biological processes, the primary transport method for mercury is the erosion and transportation of soil and sediment. Mercury most likely exists at SEDA in the elemental state as a result of the testing or demolition of munitions containing mercury fuses. Although a mercury salt, mercury fulminate, was used in the past as a priming explosive, it has not been commonly used since 1925 (Dunstan and Bell, 1972), and its environmental fate will not be considered at the site.

The primary fate for zinc is adsorption to soil, sediment, and suspended solids in water. Zinc can complex with various organic and inorganic ligands in an aqueous environment which gives it some mobility. Zinc is an essential element and therefore, is accumulated by all organisms. Zinc concentrations in air are relatively low except near industrial sources. Volatilization is not an important process from soil or water.

3.1.3.5 Radionuclides

Additional information regarding the fate and transport of the radionuclides which were detected in SEAD-12 soils at elevated concentrations is presented below. The following information on radionuclides was obtained from Chapter 14 of the document *Chemical Mobility and Radioactivity in Soil Systems*, 1983 (Soil Science Society of America Special Publication No. 11:203-227).

In general, most radionuclides exhibit moderate to high adsorption affinity for soils. The affinity of a radionuclide (or any metal) to adsorb to soil particles is controlled primarily by the distribution coefficient (K_d) of the individual radionuclide. The distribution coefficient represents the partition of the solute in the soil matrix and soil water, assuming that equilibrium conditions exist between the soil and solution phases. The K_d value of a particular radionuclide in soil is defined as the ratio of the mass of solute species adsorbed or precipitated on the solids per unit of dry mass of the soil to the solute concentration in the liquids.

Under reducing conditions, the oxides and hydroxides of radionuclides are relatively insoluble in neutral to alkaline pH waters. In addition, it has been demonstrated that thorium 230 (^{230}Th) and lead-210 (^{210}Pb) are immobilized in neutral or slightly alkaline sediments but uranium-238 (^{238}U) and radium-226 (^{226}Ra) can be complexed with solution carbonates and partially mobilized in neutral and alkaline groundwater.

The presence of ^{226}Ra wastes in soils may produce a significant radiological hazard under certain sets of conditions relating to source strength, exposure pathways, occupancy patterns, land usage, etc. One of the significant hazards that can be associated with ^{226}Ra in soils is the accumulation of ^{222}Rn within structures or other areas where this inert gas can accumulate. Since radon gas is inert, it is not expected to be chemically adsorbed on soils, however, it can be solubilized to an appreciable degree by the soil solution. Radon diffusion through soils is controlled primarily by soil pore size and the degree of saturation of the soils. Several nondiffusive mechanisms also operate to enhance radon transport. Soil gases, including radon, have been observed to respond to wind turbulence near the soil surface and to barometric pressure fluctuations. Flux changes on the order of 20 to 60% can be obtained in deep, dry soils for barometric pressure changes of 1 to 2% per day and wind turbulence can cause increased gas exchange ranging from 25 to 200%. Little effect of turbulence is observed, however, when the surface soil is fine-textured or wet.

3.2 PRELIMINARY IDENTIFICATION OF POTENTIAL RECEPTORS AND EXPOSURE SCENARIOS

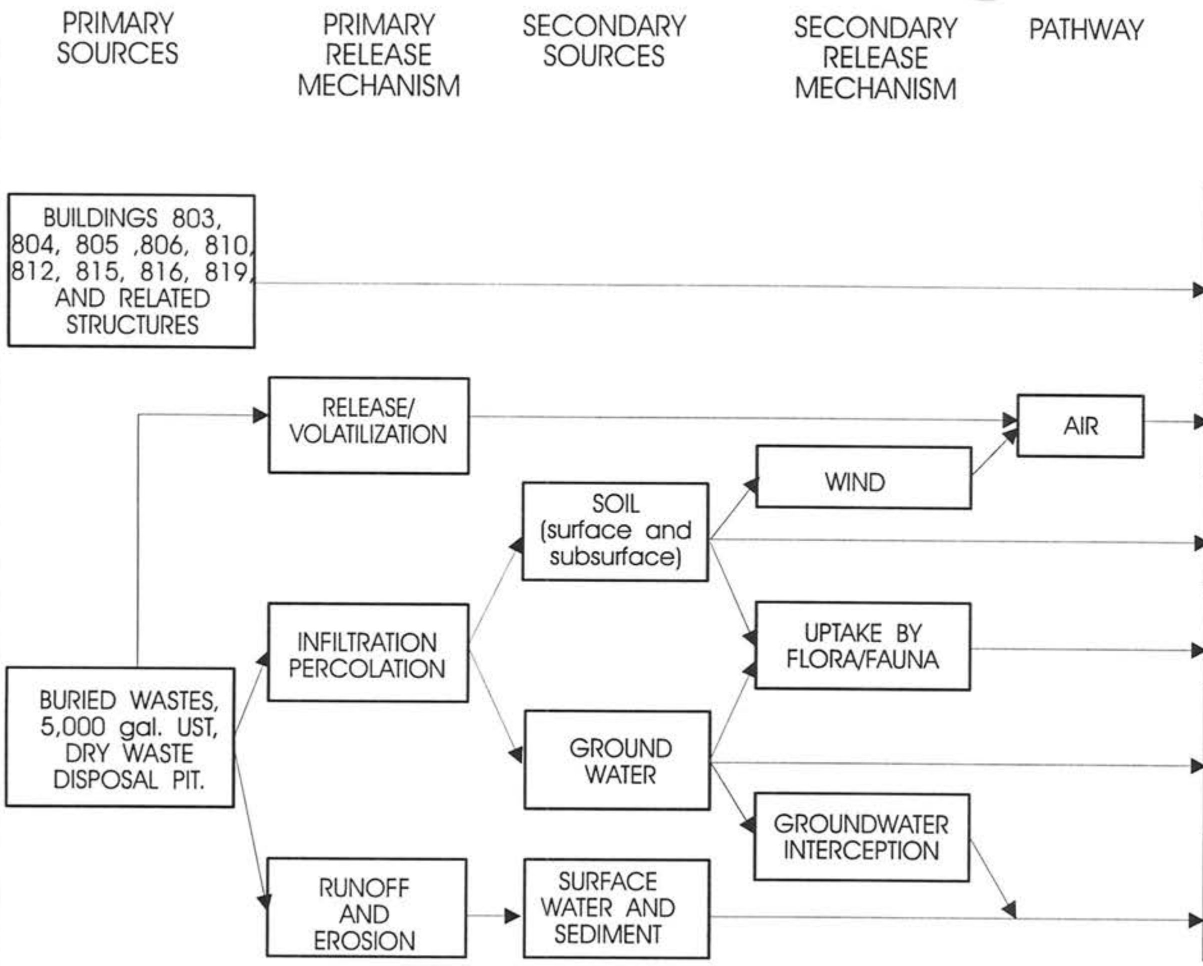
This section will identify the source areas, release mechanisms, potential exposure pathways and the likely human and environmental receptors at SEAD-12 and SEAD-63 based upon the results of the conceptual site model, which was described in the previous section. The complete potential exposure pathways from sources to receptors are shown schematically in Figures 3-22, and 3-23, The Exposure Pathway Models.

The following sections discuss the current understanding of site risks at each site based upon the data gathered from the ESIs. This information is used to assess whether sources of contamination, release mechanisms, exposure routes and receptor pathways developed in the conceptual site model for each site are valid or if they may be eliminated from further consideration prior to conducting a risk assessment. Additionally, this information will determine what additional data are necessary to develop a better conceptual understanding of the site in order to determine risks to human health and the environment, to better define the ARARs, and to develop appropriate remedial actions.

This is a generic discussion and is intended to be used to identify the exposure scenarios that will be evaluated as part of the baseline risk assessment. The actual future use scenario, and the associated degree of cleanup that will be required for that use, will be proposed as part the feasibility study for each site.

SEDA has been placed on the 1995 Base Realignment and Closure List (BRAC List). The President and the Congress have approved the list and it has become public law. As BRAC applies to SEDA, future use of the sites will be determined by the Army. At the time this project scoping plan was prepared, the Local Redevelopment Authority (LRA) had been given sole discretion in determining the future uses of the SEDA facility. The LRA has established that the Q Area, including SEAD-12 and SEAD-63, will be used as a Wildlife Conservation Area. At the time when the SEDA facility is relinquished by the Army, the Army will ensure that SEAD-12 and SEAD-63 can be used for this intended purpose. Restrictions will be put in place to ensure that additional investigations and/or remedial actions are taken should the future use of either of these two sites change.

At this time, the specific details for closure procedures, projected timetables of closure, and a detailed account of notification methods to prospective purchasers are unavailable for inclusion in this Workplan. These closure procedures, as they pertain to the SEAD-12 and SEAD-63 RI/FS, will be included in future project documents.



EXPOSURE ROUTE	RECEPTOR					
	HUMAN				BIOTA	
	CURRENT INDUSTRIAL WORKER	CURRENT and FUTURE CONSTRUCTION WORKER	CURRENT OFF-SITE RECEPTORS IN STREAM	FUTURE ON-SITE RECREATIONAL VISITOR	TERRESTRIAL	AQUATIC
INGESTION	●	NA	NA	NA	NA	NA
INHALATION	●	NA	NA	NA	NA	NA
DERMAL CONTACT	●	NA	NA	NA	NA	NA
DIRECT EXPOSURE	●	NA	NA	NA	NA	NA
INHALATION	●	●	NA	●	NA	NA
INGESTION	●	●	NA	●	●	NA
DERMAL CONTACT	●	●	NA	●	●	NA
DIRECT EXPOSURE	●	●	NA	●	●	NA
INGESTION	NA	NA	NA	●	●	NA
INGESTION	NA	NA	NA	●	NA	NA
INHALATION	NA	NA	NA	●	NA	NA
DERMAL CONTACT	NA	NA	NA	●	NA	NA
DIRECT EXPOSURE	NA	NA	NA	●	NA	NA
INGESTION	●	●	●	●	●	●
DERMAL CONTACT	●	●	●	●	NA	●
DIRECT EXPOSURE	●	●	●	●	NA	●

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE RECEPTOR

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

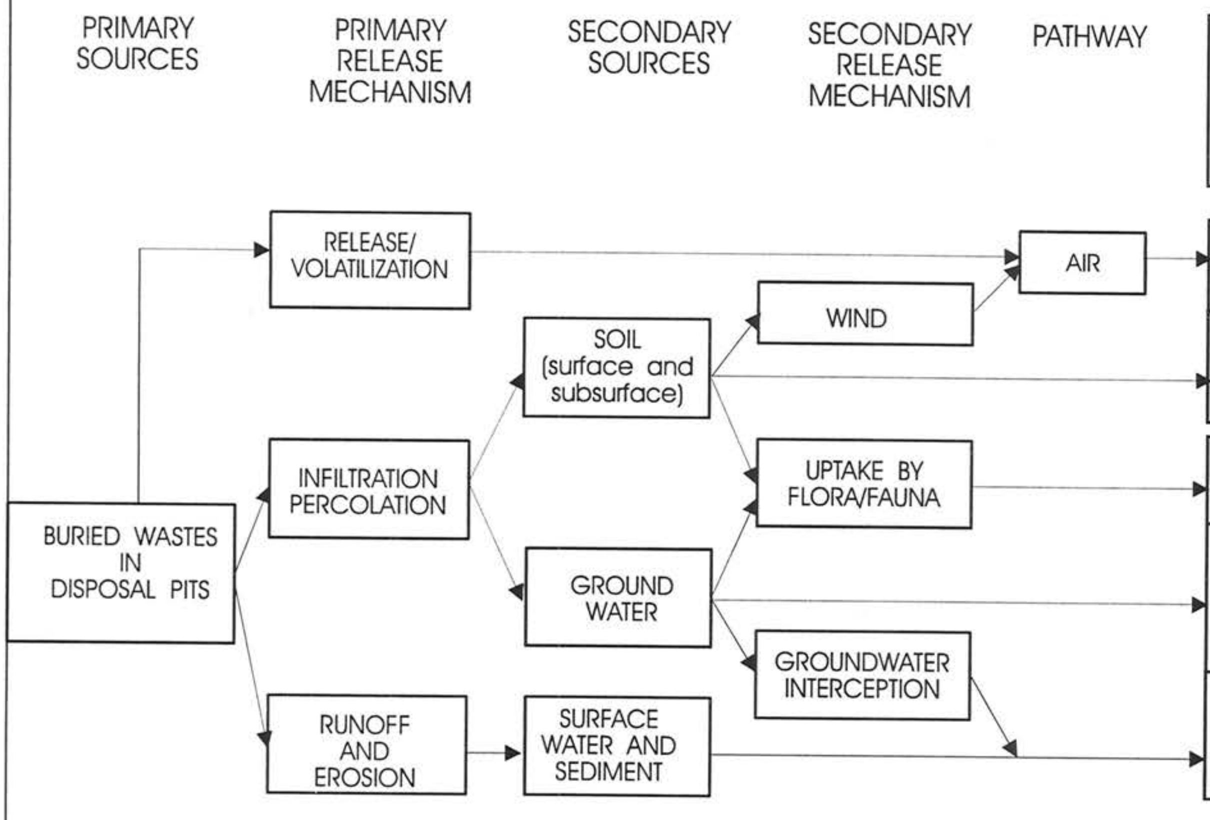
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT
RI/FS PROJECT SCOPING PLAN
SEAD-12

DEPT ENVIRONMENTAL ENGINEERING
DWG NO.

FIGURE 3-22
EXPOSURE PATHWAY SUMMARY
FOR SEAD-12

SCALE NA
DATE JULY 1997

H:\ENG\SENECA\SCOPING\12-48-63\FIG3-22.CDR



EXPOSURE ROUTE	RECEPTOR					
	HUMAN				BIOTA	
	CURRENT INDUSTRIAL WORKER	CURRENT and FUTURE CONSTRUCTION WORKER	CURRENT OFF-SITE RECEPTORS IN STREAM	FUTURE ON-SITE RECREATIONAL VISITOR	TERRESTRIAL	AQUATIC
INHALATION	●	●	NA	●	NA	NA
INGESTION	●	●	NA	●	●	NA
DERMAL CONTACT	●	●	NA	●	●	NA
DIRECT EXPOSURE	●	●	NA	●	●	NA
INGESTION	NA	NA	NA	●	●	NA
INGESTION	NA	NA	NA	●	NA	NA
INHALATION	NA	NA	NA	●	NA	NA
DERMAL CONTACT	NA	NA	NA	●	NA	NA
DIRECT EXPOSURE	NA	NA	NA	●	NA	NA
INGESTION	●	●	●	●	●	●
DERMAL CONTACT	●	●	●	●	NA	●
DIRECT EXPOSURE	●	●	●	●	NA	●

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE RECEPTOR

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT
RI/FS PROJECT SCOPING PLAN
SEAD-63

DEPT. ENVIRONMENTAL ENGINEERING
DWG NO.

FIGURE 3-23
EXPOSURE PATHWAY SUMMARY
FOR SEAD-63

SCALE NA
DATE JULY 1997

H:\ENG\SENECA\SCOPING\12-48-63\FIG3-23.CDR

3.2.1 SEAD-12

3.2.1.1 Potential Source Areas and Release Mechanisms

The primary source areas identified during the ESI are small disposal pits in the northeastern portion SEAD-12. The primary release mechanisms from the buried wastes and soil that comprise the disposal pits are infiltration and percolation of precipitation, surface water runoff and erosion, and VOC and/or radon-222 emanation. Groundwater, surface water, sediment and soils surrounding the disposal pits are secondary sources. Groundwater interception to surface water and uptake of potential chemicals of concern by plants and/or livestock are secondary release mechanisms. Wind is also a secondary release mechanism from impacted soil, although this is not expected to be significant because the site is vegetated.

Primary source areas suspected to be present at SEAD-12 include Building 804, a 5,000 gallon UST, and a suspected dry waste disposal pit. The primary release mechanisms from the 5,000 gallon UST and the suspected dry waste disposal pit are infiltration and percolation of precipitation. The secondary sources from these release mechanisms are the groundwater beneath the site and the soils surrounding the UST and the disposal pit. Potential primary source areas also considered for SEAD-12 include Buildings 803, 805, 810, 815, 816 and 819.

3.2.1.2 Potential Exposure Pathways and Receptors - Current Uses

The complete potential exposure pathways from sources to receptors, based upon current and future use scenarios, are shown in Figure 3-22. The potential for human exposures, with the exception of fugitive dust and wading in Reeder creek, is directly affected by the accessibility to the site. Human and vehicular access to the site is restricted by a chain-link fence with a locking gate, which is part of SEDA's general security provisions.

There are five primary receptor populations that could be affected by potential releases of contaminants from SEAD-12:

- Current on-site industrial workers;
- Current and future on-site construction workers;
- Current periodic off-site receptors in Reeder Creek;
- Future recreational visitors;

- Terrestrial and aquatic biota on or near the site.

Described below are those source to receptor exposure pathways that are complete. If an exposure pathway was incomplete for all receptor populations, it was not included in the discussions below or in Figure 3-22.

The numerical assumptions that will be used in the risk assessment are listed in Table 3-24 of this report (table 3-24 is presented in Section 3.2.3.4, Exposure Assessment Assumptions). Additional numerical assumtions, which are not presented in Table 3-24, may be found in Table 4-1 of the Generic Installation RI/FS Workplan which serves as a supplement to this project scoping plan.

3.2.1.2.1 Human Occupation of Buildings 803, 804, 805, 806, 810, 812, 815, 816 and 819

Human occupation of the structures by current site industrial workers could result in the direct ingestion of, inhalation of, dermal contact with, or direct exposure to any residual radioactivity present in these buildings.

3.2.1.2.2 Dust and Radon Gas Inhalation and Dermal Contact to Dust

Inhalation with impacted dust is a potential exposure pathway for current site workers (industrial and construction). Because the site is vegetated, this in not considered a potential exposure pathway for all other receptor populations.

3.2.1.2.3 Incidental Soil Ingestion, Dermal Contact and Direct Exposure

Incidental ingestion of soil (both surface and subsurface) and dermal contact with soil are potential exposure pathways for current site workers (industrial and construction) and terrestrial biota. Exposure to radiation from contaminated soils is a potential pathway for current on-site industrial and construction workers and terrestrial biota.

3.2.1.2.4 Uptake to Site Flora

Site flora are considered as receptors from the uptake of radionuclides and/or inorganics identified on-site.

3.2.1.2.5 Ingestion of Plants and/or Livestock raised on Affected Areas

The ingestion of flora and fauna are not potential exposure pathways for current on-site industrial or construction workers. However, the ingestion of fauna which have grazed in affected areas is considered as an exposure pathway for site visitors who are permitted to hunt at SEDA. However, this receptor population will not be evaluated under any of the current exposure scenarios. This receptor population will be considered in the future on-site recreational visitor exposure scenario because all possible exposure pathways for current on-site hunters would be included in those addressed in the future recreational scenario.

Ingestion of affected flora is considered as a potential route of exposure for site fauna.

3.2.1.2.6 Ingestion of Groundwater and Dermal Contact

Ingestion of, inhalation of, dermal contact with, and exposure to radiation or chemical constituents from groundwater are not potential exposure pathways for current site workers or terrestrial biota. The groundwater beneath SEAD-12 is not currently used as a drinking water source and connection to other potable groundwater aquifers has not been demonstrated. It is not anticipated that there will be direct exposure to the groundwater from the site to current site workers or terrestrial biota. However, groundwater interception into the unnamed creek may occur and could affect the receptors identified in Section 3.2.1.2.7, Ingestion and Dermal Exposure Due to Surface Water Runoff and Erosion.

3.2.1.2.7 Ingestion, Dermal Contact, and Direct Exposure to Radiation from Surface Water Runoff and Sediment

Surface water run-off on-site is controlled by the variable land surface topography, an unnamed tributary creek to Reeder Creek and a well developed drainage ditch system. At the disposal pits area, which is located in the northeastern portion of SEAD-12, overland flow is likely to be southwest toward the unnamed creek. This creek eventually flows beyond the AOC boundary and into Reeder Creek.

Human receptors of impacted surface water and sediment include current site workers (both industrial and construction) who may incidentally ingest, come in contact with, or be exposed to radiation or chemical constituents from the surface water and sediment, and off-site residents who may ingest, come in contact with, or be exposed to radiation or chemical constituents from site media transported in Reeder Creek at locations downstream of SEDA. Terrestrial biota that ingest impacted surface waters and sediment may also be affected. The aquatic biota that inhabit the unnamed creek and Reeder Creek may ingest, come in contact with, or be exposed to radiation or chemical constituents from the surface waters or sediments.

3.2.1.3 Potential Exposure Pathways and Receptors - Future Uses

For future uses of SEAD-12, the human receptor populations that would be considered are future construcation workers, off-site receptors in Reeder Creek, and future on-site recreational visitors. The future biota populations are the same as those discussed above. For the ingestion of soils, surface water, and sediment, the primary receptors would be children. Dermal contact with soil, groundwater, surface water and sediment are potential exposure pathways for future on-site adults and children. Ingestion of hunted game that grased on affected site media is a potential route of exposure to all future on-site visitors. Ingestion of groundwater is a potential route of exposure to future on-site visitors assuming on-site groundwater is used as a water supply. Inhalation of fugitive dust and groundwater (while showering) are potential routes of exposure for all on-site visitors. Direct exposure to radiation from contaminated soils, groundwater, sediments and surface waters is a potential exposure pathway for future on-site adults and children.

The numerical assumptions that will be used in the risk assessment for the future uses exposure scenarios are listed in Table 3-24 of this report (Table 3-24 is presented in Section 3.2.3.4, Exposure Assessment Assumptions). Additional numerical assumptions, which are not presented in Table 3-24, may be found in Table 4-1 of the Generic Installation RI/FS Workplan which serves as a supplement to this project scoping plan.

3.2.2 SEAD-63

3.2.2.1 Potential Source Areas and Release Mechanisms

The primary source areas identified during the ESI are disposal trenches in the central and northern portions SEAD-63. The primary release mechanisms from the buried wastes and soils that comprise the disposal pits are infiltration and percolation of precipitation, and surface water runoff and erosion. Groundwater, surface water, sediment, and soils surrounding the disposal pits are secondary sources. Groundwater interception to surface water and uptake of potential chemicals of concern by biota are secondary release mechanisms. Wind is also a secondary release mechanism from impacted soil.

3.2.2.2 Potential Exposure Pathways and Receptors - Current Uses

The complete potential exposure pathways from sources to receptors, based upon current and future use scenarios, are shown in Figure 3-23. The potential for human exposures, with the exception of fugitive dust and radon gas, is directly affected by the accessibility to the site. Human and vehicular access to the site is restricted by a chain-link fence with a locking gate, which is part of SEDA's general security provisions.

There are three primary receptor populations that could be affected by potential releases of contaminants from SEAD-63:

- Current site workers and site visitors;
- Terrestrial and aquatic biota on or near the site;
- Future on-site recreational visitors.

The exposure pathways and media of exposure are described below as they may affect the various receptors. The numerical assumptions that will be used in the risk assessment for the exposure scenarios are listed in Table 3-24 of this report (Table 3-24 is presented in Section 3.2.3.4, Exposure Assessment Assumptions). Additional numerical assumptions, which are not presented in Table 3-24, may be found in Table 4-1 of the Generic Installation RI/FS Workplan which serves as a supplement to this project scoping plan.

3.2.2.2.1 <u>Ingestion and Dermal Exposure Due to Surface Water Runoff and Sediment</u>

Human receptors of impacted surface water and sediment include current site workers at SEAD-63 and off-site receptors who may wade in Reeder Creek. These receptor populations may incidentally ingest, come in contact with, or be exposed to radiation or chemical constituents in the surface water and sediment. Terrestrial and aquatic biota that ingest, come in contact with, or are exposed to radiation or chemical constituents from impacted surface waters and sediment may also be affected.

3.2.2.2.2 Incidental Soil Ingestion and Dermal Contact

Incidental ingestion of soil (both surface and subsurface) is a potential exposure pathway for current site workers and terrestrial biota. Dermal contact with soil (both surface and subsurface), and exposure from radiation from contaminated soils are also potential exposure pathways for current site workers and terrestrial biota.

3.2.2.2.3 Uptake to Site Flora

Site flora are considered as receptors from direct exposure to, or uptake of, the radionuclides and inorganics identified on-site.

3.2.2.2.4 Ingestion of Plants and/or Livestock raised on Affected Areas

The ingestion of flora and fauna are not potential exposure pathways for current on-site industrial or construction workers. However, the ingestion of fauna which have grazed in affected areas is considered as an exposure pathway for site visitors who are permitted to hunt at SEDA. However, this receptor population will not be evaluated under any of the current exposure scenarios. This receptor population will be considered in the future on-site recreational visitor exposure scenario because all possible exposure pathways for current on-site hunters would be included in those addressed in the future recreational scenario.

Ingestion of affected flora is considered as a potential route of exposure for site fauna.

3.2.2.2.5 Groundwater Ingestion, Inhalation, and Dermal Contact

Ingestion of, inhalation of, and dermal contact with groundwater are not potential exposure pathways for current site workers or terrestrial biota. The groundwater beneath SEAD-63 is not currently used as a drinking water source and connection to other potable groundwater aquifers has not been demonstrated. It is not anticipated that there will be direct exposure to the groundwater from the site to current site workers or terrestrial biota. However, groundwater interception into the drainage swales may occur and could affect the receptors identified in Section 3.2.2.2.1, Ingestion and Dermal Exposure Due to Surface Water Runoff and Erosion.

3.2.2.2.6 Dust Inhalation and Dermal Contact and Radon Gas Inhalation

Inhalation and dermal contact with impacted dust are potential exposure pathways for current site workers and terrestrial biota. Inhalation of radon by current site workers is a potential exposure pathway.

3.2.2.3 Potential Exposure Pathways and Receptors - Future Uses

For future uses of SEAD-63, the receptor population that would be included in addition to the above-mentioned receptors would be on-site recreational visitors. For the ingestion of soils, surface water, and sediment, the primary receptors would be children. Dermal contact with soil, surface water, and sediment are potential exposure pathways for future on-site adults and children. Ingestion of plants and livestock raised on affected site media as well as dermal contact with plants growing on affected site media are potential routes of exposure to future on-site visitors. Ingestion, inhalation, and dermal contact with groundwater are potential routes of exposure to future on-site recreational visitors assuming on-site groundwater is used as a source of water. Inhalation of, and dermal contact with fugitive dust are potential routes of exposure for all future on-site visitors. Direct exposure from radiation from contaminated soils, groundwater, dusts, sediments and surface waters is a potential exposure pathway for future on-site adults and children.

The numerical assumptions that will be used in the risk assessment are listed in Table 3-24 of this report (Table 3-24 is presented in Section 3.2.3, Exposure Assessment Assumptions). Numerical assumptions which are not presented in Table 3-24, but are presented in Table 4.1 of the Generic Installation Work Plan, will be taken from Table 4.1 of that document.

3.2.3 Exposure Assessment Assumptions

The public health evaluation involves characterization of potential exposure pathways and receptors. The potential populations at risk, most likely exposure routes, and potential future land uses was presented in Section 3.2.1 for SEAD-12 and Section 3.2.2 for SEAD-63.

The identification of potentially exposed populations has considered the surrounding land-use, locations of nearby residences, and sensitive sub-populations. Receptors evaluated in the risk assessment for the current use scenario will include site workers and visitors, and off-site receptors who may wade in Reeder Creek downstream of SEDA. Receptors that will be evaluated for future use scenarios will be on-site recreational visitors and off-site construction workers. Exposure frequencies for people at the site would be increased for future scenarios based on the assumption that future receptors would be on the site daily, rather than the occasional on-site visits which characterize current use exposures. In this human health risk assessment, for the purposes of worst case considerations, the future land use of these sites will be considered to be recreational.

Following the guidance in RAGS, only those elements or compounds that are detected in the analytical sampling program will be used in the exposure scenarios of the risk assessment. In addition, elements or compounds that are found in background, whose population of data collected from a survey unit is found to be indistinguishable from a population of background data, will also be excluded from the exposure scenarios in the risk assessment. The Wilcoxon Ranked Sum test and the Quantile test will be used to determine whether or not the population of survey unit data is distinguishable from the population of background data. These tests will be performed following the guidance in the Statistical Methods for Evaluating the Attainment of Cleanup Standards, Volume 3 (EPA, 1996). The Data Quality Objectives section of this project scoping plan (Section 3.5), discusses in more detail how these tests will be performed.

Once the list of elements that will be included has been determined using the methodology described above, the exposure point concentrations for the risk assessment will be determined. A two step approach will be used to calculate reasonable maximum exposure point concentrations (RME) and central tendency exposure point concentrations (CT) for each analyte in each medium. The first step in determining these values will be to calculate the frequency of detection of each analyte in each media. The frequency of detection will be calculated as the number of times an analyte is detected divided by the number of times the analyte is analyzed for. Data that are rejected by the lab or during the data validation process will not be counted in the number of times the analyte is analyzed for. Sample and duplicate pairs will be counted as a single data point when evaluating the frequencies of detection. The average of such pairs will be used in the calculations.

The second step in determining the RME and CT values will be to calculate the 95th UCL of the mean of the normal data and the 95th UCL of the mean of the natural log transformed data for each analyte. The 95th UCL of the mean of the normal data is calculated because, although it is generally assumed that all media data will have a log-normal distribution, some results may show a strong tendency towards normal distribution. The 95th UCL of the mean for the normal and log-normal data are calculated from the means and the standard deviations of the normal and natural log transformed data, respectively. The 95th UCL of the mean of the normal and log transformed data will be calculated using all data that are unqualified or qualified as esitmated (J). For those data values that are qualified as undetected (U or UJ), one half of the contract required quantitation limit (CRQL) will be used. If the values for the 95th UCL (of either the normal or log-transformed data) exceeds the maximum detected concentration for any given analyte, then the 95th UCL for that analyte will be recalculted with the highest unusually high CRQL value deleted from the data set from which the 95th CRQL is calculated. This process will be re-iterated until either the 95th UCL is below the maximum detected concentration or all unusually high CRQLs have been deleted. The frequency of detection will not be recalculated following this process..

The frequency of detection data and the 95th UCL values are then used to determine the RME and the CT for each analyte. Three RME and CT selection guidelines will be used to assure the use of conservative (i.e., health-protective) exposure point values in the baseline risk assessment. Each guideline is defined for a specific frequency of detection window to allow for the selection of a more conservative value from either a normal distribution data set or a log normal distribution data set. The first RME and CT selection guidelines are established for analytes that are detected in more than 50% of the samples analyzed. For such analytes, the log-transformed 95th UCL of the mean is used to avoid bias caused by large numbers of non-detect values (U and UJ data) exceeding detected values. The second RME and CT selection guidelines are established for analytes that are detected in 25% to 50% of the samples analyzed. For these analytes, the more conservative values from the normal data and natural log transformed data will be used. Lastly, the third RME and CT selection guidelines are established for analytes that are detected in less than 25% of the samples analyzed. For such analytes, natural log transformation is inappropriate and the normal data values will be used. The RME and CT selection guidelines for each of the 3 frequency of detection cases are summarized below:

- For chemicals with 50% or greater detections, the log-transformed data 95% UCL of the mean and the maximum detected value are compared and the RME and the CT values are selected as the lesser of the two.

- For chemicals with 25% up to 50% detections, the maximum detected concentration is compared to the maximum 95% UCL of the mean from both distribution types (i.e., the normal and log normal 95% UCL of the mean) and the RME and CT are set equal to the lesser value.

- For chemicals with less than 25% detections, the RME and CT are set equal to the maximum detected value.

The RME and CT exposure concentrations will be used with upper tendency and median tendency exposure parameters to determine chemical intakes for each of the receptors for individual media and to determine total chemical intakes for receptors exposed to multiple contaminated media. The chemical intakes will be calculated using standard USEPA assumptions for inhalation, ingestion, and dermal contact with contaminated media (USEPA, 1988a). These parameters are listed in Table 3-24. The general basis and guidelines used for exposure projections will be in accordance with the Risk Assessment Guidance for Superfund (RAGS) and the Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (U.S. EPA, 1991). The Superfund Exposure Assessment Manual (USEPA, 1988a) and the Exposure Factors Handbook (USEPA, 1990) will only be used for scenarios not included in the Supplemental Guidance.

Exposure during childhood will be determined using chemical intake calculations and childhood activity patterns (e.g., wading in surface waters). These estimates will be incorporated into lifetime average intake estimates. Potential carcinogenic effects and noncarcinogenic effects will be defined separately for both adults and children.

3.3 SCOPING OF POTENTIAL REMEDIAL ACTION ALTERNATIVES

Remedial action alternatives for each site will be formed during the FS process from the general response actions and process options for each medium or operable unit. Depending on the site, two categories of alternatives will be assembled; the two categories are designated as source control and migration control. A number of remedial action alternatives, which are available for the treatment of impacted soils at the two sites, will be considered during the development of remedial action alternatives. They include the following technologies:

- land treatment
- bioventing
- vapor extraction
- off-site disposal
- soil washing

Table 3-24

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation Project Scoping Plan
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
INDUSTRIAL WORKER	Inhalation - Ambient Air	RME & CT	Inhalation Rate	20	m3/day	Standard inhalation rate for adult receptors	USEPA, 1991, 1993
			Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Exposure Frequency	234	days/yr	Mean for adult workers	USEPA, 1991
			Exposure Duration	5	years	Mean time for employment at a job	USEPA, 1993
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
	Ingestion of Soil	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	100	mg solids/day	Upper bound worker exposure to dirt and dust	USEPA, 1993
			Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Ingestion Rate	50	mg solids/day	Average worker exposure to dirt and dust	USEPA, 1993
			Exposure Frequency	234	days/yr	Mean for adult workers	USEPA, 1991
			Exposure Duration	5	years	Mean time for employment at a job	USEPA, 1993
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
	Dermal Contact - Soil	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	5800	cm2	Upper bound adult skin surface exposed to soils	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Skin Contact Surface Area	5000	cm2	Average adult skin surface exposed to soils	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	234	days/yr	Mean for adult workers	USEPA, 1991
			Exposure Duration	5	years	Mean time for employment at a job	USEPA, 1993
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989

Table 3-24

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation Project Scoping Plan
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
CONSTRUCTION WORKER	Inhalation - Ambient Air	RME & CT	Inhalation Rate	20	m3/day	Standard inhalation rate for adult receptors	USEPA, 1991, 1993
			Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Exposure Duration	1	year	Upper bound time of employment for constr. worker	USEPA, 1991
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
		CT	Exposure Frequency	234	days/yr	Mean for adult workers	USEPA, 1991
	Ingestion of Soil	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Exposure Duration	1	year	Upper bound time of employment for constr. worker	USEPA, 1991
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	480	mg soil/day	Assumed IR for intensive construction work	USEPA, 1991, 1993
			Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
		CT	Ingestion Rate	100	mg soil/day	Assumed average IR for construction work	USEPA, 1993
			Exposure Frequency	234	days/yr	Mean for adult workers	USEPA, 1991
	Dermal Contact - Soil	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Absorption Factor	Compound Specific			USEPA, 1992
			Exposure Duration	1	year	Upper bound time of employment for constr. worker	USEPA, 1991
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	5800	cm2	Upper bound adult skin surface exposed to soils	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
		CT	Skin Contact Surface Area	5000	cm2	Average adult skin surface exposed to soils	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	234	days/yr	Mean for adult workers	USEPA, 1991

Table 3-24

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation Project Scoping Plan
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE RECREATIONAL VISITOR - CHILD	Inhalation - Ambient Air	RME & CT	Inhalation Rate	8.7	m3/day	Average for child age 1-12	USEPA, 1996
			Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Inhalation - Groundwater while Showering	RME & CT	Inhalation Rate	0.83	m3/hr	Equivalent to standard inhalation rate of 20 m3/day	USEPA, 1991, 1993
			Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Duration of Shower - Ts	15	min/day	Upper bound time spent in shower	USEPA, 1992
			Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Duration of Shower - Ts	10	min/day	Average time spent in shower	USEPA, 1992
			Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Ingestion - Groundwater	RME & CT	Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Ingestion Rate	1	liter/day	Approx. 90th percentile value for ages 1-11	USEPA, 1996
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Groundwater while Showering	RME & CT	Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	9180	cm2	Upper bound total skin surface area for children	USEPA, 1992
			Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Skin Contact Surface Area	7930	cm2	Average total skin surface area for children	USEPA, 1992
			Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989

Table 3-24

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation Project Scoping Plan
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE RECREATIONAL VISITOR - CHILD (continued)	Ingestion of Soil	RME & CT	Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	200	mg soil/day	Maximum IR for a child	USEPA, 1993
			Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Ingestion Rate	100	mg soil/day	Average IR for a child	USEPA, 1993
			Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Soil	RME & CT	Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2300	cm2	Upper bound child skin surface exposed to soil	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Skin Contact Surface Area	1980	cm2	Average child skin surface exposed to soil	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Surface Water	RME & CT	Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2170	cm2	Upper bound child skin surface, lower extremities	USEPA, 1992
			Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Skin Contact Surface Area	1590	cm2	Average child skin surface, lower extremities	USEPA, 1992
			Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989

Table 3-24

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation Project Scoping Plan
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE RECREATIONAL VISITOR - CHILD (continued)	Dermal Contact - Sediment	RME & CT	Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2170	cm2	Upper bound child skin surface, lower extremities	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Skin Contact Surface Area	1590	cm2	Average child skin surface, lower extremities	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Ingestion - Surface Water	RME & CT	Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Contact Rate	0.05	liter/hr	Assumed amount of surface water ingested per event	USEPA, 1988
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Ingestion - Sediment	RME & CT	Body Weight	15	kg	Standard reference weight for children < 6 years old	USEPA, 1990, 1993
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	200	mg/day	Maximum IR for a child	USEPA, 1993
			Exposure Frequency	14	days/yr	2 weeks	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Ingestion Rate	100	mg/day	Average IR for a child	USEPA, 1993
			Exposure Frequency	7	days/yr	1 week	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989

RME = Resonable Maximum Exposure
CT = Central Tendency
Car = Carcinogenic
Nc = Non-carcinogenic

Source References:
- USEPA, 1988: Superfund Exposure Assessment Manual
- USEPA, 1989: Risk Assessment Guidance for Superfund, Volume I (RAGS)
- USEPA, 1990: Exposure Factors Handbook
- USEPA, 1991: Supplemental Guidance, Standard Default Exposure Factors
- USEPA, 1992: Dermal Exposure Assessment, Principles and Applications
- USEPA, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
- USEPA, 1996: Draft Updated Exposure Factors Handbook

- low temperature thermal desorption
- phytoremediation

Remedial action alternatives, that are available for treatment of any impacted groundwater at the three sites include the following technologies:

- interceptor trench
- filtration
- carbon adsorption
- ion exchange
- reverse osmosis

Remedial action alternatives that will be evaluated for any impacted structures at these sites will include the following:

- surface washing
- surface removal
- off-site disposal
- entombment

Section 3.3.2 of the Generic RI/FS Workplan provides a description of each type of remedial action alternative technology for soils, groundwater, surface water, and sediment.

A comprehensive list of remedial response action alternatives as they pertain to SEDA is provided in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

3.4 PRELIMINARY IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Identification and refinement of ARARs will be performed during the RI/FS process. As additional data is collected regarding the nature and extent of contamination, site specific conditions, and potential use of various remedial technologies, additional ARARs will be selected and existing ARARs will be reviewed for their applicability. These data will be reported within the SEAD-12 and SEAD-63 RI/FS Reports.

A preliminary identification of ARARs has been performed based upon the initial site characterization data compiled by the Army. The following federal and state regulatory requirements are potentially applicable or relevant and appropriate to SEAD-12 and SEAD-63.

SOURCES OF CHEMICAL SPECIFIC ARARS

Federal:

- Resource Conservation and Recovery Act (RCRA), Groundwater Protection Standards and Maximum Concentration Limits (40 CFR 264, Subpart F)
- Atomic Energy Act, Standards for Protection Against Radiation (10 CFR 20 subpart D)
- Clean Water Act, Water Quality Criteria (Section 304) (May 1, 1987 - Gold Book)
- Clean Air Act, Standards for Radionuclides (40 CFR 61.22 and .102)
- Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) (40 CFR 141.11-.16)
- Uranium Mill Tailings Radiation Control Act (40 CFR 192.12.A)

New York State:

- New York State Codes, Rules and Regulations (NYCRR) Title 6, Chapter X
- New York Groundwater Quality Standards (6 NYCRR 703)
- New York Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) (10 NYCRR 5)
- New York Surface Water Quality Standards (6 NYCRR 702)
- New York State Raw Water Quality Standards (10 NYCRR 170.4)
- New York RCRA Groundwater Protection Standards (6 NYCRR 373-2.6 (e))

- New York State Department of Environmental Conservation, Division of Water, Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values, November 15, 1990

- New York State Department of Environmental Conservation, Division of Hazardous Substances Regulation, Technical and Operational Guidance Series, Technical Administrative Guidance Memorandum: 4003, Cleanup Guideline for Soils Contaminated with Radioactive Materials (TAGM 4003).

- New York State Department of Environment Conservation, Division of Fish and Wildlife, Division of Marine Resources, Technical Guidance for Screening Contaminated Sediments, July 1994.

- Surface Water and Groundwater Classifications and Standards (6 NYCRR 700-705)

- Declaration of Policy, Article 1 Environmental Conservation Law (ECL)

- General Functions, Powers, Duties and Jurisdiction, Article 3 Environmental Conservation Law, Department of Environmental Conservation

- ECL, Protection of Water, Article 15, Title 5.

- Use and Protection of Waters, (6 NYCRR, Part 608)

- New York State Title 12, Part 38, Ionizing Radiation Protection, Acceptable Surface Contamination Levels (12 NYCRR Part 38)

SOURCES OF LOCATION SPECIFIC ARARS

Federal:

- Executive Orders on Floodplain Management and Wetlands Protection (CERCLA Floodplain and Wetlands Assessments) #11988 and 11990

- National Historic Preservation Act (16 USC 470) Section 106 et seq. (36 CFR 800) (Requires Federal agencies to identify all affected properties on or eligible for the National Register of Historic Places and consult with the State Historic Preservation Office and Advisory Council on Historic Presentation)

- RCRA Location Requirements for 100-year Floodplains (40 CFR 264.18(b)).

- Clean Water Act, Section 404, and Rivers and Harbor Act, Section 10, Requirements for Dredge and Fill Activities (40 CFR 230)

- Wetlands Construction and Management Procedures (40 CFR 6, Appendix A).

- USDA/SCS - Farmland Protection Policy (7CFR 658)

- USDA Secretary's memorandum No. 1827, Supplement 1, Statement of Prime Farmland, and Forest Land - June 21, 1976.

- EPA Statement of Policy to Protect Environmentally Significant Agricultural Lands - September 8, 178.

- Farmland Protection Policy Act of 1981 (FPPA)(7 USC 4201 et se q).

- Endangered Species Act (16 USC 1531).

- Fish and Wildlife Coordination Act (16 USC 661)

- Wilderness Act (16 USC 1131).

New York State:

- New York State Freshwater Wetlands Law (ECL Article 24, 71 in Title 23).

- New York State Freshwater Wetlands Permit Requirements and Classification (6 NYCRR 663 and 664).

- New York State Floodplain Management Act and Regulations (ECL Article 36 and 6 NYCRR 500).

- Endangered and Threatened Species of Fish and Wildlife Requirements (6 NYCRR 182).

- New York State Flood Hazard Area Construction Standards.

SOURCES OF ACTION SPECIFIC ARARS

Federal:

- RCRA Subtitle C Hazardous Waste Treatment Facility Design and Operating Standards for Treatment and Disposal systems, (i.e., landfill, incinerators, tanks, containers, etc.) (40 CFR 264 and 265); Minimum Technology Requirements.

- RCRA, Subtitle C, Closure and Post-Closure Standards (40 CFR 264, Subpart G).

- RCRA Groundwater Monitoring and Protection Standards (40 CFR, Subpart F).

- RCRA Generator Requirements for Manifesting Waste for Offsite Disposal (40 CFR 262).

- RCRA Transporter Requirements for Off-Site Disposal (40 CFR 263).

- RCRA, Subtitle D, Non-Hazardous Waste Management Standards (40 CFR 257).

- Safe Drinking Water Act, Underground Injection Control Requirements (40 CFR 144 and 146).
- RCRA Land Disposal Restrictions (40 CFR 268) (On and off-site disposal of excavated soil).

- Clean Water Act, - NPDES Permitting Requirements for Discharge of Treatment System Effluent (40 CFR 122-125).

- Effluent Guidelines for Organic Chemicals, Plastics and Resins (Discharge Limits) (40 CFR 414).

- Clean Water Act Discharge to Publically - Owned Treatment Works (POTW) (40 CFR 403).
- DOT Rules for Hazardous Materials Transport (49 CFR 107, 171.1-171.500).
- Occupational Safety and Health Standards for Hazardous Responses and General Construction Activities (29 CFR 1904, 1910, 1926).
- SARA (42 USC 9601)
- OSHA (29 CFR 1910.120)
- Clean Air Act (40 CFR 50.61)

New York State:

- New York State Pollution Discharge Elimination System (SPDES) Requirements (Standards for Stormwater Runoff, Surfacewater, and Groundwater discharges (6 NYCRR 750-757).
- New York State RCRA Standards for the Design and Operation of Hazardous Waste Treatment Facilities (i.e., landfills, incinerators, tanks, containers, etc.); Minimum Technology Requirements (6 NYCRR 370-373).
- New York State RCRA Closure and Post-Closure Standards (Clean Closure and Waste-in-Place Closures) (6 NYCRR 372).
- New York State Solid Waste Management Requirements and Siting Restrictions (6 NYCRR 360-361), and revisions/enhancements effective October 9, 1993.
- New York State RCRA Generator and Transporter Requirements for Manifesting Waste for Off-Site Disposal (6 NYCRR 364 and 372).

3.5 DATA QUALITY OBJECTIVES (DQOs)

The RI/FS process requires decisions regarding future site remedial actions, including whether or not any actions are required. These decisions will be based upon the data collected during the RI. Consequently, the collected data must be of sufficient quantity and quality to support this decision-making process. Data Quality Objectives (DQO)s are the portion of the RI/FS which consider issues related to data quality and quantity. As the name implies, DQOs establish objectives and requirements for data collection which, if reasonably met, will assure that the collected data is valid for its intended use.

Since the intended use of the data is to support several decisions for the RI/FS process, the first step in establishing DQOs is to identify these decisions. Once the decisions, which the collected data will support, have been identified, the levels of data quality can be specified. The sampling program and the analytical techniques to be employed must be consistent with the required levels of data quality. For the three sites described in this Scoping Plan these decisions have been identified and include the following:

- Determining the nature and extent of current environmental impacts;
- Monitoring for health and safety;
- Assessing the risk to human health and the environment;
- Selecting appropriate remedial alternatives;
- Designing remedial actions, if necessary;
- Determining background levels of constituents of concern; and
- Determining regulatory compliance with ARARs,
- Determining that residual radioactivity concentrations do not exceed release criteria,
- Determining acceptable decision error probabilities for testing statistical hypotheses,

USEPA has indicated that at a minimum, Level 3 quality data should be collected to support many of the decisions to be made at these sites, such as Risk Assessment. However, in order to meet the requirements of New York State, samples of soils, sediments, surface water, and groundwater will be collected and analyzed according to NYSDEC CLP protocols and the data reported as Level 4. Specifying Level 4 quality data will assure that the data collected in this program is of sufficient quality for the intended use.

Level 4 data will be generated by analyses performed in the Contract laboratory Program (CLP). Routine Analytical Services (RAS) will be performed according to methods established by the USEPA and the CLP Statement of Work (SOW). The New York State Department of Environmental Conservation (NYSDEC) has also established CLP Protocols for routine analyses with requirements that are considered equivalent to the USEPA requirements for Level 4 data. Level 4 analyses are characterized by rigorous QA/QC requirements defined in the SOW. All results will be reported according to the New York State Department of Environmental Conservation Contract Laboratory Protocols (CLP) for Level IV data. The NYSDEC Analytical

Services Protocol (ASP) Superfund Category will be used to report the data, and NYSDEC ASP Category B deliverable package will be used when reporting data aquired by non-CLP SOW methods.

To address the data needs for health and safety monitoring and many of radiological surveys, Level 1 and Level 2 data are sufficient to demonstrate compliance with health and safety requirements and radiological release criteria. However, for the purposes of demonstrating compliance with radiological release criteria, somewhat larger quantities of Level 1 and Levels 2 data are required.

Level 1 data, defined as field screening data, will be collected during soil boring operations and radiological scanning and measurement surveys. Precision and accuracy for Level 1 data has not been established by USEPA. The intended use of this information is for health and safety monitoring, to assist in the optimization of sampling locations and support radiological characterization decisions. Data can be generated regarding the presence or absence of certain contaminants (especially volatile organic compounds and radionuclides), at sampling or scanning locations. For locations where samples are obtained, the sample media will be screened for the presence of volatile organics using a hand-held instrument equipped with a Photoionization Detector (PID) and for the presence of radiation using gas proportional detectors, zinc sulfide detectors, Geiger Mueller detectors, and/or sodium iodide detectors. The occurrence of high readings, above normal background levels, from a discrete area within the sampling location will provide a qualitative indication that a constituents present. Sample matrix that is collected for analytical analysis will include material from that discrete area within the sampling location.
Level 2 data will be collected during the soil gas surveys and radiological surveys at SEADs-12 and 63. Level 2 data will include field analyses and field measurements which require the use of portable analytical instruments at the site without the extensive QA/QC of the higher level of data quality. Depending upon the types of contaminants, sample matrices, and personnel skills, reliable qualitative and quantitative data can be obtained.

The actual quantity of Level 1 and Level 2 radiological data (needed to demonstrate compliance with release guidelines) or Level 3 or Level 4 analytical data (needed to compare site data sets to background data sets) is dependent upon the decision error probabilities that are used. For the purposes of comparing site data sets to background data sets, acceptable decision error probabilities of 0.05 for Type One errors (or the α error rate) and 0.05 for Type Two errors (or the β error rate) were selected. A Type One error can be characterized as making a decision that is based upon a false positive result. A Type One error probability of 0.05 can be equated to there being a 5% probability that this type of error is made. Similarly, a Type Two error can be characterized as a decision that is based upon a false negative result, and a Type Two error probability of 0.05 can be equated to their being a 5% probability that this type of error is made.

The error rates of 0.05 α and 0.05 β will be used to test a null hypothesis, Ho, for each survey unit. The null hypothesis for the radiological survey units at SEADs-12 and 63 is that any residual radiation at a survey unit is below a release criterion. The alternative hypothesis, Ha, at these survey units is that residual radiation at a survey unit is present at levels that exceed a release criterion. The null hypothesis for comparing survey unit analytical data sets to background data sets is that the survey unit data set is indistinguishable from the background data set. The alternative hypothesis for comparing survey unit to background data sets is that the concentration of a given analyte is present at the survey unit at concentrations that tend to be greater than those found in background. Using these stated statistical values (the α and β error rates and the null and alternative hypotheses) and guidance provided in the NRC's NUREG 1505 (NRC 1995) document and the EPA's Statistical Methods for Evaluating the Attainment of Cleanup Standards, Vol. 3 (EPA, 1994) the minimum quantities of data that will be needed to provide sufficient power to either accept the null hypothesis or to reject it in favor of the alternative hypothesis can be determined. Table 3-25 presents the data quantities that were determined using the stated statistical values and the NUREG-1505 and EPA guidance. As can be seen in this table, the minimum number of data points that is required, using conservative estimates of what can be expected at SEADs-12 and 63, is 34 environmental media samples and 17 building surface measurements. For survey units that will be compared to a reference area, this minimum number of samples is the combined number of samples that is required from both the site and background data sets. The minimum number that is required from each survey unit and each background unit is therefore equal to one half of the total, or 17 environmental media samples and 10 building surface measurements. However, for survey units that will not be compared to a reference unit, the listed total number of samples all need to be collected from the survey unit, and therefore, in the case of the building surface measurements, a minimum of 17 measurements will be required. These minimum numbers of samples will be used to assure that the sampling and measurement plans detailed in the Task Plan for the Remedial Investigation section (Section 4) will provide enough data to give the statistical comparisons sufficient power to accept the null hypothesis or reject it in favor of the alternative hypothesis.

Further discussion of the DQOs as they pertain to SEDA is presented in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

Table 3-25
Seneca Army Depot Activity
SEAD-12, 48, and 63 Project Scoping Plan
Minimum Sample Quantity Calculations

Survey Unit Type	Nuclide	Estimated Mean (from ESI data or historical data)	Estimated Standard Deviation (from ESI data)	Delta ***	Shift (delta/standard deviation	Pr (from statistical tables)	Total Number of Samples, N **	Number of Samples in each Survey Unit (n)	Number of Samples in each Reference Unit (m)
Environmental Media	Pu-239	NA	0.72	1.25	1.74	0.89	34	17	17
	U-238	0.87	0.33	5.19	15.73	1	21	10	10
	U-235	0.21	0.15	1.75	11.67	1	21	10	10
	Th-230 *	1.56	0.36	3.90	10.83	1	21	10	10
	Ra-226	1.56	0.36	0.52	1.44	0.98	23	11	11
	Pm-147	NA	500	4800	9.60	1	21	10	10
	Cs 137	0.06	0.14	4.80	34.29	1	21	10	10
	Co-60	NA	1	1.98	1.98	0.998	17	17	NA
	Co 57	NA	23.199	77.33	3.33	1	17	17	NA
	H3	NA	82.8	276	3.33	1	21	10	10
Building Surfaces	Am 241	1	1	120.00	120.00	1	21	10	10
	Pu 239	1	1	130.00	130.00	1	21	10	10
	U-235, U-238, and associated decay products except Ra-226 and Th-230	1	1	5,000.00	5,000.00	1	21	10	10
	Ra-226 and Th-230	1	1	1,000.00	1,000.00	1	21	10	10
	Beta-gamma emitters present in background (Cs-137 andH-3)	1000	500	5,000.00	10.00	1	21	10	10
	Beta-gamma emitters not present in background (Cs-137 andH-3)	1000	500	5,000.00	10.00	1	17	17	NA

* estimated from decay product, Ra-226

** $N = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2}{12c(1-c)(P-0.5)^2}$,for datasets that will be compared to reference areas, taken from NUREG 1505

$N = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2}{3(p'-0.5)^2}$,for datasets that will not be compared to reference areas, taken from NUREG 1505

α= Type 1 error rate

β= Type 2 error rate

$Z(1-\alpha/2)$= Z statistic for Type 1 error rate

$Z(1-\beta)$= Z statistic for Type 2 error rate

c= proportion of samples to be collected in the reference area

P= specified probability required to detect that a random measurement from the survey unit is larger that a random measurement from the reference ares

p'= probability that the sum of two indeoendent random measurements from the survey unit is less than 2*delta\

*** Delta is equal to the guideline value, and is expressed in units of pCi/g for environmental media, and in units of dmp/100cm^2 for building surfaces

3.6 DATA GAPS AND DATA NEEDS

The previous investigations at SEAD-12 and SEAD-63 were conducted to gain a preliminary understanding of the nature and extent of contamination. These data were to be used to evaluate the potential for risks to human health and the environment. A conceptual site model was also developed for each site that identified potential source areas, release mechanisms and receptor pathways. The results of the investigation at the three sites were used to refine the conceptual site models and determine additional data requirements for complete evaluation of risks to human health and the environment, compliance with ARARs and development of preliminary remedial action alternatives.

The data gaps and subsequent data needs for the two sites are a direct result of the need to meet the DQOs identified in the Generic Installation RI/FS Workplan and to support the decisions for the RI/FS process that are detailed in the Data Quality Objectives section of this report (Section 3.5). The data needs will be reviewed and revised throughout the RI as additional data is collected.

3.6.1 SEAD-12

The data needs for SEAD-12 are listed below by media.

Soil Data:

- Obtain additional geophysical data to evaluate the potential for occurrences of buried waste materials in the north central portion of the site and the southern portion of the site,
- Establish the level of contamination in surface soils,
- Obtain additional soil samples from the disposal pits (in the northeastern portion of SEAD-12) to evaluate the extent of impacted soils,
- Excavate test pits to investigate the geophysical anomalies detected in the ESI and any
- additional anomalies detected from the geophysical investigations completed as part of this RI/FS study,
- Determine the thickness and extent of the waste material in the identified disposal pits using test pits and soil borings. Collect soil samples and analyze them for general chemical, radiochemical and physical parameters for the risk assessment and for the evaluation of remedial action alternatives,

- Establish guidelines for surface activities and surface soil concentrations,
- Obtain surface activity and surface soil radionuclide concentration data for comparison to guideline values,
- Obtain gamma exposure rates measured one meter above ground,
- Determine the radium-226 distribution coefficient in impacted soils for dose calculation purposes,
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives, and
- Collect additional background samples and data to develop a reference radioactive materials database,
- Collect reference site data for comparison of survey unit radiological measurements,
- Compare SEAD-12 data to site-wide soil background data that has been compiled from 57 samples obtained from the ESIs performed at 25 SEADs and RIs performed at the OB Grounds and the Ash Landfill.
- Compare SEAD-12 survey unit data to reference site data

Groundwater Data:

- Obtain additional geophysical data to evaluate the direction of groundwater flow in the areas surrounding the disposal pits in the northeastern portion of SEAD-12 and the northern portion of SEAD-12,
- Determine the hydraulic conductivity of the aquifer to assess the potential for contaminant migration and to select potential remedial action alternatives,
- Install additional monitoring wells to further characterize the groundwater on-site,
- Analyze groundwater samples for general chemical and radiochemical parameters to evaluate potential remedial actions,
- Determine whether contaminants are present in the groundwater downgradient of the disposal pits identified in the ESI or downgradient of any additional disposal pits identified during the RI/FS,
- Determine the background groundwater quality at SEAD-12 to allow comparison to other SEAD-12 groundwater data, and
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Surface Water/Sediment Data:

- Define the hydrology of the site by determining the location of all drainage systems and the direction of flow in the systems,
- Evaluate whether surface water runoff contributes to the transport of radionuclides and/or metals present in the surface soils to the drainage systems,
- Determine background surface water and sediment quality by obtaining samples of surface water and sediment in drainage ditches and the unnamed creek upgradient of the site,
- Analyze surface water and sediment samples for general chemical, radiochemical and physical parameters to evaluate potential remedial alternatives, and
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Ecological Data:

- Conduct an ecological assessment to systematically document visual observations discriminating between obviously and potentially impacted and non-impacted areas, and
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Buildings and Structures Data:

- Establish guidelines for residual activities within the structures,
- Obtain alpha,beta and gamma residual surface activity data,
- Obtain radionuclide concentration data from floor drains and/or sewer intakes and outfalls (for those building or structures with such drain systems),
- Obtain gamma exposure rates one meter above floor surfaces,
- Obtain radon concentrations in air within buildings,
- Obtain background levels of exposure to radiation and/or radioactive materials,
- Determine whether contaminants are present within the 5,000 gallon UST (at SEAD-12B),
- Obtain additional surface and subsurface (in the area of the Dry Waste Disposal Pit) soil data to compare the residual activity in the area of the Dry Waste Disposal Pit and the areas surrounding Buildings 803, 804, 805, 815, 816, and 819 to guideline values,
- Determine radionuclide concentrations in building ventilation systems.

3.6.2 SEAD-63

The data needs for SEAD-63 are listed below by media.

Soil Data:

- Obtain additional geophysical data to evaluate the potential for occurrences of buried waste materials on-site,
- Establish the level of contamination in surface soils,
- Obtain additional soil samples from the disposal pits to evaluate the extent of impacted soils,
- Excavate test pits to investigate all the geophysical anomalies detected during the ESI and any additional anomalies detected from the geophysical investigations completed as part of this RI/FS study,
- Determine the thickness and extent of the waste material in the identified disposal pits using test pits and soil borings. Collect soil samples and analyze them for general chemical, radiochemical and physical parameters for the risk assessment and for the evaluation of remedial action alternatives,
- Establish guidelines for surface activities and surface soil concentrations,
- Obtain surface activity and surface soil radionuclide concentration data for comparison to guideline values,
- Obtain gamma exposure rates measured 3 feet above ground,
- Determine the radium-226 distribution coefficient in affected soils,
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives, and
- Collect additional background samples to develop a background radiochemical database,
- Compare SEAD-63 data to site-wide soil background data that has been compiled from 57 samples obtained from the ESIs performed at 25 SEADs and RIs performed at the OB Grounds and the Ash Landfill.

Groundwater Data:

- Determine the hydraulic conductivity of the aquifer to assess the potential for contaminant migration and to select potential remedial action alternatives,
- Install additional monitoring wells to further characterize the groundwater on-site,
- Analyze groundwater samples for general chemical and radiochemical parameters to evaluate potential remedial actions,

- Determine whether contaminants are present in the groundwater downgradient of the disposal pits identified in the ESI or downgradient of any additional disposal pits identified during the RI/FS,
- Determine the background groundwater quality at SEAD-63 to allow comparison to other SEAD-63 groundwater data, and
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Surface Water/Sediment Data:

- Define the hydrology of the site by determining the location of all drainage systems and the direction of flow in the systems,
- Evaluate whether surface water runoff contributes to the transport of potential constituents of concern present in the surface soils to the drainage systems,
- Determine background surface water and sediment quality by obtaining samples of surface water and sediment in drainage ditches upgradient of the site,
- Analyze surface water and sediment samples for general chemical, radiochemical and physical parameters to evaluate potential remedial alternatives, and
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Ecological Data:

- Conduct an ecological assessment to systematically document visual observations discriminating between obviously and potentially impacted and non-impacted areas, and
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

4.0 TASK PLAN FOR THE REMEDIAL INVESTIGATION (RI)

This section describes the tasks required for completion of the Remedial Investigations at SEAD-12 and SEAD-63. These include the following:

- Pre-field Activities,
- Field Investigations,
- Data Reduction, Interpretation and Assessment,
- Data Reporting,
- Task Plan Summary.

The objective of the tasks listed above is to ensure that all of the work performed is supportive of the objectives and the decisions of the remedial investigations.

4.1 PRE-FIELD ACTIVITIES

The pre-field activities include the following:

- A site inspection to familiarize key personnel with site conditions and finalize direction and scope of field activities,
- A comprehensive review of the Health & Safety Plan with field team members to ensure that site hazards and preventive and protective measures are completely understood,
- Inspection and calibration of all equipment necessary for field activities to ensure proper functioning and usage,
- A comprehensive review of sampling and work procedures with field team members.
- Site clearance, if necessary

4.2 FIELD INVESTIGATIONS AT SEAD-12

This section describes the field investigations that are to be performed at SEAD-12. The field investigations are designed to investigate three types of areas that have been identified at SEAD-12:

- Field investigations of areas and buildings within the Q Area where the maintenance or quality assurance testing of nuclear materials has been documented, these sites are referred to as Class One sites,

- Field investigations of areas and buildings within the Q Area which were used for the storage of sealed nuclear materials or sealed nuclear sources that were integral parts of military items, such as night vision goggles or sealed calibration check sources, these sites are referred to as Class Two sites,
- Field investigations of areas and buildings withing the Q Area with no potential for residual radioactive contamination, these sites are referred to as Class Three sites.

The field investigations of buildings and areas that have been classified as either Class One, Class Two, or Class Three sites are designed to collect information to demonstrate that the levels of exposure to radiation and/or radioactive materials by current site workers or visitors and future site inhabitants is below the acceptable limits established by the New York State Department of Environmental Conservation and the New York State Department of Health. In these areas, the field investigation design follows the radiological survey methodologies described in the U.S. Nuclear Regulatory Commission's *Manual for Conducting Radiological Surveys in Support of License Termination* (NUREG/CR 5849), the *Working Draft Regulatory Guide on Release Criteria for Decommissioning* (the NRC's NUREG 1500 Series of documents), and the joint EPA, NRC, DOD, and DOE's *Multi Agency Radiological Site and Survey Investigation Manual* (MARSSIM).

In addition, for Class One and Class Two sites where one or more potential chemicals of concern (including radionuclides) are currently impacting SEAD-12 media, the field investigations were designed to include EPA guidance for conducting remedial investigations and feasibility studies under CERCLA (EPA, 1989). At present the only areas where potential chemicals of concern are known to have affected SEAD-12 media are the disposal pits located in the northeastern portion of the site (the site investigated as SEAD-12A during the ESI), the groundwater in the area of monitoring well MW12B-1, and the sediment at the SD12A-1 sampling location. The sources, if any, of the potential chemicals of concern found in the two latter areas are unknown.

SEAD-12 Field Investigations

The following field investigations will be performed to complete the RI characterization of SEAD-12:

- Geophysical investigation,
- Soil gas surveys,
- Alpha (building and pavement only),beta (building and pavement only) and gamma scanning surveys,
- Alpha and beta direct measurements (in buildings and on pavement),
- Exposure rate surveys,
- Removable radiation surveys (in buildings and on pavement),
- Investigation of radon concentrations in air (in buildings only)
- Special measurements and sampling (e.g. from floor drains, plumbing drain pipes, etc..),
- Soil Investigation (surface and subsurface soil sampling, test pits, soil borings),
- Groundwater investigation (overburden wells),
- Groundwater investigation downgradient of the 5,000 gallon tank (bedrock wells)
- Surface water and sediment investigation,
- Ecological investigation,
- Surveying.

These investigations are described in the following sections.

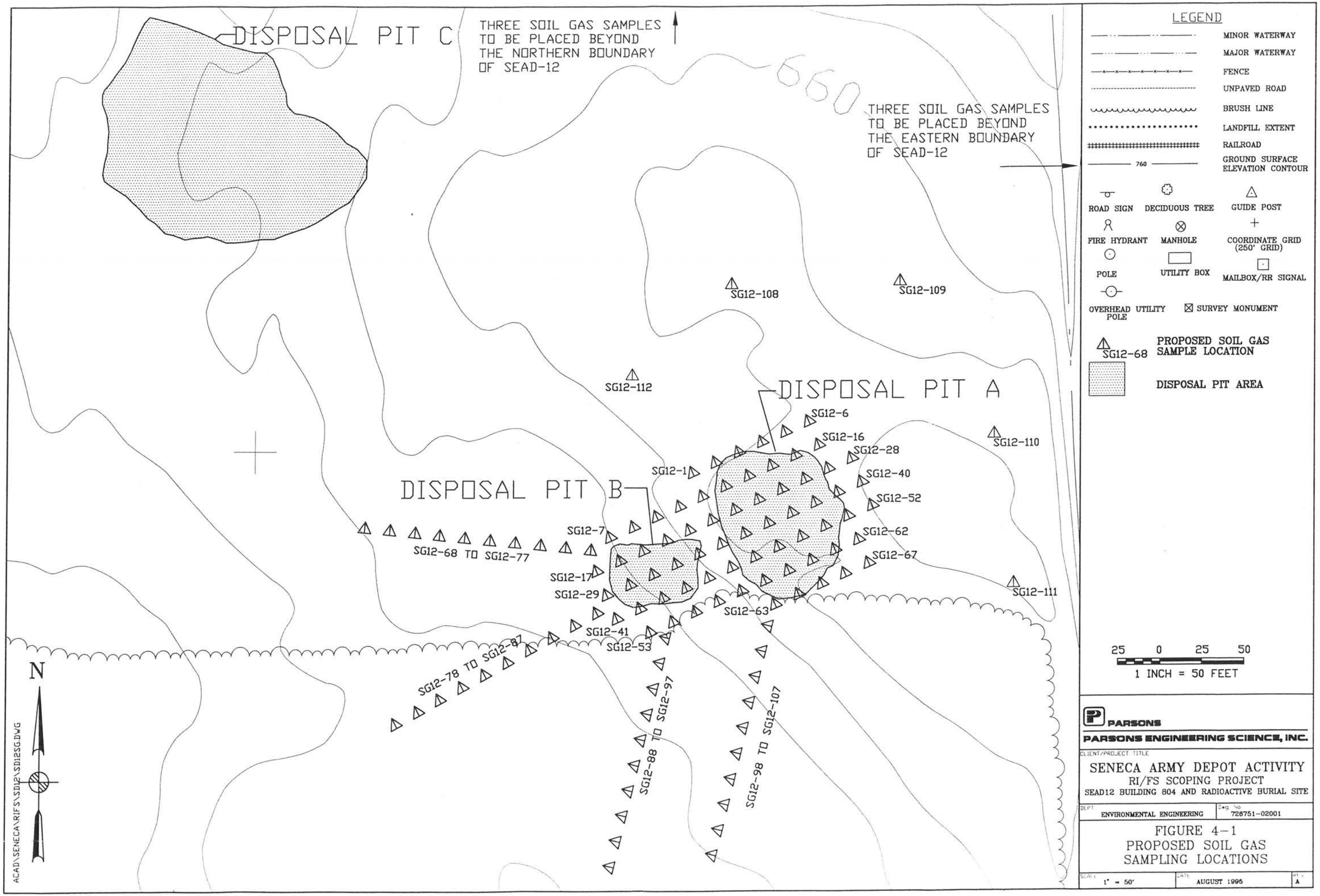
4.2.1 Geophysical Investigation

In order to determine the direction of groundwater flow at SEAD-12, eight seismic refraction profiles will be surveyed in the vicinity of the disposal pits located in the northeastern portion of the site. The seismic data will be collected using a drop weight and 2.5 and/or 5 foot geophone spacings. The objective of the seismic survey will be to map the depth of the water table beneath SEAD-12. This information will be used to determine the direction of groundwater flow, which, in turn, will be used to determine whether the proposed locations for the monitoring wells are up or downgradient of the disposal pits at SEAD-12. If the proposed locations are not up or downgradient of the disposal pits, they will be located according to the information from the seismic refraction survey.

Electromagnetic (EM-31) and Ground Penetrating Radar (GPR) surveys will be performed at SEAD-12 in those areas which were not investigated during the ESI. The initial geophysical investigation will be an EM-31 survey performed along lines spaced every 20 feet throughout the area shown on Plate 4-1. The objective of the EM-31 survey will be to identify locations where metallic objects may be buried within the subsurface. Upon completion of the EM-31 survey, contour maps of the in-phase and quadrature components of the electromagnetic field will be generated to aid in identifying the locations of possible buried metallic objects within the subsurface.

Subsequent to the EM-31 survey, a GPR survey will be performed. GPR data will be collected over each distinct EM-31 anomaly in order to provide a better characterization of the suspected anomaly source.

A borehole geophysics survey will be performed in the area of Disposal Pit A to approximately locate the extent of radium-226 (^{226}Ra) in the waste material and surrounding soil at this location. The methodology proposed herein is based upon and closely follows the methodology described in "Estimate of Volume of Radium Contaminated Soil On Five Sites In Ottawa, Illinois" prepared for the USEPA by the Argonne National Laboratory (document ANL/ESH/TS-89/100). The borehole geophysics survey will use a downhole probe equipped with a NaI(Tl) crystal and photomultiplier. The downhole probe will either be connected to a digital recording/controler unit or to a hand held ratemeter or scaler. If the digital recording/controller unit is used, it will control the rate of descent (or ascent) of the downhole probe and record the flux of gamma radiation (in counts per minute) through the NaI(Tl) crystal at preset time intervals. When recording data during this survey, the descent rate (or ascent rate) of the borehole probe will not exceed 5 feet per minute. The recording rate will be 1 measurement per second. If the borehole probe is connected to a hand held ratemeter or scaler, the borehole probe will be held at static locations at 0.5 feet (6 inches) increments from the top of the borehole to the bottom of the borehole. At each measurement depth, the total number of counts for a 20 second counting period will be recorded and multiplied by 3 to arrive a value of gamma radiation flux in units of counts per minute. The proposed locations of the boreholes that are shown in Figure 4-1. During the survey, the borehole locations will be placed at the grid nodes of a 15 foot by 15 foot grid, which will be established over the extent of the Disposal Pit A area.



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS SCOPING PROJECT
SEAD12 BUILDING 804 AND RADIOACTIVE BURIAL SITE

DEPT ENVIRONMENTAL ENGINEERING
Dwg No 728751-02001

FIGURE 4-1
PROPOSED SOIL GAS
SAMPLING LOCATIONS

SCALE 1" = 50'
DATE AUGUST 1995
REV A

Borehole locations will also be placed at fifteen foot intervals along 4 lines extending radially from the downgradient boundary of Disposal Pit A. Additionally, five boreholes will be logged at background locations. The data collected from the borehole geophysical survey will be presented as profiles of counts per minute versus depth for each measurement location. These data will be used qualitatively to identify areas of elevated count rates, which will be targeted for intrusive investigations during the soil boring and test pit programs (discussed in Sections 4.2.4.2 and 4.2.4.3, respectively). The soil borings and test pits will be located in areas where the borehole data indicate elevated count rates in the fill/soil matrix in and immediately surrounding the disposal pit. The monitoring wells MW12-10, MW12-11, MW12-12, and MW12-13 will be located in areas where the borehole geophysics survey indicates that radium-226 is being transported downgradient of the disposal pit.

4.2.2 Soil Gas Survey

Soil gas surveys will be performed at two location in SEAD-12. One location will be in the vicinity of Buildings 813/814 and one location will be in the vicinity of Building 817. Buildings 813, 814, and 817 are former paint shops, and SEDA personnel have indicated that small amounts of paint may have been intermittently disposed of on the ground surface near these buildings during their periods of operation.

Buildings 813, 814, and 817

A soil gas survey will be performed at the locations of Buildings 813, 814, and 817 to approximately locate the extent of any paint releases that may have occurred. Figure 4-2 shows the approximate locations of the soil gas sampling points in and around buildings 813 and 814. Figure 4-3 shows the approximate locations of soil gas sampling points around Building 817. The soil gas sampling locations were selected to provide a complete and cost effective coverage of these suspect sites. A more dense sampling pattern was established in one area where SEDA personnel have witnessed paint disposal on open ground. This area is located in between Buildings 813 and 814, and is currently covered by a recent addition that now links the two structures. In all other areas, a more open sampling pattern was established to provide information that will either confirm or refute the presence of volatile organic compounds (VOCs) from the disposal of paint or solvents to surrounding soils. In all, 52 soil gas samples will be collected, 37 from Building 813 and Building 814 and 15 from Building 817.

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SENECA ARMY DEPOT ACTIVITY
RI/FS SCOPING PROJECT
SEAD12 BUILDING 804 AND RADIOACTIVE BURIAL SITE

DEPT ENVIRONMENTAL ENGINEERING
Dwg. No. 726751-02001

FIGURE 4-2
PROPOSED SOIL GAS
SAMPLING LOCATIONS

SCALE 1" = 20'
DATE NOVEMBER 1996
REV A

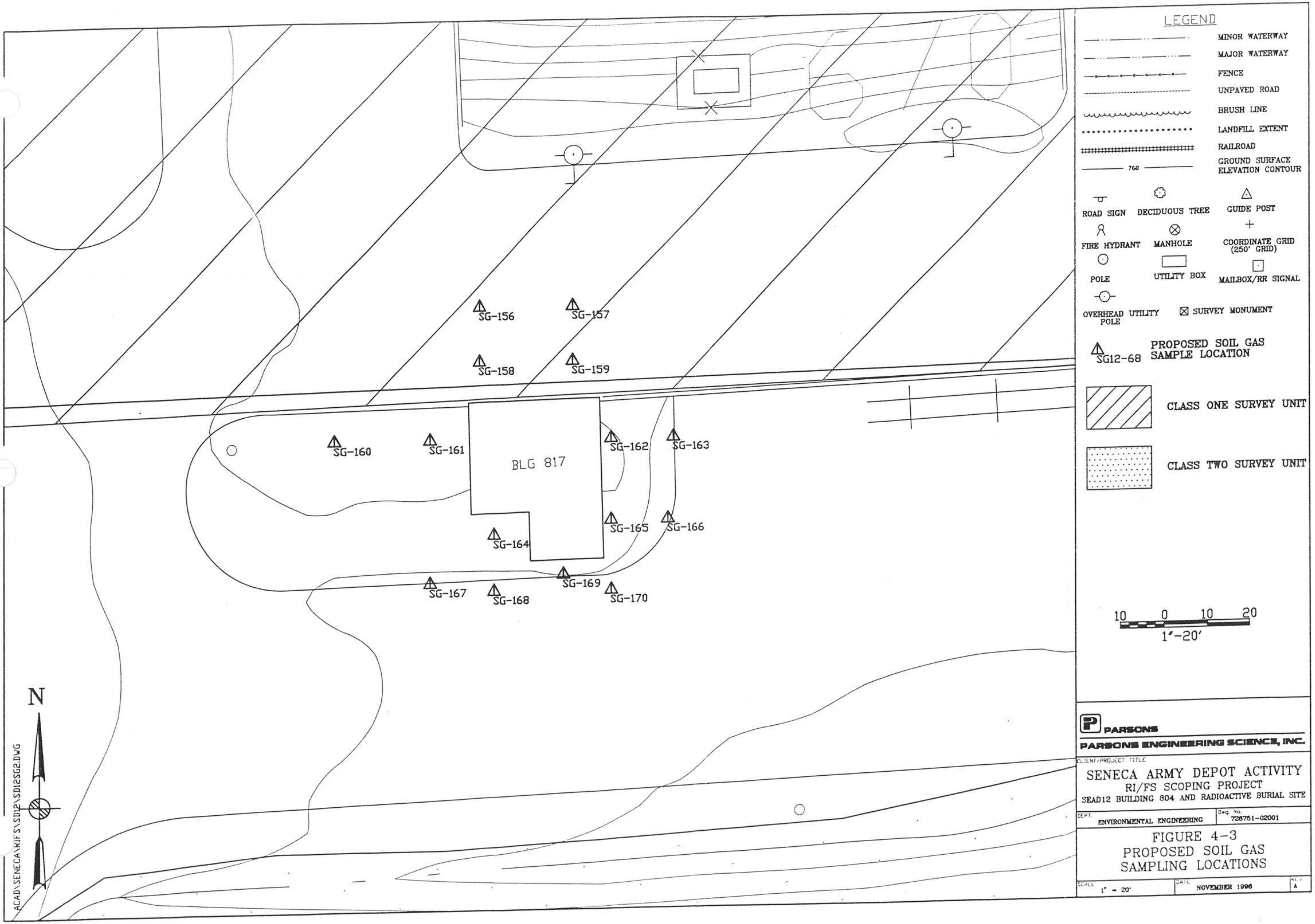

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FIGURE 4-3
PROPOSED SOIL GAS
SAMPLING LOCATIONS

SCALE 1" = 20'

DATE NOVEMBER 1996

REV. A

For all of the soil gas surveys in and around Buildings 813, 814, and 817, sample probes will be drilled into the vadose zone and soil vapor will be extracted from the probe and collected directly into a syringe. The soil gas samples will then be analyzed for VOCs in the field using a Photovac 10S50 portable gas chromatograph. The sample collection and analysis methods are described in more detail in the Generic Work Plan Appendix A, Section 3.8. If shallow groundwater is encountered during extraction of the soil gas, the liquid will be collected in a 40 ml vial with an open top septa cap and the gas from the headspace of the vial will be injected into the Photovac. Based on a list of known solvents, activators, adhesives, primers, paints, greases etc. that were used in these buildings being investigated, both BTEX and chlorinated standards will be used for the soil gas survey.

4.2.3 Radiological Surveys at SEAD-12

As discussed in the introduction to this section, the goal of the radiological surveys at SEAD-12 is to collect sufficient data to demonstrate that this site can be released for unrestricted use. To this end, radiological surveys were planned using guidance from several documents, including NUREG 1500, NUREG 1505, NUREG 1506, NUREG 1507, NUREG 5849, MARSSIM, and Methods for Evaluating the Attainment of Cleanup Standards, Volume 3 (EPA 1989) in order to provide data that will be used as a final status survey. As these surveys are designed to compare site data sets to reference data sets, the DQOs presented in Section 3.5 of this project scoping plan were used to determine the minimum number of data points that are needed from the site and reference sites. From the DQO discussions in Section 3.5, the minimum number of data points was determined to be 34, or 17 from each survey unit and the reference area. Following NUREG and MARSSIM guidance, this number was increased by 20%, to 20 for each data set, to allow for broken samples and bad, missing, or rejected data. The following subsections describe the methodologies that will be used to collect and evaluate the radiological data from SEAD-12.

Survey Units

For the purposes of establishing the sampling and measurement frequency of the radiological surveys at SEAD-12 (and SEAD-63), the buildings and areas within the Q Area were divided into survey units based upon their past operating history. Each survey unit was then classified as a Class One, Class Two, or Class Three site based again upon past operating history and the information presented in the Site History sections (Sections 3.1.1.1 and 3.1.2.1) of this project scoping document. The survey unit designations and the survey unit classifications, as well as the rationale for those classifications, are presented in Table 4-1.

Reeder Creek, Building 715 (the North Post's former sewage treatment facility), and the outfall of Building 715 were classified as Class Three areas because of their direct connection to SEAD-12 Class Three sites.

Following the radiological screening surveys, portions of Class Two or Class Three sites may be reclassified as either higher or lower class sites. Reclassification of sites to a higher classification will depend upon the amount of residual radiation found during the initial radiological screening surveys. Class Two or Class Three sites that are found to have residual radiation above a site specific guideline will be reclassified as Class One sites. Buildings that have Class Two or Class Three areas that are found to have residual radiation above 50 percent of a site specific guideline value, but below the site specific guideline values, will have all of its area classifications increased by one (i.e. its Class Three areas will be reclassified as Class Two and its Class Two areas will be reclassified as Class One). In addition, if a Hot Room in either Building 815 or Building 816 is found to have levels of residual radiation that are above 50% of a site specific guideline value, then the remaining portions of the respective building will be reclassified from Class Two to Class One. The reclassification scheme detailed above is illustrated in Figures 4-4 and 4-5, which present the radiological survey decision trees for Buildings 815 and 816 (Figure 4-4) and Buildings 800, 802, 803, 804, 805, 806, 810, 812, and 825 (Figure 4-5). Any reclassified sites or areas will receive the same level of effort as that specified for currently classified Class One or Class Two sites.

If the Class One and Class Two radiological surveys in Buildings 803, 804, 805, 806, 810, or 812 demonstrate that residual radiation is not present at levels that are above 50% of a site specific guideline, then the Class 3 areas in Buildings 806, 810, and 812, and the Class Three areas of Buildings 800, 802, and 825, will be downgraded to Un-Affected.

If the building surveys demonstrate that a radiological release has not occurred, then that data may be used to justify reducing the level of radiological survey efforts for Class Three exterior scanning surveys, which are detailed in Sections 4.2.3.1, Alpha, Beta, and Gamma Scanning Surveys.

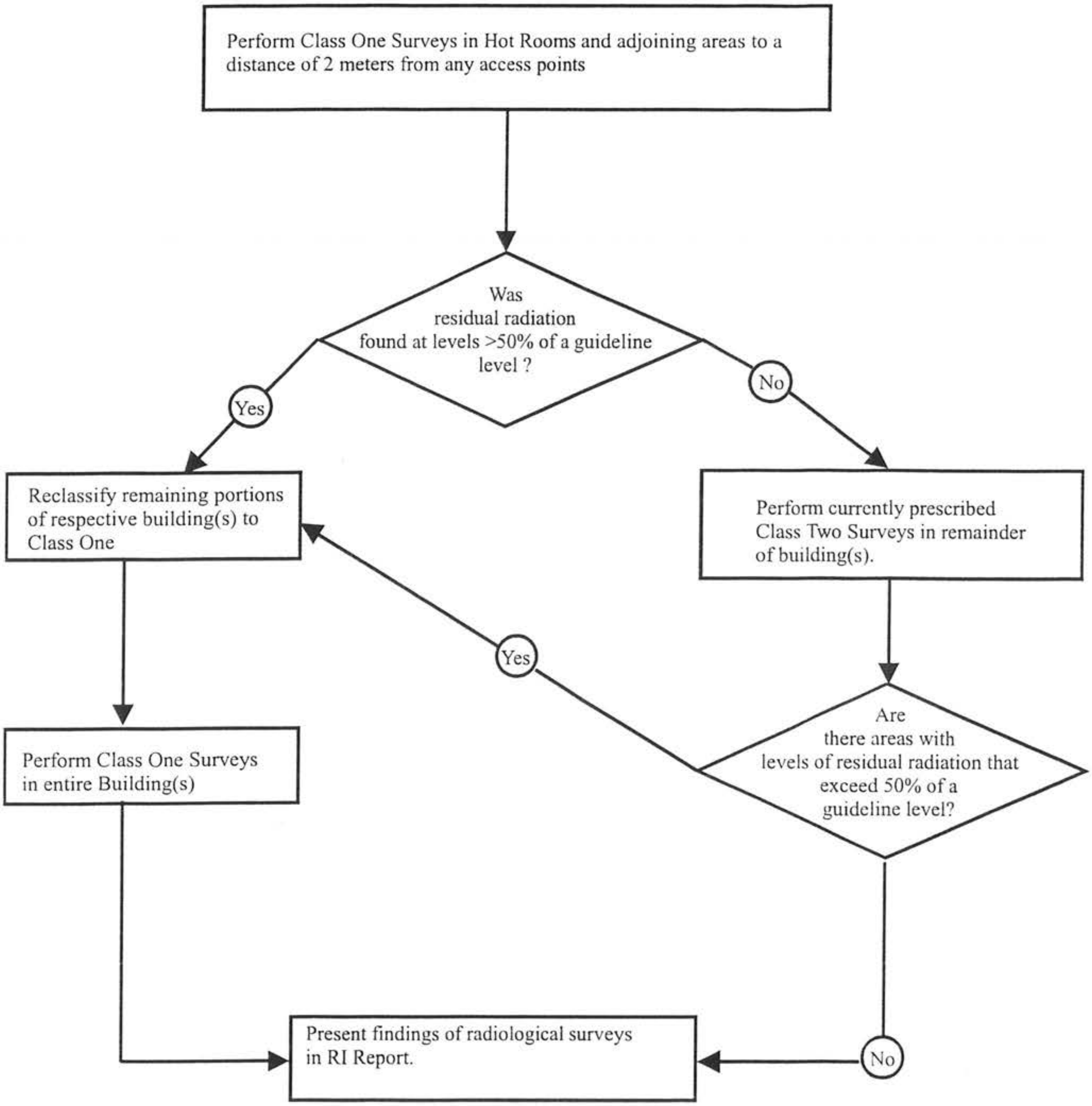
Table 4-1
Seneca Army Depot Activity
SEADs 12 and 63 Project Scoping Plan
Survey Unit Classifications

Class One Survey Units	Rational For Classification	Radionuclides of Concern
Building 803	Used to store containerized radioactive waste and military items containing radionuclides.	Pu-239, U-238, U-235, Ra-226, Co-60, Co-57, H-3
Building 804	Used to perform maintenance on military items that contained radionuclides.	Pu-239, U-238, U-235, Ra-226, H-3
Building 805	Used as a stores room for Building 804.	Pu-239, U-238, U-235, Ra-226, H-3
Disposal Pit A	Radium-226 detected above background levels during ESI in 1994.	Pu-239, U-238, U-235, Ra-226, Co-60, Co-57, H-3
Roof of Building 815; Hot Room of Building 815 and areas of adjoining rooms to a distance of 2 meters from the access point to the Hot Room.	Used to perform maintainance on military items that contained radionuclides. Uranium bearing alloys were exposed to ambient air	Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3
Roof of Building 816; Hot Room of Building 816 and areas of adjoining rooms to a distance of 2 meters from the access point of the Hot Room.	Used to perform maintainance on military items that contained radionuclides. Uranium bearing alloys were exposed to ambient air.	Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3
Building 819 And Surrounding Grounds and Asphalt	Used to perform quality assurance testing on military items that contained radionuclides.	Pu-239, U-238, U-235, Ra-226, Co-60, H-3

Class Two Survey Units	Rational For Classification	Radionuclides of Concern
Building 815 and surrounding asphalt, except hot room and adjoining areas described above	Building 815 was used to perform maintainance on military items that contained radionuclides.	Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3
Building 816 and surrounding asphalt, except hot room and adjoining areas described above	Building 816 was used to perform maintainance on military items that contained radionuclides.	Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3
Building 806, Calibration Lab Only	Used to calibrate radiological survey meters and store sealed radioactive callibration sources.	Am-241, U-238, U-235, Th-230, Cs-137
Building 810, Receiving Room and Platform Only	Used as a loading and unloading area for containerized military items that contained radionuclides.	U-238, Ra-226, Co-60, H-3
Building 812, Ammunition Storage Room and Garage Only	Used to store military items that contained radionuclides as integral componetry.	Ra-226, Pm-147, H-3
Drainage Ditch Between Building 816 and Reeder Creek Tributary, Reeder Creek Tributary, and Drainage Ditch Between Buildings 803, 804, 810 and Reeder Creek Tributary	These are the main surface water drainage pathways for the Class One Buildings 803, 804, 805, 815, and 816.	None, Screening for all radionuclides stored on-site will be performed
Grounds and Drainage Ditch Behind Buildings 803 and 804	ESI data and 1986 SEDA excavation data indicate that this area is free from residual radioactivity.	None, Screening for all radionuclides stored on-site will be performed
Disposal Pit Areas Identified By Geophysics Except Disposal Pit A	Disposal of materials that contained radionuclides is very unlikely, but no documentation to this effect exists.	None, Screening for all radionuclides stored on-site will be performed

Class Three Survey Units	Rational For Classification	Radionuclides of Concern
All open grounds not classified as either Class One or Class Two Survey Units	No known uses of these areas included the storage or disposal of military items that contained radionuclides. Also, aerial photo reviews and geophysical data will demonstrated that Class Three open grounds have not been impacted.	None, Screening for all radionuclides stored on-site will be performed
All Buildings and Rooms that are not classified as either Class One or Class Two Suvey Units	No known operations or uses of these buildings included the use or storage of military items that contained radionuclides.	None. No screening will be performed in these areas, unless the results from an adjacent Class Two survey unit indicates a release that is above a site specific guideline has occured.

Figure 4-4
Radiological Survey Decision Tree
for
Buildings 815 and 816



Note: The guideline levels that will be used are those from NYCRR Title 12, Part 38. Table 5, which are presented in Table 4-3 of this project scoping plan

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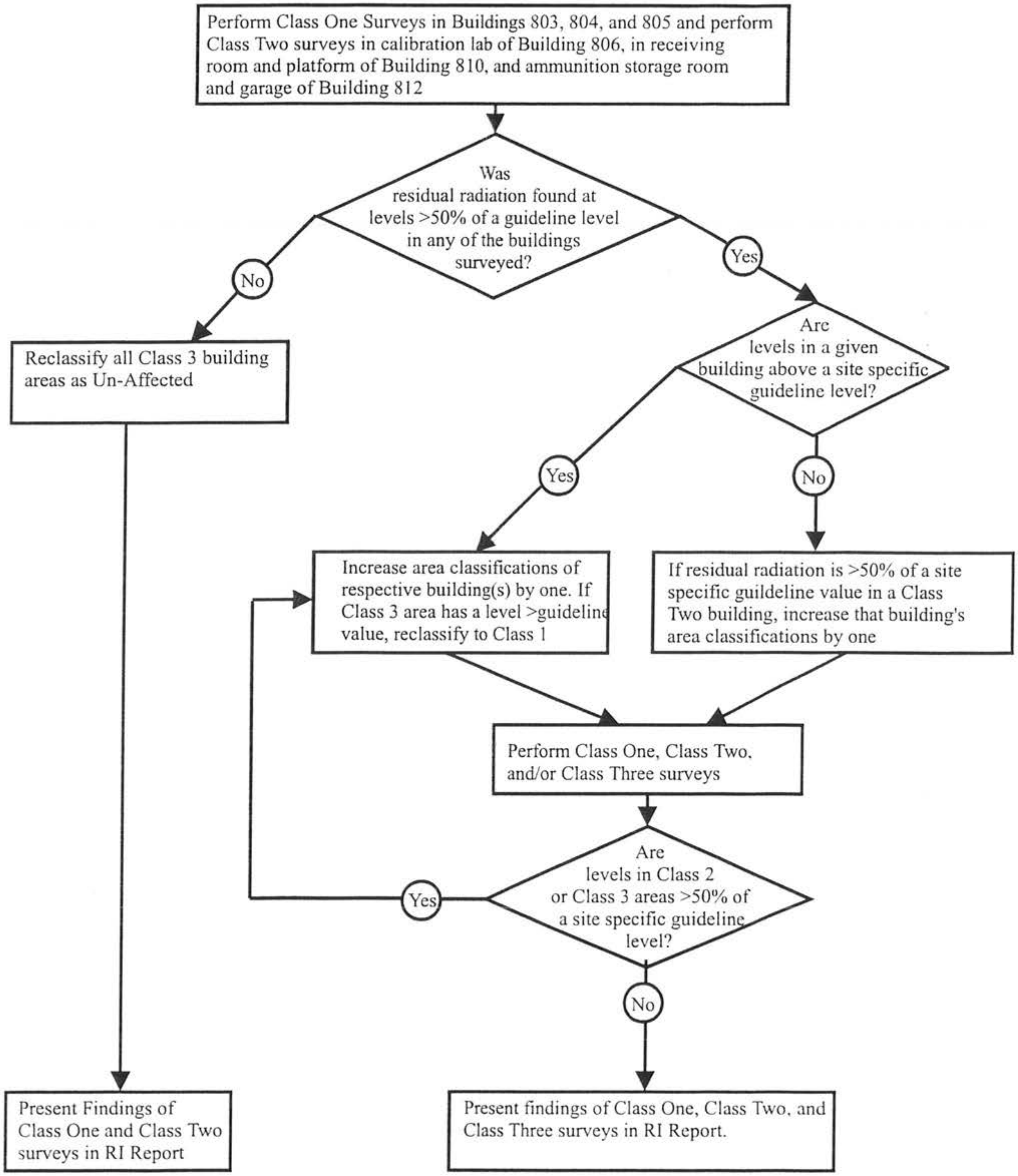
Figure 4-5
Radiological Survey Decision Tree
for
Buildings 800, 802, 803, 804, 805, 806, 810, 812, and 825



Note: The guideline levels that will be used are those from NYCRR Title 12, Part 38, Table 5, which are presented in Table 4-3 of this project scoping plan

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Radionuclides Of Concern

The identity of all radionuclides that were stored as integral parts of military items in the Q Area and all radionuclides that were contained in sealed calibration check sources in the Q Area has been released by the Army. These radionuclides, and the buildings in which they were stored or maintained, are shown in Table 4-1 In addition, Table 4-2 presents a partial list of the military items that may have been stored in the Q Area along with the radionuclides that would have been contained as components of those items.

Site Specific Guideline Values

To meet the objective of the radiological surveys in the Class One, Class Two, and Class Three sites, preliminary guideline values, against which the radiological survey data will be screened, are established prior to proceeding with the surveys. Guideline values are expressed in the same units as the survey instrumentation that will be used and are based upon pre-selected dose or exposure limits or state or federal release criteria.

For the purposes of the radiological surveys at SEAD-12, an exterior dose limit of 10 mrem per year above background was selected for the exterior ground surveys following the NYSDEC Technical Administrative Guidance Memorandum: 4003, Cleanup Guideline for Soils Contaminated with Radioactive Materials. The dose limit is used with dose modeling routines to obtain a dose derived guideline level that can be expressed in the same units as the radiological survey data. To this end, the modeled dose equivalents for soil contaminations presented in Appendix B of NUREG 1500, soil concentrations for the residential scenario, were used to define preliminary soil activity levels that are equivalent to 10 mrem/yr. These preliminary guideline levels assume that all of the dose is due to a single radionuclide, which is present at levels that are distinguishable from background. In the event that more than one radionuclide is found at levels that are distinguishable from background, then the unity rule described in MARSSIM will be used to derive site specific guideline values. For a known mixture of such radionuclides, each having a fixed relative fraction of the total activity, the site specific guildeline value for each radionuclide will be calculated by first determining the gross activity guideline value, and then multiplying that gross guideline level by the respective fractional contribution of each radionuclide. The unity rule will not be used when all of the

TABLE 4-2

SENECA ARMY DEPOT ACTIVITY
SEAD-12 AND SEAD-63 PROJECT SCOPING PLAN
MILITARY ITEMS THAT CONTAIN RADIONUCLIDES AS INTEGRAL PARTS OF THEIR COMPONENTS

Taken from the Generic Radioactive Commodity Site Remediation Survey Protocol (November 1995)	
NOMENCLATURE	ISOTOPE
Front Sight Post Assembly	H-3
Radioluminous Fire Control Devices	H-3
Compasses	H-3
Infinity Collimator	H-3
M1A1 Collimator	H-3
M1A1 Quadrant Fire Control Device	H-3
M58 and M59 Aiming Light Post	H-3
Wrist Watches	H-3
M72 Light Antitank Weapon (LAW)	PM-147
Front Sight Post Assembly	PM-147
Radium Dial/Compass/Check Source	Ra-226
UDM/6 Radiac Calibration Set	Am-241
MC-1 Moisture Density Tester	Am-241
M8A1 Chemical Agent Alarm	U-238
MA1 Tank Armor	Cs-137
MC-1 Moisture Density Gauge	Am-241
M-1 Tank Armor	DU

radionuclides that are distinguishable from background are from the same decay chain, and the guideline value for the principal radionuclide of that chain accounts for all of the radiations from its progeny. In such instances, the levels of the principal radionuclide will be compared directly to its guideline level.

The preliminary soil guideline values are presented in Table 4-3, Preliminary Guideline Values. It should be noted that these preliminary guideline values are based upon default assumptions in the NUREG 1500 Appendix B dose to contaminant ratios for a residential scenario. Final soil guideline values will be calculated by the New York State Department of Environmental Conservation's (NYSDEC) Radiation Branch. Once the guideline levels calculated by NYSDEC have been agreed to by the Army, these values will be used in the final presentation of the radiological data.

The interior release criteria from Table 5 of Part 38, Section 12 of the New York Code of Rules and Regulations (NYCRR) were selected for the building and structure surveys. These values are also shown in Table 4-3. The interior guideline values are expressed in units that are compatible with those used by the proposed survey instruments.

If an interior area is found to have radiation levels that are distinguishable from background, the source of those levels will be determined through the analysis of wipe samples or material samples. If applicable, the relative contribution from multiple radionuclides that are found to be above background will be determined, and the unity rule descibed in MARSSIM (and outlined above) will be used to calculate site specific interior activity guideline levels for each.

Using the radionuclide specific guideline values presented in Table 4-3, guideline values that are specific to each survey unit will be established for interior and exterior radiological surveys. The survey unit specific guideline values for building surfaces, roadways, and paved areas will be selected using the following selection criteria:

- For a survey unit where the radionuclides of concern include any one of ^{241}Am, ^{239}Pu, ^{238}U, ^{235}U, ^{230}Th, or ^{226}Ra, the interior alpha guideline and the exterior soil guideline will be set equal to the lowest respective guideline value from Table 4-3 of any of these 6 radionuclides of concern that are known to have been stored or maintained in that survey unit.

Table 4-3
Seneca Army Depot Activity
SEAD 12 and SEAD 63 RI/FS Project Scoping Plan
Preliminary Guideline Values

Soil Guidelines *

Nuclide	Mean of Expanded Site Inspection Data from 1994 (units=pCi/g)	Standard Deviation of Expanded Site Inspection Data	NUREG 1500 Conc. (pCi/g) at 10 mrem/yr
Am 241	NA		1.21
Pu 239	NA		1.25
U 238	0.87	0.33	5.19
U 235	0.21	0.15	1.75
Th 230	1.56**	0.36**	3.90
Ra 226	1.56	0.36	3.70
Pm 147	NA		4,800.00
Cs 137	0.06	0.14	7.13
Co 60	NA		19.80
Co 57	NA		77.30
H 3	NA		276.00

NA= Not Available

* Soil Guidelines are taken from NUREG 1500, Appendix B, Table B2, Soil Concentrations, Residential Scenario.

** Values are assumed based upon Ra-226 concentrations

Building Guidelines ***

Nuclide	NUREG 1500 Conc. (DPM/100cm^2) at 15 mrem/yr	12 NYCRR Part 38 Table 5, Average	12 NYCRR Part 38 Table 5, Maximum	12 NYCRR Part 38 Table 5, Removable
Am 241	180.00	None Available	None Available	None Available
Pu 239	195.00	None Available	None Available	None Available
U-nat., U-238, U-235, and associated decay products except Ra-226, Th-230, Ac-227, and Pa-231	Not Used	5,000 dpm alpha / 100 cm^2	15,000 dpm alpha / 100 cm^2	1000 dpm alpha / 100 cm^2
Transuranics, Ra-228, Ra 226, Ra-224, Ra-223, Th-nat., Th-228, Th-230, Th-232, Ac-227, and Pa-231	Not Used	1,000 dpm alpha / 100 cm^2	3,000 dpm alpha / 100 cm^2	200 dpm alpha / 100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except those noted above	Not Used	5,000 dpm beta, gamma / 100 cm^2	15,000 dpm beta, gamma / 100 cm^2	1000 dpm beta, gamma / 100 cm^2

*** Building guidelines are taken from Table 5 of 12 NYCRR Part 38 and from NUREG 1500, Appendix B, Table B2, Surface Concentration, Building Occupancy Scenario.

- For a survey unit where the radionuclides of concern include any one of ^{147}Pm, ^{137}Cs, ^{60}Co, ^{57}Co, or ^{3}H, the beta/gamma interior guidelines will be equal to those shown in Table 4-3, and the exterior guideline value will be set equal to the lowest soil guideline value from Table 4-3 of any of these 5 radionuclides of concern that are known to have been stored or maintained in that survey unit.

Survey Instrumentation, Building Surveys

Instrumentation for building surface scanning surveys will include gas proportional detectors for alpha and beta radiations or zinc sulfide ZnS scintillation detectors for alpha radiations only, and FIDLER (field instrument for the detection of low energy radiations) or equivalent types of detectors for gamma radiations. Surveying speeds will be 1 detector width per second when using the alpha and beta instruments and 0.5 meters per second (1.5 feet/second) when using the gamma instruments. Audible indicators will be used to identify locations having elevated (>1.5 to 3 times ambient) levels of direct radiation. The nominal distance between the detector and the surface should be less than one centimeter (0.4 inch) for scans where alpha radiation is being monitored and less than two centimeters (0.8 inch) when only beta radiation is being monitored. The gamma scans will be performed in such a manner so that the detector is swept from side to side, where the distance between the surface and detector will be as minimal as possible when the detector is immediately in front of the survey personnel.

Direct measurements will also be performed at selected areas using the same gas proportional and ZnS scintillation detectors as the surface scanning surveys. If the scanning surveys indicate that no residual radiation is present, than the instruments will be placed directly on the surface being measured. Otherwise, the minimal surface to detector separations stated above will be used. The direct measurement surveys will be performed by integrating counts over a 1 minute period.

Survey Instrumentation, Grounds Surveys

Instrumentation for exterior surface scanning surveys will use FIDLER or equivalent types of detectors. Audible indicators will be used to identify locations having elevated (>1.5 to 3 times ambient) levels of direct radiation. Depending on the instrument's scaler/ratemeter display response time and the geometry of the detector with the ground surface, two types of scanning methodologies will be considered. The preferred method of scanning will involve moving the detector across the ground surface at speeds of 0.5 meters per second or less while sweeping the detector from side to side. The detector will be moved in such a manner so that four sweeps are achieved for every one square meter area surveyed (i.e. the detector is moving within a one square meter area for a period of at least 8 seconds). This method of scanning will be used when the instrument being used has a rapid scaler/ratemeter display response time. The reason this method is preferred is that small variations in direct radiation levels (typically between 100 and 300 counts per minute) that are detected with the audible indicators will require less time to determine if they are due to background fluctuations (the "hot spot" can not be reproduced) or due to the presence of one or more radionuclides (the "hot spot" is reproducible).

The second method of scanning will be used for instruments that have longer scaler/ratemeter display response times. For these types of meters, the instrument's detector will be maintained in a static location, at a height of one foot above the ground, for a period of at least 6 seconds for every 1 square meter area that is surveyed. If the audible indicators identify an increase in the levels of direct radiation, then the instrument will be maintained in a static location until the scaler/ratemeter display shows a constant readout. The reason this method is not preferred is because of the additional time needed for the instrument's scaler/ratemeter to show a constant readout when small increases in direct radiation levels (typically between 100 and 300 counts per minute) are detected. Such increases are often due to background fluctuations and identifying them as "hot spots" would significantly increase the number of type one errors (false positives).

$$MDC = \frac{2.71 \bullet 4.65\sqrt{B_r \bullet t}}{t \bullet e_i \bullet \frac{A}{100}}$$

Discussion on MDCs

Using the minimum detection concentration (MDC) formula from NUREG 5849, and typical background count rates and instrument efficiencies from radiation measurement instrument manufacturers, typical MDCs for the gas proportional and ZnS survey instruments that will be used are shown in Table 4-4. These MDCs were calculated using the following formula (taken from NUREG 5849):

Table 4-4
Seneca Army Depot Activity
SEAD-12 and SEAD-63 RI/FS Project Scoping Plan
Table of Estimated Minimum Detectable Concentrations

GROSS ALPHA MDCs

FLOOR MONITOR - GAS PROPORTIONAL

Background* (cpm): 20
count time(min.): 1
MDC(dpm/100cm^2): 32
Efficientcy: 0.17
Probe Area (cm^2): 425

GAS PROPORTIONAL

Background* (cpm): 5
count time(min.): 1
MDC(dpm/100cm^2): 55
Efficientcy: 0.2
Probe Area (cm^2): 100

ZnS SCINTILLATOR

Background* (cpm): 2
count time(min.): 1
MDC(dpm/100cm^2): 104
Efficientcy: 0.13
Probe Area (cm^2): 50

ZnS SCINTILLATOR

Background* (cpm): 2
count time(min.): 1
MDC(dpm/100cm^2): 36
Efficientcy: 0.2
Probe Area (cm^2): 100

PANCAKE G-M

Background* (cpm): 45
count time(min.): 1
MDC(dpm/100cm^2): 1,736
Efficientcy: 0.15
Probe Area (cm^2): 12

GROSS BETA MDCs

FLOOR MONITOR - GAS PROPORTIONAL

Background* (cpm): 1000
count time(min.): 1
MDC(dpm/100cm^2): 102
Efficientcy: 0.35
Probe Area (cm^2): 425

GAS PROPORTIONAL

Background* (cpm): 400
count time(min.): 1
MDC(dpm/100cm^2): 313
Efficientcy: 0.3
Probe Area (cm^2): 100

PANCAKE G-M

Background* (cpm): 45
count time(min.): 1
MDC(dpm/100cm^2): 1,371
Efficientcy: 0.19
Probe Area (cm^2): 12

*=estimated from instrument manufacturer or site observations

B_r = background count rate in cpm
t = counting time
e_i = instrument efficiency
A = active area of probe

This formula will be used to calculate the daily MDCs for each gas proportional and ZnS scintillation instrument used. Instrument efficiencies will be determined in the field using National Institute of Standards and Technology (NIST) traceable sources that are owned by SEDA. The list of NIST traceable sources that are available are listed below.

^{241}Am (To be determined),
^{137}Cs (0.829±0.032 microcuries),
^{137}Cs (0.906±0.035 microcuries),
^{99}Tc (12,000±720 dpm),
^{99}Tc (10,800±542 dpm),
^{99}Tc (9,960±498 dpm),
^{230}Th (10,100±302 dpm),
^{230}Th (9,570±478 dpm),
^{238}U (337.2±50.6 dpm).

For interior scanning surveys, scanning MDCs will be determined using the methodology presented in MARSSIM. It is determined from the minimum detectable count rate (MDCR) of the ideal Poisson observer and the human factors efficiency, detector efficiency, and source efficiency. The scan MDC for interior structures will use the following formula:

$$Scan\ MDC = \frac{MDCR}{(E_{hf})(e_i)(e_s)(A)}$$

MDCR = ideal poison observer MDC

E_{hf} = human efficiency
e_s = surface efficiency
e_i = instrument efficiency
A = active area of probe

The scanning MDCR for various background ranges will be taken from Table 6.6 of MARSSIM, and the human efficiency (E_{hf}) will be assumed to be 65%. The surface efficiency will be determined from the literature, however, a preliminary surface efficiency of 50% will be used. The various calibration sources that will be available for the cross calibration are listed above.

For exterior scanning surveys using NaI instruments, a scanning MDCR will be determined by multiplying the appropriate MDCR of the ideal Poisson observer (from MARSSIM, Table 6.6) by the human factors efficiency, which will initially be considered to be 65%. The scanning MDCR can then later be used to estimate an exterior scan MDC by cross-calibrating the scanning instruments to a Bicron Microrem per Hour meter, and relating the resultant cross calibration to a modeled exposure rate for the radiological conditions on-site. This methodology is described in MARSSIM, and it will be used at SEAD-12.

Selection of Representative Reference Areas

For the purposes of establishing reference areas for evaluating gross alpha and gross beta activity and gamma scanning on structure surfaces, Buildings 722, 726,727, and Igloo C0912 have been identified as being of similar construction as those located in SEAD-12. Building 722 will be surveyed as the reference site for SEAD-12 buildings that are constructed of cement blocks. Building 726 or 727, whichever most resembles the current condition of those buildings at SEAD-12 at the time of the survey, will be surveyed as the reference site for buildings that are constructed of metal sheeting. As a reference site for those buildings that are earth covered (Buildings 815 and 816), Igloo C0912 was selected as the appropriate reference site. Although Igloo C0912 was not used for any purpose other than conventional munitions storage, its woven reinforcing bar / poured concrete construction is very similar to that of Buildings 815 and 816. For the land surveys, the North Post's baseball field will be gridded and surveyed as the land scanning reference site. This site is considered to be appropriate as a reference site because it is situated in close proximity to SEAD-12 (and is therefore expected to have similar geological characteristics as SEAD-12), it is located beyond the restricted areas of the Ammo Area and the Q Area, and it is not expected to have been used for any purposes, other than recreation, since the depot was established. In order to collect sufficient data to complete statistical comparisons between site and reference data, the reference areas will be surveyed as Class Two survey units.

To establish reference datasets for groundwater, surface water, sediment, surface soil, and subsurface soil, databases for each of these media will be established by collecting 9 background monitoring well samples, 9 background surface water samples, 9 background sediment samples, 15 background subsurface soil samples and 20 background surface soil samples. The 9 monitoring wells will include 6 upgradient monitoring wells that will be located east and north of the Q Area fence and 3 background monitoring wells that have already been installed at the OB ground, the OD grounds, and SEAD-57. The 9 background surface water and sediment samples will be collected from within drainage ditches and Reeder Creek, at locations that are upgradient of SEAD-12. The 15 subsurface soil samples will include one mid depth soil sample to be collected near each of the 3 existing background monitoring wells that will be used for the background groundwater database, and 2 subsurface soil samples to be collected from each of the six upgradient monitoring wells that will be installed east and north of the Q Area fence. The 20 surface soil samples will include one surface soil sample collected from each of the upgradient monitoring wells installed east and north of the Q Area fence, 8 surface soil samples to be collected from various locations east and north of the Q Area fence, and 6 surface soil samples that will be collected in the scanning reference area (the North Post's baseball field).

The quantity of background data that is proposed above is needed to allow the statistical comparisons to have sufficient power to detect that a survey unit is above a survey unit specific guideline value. The Data Quality Objectives section of this project scoping plan (Section 3.5) and the Data Reduction Assessment and Interpretation section (Section 4.4) discuss in more detail the statistical comparisons that will be performed.

4.2.3.1 Alpha, Beta and Gamma Scanning Surveys

The scanning surveys will be conducted following the schedules detailed below. All scanning measurements will be performed on grid diagrams that will be directly related to the gridding patterns established in each survey unit. Building interior and exterior grid sizes will be 2 meters by 2 meters in areas below 2 meters unless stated otherwise. Building interior and exterior grid sizes will be 1 meter by 1 meter in areas above 2 meters unless stated otherwise. Exterior grounds and pavement grid sizes will be 10 meters by 10 meters.

Areas where the scanning measurements indicate that residual radiation may be present will be marked for further investigations. Professional judgement will be used to determine if additional surveys are warranted. The additional surveys may include additional direct measurements, additional surface scanning (such as a 100% coverage using a NaI detector), or material sampling. The purpose of any additional surveys will be to confirm that any residual radiation present is below the survey unit specific guideline value.

Class One Survey Units

Scanning of surfaces and grounds to identify locations of residual surface and near surface activity in Class One survey units will be performed according to the following schedule:

- Lower walls (up to two meters), floor surfaces, pavement, un-earthen roofs with ventilation ducts, exterior building surfaces within 2 meters of a point of access (windows, ventilation ducts, doors, etc...), horizontal surfaces above 2 meters where dust or particulates could deposit and upper walls and ceilings of the hot rooms in Buildings 815 and 816: 100% of surface,
- Upper walls (above two meters), ceilings (suspended and non-suspended), - 10% of surface to be conducted in randomly located 1 meter by 1 meter areas. These areas will also serve as direct measurement and wipe measurement locations.
- Exterior grounds, including earthen covered buildings: 100% of surface

Building interior and exterior surface scanning surveys and pavement surface scanning surveys will be conducted for alpha radiations where ^{241}Am, ^{239}Pu, ^{238}U, ^{235}U, ^{230}Th, or ^{226}Ra are among the radionuclides of concern and for beta radiations where ^{147}Pm, ^{137}Cs, or ^{60}Co are among the radionuclides of concern. All pavement surfaces and building interior and exterior surfaces will also be scanned for gamma radiations. Surveys of exterior grounds will be for gamma radiations.

Instrumentation for the scanning surveys will include proportional detectors for alpha and beta radiations, zinc sulfide scintillators for alpha surveys and FIDLER or equivalent types of detectors for gamma surveys (detectors having thin NaI(Tl) crystals that are designed to detect low energy gamma and x-ray radiations). For all but the floor surveys and pavement surveys (where a large area gas proportional floor monitor will be used), the instruments having the lowest detection sensitivity will be used for the surveys, wherever physical surface conditions and measurement locations permit. Refer to the Survey Instrumentation-Building Surveys and the Survey Instrumentation-Grounds Surveys sub-sections of Section 4.2.3 for details on the survey methodologies that will be used. Any areas that are identified as having elevated levels of radiation will be noted for further investigation.

Class Two Survey Units

Scanning of surfaces and grounds to identify locations of residual surface and near surface activity in Class Two survey units will be performed according to the following schedule:

- Lower walls (up to two meters), floor surfaces, pavement, access points (such as doors or windows) to a distance of two meters beyond the Class Two survey unit, and interior horizontal surfaces above 2 meters, - 50% of surface.
- Upper walls, ceilings, and roofs - 10% of surface in randomly located 1 meter by 1 meter areas
- Exterior Grounds - 50% of surface

Building interior and exterior surface scanning surveys and exterior pavement scanning surveys will be conducted for alpha radiations where ^{241}Am, ^{239}Pu, ^{238}U, ^{235}U, ^{230}Th, or ^{226}Ra are among the radionuclides of concern and for beta radiations where ^{147}Pm, ^{137}Cs, or ^{60}Co are among the radionuclides of concern. All pavement surfaces and building interior and exterior surfaces will also be scanned for gamma radiations. Surveys of exterior grounds will be for gamma radiations.

Instrumentation for the scanning surveys will include gas proportional detectors for alpha and beta surveys, zinc sulfide scintillators for alpha surveys and FIDLER or equivalent types of detectors for gamma surveys (detectors having thin NaI(Tl) crystals that are designed to detect low energy gamma and x-ray radiations). For all but the floor surveys and pavement surveys (where a large area gas proportional floor monitor will be used), the instruments having the lowest detection sensitivity will be used for the surveys, wherever physical surface conditions and measurement locations permit. Refer to the Survey Instrumentation-Building Surveys and the Survey Instrumentation-Grounds Surveys sub-sections of Section 4.2.3 for details on the survey methodologies that will be used. Any areas that are identified as having elevated levels of radiation will be noted for further investigation.

Class Three Survey Units

Scanning of surfaces and grounds to identify locations of residual surface and near surface activity in Class Three survey units will be performed according to the following schedule:

- interior surfaces below 2 meters - 10% of surfaces or 15 locations, whichever is greater, in randomly located two meter by two meter grids.
- interior surfaces above 2 meters and roofs -10% of surface in randomly located one meter by one meter grids.
- exterior pavement - 10% of surface, in randomly located 10 meter by 10 meter areas
- exterior grounds - 10% of surface, along survey lines that are separated by approximately 15 meters.

Surface scanning surveys of pavement and building interior and exterior surfaces will be conducted for alpha, beta, and gamma radiations. Surveys of exterior grounds will be for gamma radiations.

Instrumentation for the scanning surveys will include proportional detectors for alpha and beta surveys, zinc sulfide scintillators for alpha surveys and FIDLER or equivalent types of detectors for gamma surveys (detectors having thin NaI(Tl) crystals that are designed to detect low energy gamma and x-ray radiations). For all but the floor surveys and pavement surveys (where a large area gas proportional floor monitor will be used), the instruments having the lowest detection sensitivity will be used for the surveys, wherever physical surface conditions and measurement locations permit. Refer to the Survey Instrumentation-Building Surveys and the Survey Instrumentation-Grounds Surveys sub-sections of Section 4.2.3 for details on the survey methodologies that will be used. Any areas that are identified as having elevated levels of radiation will be noted for further investigation.

4.2.3.2 Alpha and Beta Direct Measurements

Direct measurement surveys are performed as a means of detecting areas where elevated levels of surface or near surface radiation may be present at levels that are not detectable by surface scanning techniques. To this end, the direct measurement survey data are compared to two types of screening values. The first is the survey unit specific guideline value. Locations where the direct measurement is above this value will be recorded and the source(s) of the residual contamination will be determined. The second screening value is a daily flag value. Locations where the direct measurement value is above the daily flag value will be recorded and professional judgment will be used to determine if additional surveys are warranted. The additional surveys may include additional direct measurements, additional surface scanning (such as a 100% coverage using a FIDLER or equivalent type of detector), or material sampling. The purpose of any additional surveys will be to confirm that any residual radiation present is below the survey unit specific guideline value.

The flag value will be determined on a daily basis. Flag values will be established for both alpha and beta radiations for each instrument in use. The flag value will be calculated using the following formula:

$$Flag = \left(G \bullet f_{gd} \bullet E_{inst.}\right) + B$$

G = survey unit specific guideline value (specific for alpha and beta radiations)

f_{gd} = fraction of guideline value that must be detected, equal to 25% for interior surveys and 75% for exterior surveys

$E_{inst.}$ = detection efficiency of the instrument being used for the direct measurement

B = daily background count rate (determined on an instrument specific basis)

All direct measurements will be recorded on grid diagrams that will be directly related to the gridding patterns established in each survey unit. Building interior and exterior grid sizes will be 2 meters by 2 meters for areas below two meters and 1 meter by 1 meter for areas above two meters, unless stated otherwise. Exterior pavement grid sizes will be 10 meters by 10 meters.

The direct measurement plans detailed below will provide, at a minimum, the twenty data points from each survey unit that are necessary to meet the DQOs that were selected for SEAD-12.

Class One Survey Units

Direct measurements of alpha and beta surface activity will be performed at selected locations using the same instruments as outlined in Section 4.2.3.1, Alpha , Beta and Gamma Scanning Surveys.

Direct measurements will be performed according to the following schedule:

- lower walls (up to two meters), floor surfaces, pavement, un-earthen roofs with ventilation ducts, exterior building surfaces within 2 meters of a point of access (windows, ventilation grills, doors, etc....), horizontal surfaces above 2 meters where dust or particulates could deposit, and upper walls and ceilings in the hot rooms in Buildings 815 and 816: - one location per 2 meter grid, situated in the area of the highest surface scanning reading,
- upper walls (above two meters), ceilings (suspended and non-suspended), - one location per one meter by one meter area that is used to perform the surface scanning surveys, situated in the area of the highest surface scanning reading.
- exterior pavement: one location per 10 meter by 10 meter grid, to be located at the area of the highest surface scanning reading.

Measurements will be conducted by integrating counts over a 1 minute period.

Class Two Survey Units

Direct measurements of alpha and beta surface activity will be performed at selected locations using the same instruments as outlined in Section 4.2.3.1, Alpha ,Beta and Gamma Scanning Surveys.

Direct measurements will be performed according to the following schedule

- lower walls (up to two meters), floor surfaces, floors and walls to a distance of 2 meters beyond access points to Class Two survey units, and horizontal surfaces above 2 meters - one location per 2 meter by 2 meter grid used to document the surface scanning surveys, situated in the area of the highest surface scanning reading.
- upper walls ceilings, and roofs - one location per one meter by one meter area that is used to perform the surface scanning surveys, situated in the area of the highest surface scanning reading.
- exterior pavement - one location per 10 meter by 10 meter grid, situated in the area of the highest surface scanning reading

Measurements will be conducted by integrating counts over a 1 minute period.

Class Three Survey Units

Direct measurements of alpha and beta surface activity will be performed at selected locations using the same instruments as outlined in Section 4.2.3, Alpha ,Beta and Gamma Scanning Surveys.

Direct measurements will be performed according to the following schedule

- Building surfaces - one location per one meter by one meter area used for the surface scanning surveys, situated in the area of the highest surface scanning reading.
- Exterior Pavement - one location per 10 meter by 10 meter area used in the surface scanning surveys, situated in the area of the highest surface scanning reading.

Measurements will be conducted by integrating counts over a 1 minute period.

4.2.3.3 Exposure Rate Surveys

Exposure rate surveys are performed to determine that the exposure rates measured at a location are below the survey unit specific guideline value. Exposure rate measurements will be obtained in the field in units of uRem/hr or counts per minute (cpm). The final exposure rate measurements will be reported in units of uRem/hr. The exposure rate survey plans detailed below will provide, at a minimum, the twenty data points from each survey unit that are necessary to meet the DQOs that were selected for SEAD-12.

Class One Survey Units

Gamma exposure rates will be measured at one meter above ground or floor surfaces, using a Bicron microRem/hr meter. Measurements will be uniformly spaced according to the following pattern:

- Lower walls (up to two meters), floor surfaces, pavement, un-earthen roofs with ventilation ducts - one location per 2 by 2 meter grid used to document the surface scanning and direct measurement surveys, located in the center of the grid,

- Exterior grounds, including earth covered buildings, and paved areas - one location per grid node of the 10 meter by 10 meter grid used to document the surface scanning and direct measurement surveys and at any biased soil sampling locations as defined in the surface soil sampling program (Section 4.2.4.1).

Class Two Survey Units

Gamma exposure rates will be measured at one meter above ground or floor surfaces using a Bicron microRem/hr meter. Measurements will be spaced according to the following pattern:

- building floors and lower walls - one per survey grid used for the scanning and direct measurement surveys, located in the center of the grid,
- pavement - one per 10 meter by 10 meter grid used for the scanning and direct measurement surveys, located in the center of the grid,
- grounds -one per grid node of the 10 meter by 10 meter grid used to document the scanning surveys and at any biased soil sampling locations as defined in the surface soil sampling program (Section 4.2.4.1) and surface water and sediment sampling locations as defined in the surface water and sediment sampling program (Section 4.2.4.3).

Class Three Survey Units

Gamma exposure rates will be measured at one meter above ground or floor surfaces using a Bicron microRem/hr meter. Measurements will be spaced according to the following pattern:

- building floors and lower walls - one per survey area used for the scanning and direct measurement surveys, located in the center of the area,
- pavement - one per 10 meter by 10 meter area used for the scanning and direct measurement surveys, located in the center of the area,
- grounds - at each surface soil sampling location (one per 200 meter by 200 meter area plus 10 biased locations) and each surface water and soil sampling location.

4.2.3.4 Removable Radiation Surveys

Two wipes for removable radioactive contamination will be performed at each of the direct measurement locations described in section 4.2.3.2, Alpha and Beta Direct Measurements. One wipe will be collected for gross alpha and gross beta counting at each of the interior and exterior locations and one wipe will be collected for tritium analysis at each of the interior locations. The gross alpha and gross beta wipes will be evaluated by the IRDC Nuclear Counting Laboratory at the Red Stone Arsenal in Alabama. If the integrated counts from a wipe sample exceed the site guideline value for removable surface activity, that sample will be analysed for the radionuclides specified in Section 4.2.8, Analytical Program, to determine the source of the elevated radiations. The tritium wipe will be collected as a liquid scintillation wipe (LS wipe) and will also be submitted to the IRDC Nuclear Counting Lab for laboratory tritium analysis.

4.2.3.5 Investigation of Radon Concentration in Air

The concentrations of radon in buildings will be accomplished using track-etch radon detection devices. Track-etch radon testing is a long-term (3 to 6 month) radon monitoring technique and will be utilized in all of the buildings being investigated at SEAD-12. Track-etch radon detectors will be placed in all rooms that could conceivably be occupied on a frequent basis or for an extended period of time. For the purposes of this RI/FS, one track-etch radon detector will be placed in each of the following types of rooms:

- Office rooms
- Laboratory and maintenance areas
- Lunch rooms and common areas
- Storage rooms that can be occupied by people
- Washrooms/shower rooms
- Guard posts

All track-etch radon detectors will be analyzed by a laboratory that is approved by the EPA's Radon Measurement Proficiency Program. Data quality will be addressed from a field perspective by collecting field duplicate samples at a rate of 1 duplicate sample per 20 field samples and by analyzing trip blank samples.

Approximately 150 radon detectors will be placed in the 16 buildings situated within SEAD-12.

4.2.3.6 Special Measurement and Sampling

Floor drain inlets and outfalls, wastewater inlets, and ventilation ducts in Class One and Class Two areas will be accessed. Direct alpha, beta, and gamma measurements, and, if possible, sampling of sediments or materials from within these drains or inlets, will be performed at the access points. It is estimated that 26 samples will be collected for radiochemical analysis from these access points. In addition, drain lines and duct work will be surveyed using specialized instrumentation. The types and sizes of these instruments will be determined on-site, and may include specialized gas proportional, ZnS, or NaI(Tl) detectors that have been modified to be "snaked" through various diameter piping or ventilation ducts. These instruments are connected to industry standard ratemeters or scalers, and measurements are taken at various locations. These types of special probes will be used to identify areas where residual radiation is present at levels that are above a site guideline for fixed radiation. Since drain lines and ventilation ducts are structures where water or air pass through at elevated rates, it is not likely that any removable material is present.

The interior of the 5,000 gallon UST located north of Buildings 804 and 805 will also be accessed. At a minimum, three samples and/or smears of the tank's interior will be obtained either by breaching the top of the tank (using a truck mounted drill rig) and collecting a sample with a split spoon, or, the top of the tank will be exposed and accessed by excavation. The three samples will be collected as part of the special measurements discussed in Section 4.2.8, Analytical Program. Any remaining samples that are collected will be archived in the event that additional analyses are required to further characterize the tank. In the event that an excavation is necessary, such efforts will be planned around periods of low ground water levels, as the tank is likely to be situated below the average seasonal groundwater level. Should the groundwater level remain above the top of the UST year-round, pumping of groundwater from the excavation will be necessary. If groundwater pumping is required, the excavation will not be advanced until the groundwater quality in the area of the UST has been demonstrated to be unaffected by potential chemicals of concern.

4.2.4 Soil Investigation

The soil investigation program will consist of collecting soil samples from the ground surface, soil borings and test pit excavations. Forty-Seven soil borings and 26 test pit excavations will be performed at SEAD-12. Three hundred and eighteen surface soil samples will also be collected at SEAD-12.

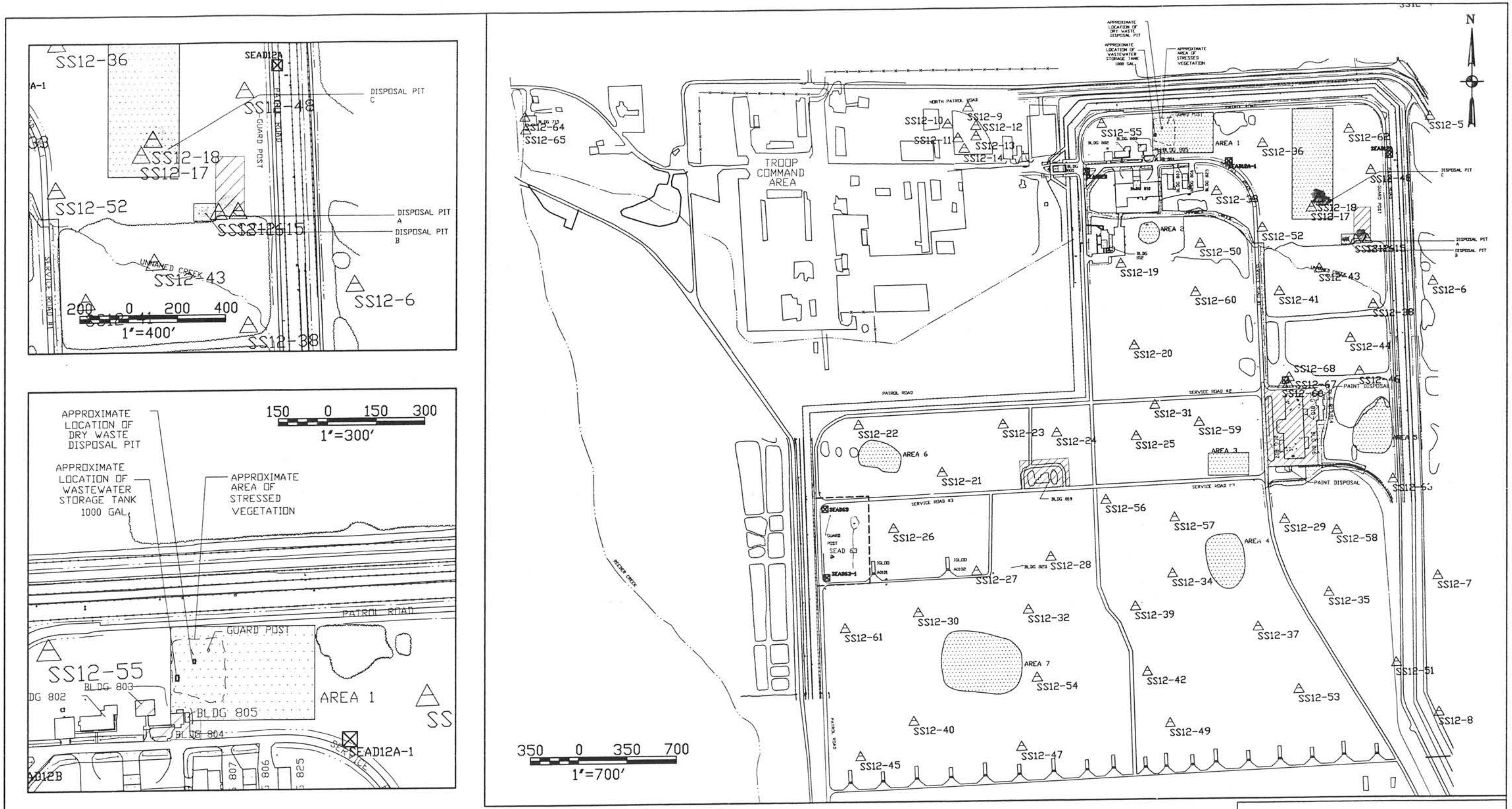
4.2.4.1 Surface Soil Sampling Program

A total of 318 surface soil samples will be collected at SEAD-12. Eight surface soil samples (SS12-1 through SS12-8) will be collected from areas located north and east of SEAD-12 and six surface (SS12-9 through SS12-14) soil samples will be collected from the surface scanning reference area to establish a surface soil background radionuclide concentration database. These fourteen surface soil samples will be analyzed for radionuclides only. Four surface soil samples (SS12-15, through and SS12-18) will be collected at test pit locations investigated during the ESI. Thirty-five surface soil samples (SS12-19 through SS12-53) will be collected at randomly selected locations in class three areas. These 35 locations will be positioned so that one random location is sampled per 200 m by 200 m area. An additional 10 surface soil samples (SS-12-54 through SS12-63) will be collected at biased locations in Class Three areas based upon the surface scanning and exposure measurement surveys. If fewer than ten locations are identified for biased soil sampling, any of the ten remaining surface soil samples will be collected at random locations. Two surface soil samples (SS12-64 and SS12-65) will be collected in the immediate vicinity of the outfall of Building 715's (the Sewage Treatment Plant) wastewater discharge point. Three surface soil samples (SS12-66, 67 and 68) will be collected from beneath the gravel pad at the substation north of Building 815. Surface soil samples SS12-15 through SS12-68 will be submitted for radiological and TAL/TCL analyses. The proposed locations of surface soil samples SS12-1 through SS12-68 are shown on Figure 4-6. An additional 250 surface soil samples will be collected from the grounds of the Class One and Class two survey areas surrounding Buildings 804/805, Buildings 815/816, Building 819, and in areas identified as waste disposal sites from the geophysical surveys. No residual radiation is expected in these areas, except where it is known to occur in the subsurface of Disposal Pit A.

The sampling density in the Class One areas will be one surface soil sample per ten meter by ten meter grid node used to document the surface scanning and exposure measurement surveys. However, if the surface scanning and/or exposure surveys indicate that a localized area of residual radiation may be present, the grid based surface soil sampling location that is closest to the localized area of residual radiation will be relocated to that localized area. Included as part of the grid based surface soil sampling, biased surface soil samples will be collected from the grounds nearest to downspout drains for Buildings 804, 805, 815, 816, and 819. At these locations, the surface soil that is closest to and in the run-off pattern of a given downspout drain will be sampled. The grid based surface soil samples around Buildings 815 and 816 will also include biased surface soil samples that will be collected from locations that would accumulate precipitation run-off from these buildings.

The sampling of Class Two survey areas will be performed so that up to twenty randomly located and/or biased surface soil samples are collected from each Class Two survey unit. For any Class Two survey unit, the sampling density will not exceed an average of one sample per 100 square meters. It is anticipated that a total of ten disposal areas will be identified at SEAD-12. At present, four such areas, identified as Area One (formerly SEAD-12B) and Disposal Pits A, B and C, are known to exist based upon the ESI investigations and past operations at SEDA. These areas are shown on Figure 4-6. The remaining six areas (Areas 2 through 7 on Figure 4-6) are currently estimated based upon the aerial photo review presented in Section 3.1.1.2.5 of this project scoping plan. Based upon the results of the geophysical investigations, any of these six areas that is shown not to have a potential for buried wastes will not be sampled as a Class Two area. Rather, any such area will be considered as part of the SEAD-12 Class Three area and only two confirmatory samples will be collected from those areas. The laboratory analysis costs for any un-used surface soil samples that are not collected as a result of such re-classifications may be used for analyses of archived samples from the soil boring and test pitting programs. However, if the geophysical or scanning investigations identify an area with potentially buried wastes that is not currently indicated on Figure 4-6, then the remaining proposed work for a currently identified Class Two area that is shown to be free of buried wastes will be performed in the suspected disposal area identified by the geophysical or scanning surveys.

The 250 Class One and Class Two surface soil samples will be analyzed for radionuclides. Of these 250 samples, those that are collected from the biased locations described above, (estimated to be 30 surface soil samples) will also be analyzed for TAL/TCL constituents.



LEGEND

MINOR WATERWAY
MAJOR WATERWAY
FENCE
UNPAVED ROAD
BRUSH LINE
LANDFILL EXTENT
RAILROAD
760 GROUND SURFACE ELEVATION CONTOUR
UNDERGROUND ELECTRIC UTILITY LINE
UNDERGROUND WATER UTILITY LINE

☒ SURVEY MONUMENT
ROAD SIGN
DECIDUOUS TREE
FIRE HYDRANT
MANHOLE
△ GUIDE POST
POLE
UTILITY BOX
\+ COORDINATE GRID (250' GRID)
OVERHEAD UTILITY POLE
MAILBOX/RR SIGNAL
(NOT ALL SYMBOLS MAY APPEAR ON MAP)

KNOWN DISPOSAL PIT AREA (PITS A,B, AND C)

▨ CLASS ONE SURVEY UNIT

░ CLASS TWO SURVEY UNIT

△ PROPOSED SURFACE SOIL SAMPLE
SD12-25

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT

DEPT
ENVIRONMENTAL ENGINEERING
Dwg No.

FIGURE 4-6
SEAD-12 PROPOSED SURFACE
SURFACE SAMPLE LOCATIONS

SCALE VARIES PER VIEW
DATE NOVEMBER 1996
NA

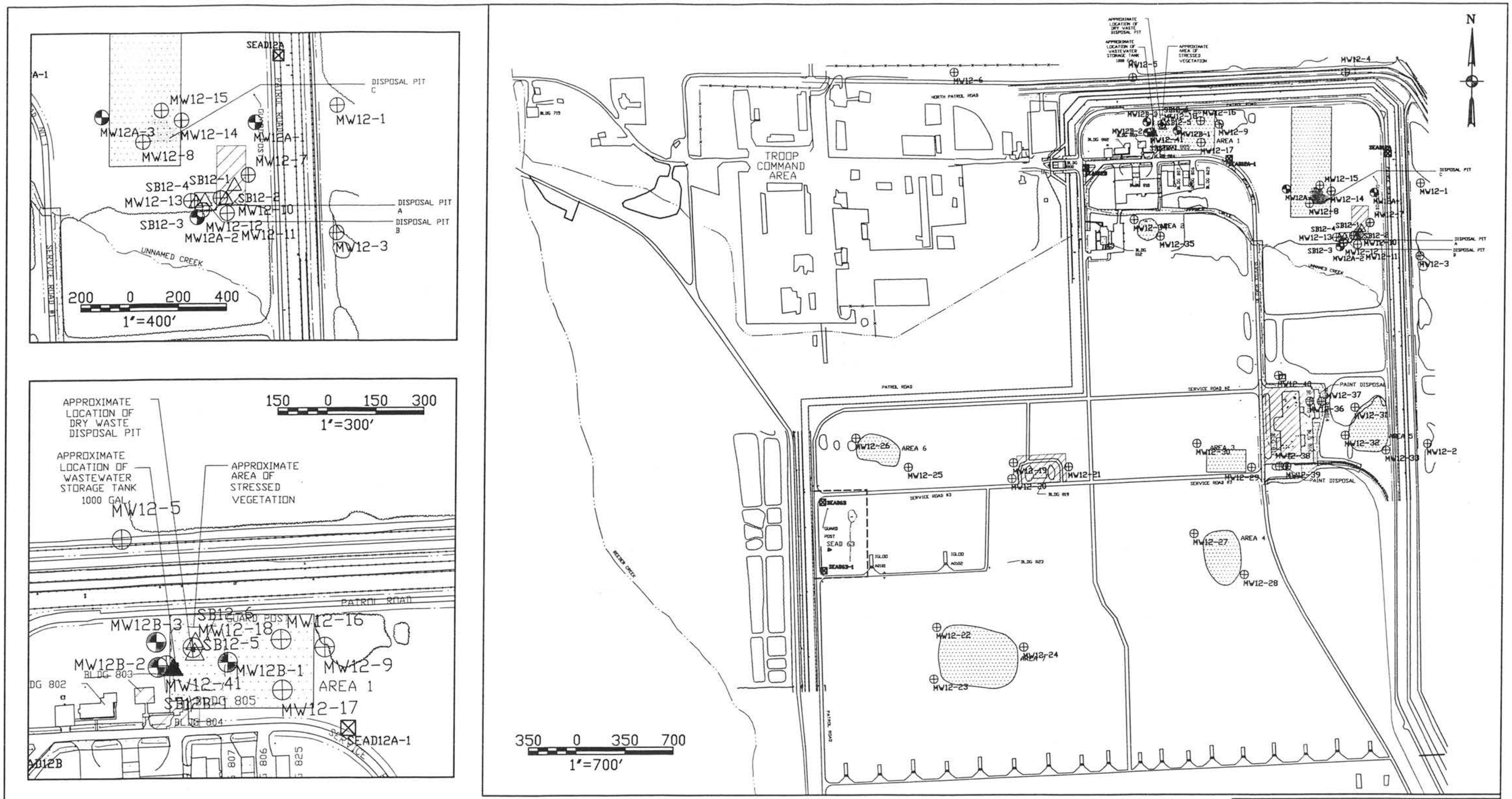
ACAD\SENECA\RIFS\SD12\SD12PSS.DWG

4.2.4.2 Soil Boring Program

A total of up to 47 soil borings will be performed. These soil borings will be drilled within the Q Area or at locations immediately upgradient of the Q Area. The locations of these 47 soil borings are shown on Figure 4-7. Three additional subsurface soil samples will be collected in the immediate vicinity of the existing upgradient monitoring wells at the OB Grounds, the OD Grounds and SEAD 57. A single subsurface soil sample will be collected at each of these three locations. The subsurface soil samples collected at these three locations will be analyzed for background radionuclide concentrations only. The purpose of the 47 soil borings will be to determine the thickness of waste materials, observe subsurface soils, measure the depth to bedrock, and obtain subsurface soil samples for chemical and radiochemical analyses. These data will also be used to assess the potential for contaminant migration to groundwater as part of the groundwater receptor pathway.

Up to forty-one of the soil borings will be completed as monitoring wells. The purpose for installing most of these soil borings/monitoring wells is to identify if any impacts are occurring downgradient of known release areas. The soil boring/monitoring wells that are proposed for the suspected Class Two areas identified by the aerial photo reviews (Areas 2 through7 on Figure 4-7) will be installed only if any of the radiological surveys or test pit excavations indicate that a release has occurred. Evidence that a release has occurred will be considered as any of the following: a positive measurement on a volatile organic vapor meter, a positive measurement on a volatile organic head-space analysis using a photo-vac or similar type of instrument, visual staining of the ground or subsurface, the presence of military components or miscellaneous military debris (not to include waste from former occupants of the area, such as farming debris), or an above background measurement on a radiation scanning or exposure rate instrument. If none of these types of evidence are found during the surface scanning, direct exposure rate measurements, or test pitting activities, then the laboratory analysis costs for any un-used soil boring samples may be used for analyses of archived samples from other soil borings or from archived samples collected during the test pitting program.

In order to select locations for the monitoring wells, the groundwater direction was assumed to follow the contours of the ground surface. The groundwater elevation map presented in Figure 3-11 indicated that the groundwater flow direction in the northeast portion of SEAD-12 is to the northwest. However, the groundwater contouring was based on data from three monitoring



LEGEND

MINOR WATERWAY
MAJOR WATERWAY
FENCE
UNPAVED ROAD
BRUSH LINE
LANDFILL EXTENT
RAILROAD
760 GROUND SURFACE ELEVATION CONTOUR
UNDERGROUND ELECTRIC UTILITY LINE
UNDERGROUND WATER UTILITY LINE

☒ SURVEY MONUMENT
ROAD SIGN DECIDUOUS TREE
FIRE HYDRANT MANHOLE GUIDE POST
POLE UTILITY BOX COORDINATE GRID (250′ GRID)
OVERHEAD UTILITY POLE MAILBOX/RR SIGNAL
(NOT ALL SYMBOLS MAY APPEAR ON MAP)

KNOWN DISPOSAL PIT AREA (PITS A,B, AND C)
▨ CLASS ONE SURVEY UNIT
CLASS TWO SURVEY UNIT

⊕ PROPOSED MONITORING WELL
△ PROPOSED SOIL BORING
◕ EXISITNG MONITORING WELL

ACAD\SENECA\RIFS\SD12\SD12PMW.DWG

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT

DEPT
ENVIRONMENTAL ENGINEERING
Dwg. No.

FIGURE 4-7
SEAD-12 PROPOSED MONITORING WELLS AND SOIL BORINGS

SCALE VARIES PER VIEW
DATE NOVEMBER 1996
REV NA

wells, which are not enough data points to accurately depict the groundwater flow direction. In addition, the groundwater elevations in the three wells differed by 0.68 feet, which does not indicate a strong gradient in any direction. Generally, the groundwater flow direction at SEDA is expected to be in a direction consistent with ground surface elevations. In the northeast portion of the site, the ground surface contours and the presence of the unnamed stream south of Disposal Pit A indicate that groundwater may flow radially from the topographic high between monitoring wells MW12A-1 and MW12A-2, toward the southwest following the ground contours.

Soil borings will be drilled according to the following schedule: Six soil borings will be drilled at locations east and north of SEAD-12, and will be completed as background overburden monitoring wells (MW12-1 through and MW12-6). Three soil borings will be drilled at locations which are upgradient of the known and suspected disposal pits identified in the northeastern portion of SEAD-12 and will be completed as overburden monitoring wells (MW12-7, MW12-8, and MW12-9). Two soil borings will be drilled within Disposal Pit A (SB12-1 and SB12-2) and two soil borings will be drilled in Disposal Pit B (SB12-3 and SB12-4), which is located approximately 50 feet west of Disposal Pit A. One soil boring will be drilled in between Disposal Pit A and Disposal Pit B and will be completed as overburden monitoring well MW12-10. Three soil borings will be drilled downgradient of Disposal Pit B and each will be completed as an overburden monitoring well (MW12-11 through MW12-13). Monitoring wells MW12-10 through MW12-13 will be situated using the soil gas survey results from this area. Two soil borings will be drilled downgradient of Disposal Pit C and completed as overburden monitoring wells MW12-14 and MW12-15. Two soil borings will be drilled in the area to the northeast of Building 805 (Area 1 on Figure 4-7) and will be completed as overburden monitoring wells MW12-16 and MW12-17. Two soil borings will be drilled at the location of the former Dry Waste Disposal Pit situated north of Building 805 (SB12-5 and SB12-6). One soil boring will be drilled immediately downgradient of the location of the former Dry Waste Disposal Pit and completed as overburden monitoring well MW12-18. Three soil borings will be drilled in the vicinity of Building 819 and will be completed as overburden monitoring wells MW12-19, MW12-20, and MW12-21. Two soil borings will be drilled in each of the two areas (for a total of 4 soil borings) suspected of having been impacted by releases of paint and will be completed as groundwater monitoring wells (MW12-36 through MW12-39). The locations of these soil borings will be determined using soil gas survey results. If the soil gas surveys suggest that no releases have occurred, these soil borings will be situated in areas where it is most likely that paint would have been disposed of (i.e, in close proximity to building doors or windows). One soil boring will be drilled in a downgradient location of the sub-station situated north of Building 815. This soil boring will be completed as monitoring well MW12-40. One soil boring will be drilled immediately downgradient of the 5,000 gallon UST north of Building 804 and completed as bedrock monitoring well MW12-41. Depending on the results of the scanning surveys, the exposure rate measurements, and the test pit excavations in Areas 2 through 7 (on Figure 4-7), up to fourteen soil borings will be drilled around these potential Class Two areas. The criteria for proceeding with a soil boring in these areas is detailed in the second paragraph above. Any of these fourteen soil borings that are performed will subsequently be completed as overburden monitoring wells (MW12-22 through MW12-35).

Soil borings will be performed by the continuous split-spoon method. Samples will be collected every two feet from the ground surface to the bottom of the boring. At each boring location except soil borings SB12-5 and SB12-6, a 0-2" surface soil sample will be collected and submitted for chemical and radiochemical testing. Two subsurface soil samples will also be collected from each soil boring to be submitted for chemical and radiochemical testing. The criteria for the selection of the subsurface soil samples submitted to the lab for chemical and radiochemical testing is provided in Section 3.4 of Appendix A, Field Sampling and Analysis Plan of the Generic Installation RI/FS Workplan. Additional sample selection criteria will include any impacts that are observed during the radiological field screening of the slit spoon material.

Additional samples will be collected from the soil borings for archive purposes. These samples may be submitted for radiochemical testing in the event that additional analyses are required to characterize any radiological impacts at SEAD-12. Archive samples will be taken from all segments of the split spoon material where the screening measurements are more than 50% above readings without a sample present. Additionally, the material immediately above and below any such segments will also be sampled and archived. Professional judgment and the radiological field screening of the split spoon material will be used to select any other archive samples.

Soil samples will be collected from the soil borings SB12-5 and SB12-6 to obtain one sample for each 3 foot interval of the soil borings. These samples are required to demonstrate that there is no residual radioactivity from the past operations at the Dry Waste Disposal Pit.

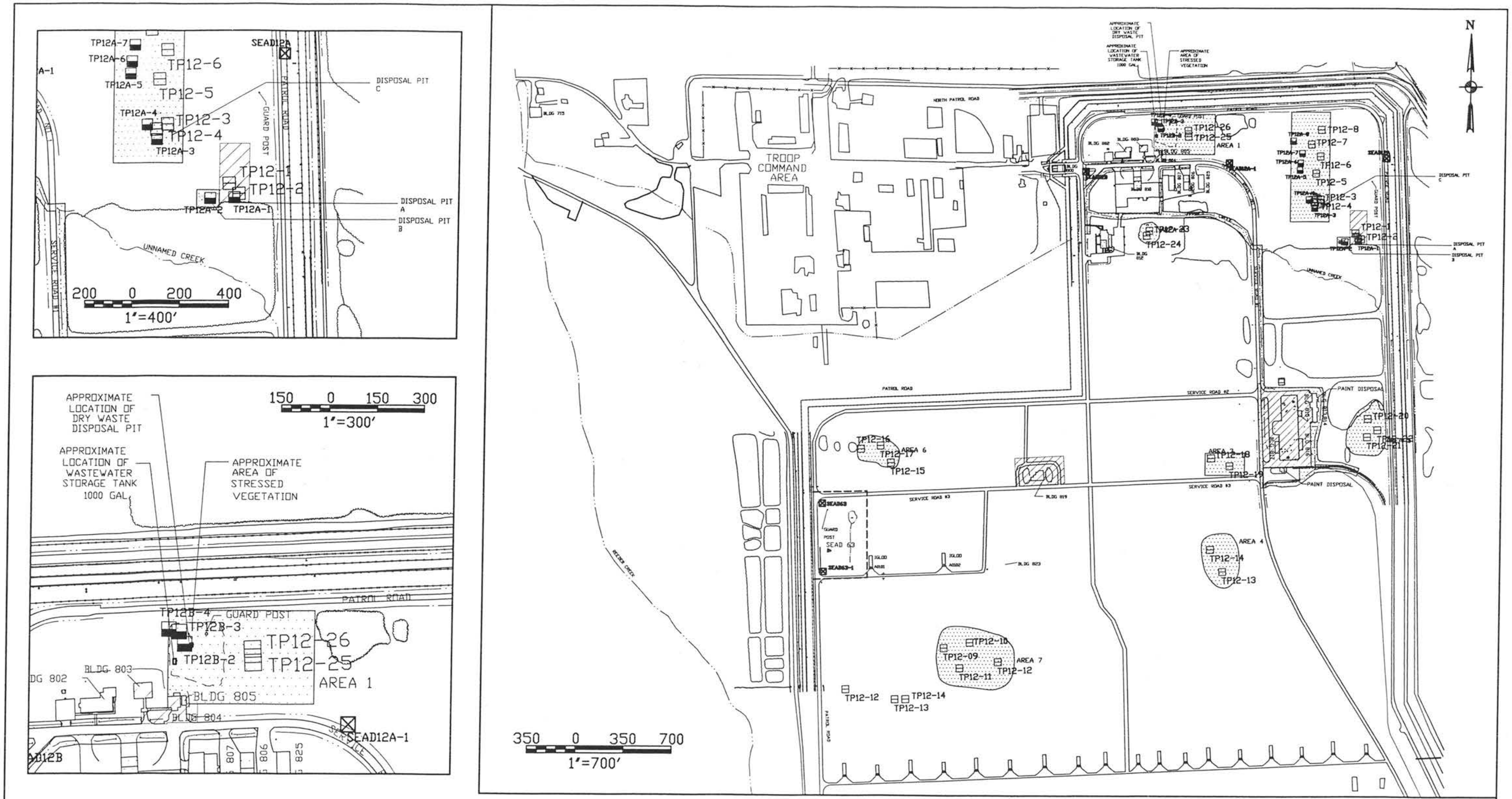
All soil boring samples collected within SEAD-12 will be submitted for TCL/TAL and radiochemical testing. All background soil boring samples will be submitted for radiochemical testing only. Each soil boring will be drilled until auger refusal is encountered. Auger refusal for this project is defined in Section 3.4 of Appendix A, Field Sampling and Analysis Plan, in the Generic Installation RI/FS Workplan

In addition, 6 total soil samples will be collected for limited chemical testing and physical testing at 2 soil boring locations. One location will be selected in each of Disposal Pits A and B in the northeastern portion of SEAD-12. At each location, one near surface sample, one sample from immediately below the fill materials, and an intermediate sample will be collected.

4.2.4.3 Test Pitting Program

A total of 26 test pits will be excavated at SEAD-12. The locations of these test pits are shown on Figure 4-8. The test pits will be excavated within the known disposal pits and over areas of geophysical anomalies. Test pits will be performed so that a visual evaluation of the subsurface soils and fill materials can be made, and also for the purpose of collecting soil samples for chemical and radiochemical testing. Four test pits (test pits TP12-1 through TP12-4) will be excavated in Disposal Pits A and C, located in the northeastern portion of SEAD-12. Four test pits (TP12-5 through TP12-8) will be located in an area of weak GPR signal returns identified during the ESI. Eighteen additional test pits (test pits TP12-9 through TP12-26) will be located based upon geophysical anomalies identified during the geophysical investigations to be performed for this RI/FS.

Test pits will be excavated to the bottom of the fill layer. The bedrock surface (if encountered) and bottom of fill layer will be documented at each test pit location. One surface soil sample and two (2) subsurface soil samples will be collected from each test pit. The samples will be collected at depths where there is evidence of impacts based upon field screening and visual observations. If no impacts are evident in the test pit, the samples will be collected from the floor of the pit and at the mid-depth of the wall of the excavation. Additional samples will be collected for archive purposes in the event that additional analyses are required to characterize



LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
- BRUSH LINE
- LANDFILL EXTENT
- RAILROAD
- 760 GROUND SURFACE ELEVATION CONTOUR
- UNDERGROUND ELECTRIC UTILITY LINE
- UNDERGROUND WATER UTILITY LINE

☒ SURVEY MONUMENT
ROAD SIGN
DECIDUOUS TREE
FIRE HYDRANT
⊗ MANHOLE
△ GUIDE POST
○ POLE
UTILITY BOX
+ COORDINATE GRID (250' GRID)
OVERHEAD UTILITY POLE
MAILBOX/RR SIGNAL

(NOT ALL SYMBOLS MAY APPEAR ON MAP)

KNOWN DISPOSAL PIT AREA (PITS A,B, AND C)

▨ CLASS ONE SURVEY UNIT

CLASS TWO SURVEY UNIT

☐ PROPOSED TEST PIT

■ EXISITNG TEST PIT

ACAD\SENECA\RIFS\SD12\SD12PTP.DWG

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT

DEPT ENVIRONMENTAL ENGINEERING

Dwg. No.

FIGURE 4-8
SEAD-12
PROPOSED TEST PITS

SCALE VARIES PER VIEW

DATE NOVEMBER 1996

REV NA

any radiological impacts at SEAD-12. Archive samples will be taken from areas in the test pit excavation where the screening measurements of excavated materials are more than 50% above readings without a sample present. Additionally, the material immediately above and below any such areas will also be sampled and archived. Professional judgement and the radiological field screening of the test pit material will be used to select any other archive samples.

In addition, six total soil samples will be collected for limited chemical testing and physical testing at 2 test pit locations. One location will be selected in Disposal Pit C and one location will be selected in Area 1, located north and east of Buildings 804/805. At each location, one near surface sample, one sample from immediately below the fill materials, and an intermediate sample will be collected. If fill material is not present in the area north and east of Buildings 804/805, this sample will be collected below the water table.

The materials removed for characterization purposes will be returned to the excavated area at the completion of each test pit investigation. This procedure was discussed with and agreed to by the New York State Department of Environmental Conservation, Bureau of Radiation, Division of Hazardous Substances (see Appendix J, Letter of Confirmation of Telephone Conversation Between Parsons ES and NYSDEC, on July 17, 1995). This procedure assures that any radiation found at a test pit site will not have the potential to migrate via over-land transport (i.e. by precipitation run-off or by wind transport), and it will minimize any potential radiation dose to on-site workers or visitors during the RI/FS process.

All personnel performing the test pit operations will be wearing Level C equipment to avoid possible exposure. The excavated soils will be monitored for VOCs and radiation during test pitting. The level of personal protective equipment may increase (to Level B) or decrease (to Level D) during the course of the excavation based upon the readings of the VOC monitoring. Test pitting procedures are provided in Section 3.4.3 of Appendix A, Field Sampling and Analysis Plan in the Generic Installation RI/FS Workplan.

4.2.4.4 Soil Sampling Summary

One surface soil sample and two subsurface soil samples will be collected from each of the 47 soil borings shown on Figure 4-7. One mid-depth subsurface soil sample will be collected from 3 background monitoring well installations at the OB Grounds, the OD Grounds, and SEAD-57.

One surface soil and two subsurface soil samples will be collected from each of the 26 test pits shown in Figure 4-8. Three hundred and eighteen surface soil samples will also be collected from the locations described in Section 4.2.4.1 and shown on Figure 4-6. In total, 285 soil samples will be collected for chemical and radiochemical testing and an additional 255 soil samples will be collected for radiochemical testing only.

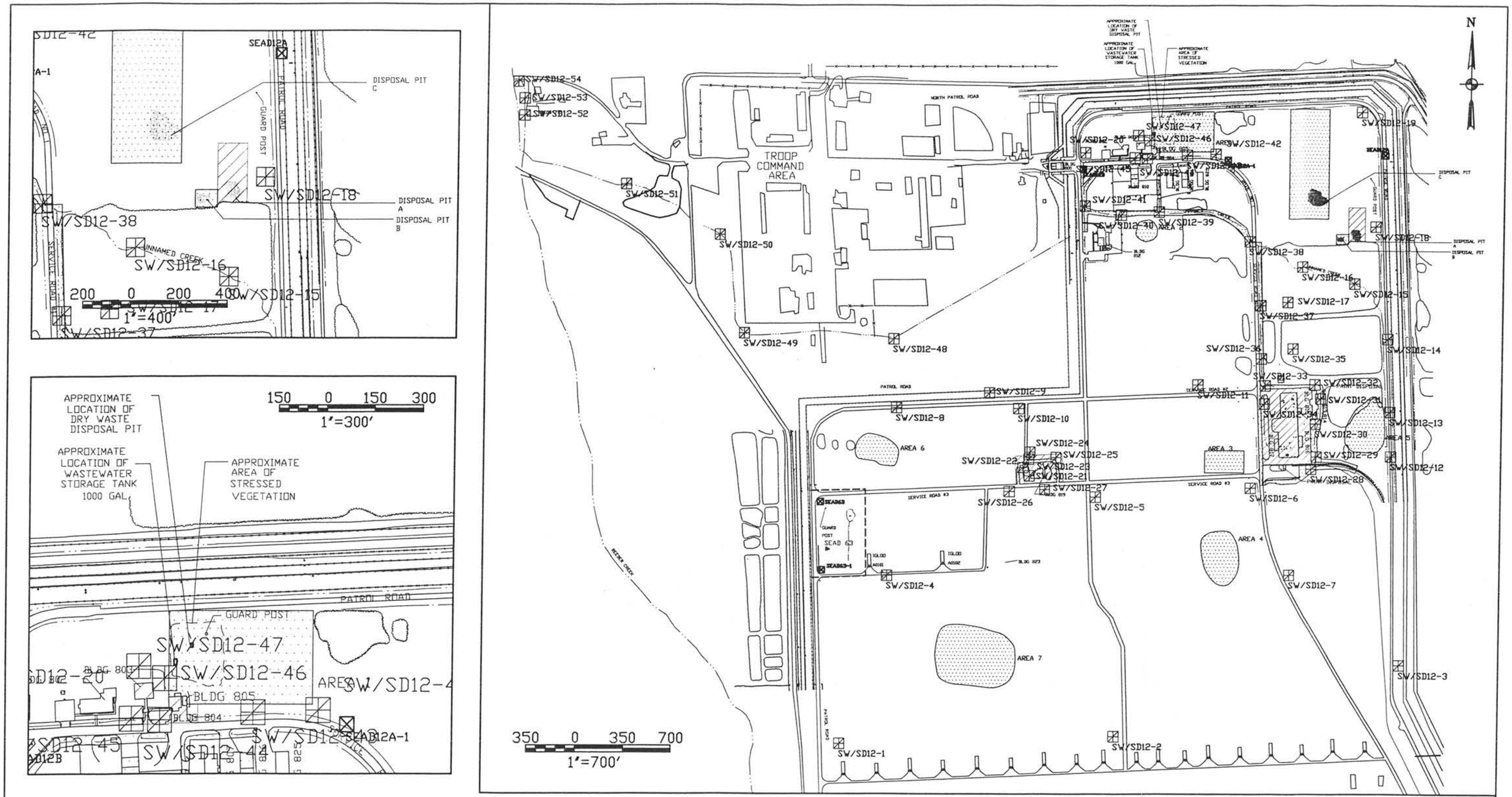
In addition, 16 subsurface soil samples will be collected from 2 soil borings and 2 test pit excavation for physical testing and limited chemical testing. The soil samples will be tested according to the analyses specified in section 4.2.8, Analytical Program.

4.2.5 Surface Water and Sediment Investigation

Surface water and sediment sampling will be conducted in areas of SEAD-12 which have the potential for acting as an exposure pathway or for off-site transport of site contaminants.

Potential on-site surface water areas include small drainage swales located throughout SEAD-12, and an unnamed creek that flows westward from the eastern boundary of SEAD-12 and eventually drains into Reeder Creek. Forty-seven surface water and sediment samples (SW/SD12-1 through SW/SD12-47) will be collected at the on-site locations shown on Figure 4-9. Twenty additional surface water and sediment samples will be collected at the off-site locations shown on Figure 4-10. Eleven of these 20 samples (SW/SD12-48 through SW/SD12-58) will be collected from down gradient locations in the un-named tributary of Reeder Creek and Reeder Creek itself. An additional 9 samples (SW/SD12-59 through SW/SD12-67) will be collected from up-gradient locations and analyzed for background radionuclide and metals concentrations. All of the surface water and sediment samples will be collected in areas where sedimentation is likely to occur, such as on the inside of bends in a creek's or tributary's path or in areas where the width of a tributary or creek increases.

The surface water and sediment will be analyzed as described in section 4.2.8, Analytical Program. These data will be used to determine if there is a surface water or sediment exposure pathway at SEAD-12. If concentrations exceeding applicable guidelines are present, the data will be used to perform a baseline risk assessment for this exposure pathway. The surface water and sediment sampling procedures are described in Section 3.7 of Appendix A, Field Sampling and Analysis Plan in the Generic Installation RI/FS Workplan.



ACAD\SENECA\RIFS\SD12\SD12PSW.DWG

LEGEND

MINOR WATERWAY
MAJOR WATERWAY
FENCE
UNPAVED ROAD
BRUSH LINE
LANDFILL EXTENT
RAILROAD
GROUND SURFACE ELEVATION CONTOUR
UNDERGROUND ELECTRIC UTILITY LINE
UNDERGROUND WATER UTILITY LINE

☒ SURVEY MONUMENT
ROAD SIGN
DECIDUOUS TREE
FIRE HYDRANT
MANHOLE
GUIDE POST
POLE
UTILITY BOX
COORDINATE GRID (250' GRID)
OVERHEAD UTILITY POLE
MAILBOX/RR SIGNAL
(NOT ALL SYMBOLS MAY APPEAR ON MAP)

KNOWN DISPOSAL PIT AREA (PITS A,B, AND C)

▨ CLASS ONE SURVEY UNIT

░ CLASS TWO SURVEY UNIT

⊠ PROPOSED SURFACE WATER/SEDIMENT SAMPLE

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT

DEPT
ENVIRONMENTAL ENGINEERING
Dwg No.

FIGURE 4-9
SEAD-12 PROPOSED SURFACE WATER/SEDIMENT SAMPLES

SCALE VARIES PER VIEW
DATE NOVEMBER 1998
REV NA

LEGEND

——— CREEK OR TRIBUTARY

⊠ SW/SD12-65 PROPOSED SURFACE WATER AND SEDIMENT LOCATION

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT

DEPT ENVIRONMENTAL ENGINEERING

DWG No

FIGURE 4-10

LOCATION OF PROPOSED OFF-SITE SURFACE WATER/SEDIMENT SAMPLES

SCALE NA

DATE NOVEMBER 1996

REV NA

4.2.6 Groundwater Investigation

4.2.6.1 Monitoring Well Installation and Sampling

Six groundwater monitoring wells were installed as part of the ESI completed at SEAD-12. Based upon water level measurements, the groundwater flow direction in the area of SEAD-12A was determined to be to the northwest, while the groundwater flow direction in the area of SEAD-12B was determined to be to the south. Groundwater samples from the ESI contained two metals (iron and manganese), two principal radionuclides (U-235 and Ra-226), and gross alpha and gross beta radiations at concentrations exceeding state or federal drinking water criteria. However, the vertical and lateral extent of potential contaminant migration from the disposal pit areas has not been fully characterized.

The goals of the groundwater investigation during the RI are to verify previous sampling data, determine the extent of groundwater contamination, gather additional potentiometric data to confirm the groundwater flow direction, determine background groundwater quality, and determine the hydraulic conductivity of the aquifer. To accomplish this, up to 41 additional monitoring wells will be installed at the approximate locations shown on Figure 4-7. Table 4-5 lists each of the 41 proposed monitoring wells shown on Figure 4-7 and provides a brief rationale for the installation of each. A description of the monitoring well locations is presented in Section 4.2.4.2. The 41 soil borings to be drilled for the installation of the 41 wells will be continuously sampled to competent bedrock. A monitoring well will then be installed and screened in the saturated overburden overlying the bedrock. These 41 monitoring wells, as well as the six existing wells installed during the ESI, an existing groundwater well located immediately west of Building 815, and 3 background wells from the OB Grounds, the OD Grounds and SEAD-57, will then be sampled according to the following schedule:

- First Round - approximately 2 weeks after well development, and,
- Second Round - approximately 3 months after the first round.

Table 4-5
SEAD -12 RI/FS Project Scoping Plan
Monitoring Well Justification Table
Seneca Army Depot Activity

Monitoring Well ID	Monitoring Well Location	Rationale for Installation of Monitoring Well
MW12-1	East of eastern Q Area boundary	Offsite background Monitoring Well
MW12-2	East of eastern Q Area boundary	Offsite background Monitoring Well
MW12-3	East of eastern Q Area boundary	Offsite background Monitoring Well, Upgradient of Disposal Pit Area
MW12-4	North of northern Q Area boundary	Offsite background Monitoring Well
MW12-5	North of northern Q Area boundary	Offsite background Monitoring Well
MW12-6	North of northern Q Area boundary	Offsite background Monitoring Well
MW12-7	Northeast of Disposal Pit A	Upgradient of Disposal Pit A, to establish the local groundwater flow direction
MW12-8	Southwest of Disposal Pit C	Upgradient of Disposal Pit C, to establish the local groundwater flow direction
MW12-9	East of Building 804; East of area with stressed vegetation	Upgradient of area with stressed vegetation, to establish the local groundwater flow direction
MW12-10	Between Disposal Pits A and B	Downgradient Monitoring Well for Disposal Pit A
MW12-11	South-southwest of Disposal Pit A	Downgradient Monitoring Well for Disposal Pit A
MW12-12	Southwest of Disposal Pit B	Downgradient Monitoring Well for Disposal Pit B
MW12-13	West of Disposal Pit B	Downgradient Monitoring Well for Disposal Pit B
MW12-14	Northeast of Disposal Pit C	Downgradient Monitoring Well for Disposal Pit C
MW12-15	North of Disposal Pit C	Downgradient Monitoring Well for Disposal Pit C
MW12-16	East of existing monitoring well MW12B-1	Downgradient or within area of stressed vegetation
MW12-17	East of existing monitoring well MW12B-1	Downgradient or within area of stressed vegetation
MW12-18	West of former dry waste Disposal Pit, North of Building 804	Downgradient Monitoring Well for the former dry waste disposal pit; to demonstrate a satisfactory cleanup of the former dry waste disposal pit as recommended in NUREG/CR 5849
MW12-19	West of Building 819	Downgradient Monitoring Well for Building 819
MW12-20	West-northwest of Building 819	Downgradient Monitoring Well for Building 819
MW12-21	East of Building 819	Upgradient of Building 819, to establish the local groundwater flow direction

Table 4-5
SEAD -12 RI/FS Project Scoping Plan
Monitoring Well Justification Table
Seneca Army Depot Activity

Monitoring Well ID	Monitoring Well Location	Rationale for Installation of Monitoring Well
MW12-22*	North of Service Road #3, West of Proposed Well MW12-24	Downgradient Monitoring Well for a suspected burial pit
MW12-23*	West of Proposed Well MW12-24	Downgradient Monitoring Well for a suspected burial pit
MW12-24*	North of Igloo Row A0200	Upgradient Monitoring Well for a suspected burial pit, to establish a boundary between unaffected and potentially affected media
MW12-25*	North of Service Road #3, east of Patrol Road	Upgradient Monitoring Well for Area 6, a suspected disposal area
MW12-26*	Northwest of Area 6	Downgradient Monitoring Well for Area 6
MW12-27*	Northwest of Area 4	Downgradient Monitoring Well for Area 4
MW12-28*	West of Service Road #1, south of Service Road #3	Upgradient Monitoring Well for Area 4, a suspected disposal area
MW12-29*	West of Service Road #1, north of Service Road #3	Upgradient Monitoring Well for Area 3, a suspected disposal area
MW12-30*	Northwest of Area 3	Downgradient Monitoring Well for Area 3
MW12-31*	West of Proposed Well MW12-33, East of Buildings 815 and 816	Downgradient Monitoring Well for Area 5
MW12-32*	West of Proposed Well MW12-33, East of Buildings 815 and 816	Downgradient Monitoring Well for Area 5
MW12-33*	East of Area 5, east of Buildings 815 and 816	Upgradient Monitoring Well for Area 5, potential past uses may have been storage or disposal of materials
MW12-34*	South of Building 810, east of Building 812	Downgradient Monitoring Well for Area 2
MW12-35*	South of Building 810, east of Building 812	Upgradient Monitoring Well for Area 2, a suspected disposal area
MW12-36	West of Buildings 813/814	Downgradient Monitoring Well for suspected paint disposal area
MW12-37	East of Buildings 813/814	Upgradient Monitoring Well for suspected paint disposal area
MW12-38	West of Building 817	Downgradient Monitoring Well for suspected paint disposal area
MW12-39	East of Building 817	Upgradient Monitoring Well for suspected paint disposal area
MW12-40	East of power sub-station for Buildings 815/816	Downgradient Monitoring Well for area with potential releases related to the power sub-station, and to define local and regional groundwater flow directions
MW12-41	East of 5,000 gallon UST	Downgradient bedrock monitoring well for 5,000 gallon UST

*These Monitoring wells may be relocated to investigate anomalies detected by geophysical surveys.

Monitoring well installation, development, and sampling procedures are described in Section 3.5 and 3.6 of Appendix A, Field Sampling and Analysis Plan in the Generic Installation RI/FS Workplan. The groundwater samples will be tested according to the analyses described in Section 4.2.13, Analytical Program.

4.2.6.2 Aquifer Testing

Slug testing will be performed on the 47 monitoring wells at SEAD-12 to characterize the hydraulic conductivity of the overburden aquifer. Three rounds of water levels will be measured at each of the wells at SEAD-12 to further define the groundwater flow direction at the site. The groundwater level measurements will be performed according to the following schedule:

- First Round - before monitoring well development,
- Second Round - at the time of the first round of groundwater sampling and,
- Third Round - at the time of the second round of groundwater sampling.

Procedures for slug testing and water level measurements are outlined in Section 3.11 of Appendix A, Field Sampling and Analysis Plan in the Generic Installation RI/FS Workplan.

4.2.7 Ecological Investigation

The following procedure for the ecological investigation was developed from the New York State

Department of Environmental Conservation (NYSDEC) Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (1994). The purpose of the ecological investigation is to determine if aquatic and terrestrial resources have been affected by a release of contaminants from the site. The investigation will be completed in two parts. The first part will be the site description, which will involve the accumulation of data describing the physical characteristics of the site, as well as the identification of aquatic and terrestrial resources present or expected to be present at the site. The second part will be the contaminant-specific impact analysis, which involves the determination of whether the identified aquatic and terrestrial resources have been impacted by contaminants that have been released at the site. The second part of the ecological investigation is dependent upon the chemical analysis data obtained for the RI.

A wetland functional assessment will be conducted if the remedial actions, which will be developed in the FS, involve disruption of wetland areas. This assessment would be conducted s an initial step in the FS if necessary.

4.2.7.1 Site Description

The purpose of the site description is to determine whether aquatic and terrestrial resources are present at the site and if they were present at the site prior to contaminant introduction. If they were present prior to contaminant introduction, the appropriate information will be provided to design a remedial investigation of the resources. The information to be gathered includes site maps, descriptions of aquatic and terrestrial resources at the site, the assessment of the value of the aquatic and terrestrial resources, and the appropriate contaminant-specific and site-specific regulatory criteria applicable to the remediation of the identified aquatic and terrestrial resources.

A topographic map showing the site and documented aquatic and terrestrial resources within a two mile radius from the site will be obtained. The aquatic and terrestrial resources of concern are Significant Habitats as defined by the New York State Natural Heritage Program; habitats supporting endangered, threatened or rare species or species of concern; regulated wetlands; wild and scenic rivers; significant coastal zones; streams; lakes; and other major resources.

A map showing the major vegetative communities within a half mile radius of the site will be developed. The major vegetative communities will include wetlands, aquatic habitats, NYSDEC Significant Habitats, and areas of special concern. These covertypes will be identified using the NYSDEC Natural Heritage Program descriptions and classifications of natural communities.

Wetlands were delineated by the U.S. Fish and Wildlife Service as part of BRAC 95. This information will be used to develop the map of vegetative communities.

To describe the covertypes at the site, the abundance, distribution, and density of the typical vegetative species will be identified. To describe the aquatic habitats at the site, the abundance and distribution of aquatic vegetation will be identified. The physical characteristics of the aquatic habitats will also be described and will include parameters such as the water chemistry, water temperature, dissolved oxygen content, depth, sediment chemistry, discharge, flow rate, gradient, stream-bed morphology, and stream classification.

The aquatic and terrestrial species that are expected to be associated with each covertype and aquatic habitat will be determined. In particular, endangered, threatened and rare species, as well as species of concern, will be identified. Alterations in biota, such as reduced vegetation growth or quality will be described. Alterations in, or absence of, the expected distribution or assemblages of wildlife will be described.

A qualitative assessment will be conducted evaluating the ability of the area within a half mile of the site to provide a habitat for aquatic and terrestrial species. The factors that will be considered will include the species' food requirements and the seasonal cover, bedding sites, breeding sites and roosting sites that the habitats provide.

The current and potential human use of the aquatic and terrestrial resources of the site and the area within a half mile of the site will be assessed. In addition to assessing this area, documented resources within two miles of the site and downstream of the site that are potentially affected by contaminants will also be assessed. Human use of the resources that will be considered will be activities such as hunting, fishing, wildlife observation, scientific studies, agriculture, forestry, and other recreational and economic activities.

The appropriate regulatory criteria will be identified for the remediation of aquatic and terrestrial resources and will include both site-specific and contaminant-specific criteria.

4.2.7.2 Contaminant-Specific Impact Analysis

Information from the site description developed in Section 4.2.7.1 and from the characterization of the contaminants at the site developed from the results of the RI will be used to assess the impacts of contaminants on aquatic and terrestrial resources. The impact analysis will involve three steps, each using progressively more specific information and fewer conservative assumptions and will depend upon the conclusion reached at the previous step regarding the degree of impact. If minimal impact can be demonstrated at a specific step, additional steps will not be conducted.

Pathway Analysis

A pathway analysis will be performed identifying aquatic and terrestrial resources, contaminants of concern and potential pathways of contaminant migration and exposure. After performing the pathway analysis, if no significant resources or potential pathways are present, or if results from field studies show that contaminants have not migrated to a resource along a potential pathway, the impact on aquatic and terrestrial resources will be considered to be minimal and additional impact analyses will not be performed.

Criteria-Specific Analysis

Presuming that the presence of contaminated resources and pathways of migration of site-related contaminants has been established, the contaminant levels identified in the field investigation will be compared with available numerical criteria or criteria developed according to methods established as part of the criteria. If contaminant levels are below criteria, the impact on resources will be considered to be minimal and additional impact analyses will not be performed. If numerical criteria are exceeded or if they do not exist and cannot be developed, an analysis of the toxicological effects will be performed.

Analysis of Toxicological Effects

The analysis of toxicological effects is based on the assumption that the presence of contaminated resources and pathways of migration of site-related contaminants has been established. The purpose of the analysis of toxicological effects is to assess the degree to which contaminants have affected the productivity of a population, a community, or an ecosystem and the diversity of species assemblages, species communities or an entire ecosystem through direct toxicological and indirect ecological effects.

A number of approaches are available to conduct an analysis of toxicological effects. One or more of the four following approaches will be used to assess the toxicological effects.

- **Indicator Species Analysis**–A toxicological analysis for a indicator species will be used if the ecology of the resource and the exposure scenarios are simple. This approach assumes that exposure to contaminants is continuous throughout the entire life cycle and does not vary among individuals.
- **Population Analysis**–A population level analysis is relevant to and will be used for the

evaluation of chronic toxicological effects of contaminants to an entire population or to the acute toxicological effect of contaminant exposure limited to specific classes of organisms within a population.

- **Community Analysis**– A community with highly interdependent species including highly specialized predators, highly competitive species, or communities whose composition and diversity is dependent on a key-stone species, will be analyzed for alternations in diversity due to contaminant exposure.
- **Ecosystem Analysis**–If contaminants are expected to uniformly affect physiological processes that are associated with energy transformation within a specific trophic level, an analysis of the effects of contaminant exposure on trophic structure and trophic function within an ecosystem will be performed. Bioconcentration, bioaccumulation, biomagnification, etc., are concepts that may be used to evaluate the potential effects of contaminant transfer on trophic dynamics.

4.2.8 Analytical Program

A total of 540 soil samples, 102 groundwater samples, and 67 surface water and sediment samples will be collected from SEAD-12 for chemical and radiochemical testing. Analyses for all of the media to be sampled are summarized in Table 4-6. The proposed sample locations are shown on Figures 4-6 through 4-10. One hundred and forty-nine surface soil samples, 136 subsurface soil samples, 84 groundwater samples, and 58 surface water and sediment samples will be analyzed for the following: Target Compound List (TCL) VOCs (EPA Method 524.2 for groundwater samples only), semivolatile organic compounds (SVOCs), TCL pesticides/PCBs, Target Analyte List (TAL) metals and cyanide according to the NYSDEC Contract Laboratory Program (CLP) Statement of Work (SOW), and nitrate-nitrogen by EPA Method 353.2. An additional 9 groundwater samples and 9 surface water and sediment samples will be analyzed for background TAL metals and cyanide according to the CLP SOW. To address the need to attain lower detection limits for several analytes in the CLP SOW for groundwater analyses, modifications to the CLP SOW have been made and submitted to the EPA and NYSDEC. Once approved, these modifications to the analysis methods will provide the detection levels that are needed to meet all potential ARARS that are not being met under the current CLP SOW.

Table 4-6

Summary of Sampling and Analyses
Seneca Army Depot Activity
SEAD-12

MEDIA	VOCs		SVOCs	Pesticides/ PCBs	Metals	Nitrate/ Nitrogen	Gross Alpha/Beta	Uranium 235/238	Thorium 230/232	Plutonium 239/240	Radium 226	Radium 226	Gamma Radiation	Americium 241	Promethium 147	Tritium	Tritium	Limited Chemical/ Physical Testing
	TCL NYSDEC CLP	Method 524.2	TCL NYSDEC CL	TCL NYSDEC CLP	TAL NYSDEC CLP	MCAWW 353.2 (note 3)		Alpha Spectrometry	Alpha Spectrometry	Alpha Spectrometry	Method 901.1	Method 903.1	Gamma Spectrometry	HASL 300	EPA Method 600	Method 906	LANL Cryogeni Method	
Surface Soil Samples (318)	84	0	84	84	84	84	0	318	318	318	318	0	318	0	114	0	318	0
Subsurface Soil Samples (3)	0	0	0	0	0	0	0	3	3	3	3	0	3	0	3	0	3	0
Soil Borings (6)																		
Surface Soil	4	0	4	4	4	4	0	4	4	4	4	0	4	0	6	0	4	0
Subsurface Soil	14	0	14	14	14	14	0	14	14	14	14	0	14	0	12	0	14	6
Monitoring Well Installations by Soil Borings (41)																		
Surface Soil	35	0	35	35	35	35	0	41	41	41	41	0	41	0	0	0	41	0
Subsurface Soil	70	0	70	70	70	70	0	82	82	82	82	0	82	0	0	0	82	0
Test Pits																		
Surface Soil	26	0	26	26	26	26	0	26	26	26	26	0	26	0	0	0	26	0
Subsurface Soil	52	0	52	52	52	52	0	52	52	52	52	0	52	0	0	0	52	6
Total Surface Soil Samples	149	0	149	149	149	149	0	389	389	389	389	0	389	0	120	0	389	0
Total Subsurface Soil Samples	136	0	136	136	136	136	0	151	151	151	151	0	151	0	15	0	151	12
Groundwater	42	42	84	84	102	84	102	102	102	102	0	102	102	0	0	102	0	102
Surface water	58	0	58	58	67	58	67	67	67	67	0	67	67	0	19	67		67
Sediment	58	0	58	58	67	58	0	67	67	67	67	0	67	0	19		67	67
Swipes (Buildings)	0	0	0	0	0	0	0	150	150	150	150	0	150	40	150	0	2100	0
Special Measurements	0	0	0	0	0	0	0	26	26	26	26	0	26	0	26	0	26	0

Notes

1) QA/QC sampling requirements are described in Appendix C, Section 5.3 of the Generic Installation RI/FS Workplan.

2) The limited chemical testing and physical testing parameters for each media are described in Section 4.2.12, Analytical Program.

3) Method in soil samples will be modified. For soils, a known quantity of soil will be mixed with a known volume of water, stirred, then filtered to form an aqueous extract.

4) For pH analysis, Method 904.5 will be used for soil samples and Method 150.1 will be used for water for TOC analysis Method 415.1 will be used for water and Lloyd Kahn method will be used for soil.

* The analysis is designated as Method 524.2, Revision 4.0, August 1992.

* The number of surface soil sampling for chemical testing includes 47 surface soil samples including 8 background samples, 4 from TPs investegutured during the ESI, 4 at POT impacted areas, 30 randomly selected and 2 near BH 7 is discharge, 34 from soil borings and 20 from tests pits Polals 101

All of the samples collected at SEAD-12, as well as the 3 subsurface soil samples collected at the OB Grounds, the OD Grounds and SEAD-57, will be analyzed for the following radionuclides: uranium 235 and 238 by alpha spectrometry, Tritium by method 906 for water samples and LANL cryogenic method for soil and sediment samples, thorium 230 and 232 by alpha spectrometry, plutonium 239 and 240 by alpha spectrometry, and radium 223, bismuth 214, lead 210, lead 214, cesium 137, cobalt 60, and cobalt 57 by gamma spectrometry. All of these samples will be anlayzed for radium-226 by Method 901.1 (for soil or sediment samples) or Method 903.1 (for water samples).

Approximately 135 samples from Building 815, Building 816 and reference area survey units will be analyzed for promethium 147 by method 600A as this radionuclide is among the radionuclides of concern at these survey units. Gross alpha and gross beta radiation levels in all of the groundwater and surface water samples will also be determined.

Additional analyses to be performed on specific media are provided below.

4.2.8.1 Limited Physical and Chemical Testing of Soils

Twelve of the subsurface soil samples collected from 2 soil borings and 2 test pit excavations will be analyzed for limited chemical testing and physical testing. These analyses will include Toxicity Characteristics Leaching Procedure (TCLP) analysis by SW846 method 1311 and will include analyses for TCLP volatile compounds by SW846 method 8240, TCLP semivolatile compounds by SW846 method 8270A, TCLP pesticides by SW846 method 8080, TCLP herbicides by SW846 method 8150, and TCLP metals by SW846 method 6010 and 7470. The TCLP data will be used to determine the leachability characteristics of any wastes that are identified. This data will be used in the feasibility study. Also, these data will be used to determine if unknown wastes are hazardous according to 40 CFR261.24. The TCLP data will not be used in the risk assessment. These samples will also be analyzed for Total Organic Carbon (TOC) by EPA Method 415.1, for grain size distribution (including the distribution within the silt and clay size fraction), and for Cation Exchange Capacity (CEC). They will also be submitted for pH determination and density determination. Additionally, eight subsurface soil samples collected from Disposal Pits A and B will be analyzed to determine the radium-226 distribution coefficient using the short term batch method (ASTM D:4319-83).

4.2.8.2 Limited Physical and Chemical Testing of Groundwater

The 102 groundwater samples will be analyzed in the field for pH, temperature, specific conductivity, dissolved oxygen, turbidity and oxidation-reduction potential in the field at the time of sampling. The 102 groundwater samples will also be analyzed for the following chemical and physical testing and will be performed by the laboratory: alkalinity, iron (ferrous), sulfate, sulfide, nitrate, TOC, biological oxygen demand (BOD), hardness, total dissolved solids (TDS), and chemical oxygen demand (COD).

4.2.8.3 Limited Physical and Chemical Testing of Surface Water and Sediment

The 67 surface water samples will be analyzed in the field for pH, temperature, specific conductivity, and dissolved oxygen (DO). The following analyses will be performed by the laboratory: total suspended solids (TSS), total dissolved solids (TDS), alkalinity, hardness, ammonia, nitrate/nitrite, phosphate, TOC, and turbidity. The 68 sediment samples will be analyzed for grain size, TOC, CEC, and pH. Three samples from known or potentially impacted sediment will also be analyzed for density. A detailed description of these methods, as well as lists of each compound included in each of the categories is presented in Appendix C, Chemical Data Acquisition Plan.

4.2.8.4 Wipe Samples Analysis

Wipes for removable radioactivity determination will be collected from the reference buildings and all buildings within SEAD-12. These wipes will be counted for removable gross alpha and gross beta activity in the field and for tritium by an analytical lab. Any wipes having removable gross alpha or gross beta activities which are above site guidelines will be submitted for the radiochemical analyses previously described. At a minimum, five percent of the total number of wipes collected will be submitted for radiochemical analyses.

4.2.8.5 Special Measurements Analysis

Twenty-six special measurements will be performed at drainage and wastewater inlets within buildings and within the 5,000 gallon UST. Collection of sediment and/or loose material from within these structures will be attempted. It is estimated that 26 samples will be collected from these structures. These samples will be submitted for the radiochemical analyses previously described.

4.2.9 Surveying

Surveying will be performed at SEAD-12 to provide data to be used for the following purposes:

- Generate a site base map by stereoscopic photo analysis,
- Locate all the environmental sampling points and geophysical surveys,
- Serve as the basis for volume estimates of impacted soil and sediment which may require a remedial action,
- Map the extent of any impacted groundwater above established ARAR limits.

The location, identification, coordinates and elevations of all the control points recovered and/or established at the site and all of the geophysical survey areas, soil gas survey areas, soil borings, monitoring wells (new and existing) and all surface water and sediment sampling points will be plotted on a topographic map to show their location with respect to surface features within the project area.

Site surveys will be performed in accordance with good land surveying practices and will conform to all pertinent state, federal, and USCOE laws and regulations governing land surveying. The surveyor shall be licensed and registered in the state of New York.

A detailed discussion of the site field survey requirements is presented in Section 3.13 of Appendix A, Field Sampling and Analysis Plan of the Generic Installation RI/FS Workplan.

4.3 FIELD INVESTIGATIONS AT SEAD-63

This section describes the field investigations that are to be performed at SEAD-63. The field investigations will be designed to gather information on two types of potential constituents of concern which may affect human health or the environment at SEAD-63:

- Field investigations to characterize the nature and extent of organic compounds and non radioactive heavy metals within SEAD-63 media, and

- Field investigations to characterize the nature and extent of radionuclides present within SEAD-63 media.

The field investigations will be designed to characterize the organic compounds and non radioactive heavy metals will follow the EPA's guidance for conducting remedial investigations and feasibility studies under CERCLA (EPA, 1989). At present the only areas where such potential constituents of concern are known to have affected SEAD-63 media are the disposal trenches located in the central and northern portions of the site and the sediments within the drainage swale east of Patrol Road. The sources, if any, of the potential constituents of concern found in the sediments are unknown.

The radiological field investigations at SEAD-63 will follow the Nuclear Regulatory Commission's *Manual for Conducting Radiological Surveys in Support of License Termination* (NUREG/CR-5849), NUREG 1500, NUREG 1505, NUREG 1506, NUREG 1507, and MARSSIM. The purpose of these investigations will be to collect information to serve as a final status survey for this site. The radiological surveys will be designed to investigate Class Two areas as defined in Section 4-2, Field Investigations at SEAD-12, of this project scoping plan. Based on a knowledge of the site's history and previous survey information, SEAD-63 is not expected to contain residual radioactivity resulting from past activities performed on-site. SEAD-63 was documented to have been used for the disposal of inert components and the radionuclide concentrations found in the SEAD-63 ESI soil samples were the same as those found at the single ESI background sampling location.

Following the radiological surveys, portions of the site may be reclassified as Class One areas. Reclassification of such areas will follow the guidelines presented in Section 4-2, Field Investigations of SEAD-12. Any area reclassified as a Class One area will be investigated following the protocols described for Class One areas at SEAD-12.

The following field investigations will be performed to complete the RI at SEAD-63:

- Geophysical investigation,
- Alpha (on pavement), beta (on pavement) and gamma screening surveys,

- Alpha, beta, and gamma direct measurements (on pavement surfaces),
- Exposure rate surveys,
- Removable radiation surveys (on pavement surfaces),
- Special measurements and sampling (e.g. in drainage culverts),
- Soil Investigation (surface soil sampling, test pits, and soil borings),
- Groundwater investigation (overburden wells),
- Surface water and sediment investigation,
- Ecological investigation, and
- Surveying.

These investigations are described in the following sections.

4.3.1 Geophysical Investigation

Electromagnetic (EM-61) and Ground Penetrating Radar (GPR) surveys will be performed throughout SEAD-63. The initial geophysical investigation will be an EM-61 survey performed along lines spaced every 5 feet to provide a complete coverage of the site. The objective of the EM-61 survey will be to identify locations where metallic objects are buried within the subsurface. Upon completion of the EM-61 survey, contour maps of the electromagnetic field will be generated to identify the locations of buried metallic objects within the subsurface, provide approximate sizes of the buried objects, and provide approximate depths of the buried objects.

Subsequent to the EM-61 survey, a GPR survey will be performed. GPR data will be collected over each distinct EM-61 anomaly in order to provide a better characterization of the suspected anomaly source.

4.3.2 Radiological Investigations at SEAD-63

The reader is referred to Section 4.2.3, Radiological Investigations at SEAD-12, for discussions on the radionuclides of concern in the Q Area, site specific guideline values, survey instrumentation, minimum detectable concentrations (MDCs), and the selection of reference sites.

4.3.2.1 Alpha, Beta and Gamma Scanning Surveys

The scanning surveys will be conducted following the schedules detailed below. All scanning measurements will be recorded on grid diagrams that will be directly related to the gridding patterns established in each survey unit. Exterior grounds and pavement grid sizes will be 10 meters by 10 meters.

Class Two Survey Units

Scanning of surfaces and grounds to identify locations of residual surface and near surface activity in Class Two survey units will be performed according to the following schedule:

- pavement - 50% of surface.
- Exterior Grounds - 50% of surface

Exterior pavement scanning surveys will be conducted for alpha , beta, and gamma radiations. Surveys of exterior grounds will be for gamma radiations.

If any of the scanning results indicate that residual radiation may be present at a given area, that area will be marked for further investigations. Professional judgment will be used to determine if additional surveys are warranted. The additional surveys may include additional direct measurements, additional surface scanning (such as a 100% coverage using a NaI detector), or material sampling. The purpose of any additional surveys will be to confirm that any residual radiation present is below the survey unit specific guideline value.

Instrumentation for the scanning surveys will include gas proportional detectors for alpha and beta surveys and sodium iodide (NaI) detectors for gamma surveys. For the pavement surveys, a large area gas proportional floor monitor will be used. Surveying speeds will be 1 detector width per second for gas proportional instruments and will be performed to cover 100% of the surface being scanned. Surveying speeds will be 0.5 meters per second (approximately 1.5 feet per second) for NaI instruments and will be performed in a zig-zag pattern such that any one square meter area is covered by at least four passes. Audible indicators will be used to identify locations having elevated (>1.5 to 3 times ambient) levels of direct radiation. Any such locations will be noted for further investigations as described above.

4.3.2.2 Alpha and Beta Direct Measurements

Direct measurement surveys are performed as a means of detecting areas where elevated levels of surface or near surface radiation may be present at levels that are not detectable by surface scanning techniques. To this end, the direct measurement survey data from SEAD-63 will be compared to a single screening value. This screening value will be a daily flag value. All locations where the direct measurement value is above the daily flag value will be recorded and professional judgement will be used to determine if additional surveys are warranted. The additional surveys may include additional direct measurements, additional surface scanning (such as a 100% coverage using a NaI detector), or material sampling. The purpose of any additional surveys will be to confirm that any residual radiation present is below the survey unit specific guideline value.

The flag value will be determined on a daily basis. Flag values will be established for both alpha and beta radiations for each instrument in use. The flag value will be calculated using the following formula:

$$Flag = \left(G \bullet f_{gd} \bullet E_{inst.}\right) + B$$

G = survey unit specific guideline value (specific for alpha and beta radiations)
f_{gd} = fraction of guideline value that must be detected (75% for exterior surveys)
$E_{inst\cdot}$ = detection efficiency of the instrument being used for the direct measurement
B = daily background count rate (determined on an instrument specific basis)

All direct measurements will be recorded on grid diagrams that will be directly related to the gridding patterns established in each survey unit. Exterior grounds and pavement grid sizes will be 10 meters by 10 meters.

The direct measurement plans detailed below will provide, at a minimum, the twenty data points from each survey unit that are necessary to meet the DQOs that were selected for SEAD-63.

Class Two Survey Units

Direct measurements of alpha and beta surface activity will be performed at selected locations using the same instruments as outlined in Section 4.2.2.1, Alpha ,Beta and Gamma Scanning Surveys.

Direct measurements will be performed according to the following schedule

- exterior pavement - one location per 10 meter by 10 meter grid, situated in the area of the highest surface scanning reading

Measurements will be conducted by integrating counts over a 1 minute period.

4.3.2.3 Exposure Rate Surveys

Exposure rate surveys are performed to determine that the exposure rates measured at a location are below the survey unit specific guideline value. Exposure rate measurements will be obtained in the field in units of uRem/hr. The final exposure rate measurements will be reported in units of uR/hr.

The exposure rate survey plan detailed below will provide, at a minimum, the twenty data points from each survey unit that are necessary to meet the DQOs that were selected for SEAD-63.

Class Two Survey Units

Gamma exposure rates will be measured at one meter above ground surfaces using a Bicron microRem/hr meter. Measurements will be spaced according to the following pattern:

- pavement - one per 10 meter by 10 meter grid used for the scanning and direct measurement surveys, located in the center of the grid,
- grounds -one per 10 meter by 10 meter grid used to document the scanning surveys, located in the center of the grid, and one at each surface soil sampling location.

4.3.2.4 Removable Radiation Surveys

One wipe for removable radioactive contamination will be performed at each of the direct measurement locations described in section 4.3.2.2, Alpha and Beta Direct Measurements. One wipe will be collected for gross alpha and gross beta counting at each location. The wipes will be evaluated for alpha and beta activity in the field by counting them with an IPC 9025 alpha and beta wipe sample counter. The methodologies that will be followed for using the IPC 9025 are provided in Appendix I, and follow the basic guidelines for gross alpha and gross beta measurements of wipe samples found in the U.S. Department of Energy's Environmental Survey Manual, Appendix D, Part 4. If the integrated counts from a wipe sample exceed the site guideline value for surface activity, that sample will be submitted for the radionuclide laboratory analyses specified in Section 4.2.7, Analytical Program.

At a minimum, 17 wipe samples will be collected at SEAD-63 and submitted for laboratory analysis.

4.3.2.5 Special Measurements and Sampling

Direct alpha, beta and gamma measurements and sampling of sediments from within drain converts beneath the roads at SEAD-63 will be performed. The probable locations for the collection of these measurements and samples are shown in Figure 4-11. A total of 3 samples will be collected for chemical and radiochemical analysis from these structures.

4.3.3 Soil Investigation

The soil investigation program will consist of collecting soil samples from the ground surface, test pits, and soil borings. Eight soil borings and 5 test pits will be performed at SEAD-63. As SEAD-63 is bounded by Class Three grounds of SEAD-12 to the north, east and south, background soil samples are not proposed in the immediate vicinity of this site. The background soil samples collected as part of the RI/FS investigations at SEAD 12 will be used for the background comparisons of SEAD-63 data.

4.3.3.1 Surface Soil Sampling Program

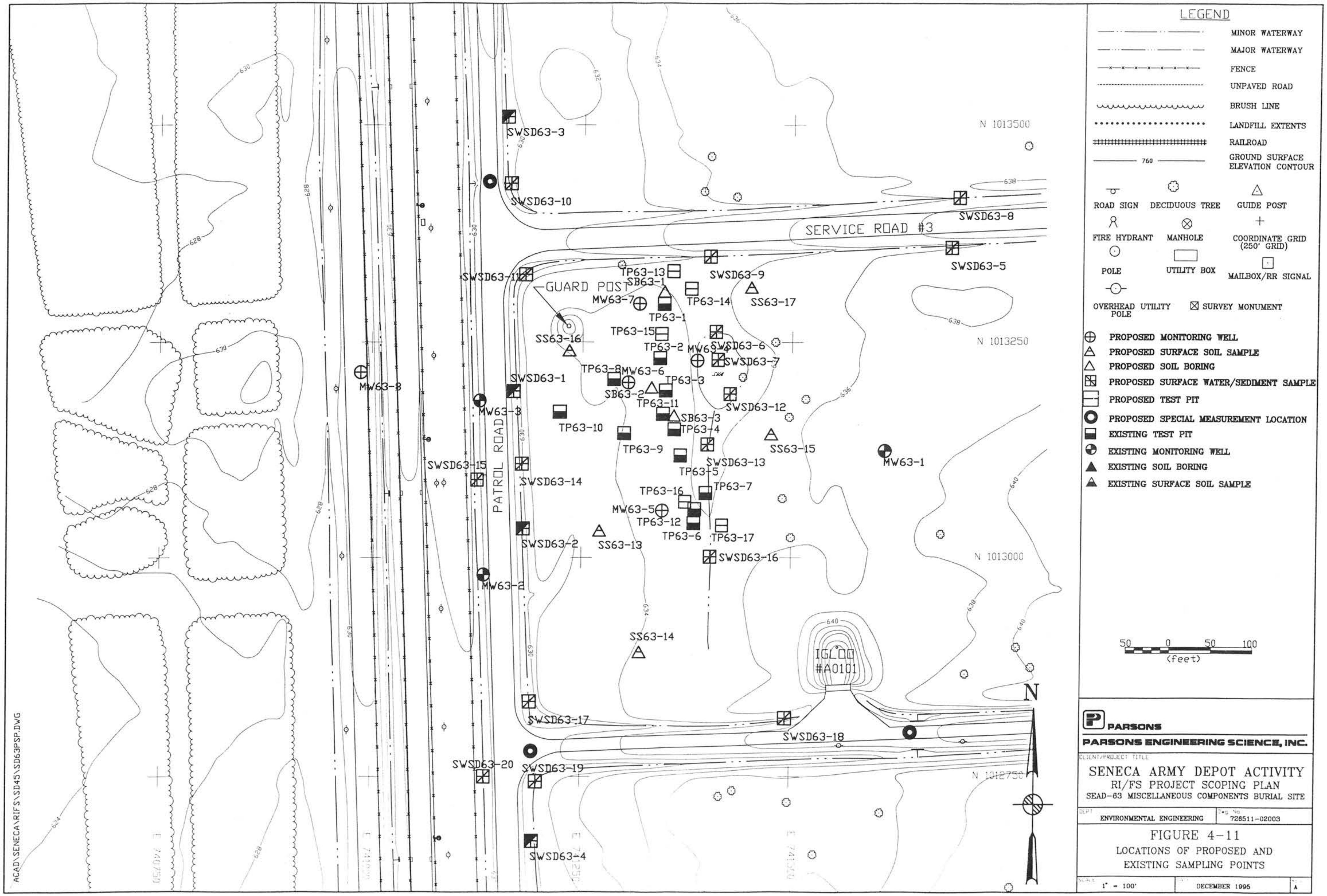
Seventeen surface soil samples will be collected at SEAD-63. Surface soil samples SS63-1 through SS63-12 will be collected at the test-pit locations that were excavated during the ESI. The five remaining surface soil samples (SS63-13 through SS63-17) will be located randomly as shown on Figure 4-11.

4.3.3.2 Soil Boring Program

A total of eight soil borings will be performed. The locations of these 8 soil borings are shown in Figure 4-11. Five of the eight soil borings will be completed as monitoring wells. The purpose of the soil borings will be to observe subsurface soils, measure the depth to bedrock, and obtain subsurface soil samples for chemical and radiochemical analyses. These data will also be used to assess the potential for contaminant migration to groundwater as part of the groundwater receptor pathway.

Three soil borings (SB63-1, SB63-2, and SB63-3) will be drilled in the areas where previous test pit excavations have identified buried wastes. These soil borings will be drilled to determine the vertical extent of the disposal pits. Three soil borings will be drilled at locations that are immediately downgradient of the disposal trenches and one soil borings will be drilled at a location that is immediately upgradient of the disposal trenches. These four soil borings will be completed as monitoring wells MW63-4 through MW63-7. One soil boring will be drilled downgradient of the ESI monitoring wells that had high gross alpha and gross beta radiations. This soil boring will be completed as overburden monitoring well MW63-8.

Soil borings will be performed by the continuous split-spoon method. Samples will be collected every two feet from the ground surface to the bottom of the boring. At each boring location, a 0-2" surface soil sample will be collected and submitted for chemical and radiochemical testing. Two subsurface soil samples will also be collected from each soil boring to be submitted for chemical and radiochemical testing. The criteria for the selection of the subsurface soil samples submitted to the lab for chemical testing is provided in Section 3.4.2 of Appendix A, Field Sampling and Analysis Plan in the generic Installation RI/FS Workplan. Each soil boring will be drilled until auger refusal is encountered. Auger refusal for this project is defined in Appendix D, Field Sampling and Analysis Plan. Additional sample selection criteria will include any impacts that are observed during the radiological field screening of the slit spoon material.



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-63 MISCELLANEOUS COMPONENTS BURIAL SITE

DEPT ENVIRONMENTAL ENGINEERING
Dwg No 728511-02003

FIGURE 4-11
LOCATIONS OF PROPOSED AND EXISTING SAMPLING POINTS

SCALE 1" = 100'
DATE DECEMBER 1995
A

Additional samples will be collected for archive purposes in the event that additional analyses are required to characterize any radiological impacts at SEAD-63. Archive samples will be taken from all segments of the split spoon material where the screening measurements are more than 50% above readings without a sample present. Additionally, the material immediately above and below any such segments will also be sampled and archived. Professional judgement and the radiological field screening of the split spoon material will be used to select any other archive samples.

In addition, 9 soil samples will be collected for limited chemical testing and physical testing at soil boring locations SB63-1, SB63-2, and SB63-3. At each location, one near surface sample, one sample from below the fill material and one intermediate sample will be collected.

4.3.3.3 Test Pitting Program

A total of 5 test pits will be excavated at SEAD-63. The locations of these test pits are shown on Figure 4-11. All five test pits (test pits TP63-13 through TP63-17) will be located over geophysical anomalies identified during the ESI or the geophysical investigations to be performed for this RI/FS. Test pits will be performed so that a visual evaluation of the subsurface soils and fill materials can be made, and also for the purpose of collecting soil samples for chemical and radiochemical testing. Test pits will be excavated to the bottom of the fill layer. The bedrock surface (if encountered) and bottom of fill layer will be documented at each test pit location. One surface soil sample and two (2) subsurface soil samples will be collected from each test pit. The samples will be collected at depths where there is evidence of impacts based upon field screening and visual observations. If no impacts are evident in the test pit, the samples will be collected from the floor of the excavation and at the mid-depth of the wall of the excavation.

Additional samples will be collected for archive purposes in the event that additional analyses are required to characterize any radiological impacts at SEAD-63. Archive samples will be taken from areas of the test pit excavation where the screening measurements of removed materials are more than 50% above readings without a sample present. Additionally, the material immediately above and below any such areas will also be sampled and archived. Professional judgement and the radiological field screening of the test pit material will be used to select any other archive samples.

The materials removed for characterization purposes will be returned to the excavated area at the completion of each test pit investigation. This procedure was discussed with and agreed to by the New York State Department of Environmental Conservation, Bureau of Radiation, Division of Hazardous Substances (see Appendix J, Letter of Confirmation of Telephone Conversation Between Parsons ES and NYSDEC, on July 17, 1995). This procedure assures that any radiation found at a test pit site will not have the potential to migrate via over-land transport (i.e. by precipitation run-off or by wind transport), and it will minimize any potential radiation dose to on-site workers or visitors during the RI/FS process.

All personnel performing the test pit operations will be wearing Level D PPE. The excavated soils will be monitored for VOCs and radiation during test pitting. Test pitting procedures are provided in Section 3.4.3 of Appendix A, Field Sampling and Analysis Plan, in the generic Installation RI/FS Workplan

4.3.3.4 Soil Sampling Summary

One surface soil sample and two subsurface soil samples will be collected from each of the eight soil borings and 5 test pits shown on Figure 4-11. Seventeen surface soil samples will also be collected. In total, 56 soil samples will be collected for TAL/TCL and radiochemical testing.

In addition, 9 subsurface soil samples will be collected from 3 locations for physical testing and limited chemical testing.

All the soil samples will be tested according to the analyses specified in Section 4.3.7, Analytical Program.

4.3.4 Surface Water and Sediment Investigation

Surface water and sediment sampling will be conducted in areas of SEAD-63 which have the potential for acting as an exposure pathway or for off-site transport of site contaminants.

Potential on-site surface water areas include drainage swales located about SEAD-63 and a small, unsustained, wetland area in the northern portion of the site. The drainage pathways at SEAD-63 eventually flow into Reeder Creek which flows north then west and drains into Seneca Lake. Sixteen surface water and sediment samples (SW/SD63-5 through SW/SD63-20) will be collected at the on-site locations shown on Figure 4-11. Surface water samples will be collected at all of the sample locations when flowing water is present (i.e., during or immediately following a precipitation event). The surface water and sediment sampling procedures are described in Section 3.7 of Appendix A, Field Sample and Analysis, in the generic Installation RI/FS Workplan.

All of the surface water and sediment samples will be analyzed as described in Section 4.3.7, Analytical Program. The results of these analyses will be used to determine if there is a surface water or sediment exposure pathway at SEAD-63. If concentrations exceeding applicable guidelines are present, the data will be used to perform a baseline risk assessment for this exposure pathway.

4.3.5 Groundwater Investigation

The groundwater investigation program will consist of collecting groundwater samples from eight groundwater monitoring wells. Five of the 8 groundwater monitoring wells will be installed at SEAD-63 as part of the remedial investigation being performed at this site. The remaining three groundwater monitoring wells were previously installed during the ESI.

4.3.5.1 Monitoring Well Installation and Sampling

The groundwater flow direction at SEAD-63 was determined from the potentiometric measurements gathered during the ESI.

The goals of the groundwater investigation during the RI are to determine the extent of groundwater contamination, gather potentiometric data to confirm the groundwater flow direction, determine background groundwater quality, and determine the hydraulic conductivity of the aquifer. To accomplish this, five monitoring wells will be installed at the approximate locations shown in Figure 4-11. Table 4-7 lists the location of the proposed monitoring wells and provides a brief rationale for the installation of each. The five soil borings to be drilled for the installation of the five monitoring wells will be continuously sampled to competent bedrock. A monitoring well will then be installed and screened in the saturated overburden overlying the bedrock.

Table 4-7
SEAD-63 RI/FS Projectr Scoping Plan
Monitoring Well Justification Table
Seneca Army Depot Activity

Monitoring Well ID	Monitoring Well Location	Rationale for Installation of Monitoring Well
MW63- 4	East of disposal pit identified by geophysics	Upgradient monitoring well for sipsosal pit, to monitor influence of area with standing water on groundwater flow direction and potential contaminant migration paterns
MW63- 5	West of disposal pit identified by geophysics	Downgradiet monitoring well for disposal pit
MW63- 6	West of disposal pit identified by geophysics	Downgradiet monitoring well for disposal pit
MW63- 7	West of disposal pit identified by geophysics	Downgradiet monitoring well for disposal pit
MW63- 8	West of Q Area fence, west of existing wells MW63-2 and MW63-3	Downgradient Monitoring Well to determine the extent of potential impacts that were detected in the existing monitoring wells

The eight monitoring wells at SEAD-63 will then be sampled according to the following schedule:

- First Round - approximately 2 weeks after well development, and,
- Second Round - approximately 3 months after the first round.

Monitoring well installation, development, and sampling procedures are described in Sections 3.5 and 3.6 of Appendix A, Field Sampling and Analysis Plan, in the generic Installation RI/FS Workplan. All wells will be properly developed prior to sampling. The groundwater samples will be tested according to the analyses described in Section 4.3.7, Analytical Program.

4.3.5.2 Aquifer Testing

Slug testing will be performed on the 8 wells at SEAD-63 (3 installed during the ESI and 5 during this RI) and used to estimate the hydraulic conductivity of the overburden aquifer. Three rounds of water levels will be measured at each of the wells at SEAD-63 to further define thegroundwater flow direction at the site. The groundwater level measurements will be performed according to the following schedule:

- First Round - after monitoring well development,
- Second Round - at the time of the first round of groundwater sampling and,
- Third Round - at the time of the second round of groundwater sampling.

Procedures for slug testing and water level measurements are outlined in Section 3.11 of Appendix A, Field Sampling and Analysis Plan, in the Generic Installation RI/FS Workplan.

4.3.6 Ecological Investigation

The following procedure for the ecological investigation was developed from the New York State Department of Environmental Conservation (NYSDEC) Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (1994). The purpose of the ecological investigation is to determine if aquatic and terrestrial resources have been affected by a release of contaminants from the site. The investigation will be completed in two parts. The first part will be the site description, which will involve the accumulation of data describing the physical characteristics of the site, as well as the identification of aquatic and terrestrial resources present or expected to be present at the site. The second part will be the contaminant-specific impact analysis, which involves the determination of whether the identified aquatic and terrestrial resources have been impacted by contaminants that have been released at the site. The second part of the ecological investigation is dependent upon the chemical analysis data obtained for the RI.

A wetland functional assessment will be conducted if the remedial actions, which will be developed in the FS, involve disruption of wetland areas. This assessment would be conducted s an initial step in the FS if necessary.

4.3.6.1 Site Description

The purpose of the site description is to determine whether aquatic and terrestrial resources are present at the site and if they were present at the site prior to contaminant introduction. If they were present prior to contaminant introduction, the appropriate information will be provided to design a remedial investigation of the resources. The information to be gathered includes site maps, descriptions of aquatic and terrestrial resources at the site, the assessment of the value of the aquatic and terrestrial resources, and the appropriate contaminant-specific and site-specific regulatory criteria applicable to the remediation of the identified aquatic and terrestrial resources.

A topographic map showing the site and documented aquatic and terrestrial resources within a two mile radius from the site will be obtained. The aquatic and terrestrial resources of concern are Significant Habitats as defined by the New York State Natural Heritage Program; habitats supporting endangered, threatened or rare species or species of concern; regulated wetlands; wild and scenic rivers; significant coastal zones; streams; lakes; and other major resources.

A map showing the major vegetative communities within a half mile radius of the site will be developed. The major vegetative communities will include wetlands, aquatic habitats, NYSDEC Significant Habitats, and areas of special concern. These covertypes will be identified using the NYSDEC Natural Heritage Program descriptions and classifications of natural communities.

Wetlands were delineated by the U.S Fish and Wildlife Service as part of BRAC 95. This information will be used to develop the map of vegetative communities.

To describe the covertypes at the site, the abundance, distribution, and density of the typical vegetative species will be identified. To describe the aquatic habitats at the site, the abundance and distribution of aquatic vegetation will be identified. The physical characteristics of the aquatic habitats will also be described and will include parameters such as the water chemistry, water temperature, dissolved oxygen content, depth, sediment chemistry, discharge, flow rate, gradient, stream-bed morphology, and stream classification.

The aquatic and terrestrial species that are expected to be associated with each covertype and aquatic habitat will be determined. In particular, endangered, threatened and rare species, as well as species of concern, will be identified. Alterations in biota, such as reduced vegetation growth or quality will be described. Alterations in, or absence of, the expected distribution or assemblages of wildlife will be described.

A qualitative assessment will be conducted evaluating the ability of the area within a half mile of the site to provide a habitat for aquatic and terrestrial species. The factors that will be considered will include the species' food requirements and the seasonal cover, bedding sites, breeding sites and roosting sites that the habitats provide.

The current and potential human use of the aquatic and terrestrial resources of the site and the area within a half mile of the site will be assessed. In addition to assessing this area, documented resources within two miles of the site and downstream of the site that are potentially affected by contaminants will also be assessed. Human use of the resources that will be considered will be activities such as hunting, fishing, wildlife observation, scientific studies, agriculture, forestry, and other recreational and economic activities.

The appropriate regulatory criteria will be identified for the remediation of aquatic and terrestrial resources and will include both site-specific and contaminant-specific criteria.

4.3.6.2 Contaminant-Specific Impact Analysis

Information from the site description developed in Section 4.3.6.1 and from the characterization of the contaminants at the site developed from the results of the RI will be used to assess the impacts of contaminants on aquatic and terrestrial resources. The impact analysis will involve three steps, each using progressively more specific information and fewer conservative assumptions and will depend upon the conclusion reached at the previous step regarding the degree of impact. If minimal impact can be demonstrated at a specific step, additional steps will not be conducted.

Pathway Analysis

A pathway analysis will be performed identifying aquatic and terrestrial resources, contaminants of concern and potential pathways of contaminant migration and exposure. After performing the pathway analysis, if no significant resources or potential pathways are present, or if results from field studies show that contaminants have not migrated to a resource along a potential pathway, the impact on aquatic and terrestrial resources will be considered to be minimal and additional impact analyses will not be performed.

Criteria-Specific Analysis

Presuming that the presence of contaminated resources and pathways of migration of site-related contaminants has been established, the contaminant levels identified in the field investigation will be compared with available numerical criteria or criteria developed according to methods established as part of the criteria. If contaminant levels are below criteria, the impact on resources will be considered to be minimal and additional impact analyses will not be performed. If numerical criteria are exceeded or if they do not exist and cannot be developed, an analysis of the toxicological effects will be performed.

Analysis of Toxicological Effects

The analysis of toxicological effects is based on the assumption that the presence of contaminated resources and pathways of migration of site-related contaminants has been established. The purpose of the analysis of toxicological effects is to assess the degree to which contaminants have affected the productivity of a population, a community, or an ecosystem and the diversity of species assemblages, species communities or an entire ecosystem through direct toxicological and indirect ecological effects.

A number of approaches are available to conduct an analysis of toxicological effects. One or more of the four following approaches will be used to assess the toxicological effects.

- **Indicator Species Analysis**–A toxicological analysis for a indicator species will be used if the ecology of the resource and the exposure scenarios are simple. This approach assumes that exposure to contaminants is continuous throughout the entire life cycle and does not vary among individuals.

- **Population Analysis**–A population level analysis is relevant to and will be used for the evaluation of chronic toxicological effects of contaminants to an entire population or to the acute toxicological effect of contaminant exposure limited to specific classes of organisms within a population.

- **Community Analysis**– A community with highly interdependent species including highly specialized predators, highly competitive species, or communities whose composition and diversity is dependent on a key-stone species, will be analyzed for alternations in diversity due to contaminant exposure.
- **Ecosystem Analysis**–If contaminants are expected to uniformly affect physiological processes that are associated with energy transformation within a specific trophic level, an analysis of the effects of contaminant exposure on trophic structure and trophic function within an ecosystem will be performed. Bioconcentration, bioaccumulation, biomagnification, etc., are concepts that may be used to evaluate the potential effects of contaminant transfer on trophic dynamics.

4.3.7 Analytical Program

A total of 56 soil samples, 16 groundwater samples, 16 surface water and sediment samples, 3 special measurement samples, and a minimum of 2 wipe samples will be collected at SEAD-63 for chemical and radiochemical testing. Analyses for all of the media to be sampled are summarized in Table 4-8. The proposed sample locations are shown in Figure 4-11.

All of the soil, water, sediment and special measurement samples collected at SEAD-63 will be analyzed for the following non-radioactive constituents: Target Compound List (TCL) VOCs (EPA Method 524.2 for groundwater samples only), semivolatile organic compounds (SVOCs), TCL pesticides/PCBs, Target Analyte List (TAL) metals and cyanide according to the NYSDEC Contract Laboratory Program (CLP) Statement of Work (SOW), and nitrate/nitrite nitrogen by EPA Method 353.2. To address the need to attain lower detection limits for several analytes in the CLP SOW for groundwater analyses, an addendum to Appendix F, Chemical Data Acquisition Plan, has been added in which the proposed modifications to the CLP SOW are presented. These modifications will provide the detection levels that are needed to meet all potential ARARS that are not being met under the current CLP SOW.

Table 4-8

Summary of Sampling and Analyses
Seneca Army Depot Activity
SEAD-63

MEDIA		VOCs TCL NYSDEC CLP	Method 524.2	SVOCs TCL NYSDEC CLP	Pesticides / PCBs TCL NYSDEC CLP	Metals TAL NYSDEC CLP	Nitrate / Nitrogen MCAWW 352.1 (note 3)	Gross Alpha / Beta	Uranium 235/238 Alpha Spectrometry	Thorium 230/232 Alpha Spectrometry	Plutonium 239/240 Alpha Spectrometry	Radium 226 Method 901.1	Radium 226 Method 903.1	Gamma Radiation Gamma Spectrometry	Limited Chemical/ Physical Testing
Soil	Surface	30	0	30	30	30	30	0	30	30	30	30	0	30	0
	Subsurface	26	0	26	26	26	26	0	26	26	26	26	0	26	9
Groundwater		0	16	16	16	16	16	16	16	16	16	0	16	0	16
Surface water		16	0	16	16	16	16	16	16	16	16	0	16	16	16
Sediment		16	0	16	16	16	16	0	16	16	16	16	0	16	16
Wipes (Asphalt)		0	0	0	0	0	0	5	5	5	5	5	0	5	0
Special Measurements		3	0	3	3	3	3	0	3	3	3	3	0	3	0

Notes:

1) QA/QC sampling requirements are described in Appendix C, Section 5.3 of the Generic Installation RI/FS Workplan.

2) The limited chemical testing and physical testing parameters for each media are described in Section 4.3.7, Analytical Program

3) Method in soil samples will be modified. For soils, a known quantity of soil will be mixed with a known volume of water, stirred, then filtered to form an aqueous extract.

4) For pH analysis, Method 904.5 will be used for soil samples and Method 150.1 will be used for water. For TOC analysis, Method 415.1 will be used for water and Lloyd Kahn method will be used for soil.

* The analysis is designated as Method 524.2, Revision 4.0, August 1992.

All of the samples collected at SEAD-63 will be analyzed by the following radiochemical methods: alpha spectrometry (to detect plutonium 239, uranium 235 and 238, and thorium-230 and 232), and gamma spectrometry (to detect radium-223, bismuth-214, lead 210, and lead 214). Gross alpha and gross beta radiation in all of the groundwater and surface water samples will also be determined.

All of these samples will be analyzed for radium-226 by method 901.1 (from soil samples) or 903.1 (for water samples).

Additional limited physical and chemical analyses to be performed on specific media are provided below.

4.3.7.1 Limited Physical and Chemical Testing of Soils

Nine subsurface soil samples will be collected and analyzed for limited chemical testing and physical testing. These analyses will include Toxicity Characteristics Leaching Procedure (TCLP) analysis, Total Organic Carbon (TOC) analysis by EPA Method 415.1, grain size distribution analysis (including the distribution within the silt and clay size fraction), Cation Exchange Capacity (CEC) analysis, pH determination, and density determination.

Additionally, these nine subsurface soil samples will be analyzed to determine the radium-226 distribution coefficient using the short-term batch method (ASTM D: 4319-83).

4.3.7.2 Limited Physical and Chemical Testing of Groundwater

The 16 groundwater samples will be analyzed in the field for pH, temperature, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. The following chemical and physical testing will be performed by the laboratory: alkalinity, iron (ferrous), sulfate, sulfide, nitrate, TOC, biological oxygen demand (BOD), hardness, total dissolved solids (TDS), and chemical oxygen demand (COD).

4.3.7.3 Limited Physical and Chemical Testing of Surface Water and Sediment

The 16 surface water samples will be analyzed in the field for pH, temperature, specific conductivity, and dissolved oxygen (DO). The surface water flow rate at the surface water sampling locations will also be determined. The following analyses will be performed by the laboratory: total suspended solids (TSS), total dissolved solids (TDS), alkalinity, hardness, ammonia, nitrate/nitrite nitrogen, phosphate, TOC, and turbidity.

The 16 sediment samples will be analyzed for grain size, TOC, CEC, and pH. Three samples from known or potentially impacted sediment will also be analyzed for density. A detailed description of these methods, as well as lists of each compound included in each of the categories is presented in Appendix F, Chemical Data Acquisition Plan.

4.3.8 Surveying

Surveying will be performed at SEAD-63 to provide data to be used for the following purposes:

- Locate all the environmental sampling points and geophysical surveys,
- Serve as the basis for volume estimates of impacted soil and sediment which may require a remedial action,
- Map the extent of any impacted groundwater above established ARAR limits.

The location, identification, coordinates and elevations of all the control points recovered and/or established at the site and all of the geophysical survey areas, soil borings, monitoring wells (new and existing) and all surface water and sediment sampling points will be plotted on a topographic map to show their location with respect to surface features within the project area.

Site surveys will be performed in accordance with good land surveying practices and will conform to all pertinent state, federal, and USACOE laws and regulations governing land surveying. The surveyor shall be licensed and registered in the state of New York.

A detailed discussion of the site field survey requirements is presented in Section 3.13 of Appendix A, Field Sampling and Analysis Plan of the Generic Installation RI/FS Workplan.

4.4 DATA REDUCTION, ASSESSMENT AND INTERPRETATION

The data collected from the radiological screening surveys, direct measurement surveys, exposure rate surveys, removable radiation surveys, special measurements, and environmental media sampling (for radionuclides) will be reduced, assessed and interpreted following the guidance in NUREG/CR-5849, NUREG 1505, and MARSSIM. These data, as well as the metals analysis data from the soil, groundwater, and surface water and sediment sampling programs, will be used to compare the SEAD-12 and SEAD-63 data to background/reference data using the Wilcoxon Ranked Sum test and the Quantile Test following the guidance provided in NUREG 1505, MARSSIM, and the EPA's Statistical Methods for Evaluating the Attainment of Cleanup Standards. These tests, as well as statistical graphs of the site and reference data (which may include histograms, quantile plots, power curves, etc...), and basic statistical quantities (such as the mean, standard deviation, median, maximum, and minimum values of the datasets) will be used to illustrate the conditions at SEAD-12 and SEAD-63 as compared to one or more background / reference areas.

The Data Reduction, assessment, and interpretation is discussed in general for all of the data collected at these sites in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan. Additional data reduction and assessment methods, which are specific for radiological analysis results, are presented in Appendix F (Chemical Data Acquisition Plan) of this project scoping plan.

4.5 BASELINE RISK ASSESSMENT

The current scenarios that will be evaluated in the baseline risk assessment will be based on the current and future uses of SEADs 12 and 63. These will include an on-site industrial scenario, an on-site construction scenario, and a down stream wadding scenario (in Reeder Creek) for the current uses. Because SEDA has recently been added to the BRAC list, the future scenarios evaluated in the baseline risk assessment will be based on the community reuse plan, as described in BRAC guidance. The community reuse plan, which was written by the Local Redevelopment Authority (LRA), states that the areas of SEADs 12 and 63 are intended to be used as a wildlife conservation area. Based on this intended future use, the future scenario that will be evaluated in the BRA will be an on-site recreational scenario.

The current populations that will be evaluated in the BRA will include on-site industrial workers, on-site construction workers, and off-site individuals who may wade in Reeder Creek at locations down stream of SEDA. The exposure pathways for these receptor populations are presented and discussed in Section 3.2, Preliminary Identification of Receptors and Exposure Scenarios.

The future receptor population that will be evaluated in the BRA is on-site recreational visitors. This receptor population is consistent with the LRA's future intended use of the SEAD-12 and 63 areas. The exposure pathways for this receptor population are also presented and discussed in

Section 3.2, Preliminary Identification of Receptors and Exposure Scenarios, and are also consistent with the LRA's future intended use for these sites.

The baseline radiation risk assessment activities will be performed using the methods described in the EPA Risk Assessment Guidance for Superfund (1989) Volume I (Human Health Evaluation Manual) and Volume II (Environmental Evaluation Manual). The approach to the baseline risk assessment is presented in the Generic Installation RI/FS Workplan , which serves as a supplement to this RI/FS Project Scoping Plan. Exposure assessment assumptions are presented and discussed in Section 3.2.3, Exposure Assessment Assumptions.

4.6 DATA REPORTING

The data from the radiological surveys will be presented in a format which provides the calculated surface activity or radionuclide concentration value, the estimated confidence level for that value and the estimated MDC for the measurement, as detailed in NUREG/CR-5849.

Data Reporting for all other data, including sample analysis results, is discussed in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

4.7 TASK PLAN SUMMARY FOR THE RI

General information about the Task Plan Summary is given in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

Detailed Task Plan Summaries that indicate the number and types of samples to be collected at each site are provided in Tables 4-6 and 4-8.

5.0 TASK PLAN FOR THE FEASIBILITY STUDY (FS)

The task plan for the FS is given in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

5.1 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES

A discussion of the development of remedial action objectives for the FS is given in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

5.2 DEVELOPMENT OF REMEDIAL ACTION ALTERNATIVES

A discussion of the development of remedial response action alternatives for the FS is given in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

5.3 SCREENING OF REMEDIAL ACTION ALTERNATIVES

A discussion of the development of remedial action objectives for the FS is given in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

5.4 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

A disussion of the detailed anaylsis of remedial action alternatives for the FS is given in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

5.5 TASK PLAN SUMMARY FOR THE FS

The task plan summary for the FS is given in the Generic Installation RI/GS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

The remedial action cost estimate for the RI/FS report will be prepared in accordance with ER1110-3-1301. Additionally, the estimate for the selected plan will be prepared using MCASES Gold Software, and structured using the Remedial Action Work Breakdown Structure (RA-WBS).

6.0 PLANS AND MANAGEMENT

The purpose of this workplan is to present and describe the activities that will be required for the site Remedial Investigation/Feasibility Studies at SEAD-12 and SEAD-63. The Field Sampling and Analyses Plan (Appendix D), details procedures that will be used during the field activities. Included in this plan are procedures for sampling soil, sediment, surface water, fish, shellfish and groundwater. Also included in this plan are procedures for developing and installing monitoring wells, measuring water levels and packaging and shipment of samples.

The Health and Safety Plan (Appendix E) details procedures to be followed during field activities to protect personnel involved in the field program.

The Chemical Data Acquisition Plan (Appendix F) describes the procedures to be implemented to assure the collection of valid data. It also describes the laboratory and field analytical procedures which will be utilized during the RI.

6.1 SCHEDULING

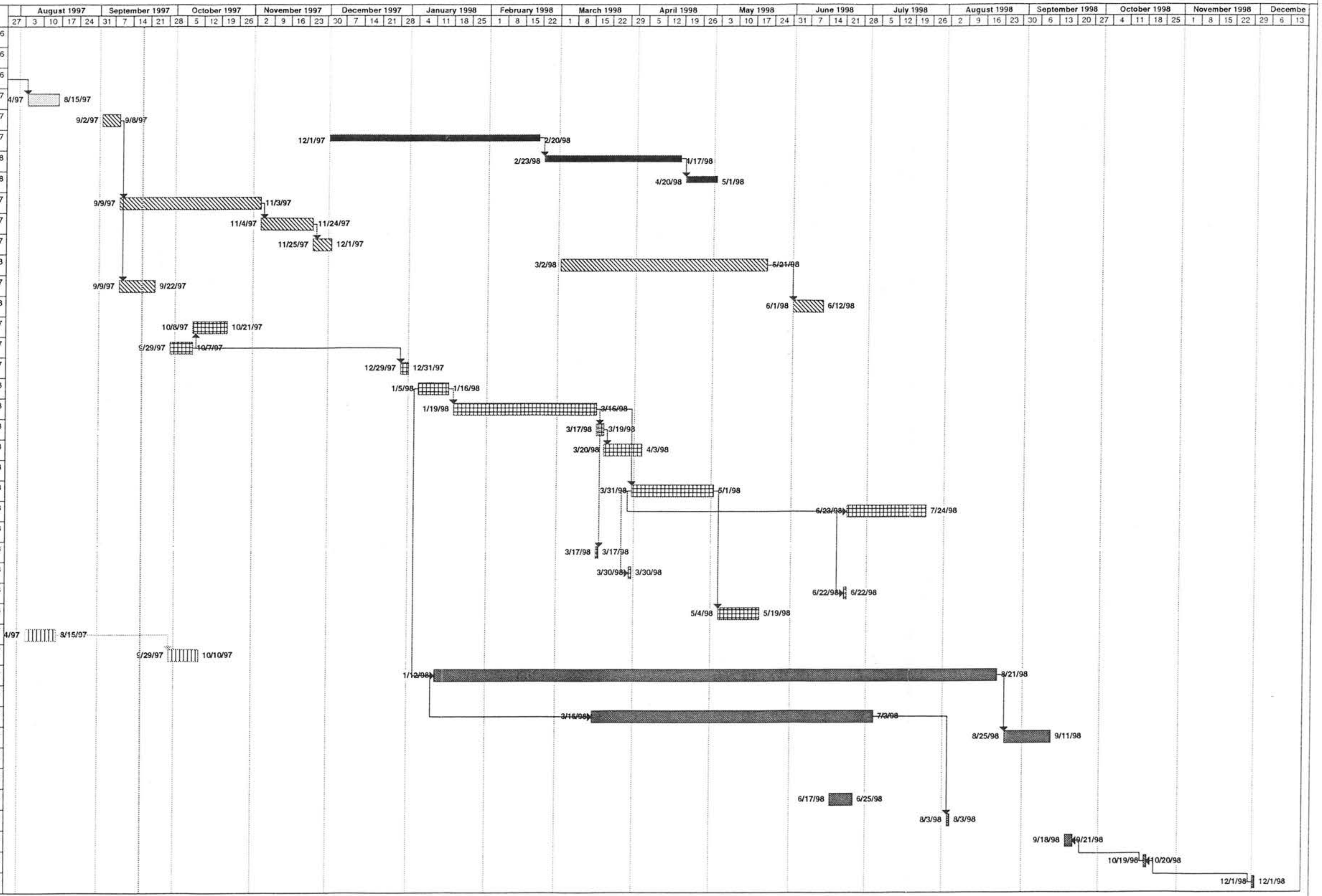
The proposed schedules for performing the RI/FS at SEAD-12 and SEAD-63 are presented in Figures 6-1 through 6-2.

6.2 STAFFING

The project team organization for performing the RI/FS is presented in Figure 6-5.

SEAD-12 PROJECT SCOPING PLAN
PROJECT SCHEDULE

ID	Task Name	Duration	Start
1	Mark Geophysical Locations: Set up 200'x200' grids	7d	8/19/96
2	Seismic Survey: 16 profiles	8d	8/28/96
3	EM Survey 1: 120 miles	60d	9/9/96
4	GPR Survey	10d	8/4/97
5	Mark Radiological Survey Locations	5d	9/2/97
6	Surface Screening Surveys-Buildings	60d	12/1/97
7	Direct Measurement Surveys/ Wipe Surveys-Buildings	40d	2/23/98
8	Exposure Rate Measurements-Buildings	10d	4/20/98
9	Surface Screening Surveys: Grounds	40d	9/9/97
10	Direct Measurement Surveys/ Wipe Surveys	15d	11/4/97
11	Surface Soil Sampling - Reference Area	5d	11/25/97
12	Surface Soil Sampling -On-Site	59d	3/2/98
13	Exposure Rate Surveys Grounds	10d	9/9/97
14	Special Measurements	10d	6/1/98
15	Borehole Geophysics, Disposal Pit A	10d	10/8/97
16	Soil Gas Survey, Buildings 813, 814, 817	7d	9/29/97
17	Mark Sample Locations	3d	12/29/97
18	Test Pit Excavations	10d	1/5/98
19	Monitoring Well Installation and Development	41d	1/19/98
20	Soil Borings	3d	3/17/98
21	Surface Water/Sediment Sampling and Runnoff Delineation	11d	3/20/98
22	**Groundwater Sampling**	84d	3/31/98
23	Groundwater Sampling 1	24d	3/31/98
24	Groundwater Sampling 2	24d	6/23/98
25	**Water Level Measurements**	70d	3/17/98
26	Water Level Measurements 1	1d	3/17/98
27	Water Level Measurements 2	1d	3/30/98
28	Water Level Measurements 3	1d	6/22/98
29	Aquifer testing	12d	5/4/98
30	Archeological Survey	10d	8/4/97
31	Ecological Investigation	10d	9/29/97
32	Sample Analysis	160d	1/12/98
33	**Data Validation**	130d	3/16/98
34	Data Validation 1	80d	3/16/98
35	Data Validation 2	14d	8/25/98
36	**Surveying**	484d	8/19/96
37	Surveying 1	2d	8/19/96
38	Surveying 2	7d	6/17/98
39	Field Sampling Letter Report	1d	8/3/98
40	Send Pre Draft RI Report to Army	1d	9/18/98
41	Receive comments from Army	1d	10/19/98
42	Send Draft RI Report	1d	12/1/98



Project: SEAD-12 Project Scoping Plan
Date: 9/18/97

Office & Other Tasks	▩	Field Crew #1	░	Field Crew #2	▨	Field Crew #3	▦	Army Crew	▬	Parsons Specialists	▥

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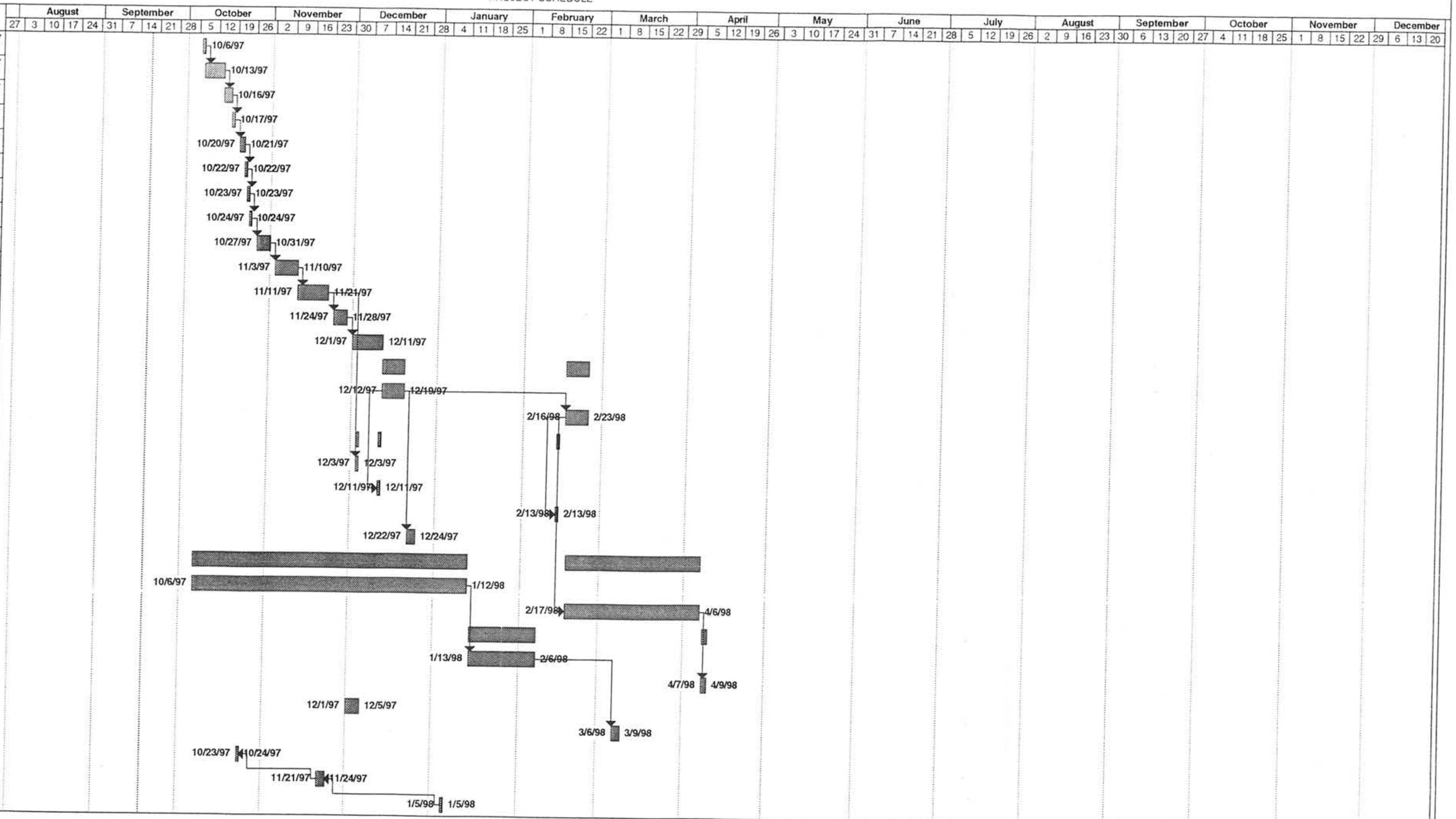
Figure 6-1

SEAD-63 PROJECT SCOPING PLAN
PROJECT SCHEDULE

ID	Task Name	Duration	Start
1	Mark Geophysical Locations	1d	10/6/97
2	EM Survey	5d	10/7/97
3	GPR Survey	3d	10/14/97
4	Mark Radiological Survey Locations	1d	10/17/97
5	Surface Screening Surveys-Grounds	2d	10/20/97
6	Direct Measurement Surveys/ Wipe Surveys	1d	10/22/97
7	Exposure Rate Surveys	1d	10/23/97
8	Mark Sample Locations	1d	10/24/97
9	Surface Soil Sampling	5d	10/27/97
10	Soil Borings	6d	11/3/97
11	Monitoring Well Installation and Development	9d	11/11/97
12	Surface Water/Sediment Sampling	5d	11/24/97
13	Ecological Investigation	9d	12/1/97
14	**Groundwater Sampling**	**52d**	**12/12/97**
15	Groundwater Sampling 1	6d	12/12/97
16	Groundwater Sampling 2	6d	2/16/98
17	**Water Level Measurements**	**53d**	**12/3/97**
18	Water Level Measurements 1	1d	12/3/97
19	Water Level Measurements 2	1d	12/11/97
20	Water Level Measurements 3	1d	2/13/98
21	Aquifer testing	3d	12/22/97
22	**Sample Analysis**	**130.88d**	**10/6/97**
23	Sample Analysis 1	70.88d	10/6/97
24	Sample Analysis 2	34.88d	2/17/98
25	**Data Validation**	**62d**	**1/13/98**
26	Data Validation 1	18d	1/13/98
27	Data Validation 2	2d	4/7/98
28	Surveying	5d	12/1/97
29	Field Sampling Letter Report	1d	3/6/98
30	Send Pre-Draft RI Report to Army	1d	10/23/97
31	Receive Comments from Army	1d	11/21/97
32	Send Draft RI Report	1d	1/5/98



Project:SEAD-63 Project Scoping Plan
Date: 9/18/97

Task	▨	Progress	■	Milestone	◆	Summary	■	Rolled Up Task	▨	Rolled Up Milestone	◇	Rolled Up Progress	■

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Figure 6-2

7.0 REFERENCES

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APPENDIX A

ESI SOIL BORING AND TEST PIT LOGS

SEAD-12

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. | CLIENT: USACOE | TEST PIT #: TP12A-1

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 720519
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/24/94
COMPLETION DATE: 6/24/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
10'	4'	5.5'	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	1120h / 6/24/94
VICTOREEN-190	pancake	10-15µR/hr	1120h / 6/24/94
LUDLUM 2221 w/ SCALER	α ScinT.	2-2 CPM	1120h / 6/24/94
LUDLUM 19 µR	γ-NaI	8-14µR/hr	1120h / 6/24/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
COMMENTS: VISITOR: Kamal Gupta

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0ppm BKGD				Light Brown Fill with miscellaneous metal Fragments 	Miscellaneous Components
2	0ppm 46µR/hr	TP12A-1-1 TP12A-1-2	2.5' 3.0'		2.0' LAYER with elevated micro-R readings Miscellaneous METAL Fragments and Some BLACK granular Fill	Highest µ-R Reading: 46µR/hr Highest victoreen Reading: 78µR/hr
3	0ppm BKGD				3.0'	
4	0ppm BKGD				4.0' ∇ WATER TABLE	
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12A-1

PAGE 2 OF 2

TEST PIT REPORT

TEST PIT #: TP12A-1

ENGINEERING-SCIENCE, INC.	CLIENT:

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:

INSPECTOR:
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
						↓
					5.5' BASE OF PIT	
					* Discontinued excavation due to water	

TEST PIT #: TP12A-2

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

Page of

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TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: USACOE	TEST PIT #: TP12A-2

PROJECT: 15 SWMU ESI (SEAD-12A)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

JOB NUMBER: 720519
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/22/94
COMPLETION DATE: 6/22/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
12'	6'	8'	BACKHOE

MONITORING DATA

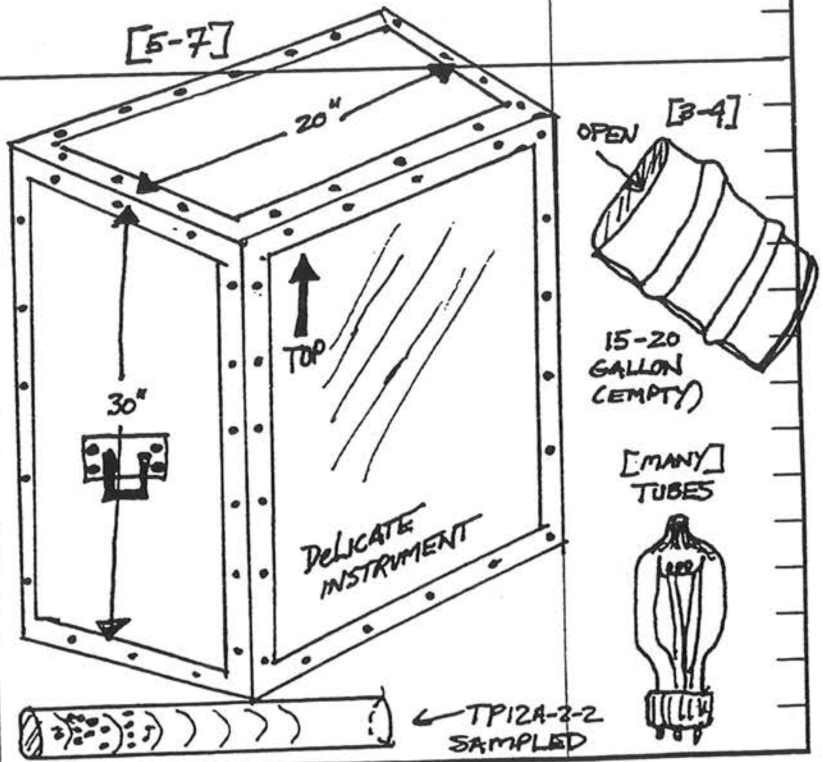
INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0	
LUDLUM 2221 w/SCALER	α SCINTIL	3 CPM	
LUDLUM 19 MICRO-R	γ	1.5	
VICTOREEN 190	β γ	1.59 mR/hr	

QA/QC DUPLICATE SAMPLE: YES or NO
Duplicate Sample Number:
MRD Sample Number:

QA/QC Rinsate Sample Number:

SAMPLES SHIPPED:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				TOPSOIL	
1 2	0ppm BKGD				LIGHT BROWN SILT (FILL)	
3 4 5	0ppm BKGD					



SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #:

TEST PIT REPORT

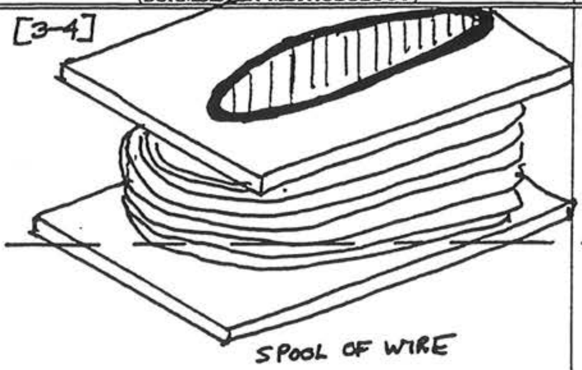
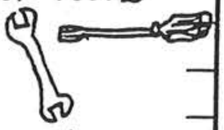
ENGINEERING–SCIENCE, INC. | CLIENT: USACOE | TEST PIT #: TP12A-2

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME	AS	ABOVE	

DATE START: 6/22/94
DATE FINISH: 6/22/94

INSPECTOR: JWC /AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6		TP12A-2-1	6'		[3-4] 	Box FULL OF TOOLS  ▽ 6' WATER
7				*Below	WATER TABLE	
8					BOTTOM OF PIT @ 8' Discontinued excavation Due To water	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS   TEST PIT #:

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.
CLIENT: USACOE
TEST PIT #: TP12A-3

PROJECT: 15 SWMU ESI (SEAD– 12A)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

JOB NUMBER: 720519
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/22/94
COMPLETION DATE: 6/22/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
11'	8'	6'	BACKHOE

MONITORING DATA

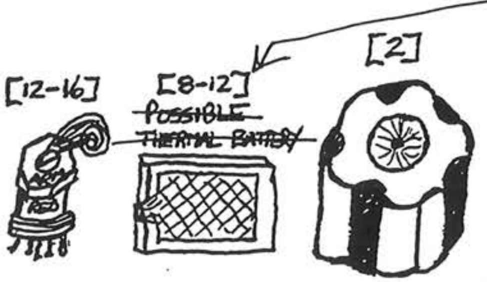
INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0eV	0	
LUDLUM 2221 w/scaler	α SCINTIL	3 CPM	0930 6/22/94
Ludlum #19 micro-R	γ COUNT	1.5	0930 6/22/94
VICTOREEN 190	GM-PROBE	1.59 µR/hr	0930 6/22/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:

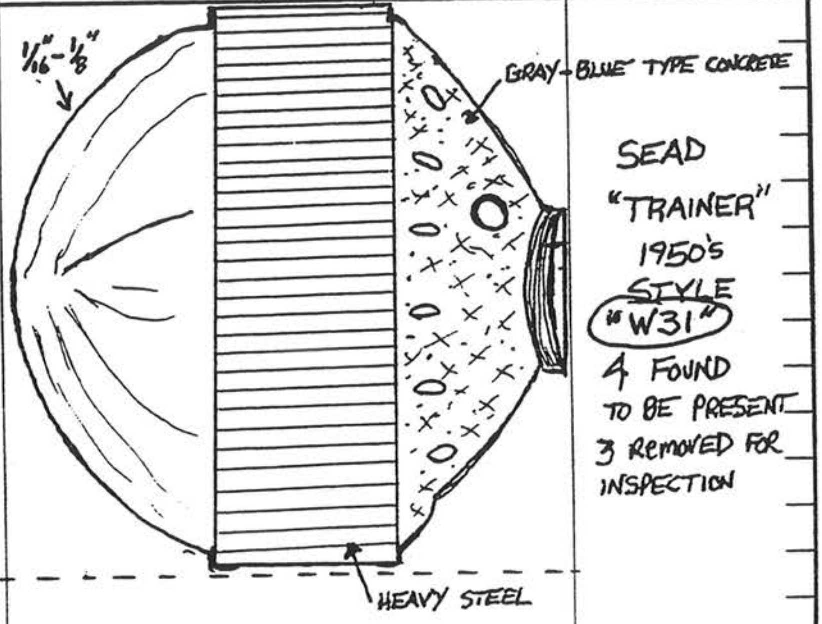
QA/QC Rinsate Sample Number:

SAMPLES SHIPPED: 6/23/94

SCALE (FT)	VOC./RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
				∼∼∼∼	TOPSOIL	
1 2	0ppm BKGD				LIGHT BROWN SILT WITH FOREIGN COMPONENTS DARK BURNT MATRIX	Identified as Ni Cd Battery - 11/13/96 ★ ANOMALIES
3 4 5	0ppm BKGD	TP12A-41	2.5'			SEAD "TRAINER" 1950'S STYLE "W31" 4 FOUND TO BE PRESENT 3 Removed FOR INSPECTION



30"



SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

PAGE 2 OF 2

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACOE	TEST PIT #: TP12A-4

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME	AS	ABOVE	

DATE START: 6/22/94
DATE FINISH: 6/22/94

INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC./ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6		TP12A-32	6'		BOTTOM OF PIT @ 6'	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12A-3

H:\ENG\SENECA\15SWMU\FIELDFMS\TSTPITP2.WK3

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** USACOE **TEST PIT #:** TP12A-4

PROJECT: 15 SWMU ESI (SEAD-12A)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

JOB NUMBER: 720519-01000
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/21/94
COMPLETION DATE: 6/22/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

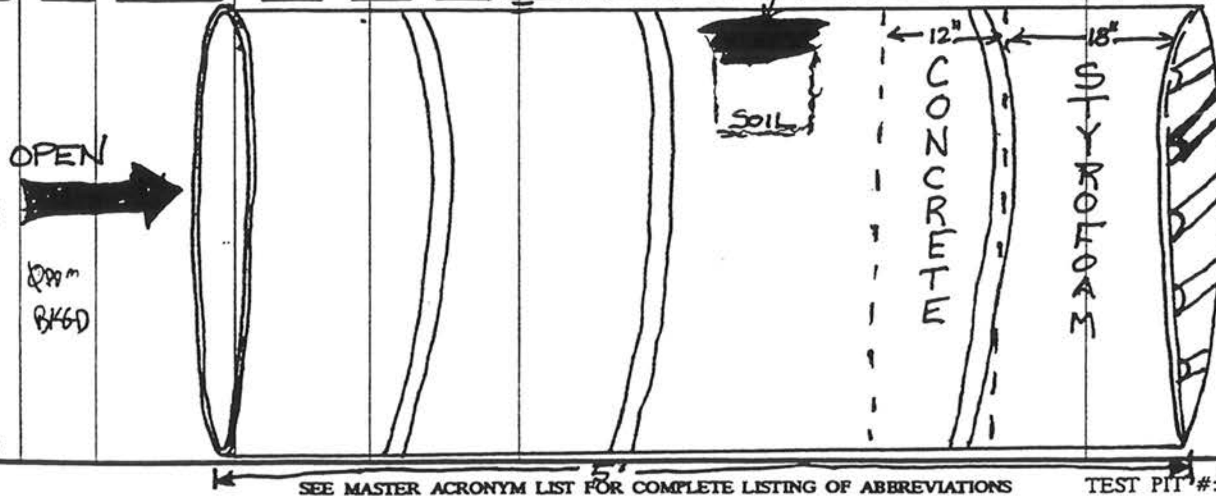
LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
12'	7.5'	50"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B			
LUDLUM 2221 w/scaler	α SCINTILL		
LUDLUM 19	γ	NAI	
VICTOREEN 190	βγ	GM-Probe	

QA/QC DUPLICATE SAMPLE: YES or NO
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
SAMPLES SHIPPED:

SCALE (FT)	VOC./RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					TOPSOIL	
1	0ppm BKGD				LIGHT BROWN SILT (FILL)	
2						
3	0ppm BKGD				LIGHT GRAY SILT (FILL) SAMPLE TP12A-4-2 WT @ 3'	
4	0ppm BKGD					
5						



SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP12A-4

H:\ENG\SENECA\15SWMU\FIELDFMS\TSTPITP1.WK3

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: SEAD

TEST PIT #: TP12A-5

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 12A TEST PIT #5

JOB NUMBER: 720
EST. GROUND ELEV.:
INSPECTOR: JWC/AS
CONTRACTOR: ES
START DATE: 6/23/94
COMPLETION DATE: 6/23/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
21'	5'	7'4"	BACKHOE

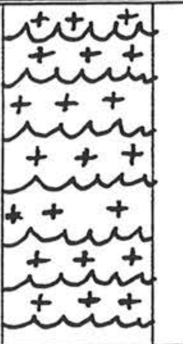
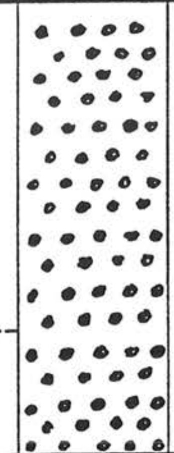
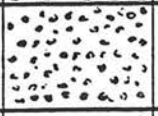
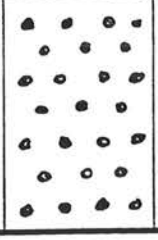
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 PPM	6/23/94
VICTOREEN-190	GM-PANCAKE	8-12 uR/hr	6/23/94
LUDLUM 2221 W/43-5	probe α	1-3 CPM	6/23/94
LUDLUM MICRO-R	NAI	8-12 uR/hr	6/23/94
EBERLINE RAP-1	FILTER		6/23/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number:

COMMENTS:

SCALE (FT)	VOC./RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0ppm BKGD				TOPSOIL W/1" DIA. SHALE (FILL) (6" PIECE OF GLASS)	0-18"
	0ppm BKGD				NATURAL DECAYING PEAT 18"-19"	
2 3	0ppm BKGD	TP12A-5-1	3'		OLIVE GRAY SILT	19"-42"
4	0ppm BKGD				LIGHT BROWN FINE SAND	42"-48"
5	0ppm BKGD				OLIVE GRAY SILT	48"-60"

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12A-5

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. **CLIENT:** SEAD **TEST PIT #:** TP 12A-5

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME	AS	ABOVE	

DATE START: 6/23/94
DATE FINISH: 6/23/94

INSPECTOR: JWC/AS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6					OLIVE GRAY SILT	60"-88"
7					BOTTOM OF TEST PIT @ 88"	
8						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12A-5

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	**CLIENT:** SEAD	**TEST PIT #:** TP12A-6

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 12A TEST PIT #6

JOB NUMBER: 720519
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES
START DATE: 6/23/94
COMPLETION DATE: 6/23/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
17'	7'	8'8"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 PPM	6/23/94
VICTOREEN-190	GM-PANCAKE	8-12 µR/hr	6/23/94
LUDLUM 2221 w/43-5	α SCINT	1-3 CPM	6/23/94
LUDLUM MICRO-R	NAI	8-12 µR/hr	6/23/94
EBERLINE-RAP-1	FILTER		6/23/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number:

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				TOPSOIL	0-11"
1	0ppm BKGD	TP12A-6-1	1'		LIGHT GRAY SILT (FILL) (BASE OF FILL)	11"-22"
2	0ppm BKGD				OLIVE GRAY SILT	22"-60"
3						
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #:

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: SEAD

TEST PIT #: TP12A-6

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME		AS	ABOVE

DATE START: 6/23/94
DATE FINISH: 6/23/94

INSPECTOR: JWC/AS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6						
					OLIVE GRAY SILT	60"-104"
7		TP12A-62	7'			
8						
					BOTTOM OF TEST PIT @ 8'8"	
					WEATHERED BEDROCK	
9						
10						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12A-6

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: USACOE

TEST PIT #: TP12A-7

PROJECT: 15 SWMU ESI

LOCATION: ROMULUS, NY

JOB NUMBER: 720519

EST. GROUND ELEV.

INSPECTOR: JWC/ABS

CONTRACTOR: ES/ESI

START DATE: 6/23/94

COMPLETION DATE: 6/23/94

CHECKED BY:

DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
11'	3'	7.5'	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	1610 h / 6/23/94
VICTOREEN-190	pancake	8-12 μR/hr	1610h / 6/23/94
LUDLUM 2221 w/ SCALER	α Scint.	1-3 CPM	1610h / 6/23/94
LUDLUM 19 μR	γ-NaI	8-12 μR/hr	1610h / 6/23/94
Eberline RAP-1	Filter	—	1610h To 1645h 6/23/94

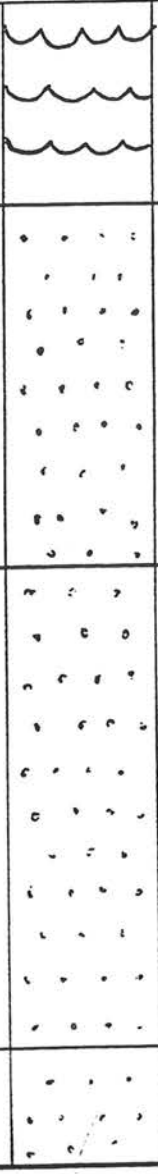
QA/QC DUPLICATE SAMPLE: YES or [✓ NO]

Duplicate Sample Number:

MRD Sample Number:

QA/QC Rinsate Sample Number:

COMMENTS:



SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				TopSoiL	
1 2	0ppm BKGD				10" OLive Gray SiIT	
3 4	0ppm BKGD	TP12A-7-1	3.5'		2'5" Dark Gray SiIT	
5	0ppm BKGD				4'5" ~~Dark~~ Gray SiIT	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12A-7

PAGE 2 OF 2

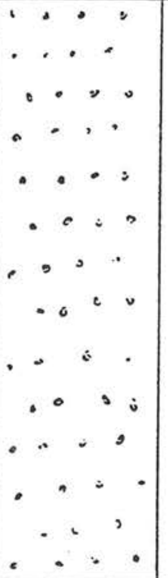
TEST PIT REPORT –

ENGINEERING-SCIENCE, INC. | **CLIENT:** | **TEST PIT #:** TP12A-7

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:
INSPECTOR: JWC/ABS
CONTRACTOR:

SCALE (FT)	VOC./ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6						
7						
					7'6"	
8						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP12A-7

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACOE	TEST PIT #: TP12A-8

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 72051
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/24/94
COMPLETION DATE: 6/24/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
12'	3'	7'	BACKHOE

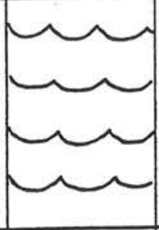
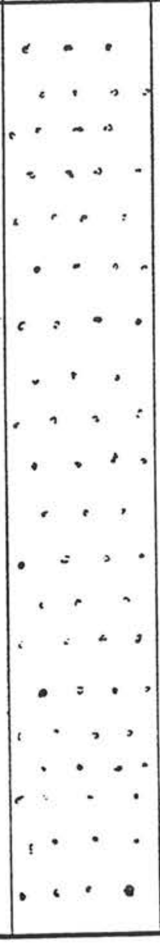
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	0937h / 6/24/94
VICTOREEN-190	PANCAKE	8-12 μR/hr	0937h / 6/24/94
LUDLUM 2221 w/ SCALER	α SCINT.	1-3 CPM	0937h / 6/24/94
LUDLUM 19 μR	γ-NaI	8-12 μR/hr	0937h / 6/24/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:

QA/QC Rinsate Sample Number:

COMMENTS:

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0ppm BKGD				Top Soil	
2	0ppm BKGD				1' 0" Olive Gray Silt with Some Fine To Large Shale Clasts	
3						
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12A-8

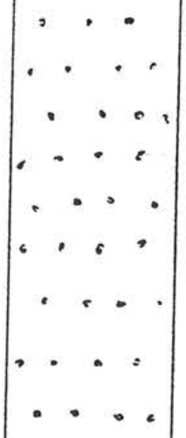
TEST PIT REPORT -

ENGINEERING-SCIENCE, INC.
CLIENT:
TEST PIT #: TP12A-8

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:
INSPECTOR: JWC/ABS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6						
7		TP12A-8-1	7.0'			
					7' 0" BASE OF PIT	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12A-8

PAGE 1 OF 2

TEST PIT REPORT

TP12B-1

ENGINEERING–SCIENCE, INC.

CLIENT: USACOE

TEST PIT #: ~~TP12B-4~~ KK

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 720519
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/25/94
COMPLETION DATE: 6/25/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
43'	3'	5' 3"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	0941h / 6/25/94
VICTOREEN-190	pancake	9-14 μR/h	0941h / 6/25/94
LUDLUM 2221 w/ SCALER	α Scint.	2-4 CPM	0941h / 6/25/94
LUDLUM 19 μR	γ-NaI	9-12 μR/h	0941h / 6/25/94
Eberline RAP-1	Filter	—	0941h / 6/25/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				TopSoil	
1	0ppm BKGD				2" Light Gray and Light Brown Silt and Sand	
2						
3	0ppm BKGD				2' 2" Olive Gray Silt with Shale Clasts and Very Little Light Brown Silty SAND ClASTS	
4		TP12B-1	4'			
5						

PAGE 2 OF 2

TEST PIT REPORT –

ENGINEERING-SCIENCE, INC. | **CLIENT:** | **TEST PIT #:** TP12B-4

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:

INSPECTOR: JWC/ABS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					5' 3" BASE OF PIT.	
6						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12B-4

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.
CLIENT: SEAD
TEST PIT #: TP12B-2

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 12B TEST PIT 12B-2

JOB NUMBER: 720519
EST. GROUND ELEV.:
INSPECTOR: JWC/AS
CONTRACTOR: ES
START DATE: 6/24/94
COMPLETION DATE: 6/24/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
18'	5'4"	5'10"	BACK HOE

MONITORING DATA

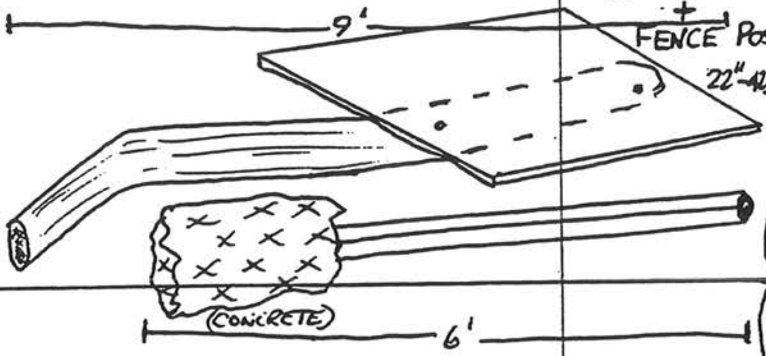
INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 ppm	1530h 6/24/94
VICTOREEN-190	GM Probe	8-12 uR/hr	1530h 6/24/94
LUDLUM 2221 w/43-5	α SCINT.	1-3 CPM	1530h 6/24/94
LUDLUM MICRO-R	γ NAI	8-12 uR/hr	1530h 6/24/94
EBERLINE RAP-1	Filter		6/24/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number: N/A

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm				TOPSOIL, LIGHT BROWN SILT	
1	BKGD 0ppm BKGD				OLIVE GRAY SILT W/ SHALE CLASTS	2"-22"
2 3	0ppm BKGD	TP12B-2-1	2.5'		LIGHT GRAY SILT (WET) W/SHALE CLASTS	SIGN POST + FENCE POST 22"-42"
4 5	0ppm BKGD				LIGHT BROWN SANDY SILT W/ SHALE CLASTS	42"-60"



SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #:

PAGE 2 OF 2

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. CLIENT: SEAD

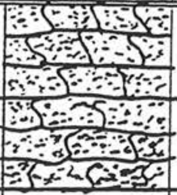
TEST PIT #: TP12B-2

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME AS ABOVE			

DATE START: 6/24/94
DATE FINISH: 6/24/94

INSPECTOR: JWC/AS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					LIGHT BROWN SANDYSILT	60"-70"
6					BOTTOM OF TEST PIT @ 5'10"	
7						
8						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12B-2

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP12B-3

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 12B TEST PIT #3

JOB NUMBER: 720519
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES
START DATE: 6/25/94
COMPLETION DATE: 6/25/94
CHECKED BY:
DATE CHECKED:

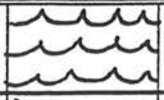
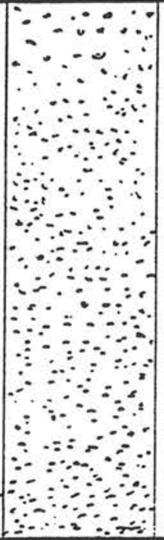
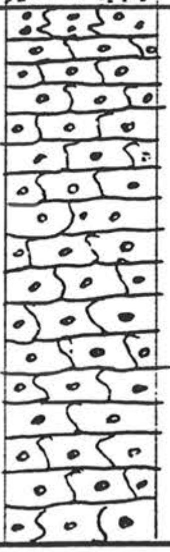
TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
14'	3'	8'4"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6eV	0 PPM	0835h 6/25/94
VICTOREEN-190	GM PROBE	8-12 µR/hr	0835h 6/25/94
LUDLUM 2221 w/43-5	α SCINT.	1-3 CPM	0835h 6/25/94
LUDLUM MICRO-R	γ NAI	8-12 µR/hr	0835h 6/25/94

QA/QC DUPLICATE SAMPLE: [✓ YES] or NO
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				TOPSOIL	0-4"
1 2	0ppm BKGD	TP12B-3-1	2.5'		Yellow-ORANGE FINE SAND	4"-33"
3 4 5	0ppm BKGD				OLIVE GRAY SILT W/SMALL & LARGE SUBROUNDED SHALE	33"-60"

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP12B-3

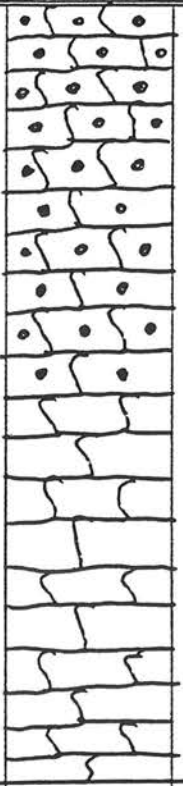
TEST PIT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** SEAD **TEST PIT #:** TP12B-3

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME AS ABOVE			

DATE START: 6/25/94
DATE FINISH: 6/25/94
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
						
6					OLIVE GRAY SILT w/SMALL & LARGE SUBROUNDED SHALE	
7						
8					BOTTOM OF TEST PIT @8'4"	
9						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP12B-3

LOG OF BORING NO. MW12A-1

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-12A**
PROJECT NO: **720519-01000**
DATE STARTED: **06/10/94**
DATE COMPLETED: **06/11/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" SPLIT SPOONS**

DEPTH TO WATER (ft): **9.1**
BORING LOCATION (N/E): **1015496.7 745165.9**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **656.9**
DATUM: **NAD 1983**
INSPECTOR: **FO**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.01	3 4 5 5	2.00	1.5	0	BGD	0.3		Grey-brown SILT, some fine Sand, trace fine Shale fragments, little organic material, loose, damp.	ML
						1.5		Grey-brown SILT, little(+) very fine Sand, trace(-) organic material, damp.	ML
						2.0		No Recovery	-
.02	6 11 21 22	2.00	1.8	0	BGD	3.8		Brown-grey SILT, some(-) very fine Sand, trace(+) Clay, trace fine Shale fragments, trace weathered Shale, stiff, moist.	ML
						4.0		No Recovery	-
.03	11 19 20 27	2.00	1.7	0	BGD	5.7		Light brown SILT, some very fine Sand, trace(+) very fine to fine Shale fragments, trace(-) Clay, trace(-) medium Shale fragments, medium stiff, moist.	ML
						6.0		No Recovery	-
.04	29 26 32 31	2.00	2.0	0	BGD	8.0		Light brown SILT, some very fine Sand, trace(+) very fine to fine Shale fragments, trace medium to coarse Shale fragments, stiff, moist to wet.	ML
.05	28 48 48 48	2.00	2.0	0	BGD	9.1 ▼		Light brown very fine SAND, little Silt, trace fine to medium Shale fragments, moist to wet.	SM
						9.2		Weathered SHALE, saturated.	
						9.5		AA, (8-9.1').	SM
						10.0		Grey-brown SILT, little very fine Sand, trace fine to coarse Shale fragments,	ML

NOTES: The following samples were collected for chemical analysis: (MW12A-1-00), (MW12A-1-03), (MW12A-1-05).

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LOG OF BORING MW12A-1

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT NO: **720519-01000**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**

GROUND SURFACE ELEVATION: **656.9**
INSPECTOR: **FO**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.06	18 18 12 9	2.00	1.5	0	BGD	11 11.5		very stiff, moist. Olive grey-brown SILT, little very fine Sand, lenses of highly weathered Shale, dry to saturated.	ML
						12.0		No Recovery	-
.07	12 18 80 100/.4	1.90	1.4	0	BGD	12 13 13.4		Dark grey very weathered SHALE, saturated.	-
						14		No Recovery	-

BORING TERMINATED AT 14.0'
SPOON REFUSAL

NOTES: The following samples were collected for chemical analysis: (MW12A-1-00), (MW12A-1-03), (MW12A-1-05).

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LOG OF BORING MW12A-1

Sheet 2 of 2

Sheet 1 of 2

LOG OF BORING NO. MW12A-2

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-12A**
PROJECT NO: **720519-01000**
DATE STARTED: **06/11/94**
DATE COMPLETED: **06/11/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" SPLIT SPOONS**

DEPTH TO WATER (ft): **4.6**
BORING LOCATION (N/E): **1015117.5 744926.6**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **656.3**
DATUM: **NAD 1983**
INSPECTOR: **KK**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	DESCRIPTION	USCS
.01	2 4 4 5	2.00	1.6	0	BGD	0.4	Brown, very fine to fine SAND, trace Silt, trace Organics, loose, dry to moist.	SM
						1.2	Tan, iron-stained SILT + very fine SAND, trace very fine to fine grey Shale fragments, trace Organics, loose to medium dense.	ML
						1.5	Olive grey SILT + CLAY, iron-stained, little(-) very fine to fine grey Shale fragments, medium stiff, slightly moist.	ML-CL
						1.6	AA, some highly weathered, highly fractured Shale.	ML-CL
						2.0	No Recovery	-
.02	5 7 7 10	2.00	1.6	0	BGD	2.3	AA, (1.2-1.5').	ML-CL
						2.4	Highly weathered, highly fractured black SHALE, moist.	
						2.7	Highly weathered SHALE, trace(-) grey, iron-stained Clay, trace(-) medium Gravel, moist.	-
						3.2	Light brown, very fine SAND, little(-) fine grey Shale fragments, trace(-) medium Gravel, loose to medium dense, wet.	SM
						3.6	Light brown to olive grey SILT + CLAY, little(-) coarse sand-sized grey Shale fragments, trace(-) fine Gravel, stiff, moist.	ML-CL
						4.0	No Recovery	-
.03	9 5 5 6	2.00	1.8	0	BGD	4.4	AA (3.2-3.6')	ML-CL
						4.6	Red, tan, and orange CLAY, stiff, moist.	CL
						5.5	Light brown fine SAND, trace Silt, trace red Clay in small lenses, loose, saturated.	SM
						5.6	Olive grey SILT + CLAY, some fine grey Shale fragments, saturated.	ML-CL
						5.8	Fractured, slightly weathered grey SHALE.	-
						6.0	No Recovery	-
.04	9 10 13 12	2.00	1.8	0	23	6.3	QUARTZ COBBLE	-
						7.8	Olive grey SILT + CLAY, iron-stained, some coarse grey Shale fragments, little fine to medium grey Shale fragments, medium stiff, saturated.	ML-CL
						8.0	No Recovery	-
.05	8 13 25 54	2.00	1.8	0	22	9.2	Olive grey SILT, little(+) fine to medium grey Shale fragments, soft, saturated.	ML
						10.0	Highly fractured, weathered grey SHALE, saturated.	-

Macro Lithology

NOTES: No samples were taken for chemical analysis.

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LOG OF BORING MW12A-2

Sheet 1 of 2

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT NO: **720519-01000**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**

GROUND SURFACE ELEVATION: **656.3**
INSPECTOR: **KK**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.06	35 100/.4	0.90	0.9	0	23	10.2		AA, (9.2-10').	-
								AA, dry.	-

BORING TERMINATED AT 10.9'
SPOON REFUSAL

NOTES: No samples were taken for chemical analysis.

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LOG OF BORING MW12A-2

Sheet 2 of 2

LOG OF BORING NO. MW12A-3

PROJECT: EIGHT MODERATELY LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
ASSOCIATED UNIT/AREA: SEAD-12A
PROJECT NO: 720519-01000
DATE STARTED: 06/12/94
DATE COMPLETED: 06/12/94
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" SPLIT SPOONS

DEPTH TO WATER (ft): 13.0
BORING LOCATION (N/E): 1015521.5 744532.2
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 655.6
DATUM: NAD 1983
INSPECTOR: KK
CHECKED BY: KK

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.01	3 5 5 10	2.00	1.2	0	BGD	0.5		Dark brown very fine SAND + SILT, little fine Sand, little Organics, loose, dry.	ML
						1.2		Grading from dark brown SILT + very fine SAND, trace Clay, trace Organics, trace(-) very fine Shale fragments to brown SILT + iron-stained grey CLAY, soft to medium stiff, moist.	ML-CL
						2.0		No Recovery	-
.02	10 13 19 32	2.00	1.8	0	BGD	2.3		AA, highly fractured, highly weathered Shale (2.2-2.25').	GM
						2.5		Red-orange SILT + CLAY, trace very fine Sand, trace fine grey Shale fragments and Gravel, medium stiff, moist.	ML-CL
						3.8		Olive-grey SILT + CLAY, little of grey Shale fragments and Gravel, trace medium Gravel, trace .01 lenses of red and tan Clay, stiff, moist.	ML-CL
						4.0		No Recovery	-
.03	19 21 36 47	2.00	1.6	0	BGD	4.2		AA (2.4-3.8)	ML-CL
						5.6		AA, no red and tan Clay, fractured coarse Shale fragments (4.9-5.0').	ML-CL
						6.0		No Recovery	-
.04	8 28 40 60	2.00	1.5	0	BGD	6.3		AA, (2.4-3.8'), little upper coarse Shale fragments, medium stiff, moist.	ML-CL
						6.5		Light brown-red SILT, little fine grey Shale fragments, medium stiff, moist.	ML
						7.5		SILT, little Clay, little fine to medium grey Shale fragments and Gravel, trace .01 lenses of red and tan Clay, grading brown-olive grey to light brown, stiff, moist.	ML
						8.0		No Recovery	-
.05	35 33 45 82	2.00	2.0	0	BGD	8.6		Light brown SILT, little very fine Sand, little fine grey Shale fragments, trace medium grey Shale fragments, medium stiff, wet.	ML
						10.0		Grey-light brown SILT, little fine grey Shale fragments and Gravel, trace medium grey Shale fragments and Gravel, iron-stained, stiff, moist.	ML

NOTES: No samples were collected for chemical analysis.

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT NO: **720519-01000**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**

GROUND SURFACE ELEVATION: **655.6**
INSPECTOR: **KK**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.06	28 32 35 28	2.00	1.7	0	BGD	10.6		Brown SILT + very fine SAND, little fine grey Shale fragments, trace medium grey Shale fragments, trace dark grey, iron-stained Clay, medium stiff, moist to wet.	ML
						11 11.7		Dark grey SILT + iron-stained CLAY, little fine gray Shale fragments, trace medium grey Shale fragments, trace light brown very fine Sand, medium stiff, moist to wet.	ML-CL
						12.0		No Recovery	-
.07	9 26 75 60	2.00	1.4	0	BGD	12 12.5		Dark grey SILT + CLAY, trace fine gray Shale fragments, soft to medium stiff, wet.	ML-CL
						12.6		Red CLAY, trace very fine grey Shale fragments, medium stiff, moist.	CL
						12.8		Brown-red SILT + CLAY, little very fine grey Shale fragments, soft to medium stiff, wet.	ML-CL
						13 13.0		Olive grey SILT + CLAY, trace coarse sand-sized grey Shale fragments, trace fine grey Shale fragments, soft, wet.	ML-CL
						13.2		Highly fractured, weathered grey SHALE, trace grey Silt, saturated.	-
						13.4		Grey SILT + coarse sand-sized grey SHALE fragments, trace fine grey Shale fragments, loose, saturated.	GM
						14.0		No Recovery	-
.08	8 95 100/.3	1.30	1.3	0	BGD	14 15		Highly fractured, highly weathered grey SHALE, trace grey Silt, saturated.	-

BORING TERMINATED AT 15.3'
AUGER REFUSAL

NOTES: No samples were collected for chemical analysis.

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LOG OF BORING MW12A-3

Sheet 1 of 2

LOG OF BORING NO. MW12B-1

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-12B**
PROJECT NO: **720519-01000**
DATE STARTED: **06/13/94**
DATE COMPLETED: **06/13/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **13.2**
BORING LOCATION (N/E): **1015934.0 743739.7**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **652.0**
DATUM: **NAD 1983**
INSPECTOR: **KK**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.01	4 6 9 12	2.00	2.0	0	BGD		0.3	Brown SILT + very fine SAND, trace fine angular Shale fragments, trace organics, loose, dry.	ML
						1	1.4	Olive grey SILT + very fine SAND, little(-) fine angular Shale fragments, trace medium angular Shale fragments, trace grey-tan, iron-stained Clay, medium stiff, dry to slightly moist.	ML
							1.6	Grey fine SAND + CLAY, loose, dry.	ML-CL
							2.0	AA, (0.3-1.4').	ML
.02	21 24 38 30	2.00	0.1	0	BGD	2	2.1	SHALE COBBLE fragment.	
						3	4.0	No Recovery	-
.03	14 17 18 23	2.00	2.0	0	BGD	4 5		Light brown SILT + very fine SAND, some very fine Shale fragments, trace fine to medium Shale fragments, medium stiff to stiff, moist.	ML
.04	20 20 23 25	2.00	2.0	0	BGD	6 7	8.0		
.05	20 22 20 24	2.00	2.0	0	BGD	8 9 10	10.0	AA, some iron staining, trace coarse Shale fragments, moist to wet.	ML

NOTES: The following samples were collected for chemical analysis: (MW12B-1.00), (MW12B-1.03), (MW12B-1.03-R), (MW12B-1.03-MRD), (MW12B-1.20-DUP), (MW12B-1.07).

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LOG OF BORING MW12B-1

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT NO: **720519-01000**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**

GROUND SURFACE ELEVATION: **652.0**
INSPECTOR: **KK**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.06	12 17 18 20	2.00	2.0	0	BGD	11 12.0		AA, (8-10').	ML
.07	20 24 27 20	2.00	2.0	0	BGD	12 13 13.2		Grading from light brown SILT + very fine SAND to dark grey very fine SAND, medium stiff, moist to wet.	ML
						14.0		Dark grey very fine + fine SAND, little Shale fragments, trace medium Shale fragments, soft, wet to saturated.	ML
.08	18 24 26 20	2.00	1.6	0	BGD	14 14.6		Dark grey very fine to fine SAND + fine to coarse SHALE fragments, trace Silt, trace light brown fine Sand, loose, saturated.	GP
						14.9		Highly fractured, slightly weathered SHALE, saturated.	-
						15 15.6		AA, (14-14.6').	GP
						16.0		No Recovery	-
.09	30 20 20 25	2.00	1.4	0	BGD	16 17 17.1		Grey fine to coarse SHALE fragments, little very fine to fine Sand, loose, saturated.	GP
						17.4		Highly weathered, highly fractured grey SHALE, saturated.	-
						18		No Recovery	-

BORING TERMINATED AT 18'

NOTES: The following samples were collected for chemical analysis: (MW12B-1.00), (MW12B-1.03), (MW12B-1.03-R), (MW12B-1.03-MRD), (MW12B-1.20-DUP), (MW12B-1.07).

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LOG OF BORING MW12B-1

LOG OF BORING NO. MW12B-2

PROJECT: EIGHT MODERATELY LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
ASSOCIATED UNIT/AREA: SEAD-12B
PROJECT NO: 720519-01000
DATE STARTED: 06/12/94
DATE COMPLETED: 06/12/94
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" SPLIT SPOONS

DEPTH TO WATER (ft): 8.4
BORING LOCATION (N/E): 1015919.8 743522.9
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 648.1
DATUM: NAD 1983
INSPECTOR: KK
CHECKED BY: KK

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.01	6 5 7 12	2.00	1.5	0	BGD	0.3		Brown, very fine SAND + SILT, trace organic, loose, dry.	ML
						1.5		Brown SILT + very fine SAND, little very fine Shale fragments, trace iron-stained grey Clay, trace fine Shale fragments and Gravel, medium stiff, moist to slightly moist.	ML
						2.0		No Recovery	-
.02	10 12 13 29	2.00	1.5	0	22	3.5		AA, brown to olive grey, stiff.	ML
						4.0		No Recovery	-
.03	9 11 13 20	2.00	1.4	0	20	5.4		AA, (2-3.5').	ML
						6.0		No Recovery	-
.04	11 19 22 22	2.00	2.0	0	BGD			Light brown SILT + very fine SAND, little very fine grey Shale fragments and Gravel, trace fine to medium Shale fragments and Gravel, moist to wet.	ML
.05	10 11 14 19	2.00	2.0	1.8	BGD	8.4			
						10.0		AA, saturated.	ML

NOTES: No samples were collected for chemical analysis.

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LOG OF BORING MW12B-2

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT NO: **720519-01000**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**

GROUND SURFACE ELEVATION: **648.1**
INSPECTOR: **KK**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.06	3 10 10 15	2.00	1.6	0	BGD	10.8		AA, (8.6-10'), wet.	ML
						11 11.2		Grading from light brown to olive grey very fine SAND + SILT, little very fine Shale fragments, moist to wet.	ML
						11.6		Grey, very fine to fine SAND, trace coarse sand-sized Shale fragments, soft, saturated.	SP
						12.0		No Recovery	SP
.07	13 13 26 57	2.00	1.3	0	BGD	12 12.3		AA (11.2-11.6')	-
						12.9		Grey, very fine to fine SAND + fine to medium SHALE fragments, soft, saturated.	GP
						13 13.3		Highly fractured, highly weathered SHALE fragments, saturated.	-
						14		No Recovery	-

BORING TERMINATED AT 14'

NOTES: No samples were collected for chemical analysis.

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LOG OF BORING MW12B-2

LOG OF BORING NO. MW12B-3

PROJECT: EIGHT MODERATELY LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
ASSOCIATED UNIT/AREA: SEAD-12B
PROJECT NO: 720519-01000
DATE STARTED: 06/12/94
DATE COMPLETED: 06/12/94
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2" SPLIT SPOONS

DEPTH TO WATER (ft): 6.3
BORING LOCATION (N/E): 1015995.8 743517.1
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 655.6
DATUM: NAD 1983
INSPECTOR: KK
CHECKED BY: KK

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.01	3 4 4 4	2.00	1.2	0	BGD	0.4		Dark brown SILT + very fine SAND, little Organics, loose, dry to slightly moist.	ML
						0.7		Light brown SILT, little very fine grey Shale fragments, medium stiff, moist.	ML
						0.9		Light brown SILT, little coarse Sand, little very fine grey Shale fragments, soft, saturated.	ML
						1.2		Olive grey SILT + iron-stained CLAY, little very fine grey Shale fragments, trace fine to medium grey Shale fragments, medium stiff, moist.	ML-CL
						2.0		No Recovery	-
.02	8 12 13 10	2.00	2.0	0.6	28	2.7		Olive grey to light brown SILT, some light grey and tan iron-stained Clay, little very fine grey Shale fragments, trace(-) medium Gravel, medium stiff, moist.	ML-CL
						2.8		AA, little grey fine Sand.	ML-CL
						4.0		AA, (2-2.7').	ML-CL
.03	10 11 11 14	2.00	1.6	0	27	5.6		AA, (2-2.7'), trace(-) coarse grey Shale fragments, trace Clay.	ML-CL
						6.0		No Recovery	-
.04	16 17 17 17	2.00	2.0	0	50	6.3		AA, (2-2.7') light brown, no Clay.	ML
						6.8		AA, saturated.	ML
						8.0		AA, wet to saturated.	ML
.05	10 12 10 10	2.00	1.7	1.8	20	9.5		AA, wet.	ML
						9.7		AA, little very fine Sand, soft, wet.	ML
						10.0			-

NOTES: No samples were collected for chemical analysis.

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Romulus, New York

LOG OF BORING MW12B-3

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT NO: **720519-01000**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**

GROUND SURFACE ELEVATION: **655.6**
INSPECTOR: **KK**
CHECKED BY: **KK**

Sample Number	Blow Counts (# Blows per 6")	Sample Advance	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.06	13 25 20 28	2.00	2.0	0	20	10.4		AA, wet.	ML
						10.6		Light brown fine SAND, some medium Sand, trace grey Shale fragments, saturated.	- SP
						11 11.2		AA, (8-9.5') grading from light brown to olive grey.	
						12.0		Dark grey SILT, little fine grey Shale fragments, trace medium to coarse grey Shale fragments, very stiff, moist.	ML
.07	29 55 75 93	2.00	1.8	0	25	12 13.0		AA, moist to wet.	ML
						13 13.8		Highly fractured, highly weathered grey Shale, saturated.	-
						14.0		No Recovery	-
.08	30 100/.3	0.80	0.4	0	BGD	14 14.4		AA (13.0-13.8')	-
								No Recovery	-

BORING TERMINATED AT 14.8'
SPOON REFUSAL

NOTES: No samples were collected for chemical analysis.

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LOG OF BORING MW12B-3

Sheet 2 of 2

APPENDIX A

ESI SOIL BORING AND TEST PIT LOGS

SEAD-63

Sheet 1 of 1

LOG OF BORING NO. MW63-1

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-63**
PROJECT NO: **720518-01000**
DATE STARTED: **06/13/94**
DATE COMPLETED: **06/13/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" SPLIT SPOONS**

DEPTH TO WATER (ft): **4.3**
BORING LOCATION (N/E): **1013124.1 741608.4**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **638.3**
DATUM: **NAD 1983**
INSPECTOR: **KK**
CHECKED BY: **FO**

This log is part of the report prepared by Engineering-Science, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Advance (ft)	Sample Recovery (ft)	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.01	3 5 5 5	2.00	1.5	0	BGD	0.3		Gray-brown SILT, some very fine Sand, some organics, loose, dry.	ML
						0.6		AA, no organics, medium stiff.	ML
						0.9		Pink-brown SILT, little very fine Sand, trace(-) organics, medium stiff, dry.	ML
						1 1.5		Brown, very fine SAND + SILT, trace Clay, trace(+) organics, trace fine gray weathered Shale fragments, medium stiff, moist.	ML
						2.0		No Recovery	-
.02	6 8 10 14	2.00	1.2	0	BGD	2 2.4		Brown very fine SAND, some Silt, trace fine Shale fragments, little weathered Shale fragments, moist to wet.	SM
						2.8		Brown SILT, some very fine Sand, trace weathered Shale fragments, moist.	ML
						3 3.2		AA, little(+) weathered Shale.	ML
						4.0		No Recovery	-
.03	5 9 27 72	2.00	1.8	0	BGD	4 4.3		Light brown very fine SAND, some Silt, trace weathered Shale fragments and trace fine Shale fragments.	SM
						5.0		Weathered SHALE, some Silt and very fine Sand, medium stiff, wet to saturated.	ML
						5 5.8		Highly weathered SHALE, moist.	-
						6.0		No Recovery	-
.04	93 100/.2	0.70	0.7	0	BGD	6 6.7		Highly weathered SHALE, dry.	-
						7 8		No Recovery	-
								BORING TERMINATED AT 8' AUGER REFUSAL	

NOTES: Bottom of overburden at 5'. No samples were collected for chemical analysis.

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LOG OF BORING MW63-1

Sheet 1 of 1

LOG OF BORING NO. MW63-2

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-63**
PROJECT NO: **720518-01000**
DATE STARTED: **06/14/94**
DATE COMPLETED: **06/14/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" SPLIT SPOONS**

DEPTH TO WATER (ft): **4.0**
BORING LOCATION (N/E): **1012979.9 741136.2**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **630.9**
DATUM: **NAD 1983**
INSPECTOR: **KK**
CHECKED BY: **FO**

This log is part of the report prepared by Engineering-Science, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Advance (ft)	Sample Recovery (ft)	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	DESCRIPTION	USCS
.01	3 4 4 5	2.00	1.2	0	BGD	0.2	Dark brown SILT + very fine SAND, some organics, trace very fine gray Shale fragments, loose, moist to wet.	ML
						0.5	Gray fractured, weathered SHALE, dry.	-
						1.0	Light brown SILT and very fine SAND, trace iron-stained Clay, little very fine to fine gray Shale fragments, trace medium gray Shale fragments, medium stiff, moist.	ML
						1.2	Light brown SILT, trace Clay, soft to medium stiff, moist. Iron stained.	ML
						2.0	No Recovery	-
.02	6 8 8 7	2.00	1.4	0	BGD	2.5	Light brown and olive gray SILT + CLAY, trace fine weathered Shale fragments, medium stiff, moist.	ML
						2.6	AA, some iron staining.	ML
						3.2	Olive gray SILT + CLAY, some fine to medium weathered gray Shale fragments, medium stiff, moist, trace wetness on Shale fragments. Some iron staining.	ML
						3.4	Olive gray SILT and very fine SAND, little very fine to fine weathered gray Shale fragments, soft, wet to saturated.	ML
						4.0	No Recovery	-
.03	2 1 1 2	2.00	0.7	0	BGD	4.4	Olive gray very fine to fine SAND, coarse Sand-sized gray Shale fragments, some fine gray Shale fragments, soft, saturated.	SP
						4.6	Olive gray SILT + CLAY, little very fine Sand, little very fine to fine gray Shale fragments, saturated.	ML
						4.7	AA, (4-4.4').	ML
						6.0	No Recovery	-
.04	12 24 75 100/.4	2.00	1.9	0	BGD	6.9	Olive gray very fine to fine SAND, some very fine to medium weathered gray Shale fragments, trace Silt, soft, saturated.	SP
						7.9	Highly weathered SHALE, saturated (6.9-7'), moist (7-7.2'), dry (7.2-7.9').	-
							No Recovery	-

BORING TERMINATED AT 8.2'

NOTES: Bottom of overburden at 6.9'. No samples were collected for chemical analysis.

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LOG OF BORING MW63-2

LOG OF BORING NO. MW63-3

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-63**
PROJECT NO: **720518-01000**
DATE STARTED: **06/14/94**
DATE COMPLETED: **06/14/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" SPLIT SPOONS**

DEPTH TO WATER (ft): **4.0**
BORING LOCATION (N/E): **1013181.9 741130.1**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **631.8**
DATUM: **NAD 1983**
INSPECTOR: **KK**
CHECKED BY: **FO**

This log is part of the report prepared by Engineering-Science, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Advance (ft)	Sample Recovery (ft)	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Macro Lithology	DESCRIPTION	USCS
.01	2 3 3 4	2.00	2.0	0	BGD		0.3	Olive gray SILT + fine SAND, some coarse Sand, little organics, loose, moist.	ML
							0.5	Gray coarse sand-sized SHALE fragments, little fine Sand, loose, wet.	GM
						1	1.2	Brown SILT, trace weathered fine Shale, trace iron-stained Clay, medium stiff to stiff, moist.	ML
							2.0	Brown SILT and tan very fine SAND, trace iron stained Clay, some gray, iron-stained Clay, trace very fine Sand, trace fine weathered shale, medium stiff, moist to wet.	ML
.02	4 5 5 5	2.00	1.8	0	BGD	2	2.7	Gray-brown, highly iron-stained CLAY, little fine to medium gray Shale fragments, trace weathered fine Shale, medium stiff, moist to wet, trace wetness on Shale fragments.	CL
							3.0	Light brown to brown very fine Sand, trace very fine gray Shale fragments, trace Silt, loose, wet to saturated.	SP
						3	3.8	Olive gray very fine to fine SAND, little very fine Shale fragments, trace Silt, trace fine to medium Shale fragments, loose, wet to saturated.	SM
							4.0	No Recovery	-
.03	4 4 3 4	2.00	1.3	0	9-21	4	4.4	AA (2.7'-3.0'), soft, saturated.	SP
						5	5.3	AA, little medium Shale fragments, very loose, saturated.	SP
							6.0	No Recovery	-
.04	24 78 100/.4	1.40	1.4	0	BGD	6	6.7	Olive gray very fine to fine SAND, some very fine to fine gray Shale fragments, trace Silt, soft, saturated.	SM
							6.8	Gray highly weathered SHALE, moist to wet.	
						7	7.4	Gray highly weathered SHALE, dry.	-
						8		No Recovery	-
								BORING TERMINATED AT 8.3'	

NOTES: Bottom of overburden at 6.7'. No samples were collected for chemical analysis.

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LOG OF BORING MW63-3

Sheet 1 of 1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. **CLIENT:** USACOE **TEST PIT #:** TP63-1

PROJECT: 15 SWMU ESI
LOCATION: Romulus N.Y.

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/25/94
COMPLETION DATE: 6/25/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
20'	4.5'	8'	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM 580B	10.0eV	0 ppm	1400 h 6/25/94
Victoreen-190	Pancake	10-15 µR/hr	1400 h 6/25/94
Ludlum 19 µR	NaI	8-13 µR/hr	1400 h 6/25/94
Ludlum 2221	α Scint.	6 CPM	1400h 6/25/94
Eberline RAP-1	Filter	——	1400h To 1600h 6/25/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:

QA/QC Rinsate Sample Number:

COMMENTS: Visitor: Kamal Gupta.

SCALE (FT)	VOC./ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0 ppm BKGD				TOPSOIL	
1	0 ppm BKGD				2" Shale Gravel	
2	0 ppm BKGD				1'0" Olive Gray Silt (one Half) Shale Gravel (one Half)	1' To 2': Half The width of The pit was Shale Gravel 2' To 8': was miscellaneous
3	0 ppm BKGD	TP63-1	3'		2' 4" Light Brown Silt (one Half) Shale Gravel (one Half)	components over 1/2 The width of The pit. Components
4 5	0 ppm BKGD	Base of This of The pit	1/2		with 3' 4" Miscellaneous Components	Included: Battery Assemblies, Accelerometers, Lock mechanisms, Fire/SAFE pins, BARO Switchs

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP63-1

PAGE 2 OF 2

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** | **TEST PIT #:** TP63-1

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:
INSPECTOR: JWC/AS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6						
7						
8						
					8' BASE OF PIT	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS   TEST PIT #: TP63-1

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: USACOE	TEST PIT #: TP63-2

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 72051
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/26/94
COMPLETION DATE: 6/26/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
3'	3'	5'6"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	0836h / 6/26/94
VICTOREEN-190	pancake	8-12 µR/hr	0836h / 6/26/94
LUDLUM 2221 w/ SCALER	α Scint.	5 cpm	0836h / 6/26/94
LUDLUM 19 µR	γ-NaI	9-12 µR/hr	0836h / 6/26/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:

QA/QC Rinsate Sample Number:

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				Top Soil	
1	0ppm BKGD				4" Shale gravel	
2	0ppm BKGD	TP63-2	2'		1'1" Olive Gray Silt	
3 4 5	0ppm BKGD				2'11" Light Brown Silt 5': ▽ water TABLE	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-2

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. | **CLIENT:**

TEST. PIT # TP63-2

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:
INSPECTOR: JWC/AS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6						
					5'6" BASE OF PIT	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-2

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	**CLIENT:** USACOE	**TEST PIT #:** TP63-3

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 720518
EST. GROUND ELEV.:
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/26/94
COMPLETION DATE: 6/26/94
CHECKED BY:
DATE CHECKED:

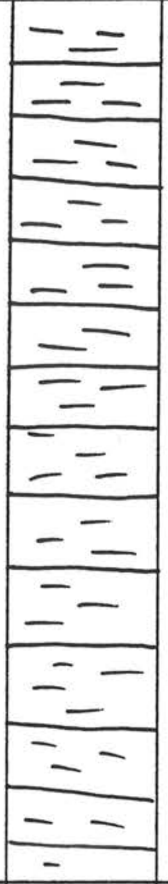
TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
13'	8'	9.2	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	0935h / 6 / 26 / 94
VICTOREEN-190	pancake	10-15 µR/hr	0935h / 6 / 26 / 94
LUDLUM 2221 w/ SCALER	α Scint.	2-5 cpm	0935h / 6 / 26 / 94
LUDLUM 19 µR	γ-NaI	10-15 µR/hr	0935h / 6 / 26 / 94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:
QA/QC Rinsate Sample Number:
COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				Topsoil	
1 2 3 4	0ppm BKGD				.9' Shale GRAVEL with dark Gray SilT.	
5	0ppm BKGD	0M			4.2' Miscellaneous Components	Anomalies: BATTery Assemblies, accelerometers, Cannon Connectors Lock Mechanisms, etc.

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP63-3

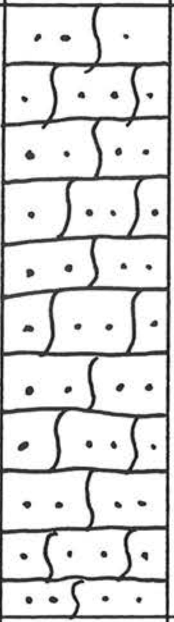
TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	**CLIENT:**	**TEST PIT #:** TP63-3

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:
INSPECTOR: JWC/ABS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6					∇ WATER @ 6.0'	
		TP63-3	6.5'			
7	0 ppm BKGD				6.5' Dark Gray SILT with shale clasts	
8						
9						
					9.2' Base of Pit	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-3

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT:	TEST PIT #: TP63-4

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 63 TEST PIT #4

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES
START DATE: 6/26/94
COMPLETION DATE: 6/26/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
12'	3'	6.5'	BACKHOE

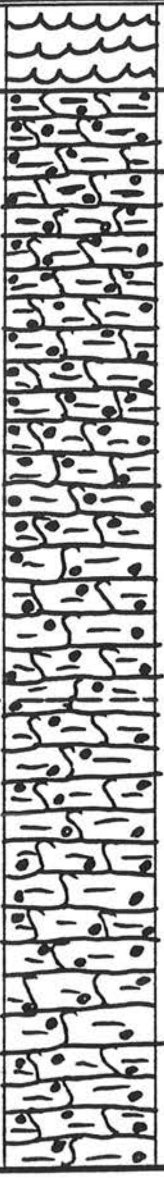
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 ppm	1330h 6/26/94
VICTOREEN-190	GM Probe	8-12 µR/hr	1330h 6/26/94
LUDLUM 2221 W/43-5	α Scint.	1-3 cpm	1330h 6/26/94
LUDLUM micro-R	γ NAI	8-12 µR/hr	1330h 6/26/94
EBERLINE RAP-1	Filter		

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number:

COMMENTS:



SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				TOPSOIL	0-4"
1	0ppm BKGD				SHALE /GRAVEL LAYER W/DARK SHALE W/ DARK GRAYSILT	Anomalies: Quick Connects, Battery Assm'bly, Baroswitch, Lock mechanisms, other. 4"-60"
2						
3		TP63-4-1	3'			
4						
5					▽ WATER TABLE @ 5'	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-4

TEST PIT REPORT

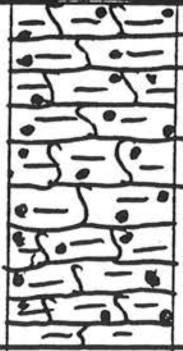
ENGINEERING-SCIENCE, INC. **CLIENT:** SEAD

TEST PIT #: TP63-4

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME AS ABOVE			

DATE START: 6/26/94
DATE FINISH: 6/26/94
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC./ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6					SHALE/GRAVEL LAYER W/ DARK SHALE W/DARK GRAY SILT BOTTOM OF TEST PIT @ 6'5"	60-77
7						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-4

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** SEAD | **TEST PIT #:** TP63-5

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 63 TEST PIT #5

JOB NUMBER: 72C518
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/26/94
COMPLETION DATE: 6/26/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
17'	3'	5'	BACKHOE

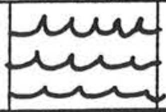
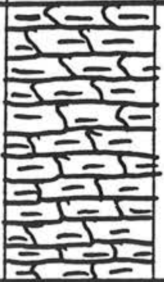
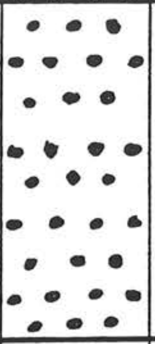
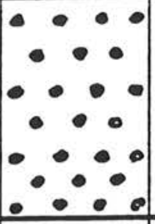
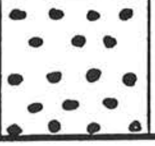
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6^{eV}	0 PPM	6/26/94
VICTOREEN-190	GM-Probe	8-12 µR/hr	6/26/94
LUDLUM 2221 W/43-5	α Scint.	1-3 CPM	6/26/94
LUDLUM MICRO-R	γ NAI	8-12 µR/hr	6/26/94
EBERLINE RAP-1	Filter		6/26/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number:

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE		STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
		NUMBER	DEPTH RANGE			
	0ppm BKGD				TOPSOIL	0-6"
1	0ppm BKGD				SHALE/GRAVEL	6"-21"
2	0ppm	TP63-5-1	2'			
3	BKGD				OLIVE GRAY SILT	21"-41"
4	0ppm BKGD				LIGHT BROWN SILT	41"-53"
5	0ppm BKGD				LIGHT BROWN SILT BOTTOM OF TEST PIT @ 5'	53"-60"

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #:

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: SEAD

TEST PIT #: TP63-6

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 63

JOB NUMBER: 720518
EST. GROUND ELEV.:
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/27/94
COMPLETION DATE: 6/27/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
39'	3'	8'	BACKHOE

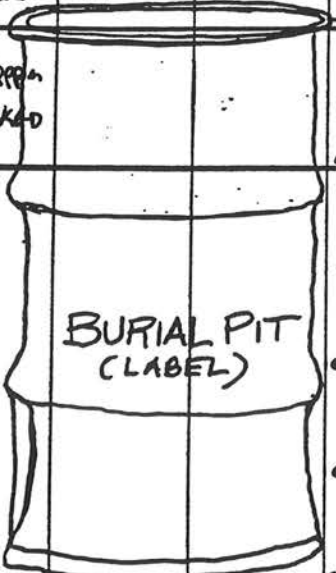
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 ppm	6/27/94
VICTOREEN-190	GM-Probe	8-12 uR/hr	6/27/94
LUDLUM 2221 w/43-5	α SCINT.	1-3 cPm	6/27/94
LUDLUM micro-R	γ NAI	8-12 uR/hr	6/27/94
EBERLINE RAP-1	filter		6/27/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number:

COMMENTS:



SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				TOPSOIL	0"-4"
1	0ppm BKGD				LIGHT BROWN SILT (very stiff) SHALE DEPOSITS	4"-12"
2 3	0ppm BKGD	TP63-6-1	3'		LIGHT GRAY SILT	12"-45"
4 5	0ppm BKGD				OLIVE GRAY SILT	45"-60"

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-6

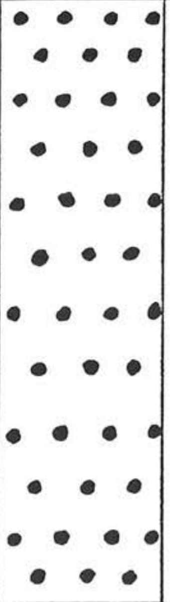
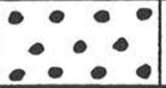
TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	**CLIENT:** SEAD	**TEST PIT #:** TP63-6

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME AS ABOVE			

DATE START: 6/27/94
DATE FINISH: 6/27/94
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6 7					OLIVE GRAY SILT	60"-92"
8					BOTTOM OF TEST PIT #6	92"-96"
9						
10						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-6

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** SEAD

TEST PIT #: TP63-7

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 63 TEST PIT #7

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/27/94
COMPLETION DATE: 6/27/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
11'	10'	8'	BACKHOE

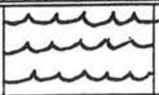
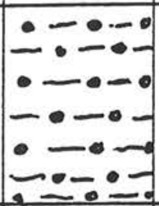
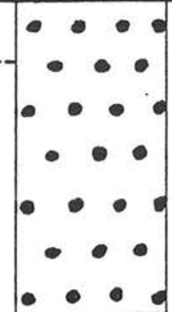
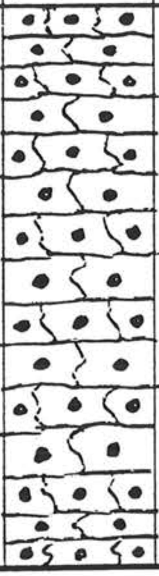
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 ppm	6/27/94 (1120)
VICTOREEN-190	GM-Probe	8-12 μR/hr	6/27/94 (1120)
LUDLUM 2221 w/43-5	α SCINT.	1-3 CPM	6/27/94 (1120)
LUDLUM MKRG-R	γ NAI	8-12 μR/hr	6/27/94 (1120)
EBERLINE RAP-1	filter		6/27/94 (1120)

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number: N/A

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE		STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
		NUMBER	DEPTH RANGE			
	0ppm BKGD				TOPSOIL	0-4"
1	0ppm BKGD				LIGHT GRAY GRAVEL & SILT	4"-15"
2	0ppm BKGD	TP63-7-1	1.5'		LIGHT BROWN SILT	*WIRING, QUICK CONNECTS CRUSHED DRUM 15"-31"
3 4 5	0ppm BKGD				OLIVE GRAY SILT w/SHALE DEPOSITS	31"-60"

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-7

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. **CLIENT:** SEAD

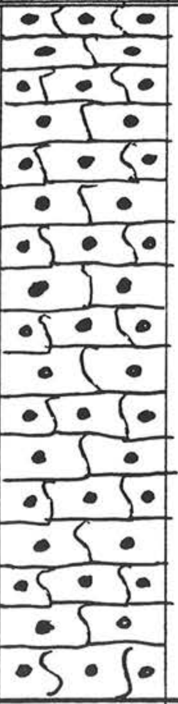
TEST PIT #: TP63-7

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME AS ABOVE			

DATE START: 6/27/94
DATE FINISH: 6/27/94

INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC./ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6						
					OLIVE GRAY SILT w/SHALE DEPOSITS	60"-96"
7						
8					BOTTOM OF TEST PIT #7	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** SEAD | **TEST PIT #:** TP63-8

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 63 TEST PIT #8

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/27/94
COMPLETION DATE: 6/27/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
13'3"	3'	5'3"	BACKHOE

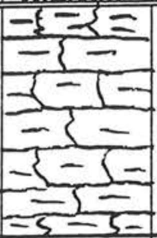
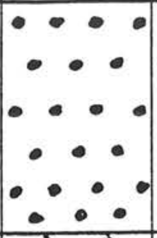
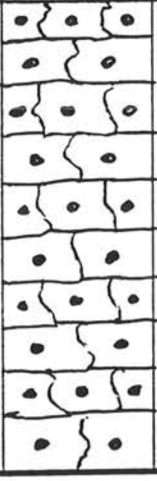
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 ppm	6/27/94 (1350)
VICTOREEN-190	GM-PROBE	8-12 uR/hr	6/27/94 (1350)
LUDLUM 2221 w/43-5	α SCINT.	1-3 CPM	6/27/94 (1350)
LUDLUM MICRO-R	γ NAI	8-12 uR/hr	6/27/94 (1350)
EBERLINE RAP-1	filter		6/27/94 (1350)

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number: N/A

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0ppm BKGD				SHALE/GRAVEL	0-12"
2	0ppm BKGD	TP63-8-1	1.5'		Yellow-ORANGE SILT	12"-24"
3	0ppm BKGD				LIGHT BROWN SILT	24"-36"
4 5	0ppm BKGD				OLIVE GRAY SILT w/SHALE DEPOSITS	36"-60"

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-8

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** SEAD | **TEST PIT #:** TP63-8

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME AS ABOVE			

DATE START: 6/27/94
DATE FINISH: 6/27/94

INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC./ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					WATER TABLE ▽ @ 5'3"	
					BOTTOM OF TEST PIT #8	
6						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-8

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: SEAD

TEST PIT #: TP63-9

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 63 TEST PIT #9

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/27/94
COMPLETION DATE: 6/27/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
14.5'	3'	8'2"	BACKHOE

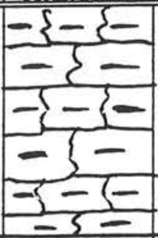
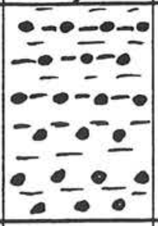
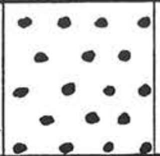
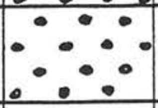
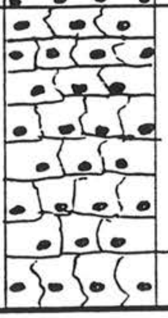
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 ppm	6/27/94 (1455)
VICTOREEN 190	GM-Probe	8-12 uR/hr	6/27/94 (1455)
LUDLUM 2221 w/43-5	α SCINT.	1-3 CPM	6/27/94 (1455)
LUDLUM MICRO-R	γ NAI	8-12 uR/hr	6/27/94 (1455)
EBERLINE RAP-1	filter		6/27/94 (1455)

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A

QA/QC Rinsate Sample Number: N/A

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0ppm BKGD				SHALE/GRAVEL	0-12"
2	0ppm BKGD				LIGHT BROWN SILT w/SOME GRAVEL	12"-23"
	0ppm BKGD	TP63-9	2.5'		OLIVE GRAY SILT	23"-32" BASE OF FILL
3	0ppm BKGD				LIGHT BROWN SILT (W/ORGANIC MATTER 32"-34")	32"-36"
	0ppm BKGD				DARK GRAY SILT	36"-45"
4 5	0ppm BKGD				OLIVE GRAY SILT (w/SHALE DEPOSITS)	45"-60"

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-9

TEST PIT REPORT

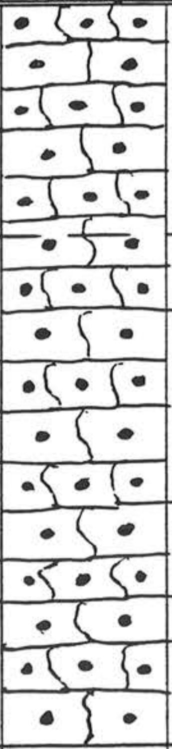
ENGINEERING-SCIENCE, INC. **CLIENT:** SEAD **TEST PIT #:** TP63-9

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME	AS	ABOVE	

DATE START: 6/27/94
DATE FINISH: 6/27/94

INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6					WATER TABLE @ 6'	
					OLIVE GRAY SILT W/SHALE DEPOSITS	45-98"
7						
8					BOTTOM OF TEST PIT @ 8'2"	
9						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-9

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	**CLIENT:** SEAD	**TEST PIT #:** TP63-10

PROJECT: 15 SWMU INVESTIGATION
LOCATION: SEAD 63 TEST PIT #10

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/28/94
COMPLETION DATE: 6/28/94
CHECKED BY:
DATE CHECKED:

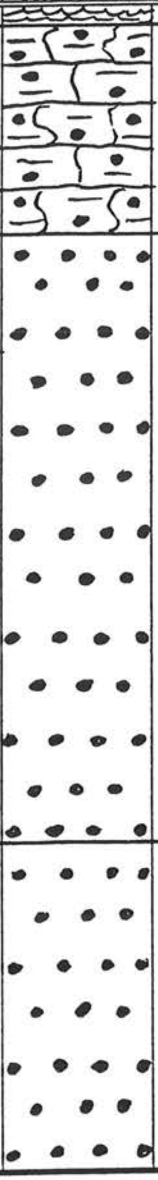
TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
12'	3'	5'4"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	0 ppm	6/28/94 (0840)
VICTOREEN-190	GM-Probe	8-12 µR/hr	6/28/94 (0840)
LUDLUM 2221 w/43-5	α SCINT.	1-3 CPM	6/28/94 (0840)
LUDLUM MK60-R	γ NAI	8-12 µR/hr	6/28/94 (0840)
EBERLINE RAP-1	filter		6/28/94 (0840)

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number: N/A
MRD Sample Number: N/A
QA/QC Rinsate Sample Number: N/A
COMMENTS:



SCALE (FT)	VOC./RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0 ppm				TOPSOIL / PEAT MOSS	0-1"
1	BKGD 0 ppm BKGD				SHALE/GRAVEL w/SILT	1"-12"
2 3	0 ppm BKGD	TP63-10	1.5'		LIGHT BROWN SILT	12"-44"
4 5	0 ppm BKGD				OLIVE GRAY SILT	44"-60"

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-10

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. **CLIENT:** SEAD

TEST PIT #: TP63-10

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
SAME	AS	ABOVE	

DATE START: 6/28/94
DATE FINISH: 6/28/94

INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					OLIVE GRAY SILT	60"-64"
					BOTTOM OF TEST PIT @ 64"	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-10

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** USACOE

TEST PIT #: TP63-11

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 72051
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/28/94
COMPLETION DATE: 6/28/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
14'	5' 8"	7' 3"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	0906 h / 6 / 28 / 94
VICTOREEN-190	pancake	10-15 µR/hr	0906 h / 6 / 28 / 94
LUDLUM 2221 w/ SCALER	α Scint.	3-5 CPM	0906 h / 6 / 28 / 94
LUDLUM 19 µR	γ-NaI	10-15 µR/hr	0906 h / 6 / 28 / 94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:

QA/QC Rinsate Sample Number:

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				Top Soil	
1 2	0ppm BKGD				4" Olive Gray Silt and Shale Gravel with Few miscellaneous components	miscellaneous components included: Accelerometers, BARO switches, Battery Assemblies, Lock mechanisms.
3	0ppm BKGD	TP63-11	3'		2' 4" DARK Gray Fine Shale Gravel with miscellaneous components	
4	0ppm BKGD				3'10" DARK OLIVE GRAY SILT with Few Shale Clasts	
	0ppm BKGD				4'4" Light Brown Silt	
5	0ppm BKGD				4'9" Olive Gray Silt	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-11

TEST PIT REPORT

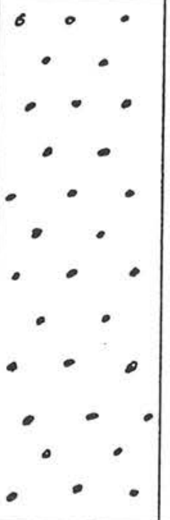
ENGINEERING-SCIENCE, INC. | **CLIENT:** | **TEST PIT #:** TP63-11

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:

INSPECTOR: JWC/AS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
6 7						
8					7'3" BASE OF PIT	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-11

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACOE	TEST PIT #: TP63-12

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 72051
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/28/94
COMPLETION DATE: 6/28/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
			BACKHOE

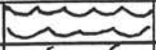
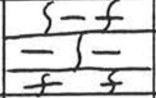
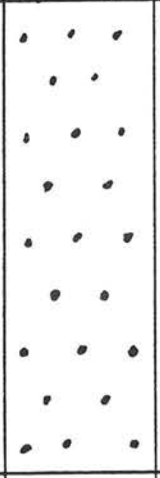
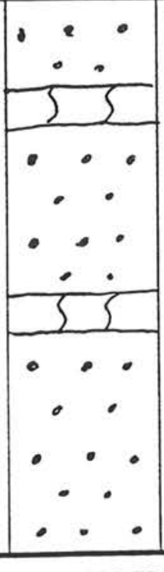
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	1040h / 6/28/94
VICTOREEN-190	pancake	9-15 µR/hr	1040h / 6/28/94
LUDLUM 2221 w/ SCALER	α Scint.	1-3 CPM	1040h / 6/28/94
LUDLUM 19 µR	γ-NaI	9-15 µR/hr	1040h / 6/28/94

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:

QA/QC Rinsate Sample Number:

COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm BKGD				TopSoil	
	0ppm BKGD				2" DARK Gray Shale Gravel	
1 2	0ppm BKGD				7" Olive Gray SilT with Few shale clasTs	
3 4 5	0ppm BKGD	TP63-12	5'		2' 8" Olive Gray Silt with Few Shale DeposiTs	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP63-12

PAGE 2 OF 2

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. | **CLIENT:** | **TEST PIT #:** TP63-12

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START:
DATE FINISH:
INSPECTOR: JWC/ABS
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
						
					BASE OF PIT 5' 4"	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP63-12

G:\123DATA\FIELDFMS\TSTPITP2.WK3

APPENDIX B

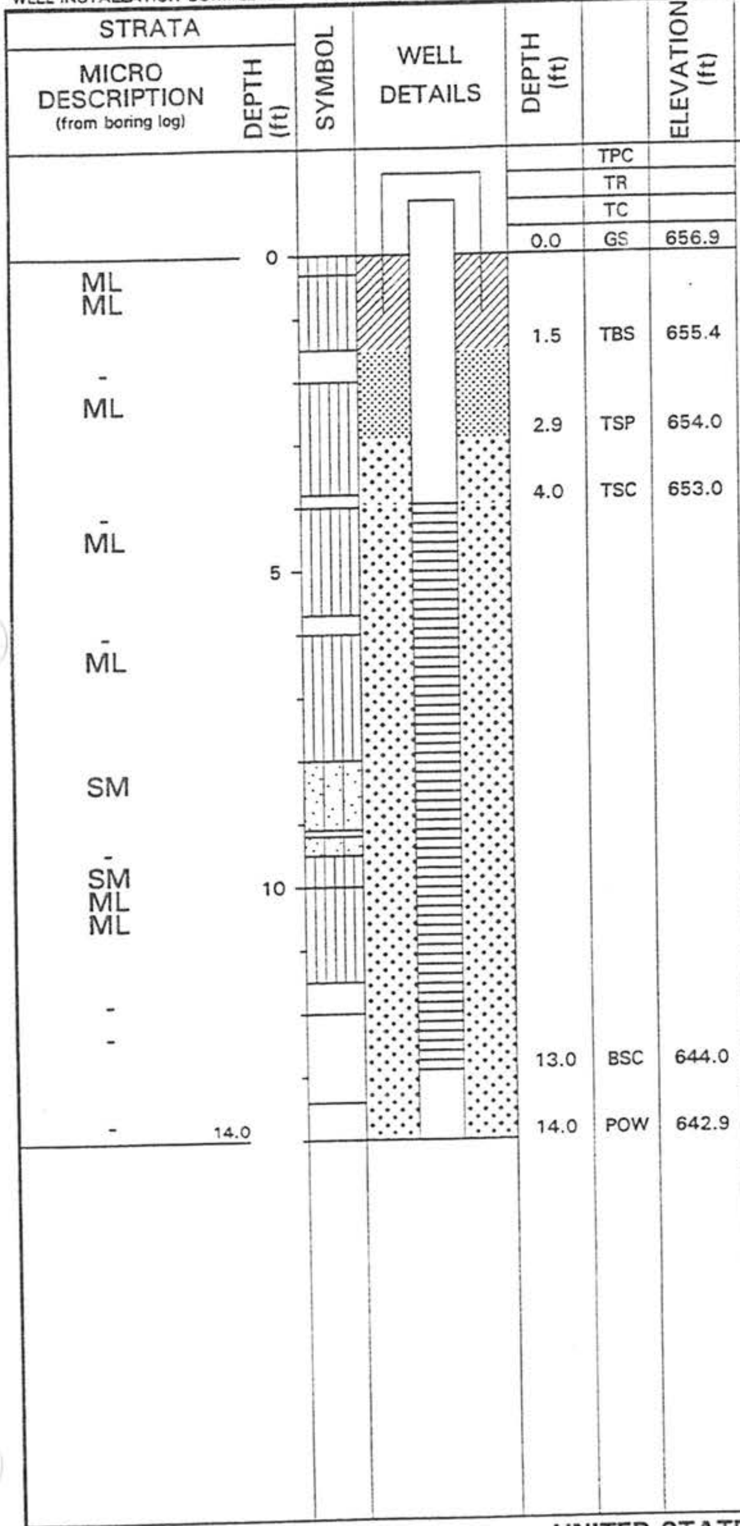
ESI MONITORING WELL INSTALLATION DIAGRAMS

Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW12A-1

PROJECT: EIGHT MODERATELY LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
WELL INSTALLATION STARTED: 06/10/94
WELL INSTALLATION COMPLETED: 06/11/94

WELL LOCATION (N/E): 1015496.7 745165.9
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 656.9
DATUM: NAD 1983
GEOLOGIST: F. O'LOUGHLIN
CHECKED BY: KK



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	656.9
1.5	TBS	655.4
2.9	TSP	654.0
4.0	TSC	653.0
13.0	BSC	644.0
14.0	POW	642.9

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: 4
Type: RISER
Interval: 3.5

RISER
Diameter: 2
Type: SCH. 40-PVC
Interval: 5

SCREEN
Diameter: 2
Type: SCH. 40-PVC/0.010
Interval: 9

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE PELLETS
Interval: 1.4

SANDPACK
Type: #1, #3
Interval: 11.1

WELL DEVELOPMENT DATA
Date: 6/22/94
Method: BAIL
Duration: 170 MIN
Rate: 1.4 L/MIN

WATER LEVELS

	Date	Time	Depth, TR
▽	6/22	1130	6.30
▼	6/22	1525	6.42

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.24	9.5	590	26.1

LEGEND

▨	SURFACE SEAL
▩	GROUT
▒	SEAL
⁘	SANDPACK
●	GRAVEL
⁘	SAND
▥	SILT
▨	CLAY
☒	NO RECOVERY

TPC	TOP OF PROTECTIVE CASING
TR	TOP OF WELL RISER
GS	GROUND SURFACE
TG	TOP OF GROUT
TBS	TOP BENTONITE SEAL
TSP	TOP OF SANDPACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
POW	POINT OF WELL

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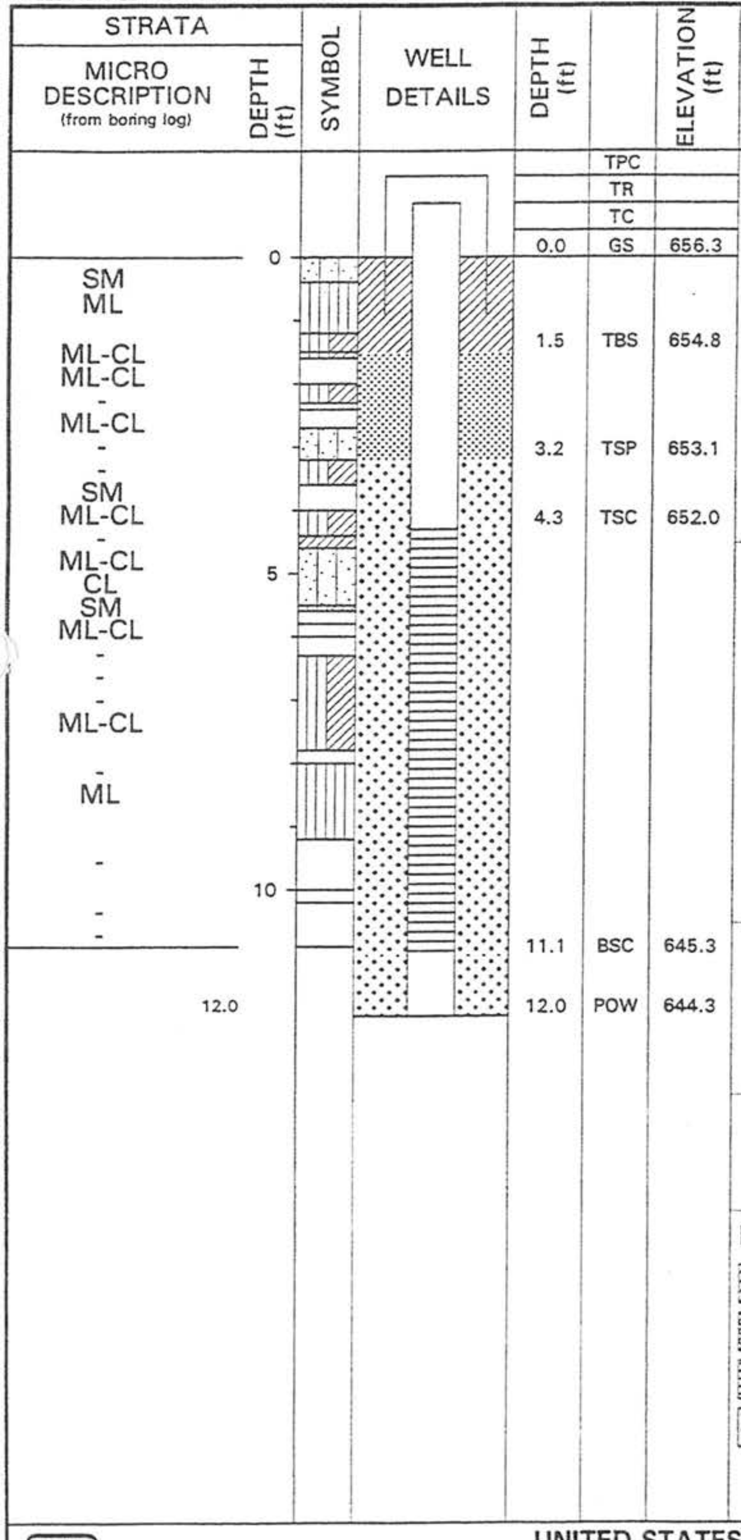
COMPLETION REPORT OF
WELL No. MW12A-1
Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW12A-2

PROJECT:	EIGHT MODERATELY LOW PRIORITY AOCs	WELL LOCATION (N/E):	1015117.5 744926.6
PROJECT LOCATION:	SENECA ARMY DEPOT, ROMULUS NY	REFERENCE COORDINATE SYSTEM:	New York State Plane
DRILLING CONTRACTOR:	EMPIRE SOILS INVESTIGATIONS	GROUND SURFACE ELEVATION (ft):	656.3
DRILLING METHOD:	HOLLOW STEM AUGER	DATUM:	NAD 1983
WELL INSTALLATION STARTED:	06/11/94	GEOLOGIST:	F. O'LOUGHLIN
WELL INSTALLATION COMPLETED:	06/11/94	CHECKED BY:	KK



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	656.3
1.5	TBS	654.8
3.2	TSP	653.1
4.3	TSC	652.0
11.1	BSC	645.3
12.0	POW	644.3

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: **4**
Type: **RISER**
Interval: **3.5**

RISER
Diameter: **2**
Type: **SCH. 40-PVC**
Interval: **5.35**

SCREEN
Diameter: **2**
Type: **SCH. 40-PVC/0.010**
Interval: **3.95, 1.95**

SURFACE SEAL
Type: **CEMENT**
Interval: **1.5**

GROUT
Type: **N/A**
Interval: **N/A**

SEAL
Type: **BENTONITE PELLETS**
Interval: **1.7**

SANDPACK
Type: **#1, #3**
Interval: **8.8**

WELL DEVELOPMENT DATA
Date: **6/23/94**
Method: **BAIL**
Duration: **130 MIN**
Rate: **.1140 L/MIN**

WATER LEVELS

Date	Time	Depth,TR
6/23	0930	5.30
6/23	1230	5.36
6/23	1430	5.85

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.11	8.5	425	4.94

LEGEND

▨	SURFACE SEAL	●	GRAVEL	TPC	TOP OF PROTECTIVE CASING
▩	GROUT	⁘	SAND	TR	TOP OF WELL RISER
▦	SEAL	▥	SILT	GS	GROUND SURFACE
⁘	SANDPACK	▨	CLAY	TG	TOP OF GROUT
		×	NO RECOVERY	TBS	TOP BENTONITE SEAL
				TSP	TOP OF SANDPACK
				TSC	TOP OF SCREEN
				BSC	BOTTOM OF SCREEN
				TD	TOTAL DEPTH
				POW	POINT OF WELL

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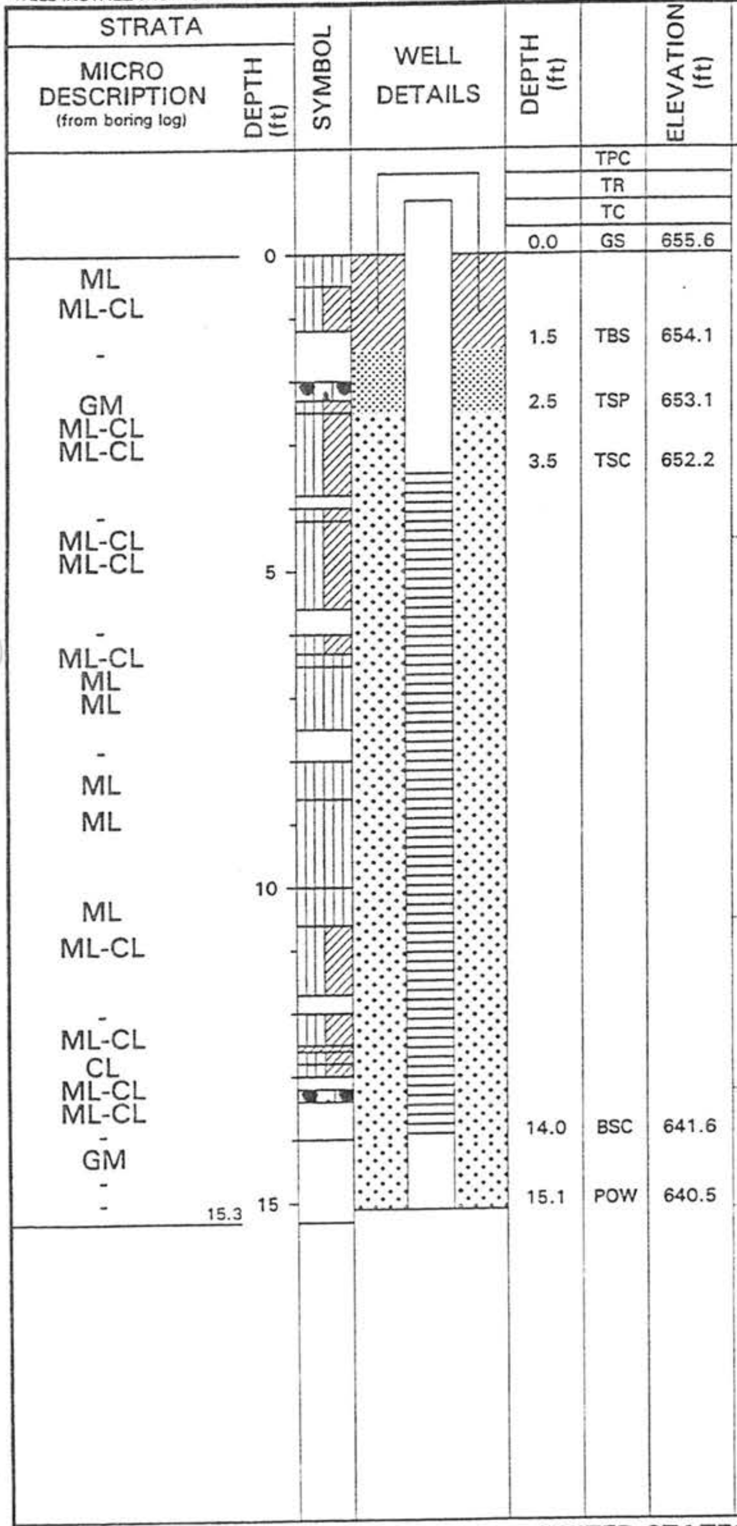
COMPLETION REPORT OF
WELL No. MW12A-2

COMPLETION REPORT OF WELL No. MW12A-3

PROJECT:	EIGHT MODERATELY LOW PRIORITY AOCs	WELL LOCATION (N/E):	1015521.5 744532.2
PROJECT LOCATION:	SENECA ARMY DEPOT, ROMULUS NY	REFERENCE COORDINATE SYSTEM:	New York State Plane
DRILLING CONTRACTOR:	EMPIRE SOILS INVESTIGATIONS	GROUND SURFACE ELEVATION (ft):	655.6
DRILLING METHOD:	HOLLOW STEM AUGER	DATUM:	NAD 1983
WELL INSTALLATION STARTED:	06/12/94	GEOLOGIST:	F. O'LOUGHLIN
WELL INSTALLATION COMPLETED:	06/12/94	CHECKED BY:	KK



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	655.6
1.5	TBS	654.1
2.5	TSP	653.1
3.5	TSC	652.2
14.0	BSC	641.6
15.1	POW	640.5

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: 4
Type: RISER
Interval: 3.5

RISER
Diameter: 2
Type: SCH. 40-PVC
Interval: 4.8

SCREEN
Diameter: 2
Type: SCH. 40-PVC/0.010
Interval: 9, .8

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE PELLETS
Interval: 1

SANDPACK
Type: #1, #3
Interval: 12.8

WELL DEVELOPMENT DATA
Date: 6/22/94
Method: BAIL/PUMP
Duration: 163 MIN
Rate: 2 L/MIN

WATER LEVELS

	Date	Time	Depth,TR
▽	6/22	1130	6.06
▼	6/22	1600	6.30

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
8.02	10	580	20

LEGEND

▨	SURFACE SEAL	●	GRAVEL	TPC	TOP OF PROTECTIVE CASING
▩	GROUT	⁙	SAND	TR	TOP OF WELL RISER
░	SEAL	▥	SILT	GS	GROUND SURFACE
⁙	SANDPACK	▨	CLAY	TG	TOP OF GROUT
		☒	NO RECOVERY	TBS	TOP BENTONITE SEAL
				TSP	TOP OF SANDPACK
				TSC	TOP OF SCREEN
				BSC	BOTTOM OF SCREEN
				TD	TOTAL DEPTH
				POW	POINT OF WELL

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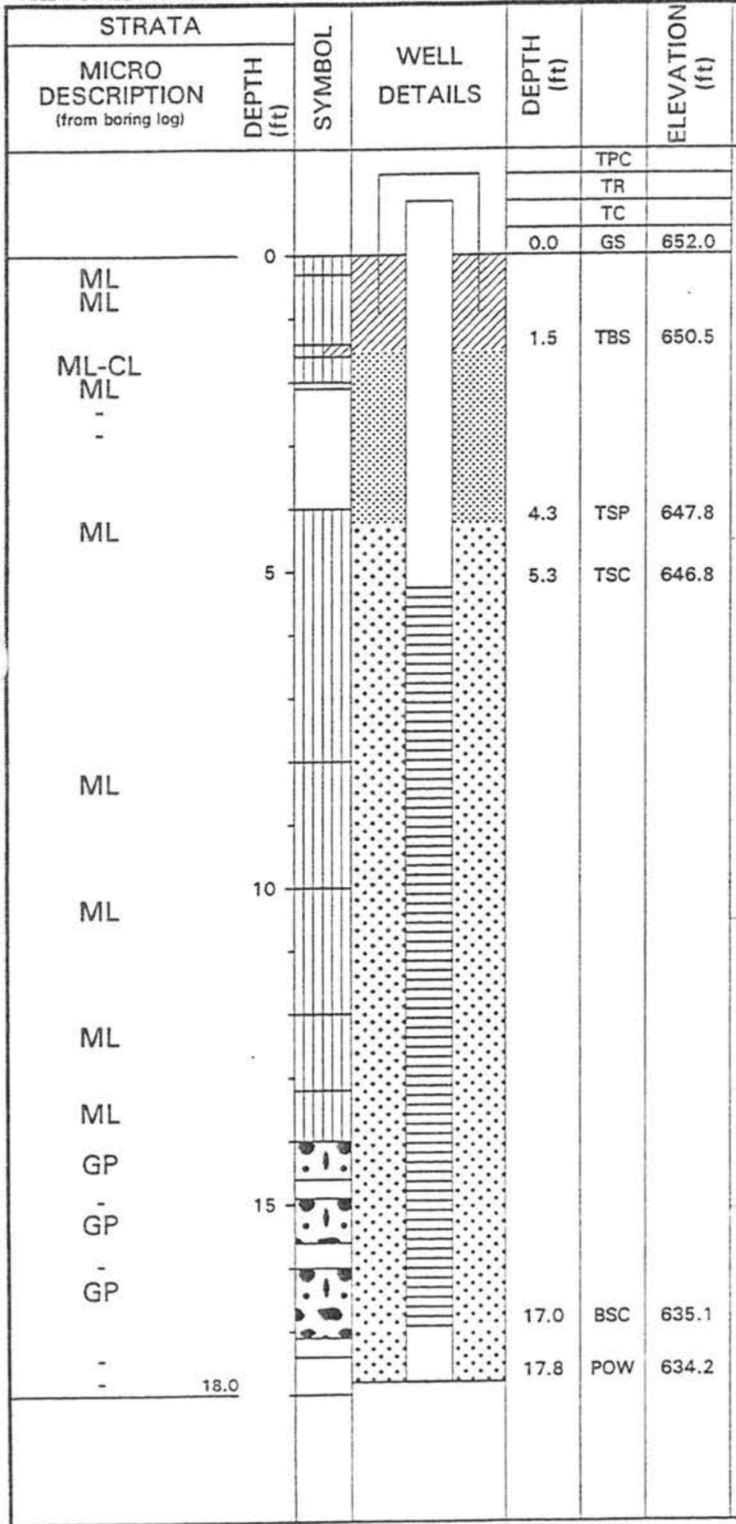
COMPLETION REPORT OF
WELL No. MW12A-3

COMPLETION REPORT OF WELL No. MW12B-1

PROJECT: **EIGHT MODERATELY LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
WELL INSTALLATION STARTED: **06/13/94**
WELL INSTALLATION COMPLETED: **06/13/94**

WELL LOCATION (N/E): **1015934.0 743739.7**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **652.0**
DATUM: **NAD 1983**
GEOLOGIST: **F. O'LOUGHLIN**
CHECKED BY: **KK**



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	652.0
1.5	TBS	650.5
4.3	TSP	647.8
5.3	TSC	646.8
17.0	BSC	635.1
17.8	POW	634.2

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: **4**
Type: **RISER**
Interval: **3.5**

RISER
Diameter: **2**
Type: **SCH. 40-PVC**
Interval: **6.25**

SCREEN
Diameter: **2**
Type: **SCH. 40-PVC/0.010**
Interval: **8.9, 1.95**

SURFACE SEAL
Type: **CEMENT**
Interval: **1.5**

GROUT
Type: **N/A**
Interval: **N/A**

SEAL
Type: **BENTONITE PELLETS**
Interval: **2.75**

SANDPACK
Type: **#1, #3**
Interval: **13.55**

WELL DEVELOPMENT DATA
Date: **6/25/94**
Method: **BAIL**
Duration: **110 MIN**
Rate: **.1890 L/MIN**

WATER LEVELS

	Date	Time	Depth,TR
▽	6/25	0900	10.22
▼	6/25	1045	10.38

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
6.96	10	1100	13.7

LEGEND

▨	SURFACE SEAL	●	GRAVEL	TPC	TOP OF PROTECTIVE CASING
▩	GROUT	⠿	SAND	TR	TOP OF WELL RISER
▒	SEAL	▥	SILT	GS	GROUND SURFACE
⠿	SANDPACK	▨	CLAY	TG	TOP OF GROUT
		☒	NO RECOVERY	TBS	TOP BENTONITE SEAL
				TSP	TOP OF SANDPACK
				TSC	TOP OF SCREEN
				BSC	BOTTOM OF SCREEN
				TD	TOTAL DEPTH
				POW	POINT OF WELL

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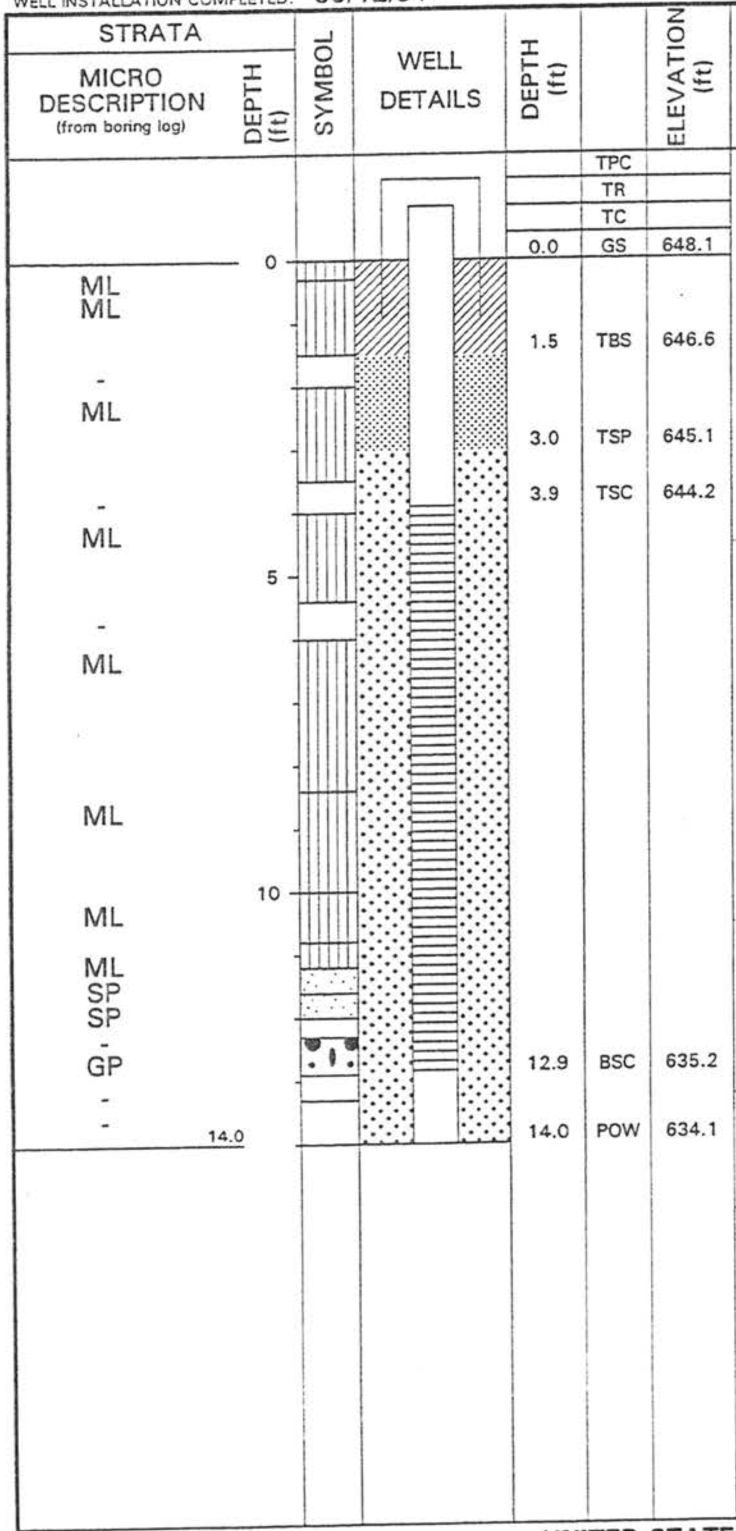
COMPLETION REPORT OF
WELL No. MW12B-1

Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW12B-2

PROJECT: EIGHT MODERATELY LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
WELL INSTALLATION STARTED: 06/12/94
WELL INSTALLATION COMPLETED: 06/12/94

WELL LOCATION (N/E): 1015919.8 743522.9
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 648.1
DATUM: NAD 1983
GEOLOGIST: F. O'LOUGHLIN
CHECKED BY: KK



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	648.1
1.5	TBS	646.6
3.0	TSP	645.1
3.9	TSC	644.2
12.9	BSC	635.2
14.0	POW	634.1

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: 4
Type: RISER
Interval: 3.5

RISER
Diameter: 2
Type: SCH. 40-PVC
Interval: 5

SCREEN
Diameter: 2
Type: SCH. 40-PVC/0.010
Interval: 9

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE PELLETS
Interval: 1.55

SANDPACK
Type: #1, #3
Interval: 11

WELL DEVELOPMENT DATA
Date: 6/23/94
Method: BAIL
Duration: 150 MIN
Rate: .1360 L/MIN

WATER LEVELS

	Date	Time	Depth, TR
▽	6/23	1545	7.15
▼	6/24	1030	7.36
▽	6/24	1235	7.20

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.15	9.5	800	43.3

LEGEND

▨	SURFACE SEAL	●	GRAVEL	TPC	TOP OF PROTECTIVE CASING
▩	GROUT	⁘	SAND	TR	TOP OF WELL RISER
▦	SEAL	▥	SILT	GS	GROUND SURFACE
⁙	SANDPACK	▨	CLAY	TG	TOP OF GROUT
		☒	NO RECOVERY	TBS	TOP BENTONITE SEAL
				TSP	TOP OF SANDPACK
				TSC	TOP OF SCREEN
				BSC	BOTTOM OF SCREEN
				TD	TOTAL DEPTH
				POW	POINT OF WELL

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COMPLETION REPORT OF
WELL No. MW12B-2
Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW12B-3

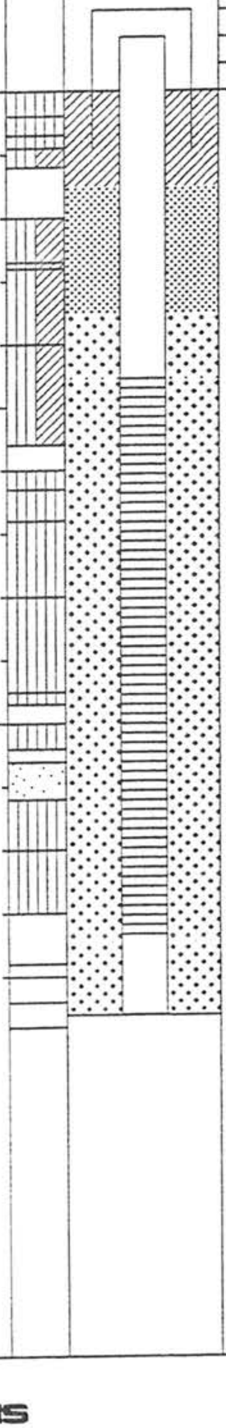
PROJECT: EIGHT MODERATELY LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
WELL INSTALLATION STARTED: 06/12/94
WELL INSTALLATION COMPLETED: 06/12/94

WELL LOCATION (N/E): 1015995.8 743517.1
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 655.6
DATUM: NAD 1983
GEOLOGIST: F. O'LOUGHLIN
CHECKED BY: KK

STRATA

MICRO DESCRIPTION (from boring log) / DEPTH (ft)

0
ML
ML
ML
ML-CL
-
ML-CL
ML-CL
ML-CL
ML-CL
5
-
ML
ML
ML
ML
ML
10
-
ML
-
SP
ML
ML
-
-
-
14.8
-



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	655.6
1.5	TBS	654.1
3.5	TSP	652.1
4.6	TSC	651.1
13.5	BSC	642.2
14.6	POW	641.0

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: 4
Type: RISER
Interval: 3.5

RISER
Diameter: 2
Type: SCH. 40-PVC
Interval: 5.55

SCREEN
Diameter: 2
Type: SCH. 40-PVC/0.010
Interval: 8.9

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE PELLETS
Interval: 2

SANDPACK
Type: #1, #3
Interval: 11.1

WELL DEVELOPMENT DATA
Date: 6/26/94
Method: BAIL
Duration: 235 MIN
Rate: .1030 L/MIN

WATER LEVELS

	Date	Time	Depth,TR
▽	6/26	1010	7.34
▽	6/26	1310	7.66
▽	6/26	1445	7.46

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.19	12	850	15.8

LEGEND

▨	SURFACE SEAL	●	GRAVEL
▩	GROUT	⁘	SAND
░	SEAL	▥	SILT
⁙	SANDPACK	▨	CLAY
		☒	NO RECOVERY

TPC	TOP OF PROTECTIVE CASING
TR	TOP OF WELL RISER
GS	GROUND SURFACE
TG	TOP OF GROUT
TBS	TOP BENTONITE SEAL
TSP	TOP OF SANDPACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
POW	POINT OF WELL

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COMPLETION REPORT OF
WELL No. MW12B-3

APPENDIX B

MONITORING WELL INSTALLATION

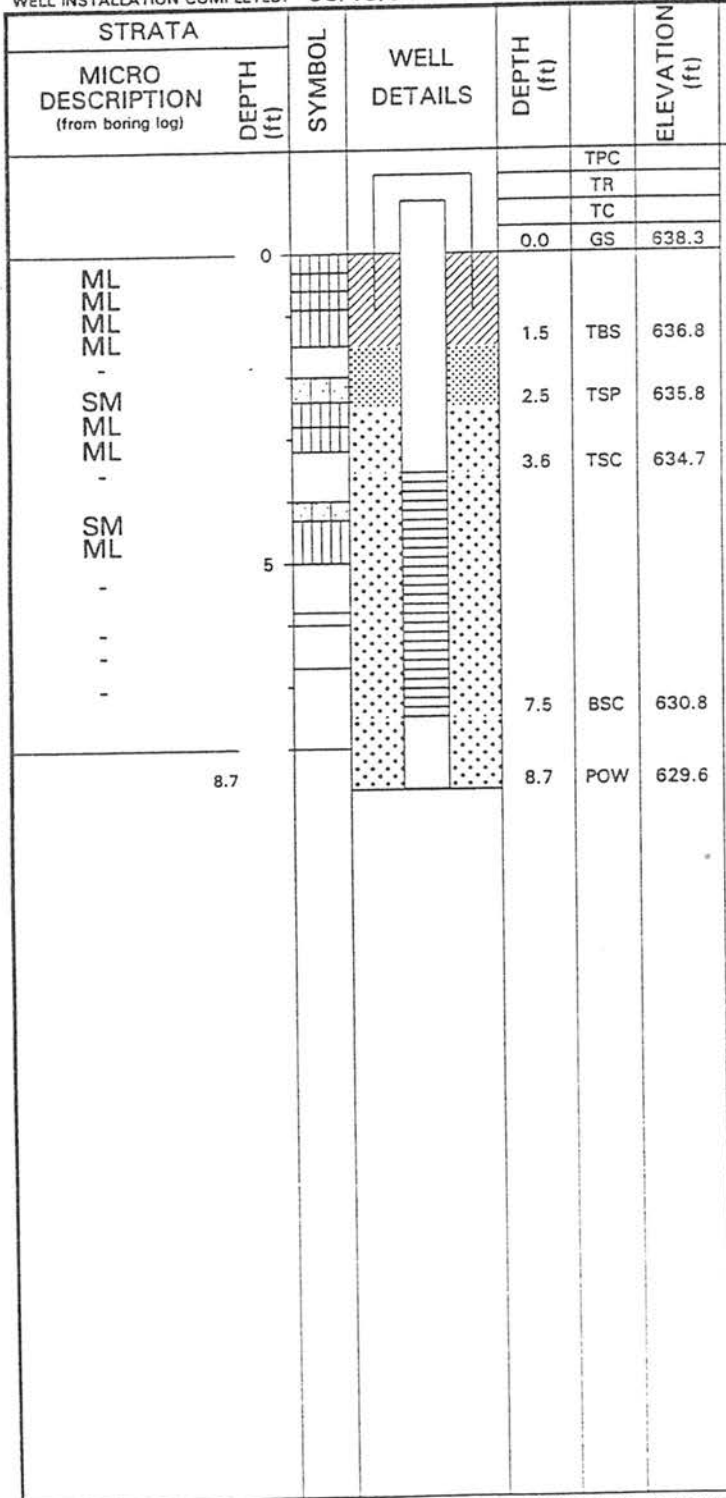
SEAD-63

Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW63-1

PROJECT: SEVEN LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
WELL INSTALLATION STARTED: 06/13/94
WELL INSTALLATION COMPLETED: 06/13/94

WELL LOCATION (N/E): 1013124.1 741608.4
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 638.3
DATUM: NAD 1983
GEOLOGIST: K. KELLY
CHECKED BY: FO



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	638.3
1.5	TBS	636.8
2.5	TSP	635.8
3.6	TSC	634.7
7.5	BSC	630.8
8.7	POW	629.6

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: 4
Type: RISER
Interval: 3.5

RISER
Diameter: 2
Type: SCH. 40-PVC
Interval: 4.65

SCREEN
Diameter: 2
Type: SCH. 40-PVC/0.010
Interval: 3.95

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE PELLETS
Interval: 1

SANDPACK
Type: #1, #3
Interval: 6.15

WELL DEVELOPMENT DATA
Date: 6/27/94
Method: BAIL/PUMP
Duration: 2 DAYS
Rate: .220 L/MIN

WATER LEVELS

Date	Time	Depth,TR
6/26	1615	5.98
6/27	1255	8.40

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.19	12.6	390	16

LEGEND

▨	SURFACE SEAL	●	GRAVEL	TPC	TOP OF PROTECTIVE CASING
▩	GROUT	☐	SAND	TR	TOP OF WELL RISER
░	SEAL	▥	SILT	GS	GROUND SURFACE
⁘	SANDPACK	▨	CLAY	TBS	TOP BENTONITE SEAL
		☒	NO RECOVERY	TSP	TOP OF SANDPACK
				TSC	TOP OF SCREEN
				BSC	BOTTOM OF SCREEN
				TD	TOTAL DEPTH
				POW	POINT OF WELL

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COMPLETION REPORT OF WELL No. MW63-1

Sheet 1 of 1

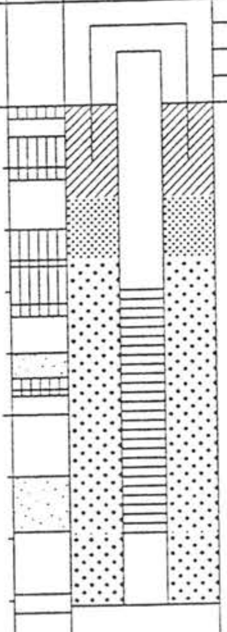
Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW63-2

PROJECT: SEVEN LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
WELL INSTALLATION STARTED: 06/14/94
WELL INSTALLATION COMPLETED: 06/14/94

WELL LOCATION (N/E): 1012979.9 741136.2
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 630.9
DATUM: NAD 1983
GEOLOGIST: K. KELLY
CHECKED BY: FO

STRATA MICRO DESCRIPTION (from boring log)	DEPTH (ft)
	0
ML	
-	
ML	
ML	
-	
ML	
ML	
ML	
ML	
-	
SP	
ML	
ML	5
-	
SP	
-	
	8.2



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	630.9
1.5	TBS	629.4
2.5	TSP	628.4
3.0	TSC	627.9
7.0	BSC	623.9
8.1	POW	622.8

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: 4
Type: RISER
Interval: 3.5

RISER
Diameter: 2
Type: SCH. 40-PVC
Interval: 4.05

SCREEN
Diameter: 2
Type: SCH. 40-PVC/0.010
Interval: 3.95

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE PELLETS
Interval: 1

SANDPACK
Type: #1, #3
Interval: 5.7

WELL DEVELOPMENT DATA
Date: 6/26/94
Method: BAIL/PUMP
Duration: 2 DAYS
Rate: .893 L/MIN

WATER LEVELS

Date	Time	Depth,TR
6/25	1450	2.98
6/26	1410	8.20

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.02	15.4	600	10

LEGEND

▨	SURFACE SEAL
▩	GROUT
░	SEAL
⁘	SANDPACK
●	GRAVEL
☐	SAND
▥	SILT
▨	CLAY
☒	NO RECOVERY

TPC	TOP OF PROTECTIVE CASING
TR	TOP OF WELL RISER
GS	GROUND SURFACE
TBS	TOP BENTONITE SEAL
TSP	TOP OF SANDPACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
POW	POINT OF WELL

PARSONS
ENGINEERING-SCIENCE, INC.

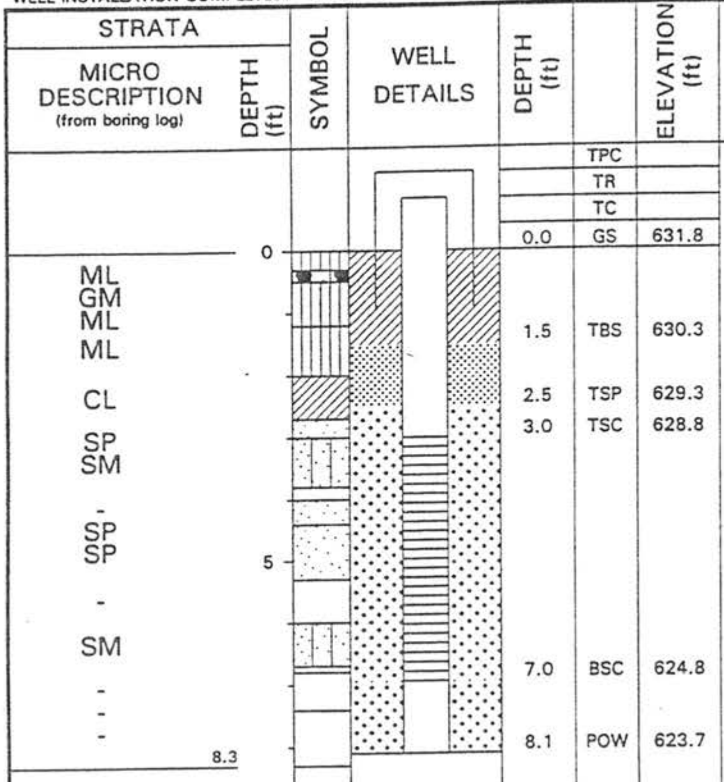
UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

COMPLETION REPORT OF
WELL No. MW63-2
Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW63-3

PROJECT: SEVEN LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
WELL INSTALLATION STARTED: 06/14/94
WELL INSTALLATION COMPLETED: 06/14/94

WELL LOCATION (N/E): 1013181.9 741130.1
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 631.8
DATUM: NAD 1983
GEOLOGIST: K. KELLY
CHECKED BY: FO



WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: 4
Type: RISER
Interval: 3.5

RISER
Diameter: 2
Type: SCH. 40-PVC
Interval: 4.05

SCREEN
Diameter: 2
Type: SCH. 40-PVC/0.010
Interval: 3.95

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE PELLETS
Interval: 1

SANDPACK
Type: #1, #3
Interval: 5.8

WELL DEVELOPMENT DATA
Date: 6/27/94
Method: BAIL/PUMP
Duration: 2 DAYS
Rate: .526 L/MIN

WATER LEVELS

Date	Time	Depth,TR
6/26	1330	4.15
6/26	1610	6.40
6/27	0945	3.42

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
6.89	16.1	2000	20

LEGEND

▨	SURFACE SEAL	●	GRAVEL
▩	GROUT	☐	SAND
░	SEAL	▥	SILT
⁘	SANDPACK	▨	CLAY
		☒	NO RECOVERY

TPC	TOP OF PROTECTIVE CASING
TR	TOP OF WELL RISER
GS	GROUND SURFACE
TBS	TOP BENTONITE SEAL
TSP	TOP OF SANDPACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
POW	POINT OF WELL

PARSONS
ENGINEERING-SCIENCE, INC.

UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

COMPLETION REPORT OF
WELL No. MW63-3

APPENDIX C

WELL DEVELOPMENT REPORTS

SEAD-12

WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. **CLIENT:** USACOE **WELL #:** MW12A-1

PROJECT: 15 SWMU ESI (SEAD- 12A)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY
DATE: 6/22/94
PROJECT NO.: 720519

DRILLING METHOD (s): HSA
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Teflon bailer
INSTALLATION DATE: 6/11/94

INSPECTOR: ES
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/22/94
END DEVELOPMENT DATE: 6/22/94
Stick up 1.44 ft

WATER DEPTH (TOC): 6.30 ft
WELL DIA. (ID CASING): 2.0" ~~ft~~
BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~TOC~~)GS 14.00 ft
MEASURED POW DEPTH(TOC): 15.44 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 15.36 (?) ft

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	8.5	9	10	11	12
GALLONS/FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	2.95	3.30	4.08	4.93	5.87

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 1.49 GAL. = A
(15.44 - 6.30) x .163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 7.64 GAL. = B
(15.44 - 6.30) 9.14 x (2.95 - .163) .3

SINGLE STANDING WATER VOLUME = A + B = ... 9.13 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 45.5 GALS.
3 x = 27.3

Flow Rate
1L/m
1.4 L/m

DATE	ACTIVITY	STARTING H20 DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
6/22	surging	6.30	1130	1150	20 min	4				dk brown	very silty!	6.72
	1st vol. (cont)	6.36	1335	1355	30 min	5.1	7.16	600	11° C	dk brown	1000+	6.40
	2nd vol	6.40	1355	14:25	30 min	9.1	7.19	590	11° C	cloudy	219	6.42
	3rd vol.	6.42	1425	1455	30 min	9.1	7.26	590	11°C	clear	14.3	6.42
	4th vol	6.42	1455	1525	30 min	9.1	7.26	580	10°C	clear	10.2	6.42
	5th vol	6.42	1525	15:55	30 min	9.1	7.24	590	9.5°C	clear	26.1	6.38
	TOTALS/FINAL					45.5						

RECOVERY
[✓ GOOD] FAIR POOR

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/22				
VOLUME	45.5				
DRUM #	12A-4W				

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #:

342
243
34

9.1
5
45.5

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WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** USACOE

WELL #: MW12A-2

PROJECT: 15 SWMU ESI (SEAD- 12A)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

DATE: 6/23/94
PROJECT NO.: 720519

DRILLING METHOD (s): HSA
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Teflon bailer
INSTALLATION DATE: 6/11/94

INSPECTOR: ES
CONTRACTOR: —
CREW: —
START DEVELOPMENT DATE: 6/23/94
END DEVELOPMENT DATE: 6/23/94
Stickup = 1.0 ft.

WATER DEPTH (TOC): 5.25 * ft
WELL DIA. (ID CASING): 2" ft
BORING DIAMETER: 8.5" ft

INSTALLED POW DEPTH(~~TOC~~GS): 12.0 ft
MEASURED POW DEPTH(TOC): 13.00 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 13.0 ft

4.2 ftP
5.25 ft

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	8.5	9	10	11	12
GALLONS/FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	2.95	3.30	4.08	4.93	5.87

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 1.26 GAL. = A
(13-5.25) = .163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 6.5 GAL. = B
13-5.25 = 7.75 7.75(2.95-.163).3 =

SINGLE STANDING WATER VOLUME = A + B = ... 7.8 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5XC .... 39 GALS.

3x = 23.4

Flow Rate	DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
	6/23	surge	5.30	930	950	20 min ~~950~~	6.5						5.46
		1st vol cont.	5.46	1040	1045	5 min	1.3	7.11	490	9°C	dk. brown	1000+	5.76
1140		2nd vol.	5.76	1045	11:10	25 min	7.8	7.12	425	8°C	Cloudy	54.5	5.82
1140		3rd vol	5.82	11:10	11:20	10 min	3	~~7.11~~ eo	~~425~~ eo	~~8.5°C~~ eo			
		3rd vol cont.	5.36	12:30	1250	20 min	4.8	7.11	425	8.5°C	clear	55.6	5.83
1140		4th vol.	5.83	1250	1:00	10 min	1.5						
		4th vol cont.	5.38	1415	1430	15 min	6.3	7.10	400	8.5°C	clear	13.7	5.85
1140		5th vol	5.85	1430	1455	25 min	7.8	7.11	425	8.5°C	clear	4.94	5.56
		TOTALS/FINAL					39						

RECOVERY
[✓ GOOD] FAIR POOR

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/23				
VOLUME	39				
DRUM #	12A-GW				

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS **WELL #:** MW12A-2

* initial GW measurement done on 6/22/94.

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4 25

WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** USACOE **WELL #:** MW12A-3

PROJECT: 15 SWMU ESI (SEAD- 12A **DATE:** 6/22/94
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY **PROJECT NO.:** 720519

DRILLING METHOD (s): HSA
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Teflon Bailer
INSTALLATION DATE: 6/12/94

INSPECTOR: KKS
CONTRACTOR:
CREW:
START DEVELOPMENT DATE:
END DEVELOPMENT DATE:

WATER DEPTH (TOC): 6.06 ft
WELL DIA. (ID CASING): 2.0" ft
BORING DIAMETER: 8.5" ft

1.56 Stickup
INSTALLED POW DEPTH(~~TOC~~):GS 15.3 ft
MEASURED POW DEPTH(TOC): 16.86 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 16.86 ft

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	8.5	9	10	11	12
GALLONS/FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	2.95	3.30	4.08	4.93	5.87

TSP - 2.5
+ 1.56
4.06

10.8 x .163
STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 1.76 GAL. = A

STANDING WATER IN ANNULAR SPACE = 12.8 x (2.95 - .163) x .3
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 10.7 GAL. = B

SINGLE STANDING WATER VOLUME = A + B = ... 12.5 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 62.5 GALS.

3x = 37.5

2L/min

DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
6/22	Surge	6.06	1130	1200	30 min	9 gal				Dark Brown		6.23
6/22	pump Vol. #1	6.15	1405	1415	10 min	3.5	7.94	600	10.6	Dark Brown	1000+	6.20
6/22	pump Vol #2	6.20	1415	1500	45 min	12.5	7.94	590	9.6	light brown	100+	6.30
6/22	pump Vol #3	6.30	1500	1530	30 min	12.5	7.82	565	9.7	silty	90	6.30
6/22	pump Vol #4	6.30	1530	1600	30 min	12.5	7.88	600	9.8	clearing	25	6.30
6/22	pump Vol #5	6.30	1600	1610	18 min	8 gallons	8.02	580	10.0	clear	20	6.30
							Complete					
TOTALS/FINAL						58						

RECOVERY
[✓ GOOD] FAIR POOR

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/22/94	6/22/94			
VOLUME	54	4			
DRUM #	12A-5	12A-4			

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS **WELL #:** MW12A-3

Note - Measurements taken 2 Ft. above Bottom of Screen

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WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: USACOE
WELL #: MW12B-1

PROJECT: 15 SWMU ESI (SEAD-12B)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY
DATE: 6/25/94
PROJECT NO.: 720519

DRILLING METHOD (s): HSA
PUMP METHOD (s): peristaltic
SURGE METHOD (s): teflon bailer
INSTALLATION DATE: 6/13/94

INSPECTOR: ES
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/25/94
END DEVELOPMENT DATE:
stickup 1.86'

WATER DEPTH (TOC): 10.22 ft
WELL DIA. (ID CASING): 2" ~~ft~~
BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~TOC~~)GS: 17.8' ft
MEASURED POW DEPTH(TOC): 19.66 ft ?
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 19.26 ft

TSP 6.11'
∇ 10.22'

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	8.5	9	10	11	12
GALLONS/FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	2.95	3.30	4.08	4.93	5.87

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 1.5 GAL. = A
(19.66 − 10.22) x .163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR − WELL DIAM. FACTOR) X 0.3 = 7.9 GAL. = B
(19.66 − 10.22) x (295 − .163) .3

SINGLE STANDING WATER VOLUME = A + B = ... 9.4 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 47 GALS.

3x = 28.2

Flow Rate

Flow Rate	DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
	6/25	surging	10.22	9:00	9:20	20 min	3						10.48
1800 2160		1st vol cont.	10.48	9:35	9:45	10 min	6.4	6.98	1025	12°C	dk. brown	1000+	10.40
		2nd vol	10.40	9:45	10:05	20 min	9.4	6.99	1025	10°C	cloudy	78.5	10.36
		3rd vol	10.35	10:10	10:30	20 min	9.4	7.01	1050	10°C	clear	15.7	10.36
2160		4th vol.	10.36	10:30	10:45	15 min	9.4	7.00	1050	11°C	clear	20.5	10.38
1440		5th vol	10.38	10:45	11:00	25 min	9.4	6.96	1100	10°C	clear	~~14.9~~ 13.7	10.26
		TOTALS/FINAL					47 gal.						

RECOVERY
[✓ GOOD] FAIR POOR

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/25				
VOLUME	47 gal				
DRUM #	12B-5W				

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW12B-1

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WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** USACOE **WELL #:** MW12B - 2

PROJECT: 15 SWMU ESI (SEAD- 12B)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY
DATE: 6/23/94
PROJECT NO.: 720519

DRILLING METHOD (s): HSA
PUMP METHOD (s): peristaltic
SURGE METHOD (s): bailer
INSTALLATION DATE: 6/13/94

INSPECTOR: ES
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/23/94
END DEVELOPMENT DATE:
stickup 2.2 ft

WATER DEPTH (TOC): 7.15 ft
WELL DIA. (ID CASING): 2" ~~ft~~
BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~TOC~~): GS 14.0 ft
MEASURED POW DEPTH(TOC): 16.2 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 16.26 ft

5.2 TSP
▽ 7.15

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	8.5	9	10	11	12
GALLONS/FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	2.95	3.30	4.08	4.93	5.87

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 1.5 GAL. = A
(16.2 - 7.15) .163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 7.6 GAL. = B
(16.2 - 7.15) = 9.05 9.05 (2.95 - .163) .3 =

SINGLE STANDING WATER VOLUME = A + B = ... 9.1 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 45.5 GALS.

3x = 27.3

Flow Rate	DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
	6/23	surging	7.15	13:45	16:05	20 min	6						7.34
1200	6/24	1st vol. cond.	7.16	10:00	10:05	5 min	3.1	7.14	800	10°C	lt. brwn	1000+	7.44
		2nd vol.	7.44	10:05	10:30	25 min	9.1	7.08	825	10°C	clear	27.3	7.36
		3rd vol	7.36	10:30	1100	30 min	9.1	7.06	800	10°C	clear	34.7	7.36
		4th vol	7.36	11:00	11:35	35 min	9.1	7.11	800	10°C	clear	74.5	7.32
2400		5th vol	7.32	1135	1200	25 min	9.1	7.15	800	9.5C	clear	43.3	7.50
480			7.20	1235	1245	10 min	1.5				clear	4.33	
	TOTALS/FINAL						47						

RECOVERY
GOOD FAIR POOR

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/23	6/24			
VOLUME	6	41			
DRUM #	12B-4W	12B-4W			

3

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS **WELL #:** MW12B-2

WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** USACOE **WELL #:** MW12B- 3

PROJECT: 15 SWMU ESI (SEAD- 12B) **DATE:** 6/26/94
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY **PROJECT NO.:** 720519

DRILLING METHOD (s): HSA
PUMP METHOD (s): peristaltic
SURGE METHOD (s): teflon bailer
INSTALLATION DATE: 6/12/94

INSPECTOR: ES
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/26/94
END DEVELOPMENT DATE:

WATER DEPTH (TOC): 6.70 ft
WELL DIA. (ID CASING): 2" ~~ft~~
BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~TOC~~): GS ~~16~~ 14.6 ft
MEASURED POW DEPTH(TOC): 10.80 ft
SILT THICKNESS: 5.2 ft
POW AFTER DEVELOPMENT: 15.98 ft

measured
assumes
1.8 stickup

5.3 ~~45~~ – TSP
6.35 – TSC
6.7 – ▽
16.4 – POW

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	8.5	9	10	11	12
GALLONS/FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	2.95	3.30	4.08	4.93	5.87

Calculations assuming (1) several inches of sediment and using 1.8 ft = stickup.

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 1.6 ~~13~~ GAL. = A

16.4 (~~16~~ - 6.70) = ~~13~~ 9.7 9.7 ~~79~~ x .163

STANDING WATER IN ANNULAR SPACE =

WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 8.1 GAL. = B

16.4 6(~~16~~ - 6.70) = 9.7 9.7 × (2.95 - .163) .3 =

SINGLE STANDING WATER VOLUME = A + B = ... 9.7 GAL. = C * 7.8
** 8.7

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 48.5 GALS. * 39
*+ 43.5

Flow Rate
~~1200~~ 600
960
2 = 1080
3 = 1260
1260

DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
6/26	surging A	7.34	10:10	10:40	30 min	4	Pow	measured 15	.80 ft			8.06
	1st vol. cont	7.74	10:55	11:15	20 min	3.8	7.22	700	12°C	very silty	1000+	7.64
	2nd vol.	7.64	11:15	11:50	35 min	7.8	7.27	850	12°C	lt. brown	1000 +	7.38
	surging B	7.26	12:40	1:05	25 min	4						7.66
	1st vol **	7.66	1:10	1:30	20 min	4.7	7.34	850	12°C	dk brn.	1000 +	7.51
	2nd vol	7.51	1:30	1:55	25 min	8.7	7.34	875	12°C	cloudy	109	7.45
	3rd vol	7.45	1:55	2:20	25 min	8.7	7.23	850	11°C	cloudy	9.12	7.45
	4th vol.	7.45	2:20	2:45	25 min	8.7	7.21	900	12°C	clear ~~cloudy~~	12.4	7.46
	5th vol.	7.46	2:45	3:15	30 min	8.7	7.19	850 ~~825~~	12°C	clear	15.8	7.46
	TOTALS/FINAL					59.1 ~						

RECOVERY
GOOD FAIR POOR
A + B = C = 8.7 **
5 × C = 43.5

** Recalculation after surge B
A = (15.94 - 7.26) .163 = 1.4
Pow = 15.94 ▽ ~~7.66~~ 7.26
B = (15.94 - 7.26) 2.787 (.3) = 7.3

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/26	6/26		
VOLUME	55 gal	4		
DRUM #	12B-6-W	12B-4W		

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS **WELL #:** MW12B-3

* after surging A, Pow = 15.80 ▽ = 8.06. Recalculated water vol.
A = (15.80 - 8.06) .163 = 1.3
B = (15.80 - 8.06) (2.787) .3 = 6.5 } *

H:\ENG\SENECA\15SWMU\FIELDFMS\WELLDEV.WK3

APPENDIX C

WELL DEVELOPMENT REPORTS

SEAD-63

WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: ACOE
WELL #: MW63-1

PROJECT: 15 SEAD SWMU
LOCATION: SEAD-63
DATE: 6/26/94
PROJECT NO.: 720518

DRILLING METHOD (s): HSA
PUMP METHOD (s): peristaltic
SURGE METHOD (s): teflon bailer
INSTALLATION DATE: 6/14/94

INSPECTOR: ES
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/26/94
END DEVELOPMENT DATE: 6/27/94
Stickup = 1.6'

WATER DEPTH (TOC): 5.98 ft
WELL DIA. (ID CASING): 2" ~~ft~~
BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~TOC~~) GS: 8.5 ft
MEASURED POW DEPTH(TOC): 10.06 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: ft

4.1 TSR
.98 V
SC 9.1
10.06

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	[✓ 2]	3	4	5	6	7	8 [✓ 8.5]	9	10	11	12
GALLONS/FT:	[✓ 0.163]	0.367	0.654	1.02	1.47	2.00	2.61 [✓ 2.95]	3.30	4.08	4.93	5.87

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = .7 GAL. = A
(10.06 - 5.98) = 4.08   4.08 × .163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR - WELL DIAM. FACTOR) X 0.3 = 3.4 GAL. = B
4.08 × (2.95 - .163) .3 =

SINGLE STANDING WATER VOLUME = A + B = ... 4.1 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 20.5 GALS.

date	ACTIVITY	Start H2O	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity NTU ~~OTHER~~	Ending H2O Depth
6/26	Surging	5.98	4:15	4:35	20 min.	3+1				Dark Brown		8.10
6/27	surge	6.00	0830	0900	30	3.5				"		10.00 Dry
6/27	3 surges	6.48	0950	1100	3x 10min	4.25				"		10.00 Dry
6/27	pump	6.55	1140	1240	60	4.1	7.28	410	13.3	clear	11.0	
6/27	pump	8.40	1255	1355	60	3.0	7.19	390	12.6	clear	16.0	8.40
							Complete					
TOTALS/FINAL						18.85						

1.25
1.5
~20 ml/min

~~COMMENTS:~~
Recovery
GOOD FAIR [✓ POOR]

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS   WELL #:

Waste

Date	6/26	6/27
Volume	4	~~[illegible]~~ 14.85
Drum #	63-4-W	63-4-W

WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: ACOE	WELL #: MW63-2

PROJECT: SEAD - 15 SWMU

LOCATION: SEAD - 63

DATE: 6/25/94

PROJECT NO.: 720518 ~~730~~

DRILLING METHOD (s): HSA

PUMP METHOD (s): Peristaltic

SURGE METHOD (s): Teflon Bailer

INSTALLATION DATE: 6/14/94

INSPECTOR: KKS

CONTRACTOR:

CREW:

START DEVELOPMENT DATE: 6/25

END DEVELOPMENT DATE: 2/26

Stickup = 1.46'

WATER DEPTH (TOC): 2.98 ft

WELL DIA. (ID CASING): 2.0" ft

BORING DIAMETER: 8.5" ft

INSTALLED POW DEPTH(TOC): 8.1 ft

MEASURED POW DEPTH(TOC): 9.56 ft

SILT THICKNESS: ft

POW AFTER DEVELOPMENT: ft

38

25

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	[✓ 2]	3	4	5	6	7	8	8.5	9	10	11	12
GALLONS/FT:	[✓ 0.163]	0.367	0.654	1.02	1.47	2.00	2.61	2.95	3.30	4.08	4.93	5.87

6.58 × .163 =

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 1.07 GAL. = A

STANDING WATER IN ANNULAR SPACE =

WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 4.7 GAL. = B

(4.1 - 2.5) × (2.95 - .163) × .3   5.6 × 2.787 × .3

SINGLE STANDING WATER VOLUME = A + B = ... 5.8 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 29 GALS.

	ACTIVITY	Depth Start	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	OTHER	Depth End	Rate
6/25	Surge	2.98 ~~3.22~~	1450	1515	25	5			.	Dark Brown			
	Pump 1st Vol.	3.22	1530	1550	20	5.8	6.97	660	15.7	Brown	1000+	6.80	
	Pump 2nd Vol	6.80	1550	1610	20	5.8	6.89	625	15.2	Brown	100+	7.80	900
	Pump 3rd Vol	7.80	1610	1630	20	5.8	6.93	630	15.3	Brown	100+	8.00	400
6/26	Pump 4th Vol	3.24	1244	1300	14	5.8	6.95	670	15.5	Light Brown	100+	7.7	1000
	Pump 5th Vol	7.7	1300	1320	20	5.8	6.93	630	15.6	Light Brown	100+	7.82'	900
	Pump 6th Vol	7.82	1320	1345	25	5.8	6.89	600	15.4	Dark Brown	1000+	7.30	900
	Pump 7th Vol	8.2	1345	1410	25	5.8	6.98	600	15.3	milky clear	67	8.2	850
	Pump 8th Vol	8.2	1410	1430	20	4.0	7.02	600	15.4	clear	10	7.6	800
							Complete						
	TOTALS/FINAL					49.6							

COMMENTS: Maintains 7' water level @ 920 ml/min

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW63-2

Waste Water: 6-25-94 • 22.4 gallons • #63-~~1~~2-W
6-26-94 • 27.2 gallons • #63-2-W

ver. 05–Nov–93

WELLDEV.WK1

WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC. CLIENT: USACOE

WELL #: MW63-3

PROJECT: 15 SWMU ESI (SEAD-63
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

DATE: 6/26/94
PROJECT NO.: 720518

DRILLING METHOD (s): HSA
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Teflon Bailer
INSTALLATION DATE: 6/14/94

INSPECTOR: KKS
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/26
END DEVELOPMENT DATE: 6/27
Stickup - 1.4'

WATER DEPTH (TOC): 4.15 ft
WELL DIA. (ID CASING): 2.0" ft
BORING DIAMETER: 8.5" ft

INSTALLED POW DEPTH(TOC): 8.1 ! ft
MEASURED POW DEPTH(TOC): 9.5 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: ft

TSP
2.5

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	[✓ 2]	3	4	5	6	7	8	[✓ 8.5]	9	10	11	12
GALLONS/FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	2.95	3.30	4.08	4.93	5.87

5.35 x .163 =
STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 0.9 GAL. = A

STANDING WATER IN ANNULAR SPACE = 5.35 x (2.95 - .163) x .3
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 4.47 GAL. = B

SINGLE STANDING WATER VOLUME = A + B = ... 5.4 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 27 GALS.

Rate	DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
	6/26	Surge	4.15	1330	1350	20	5.0			~~17~~2		dark Brown	7.35
	6/26	Pump 1st Vol	4.58	1445	1505	20	5.0	6.92	2100	16.2	dark Brown	d 1000+	9.00
	6/26	Pump 2nd Vol	9.00	1505	1525	20	4.5	6.84	2050	15.9	clear	17	9.10
500ml	6/26	Pump 3rd Vol	9.10	1525	1600	35	4.0	6.87	2000	16.3	clear	67	7.0
	6/26	Surge	6.40	1610	1625	15	2.0				dark brown		5.90
1500/650ml	6/26	Pump 4th Vol	5.90	1625	1640	15	4.5	6.95	2000	16.5	clear	24	9.10
480ml	6/26	Pump 5th Vol	9.18	1640	1710	30	4.5	6.83	2100	16.4	clear	27	7.60
500ml	6/27	surge/pump	3.42	0910 0945	0940 1005	20 20	surge 7.5 4.0	6.82	2000	16.2	clear	7	
500ml	6/29	surge/pump		1030 1040	1040 1110	10 30	3.0 5	6.89	2000	16.1	clear	20	7.55
							Complete						
		TOTALS/FINAL					20 ~~44.5~~ 49						

RECOVERY
GOOD [✓ FAIR] [✓ POOR]

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/26	6/27		
VOLUME	29.5	19.5		
DRUM #	#63-3	#63-3		

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW63-3

Note = Maintains 9.0' @ 680 ml/min

H:\ENG\SENECA\15SWMU\FIELDFMS\WELLDEV.WK3

No pressure cap

APPENDIX D

FIELD SAMPLING AND ANALYSIS PLAN

Appendix D information is contained in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping plan

APPENDIX E

HEALTH AND SAFETY PLAN

Appendix E information is contained in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan

HEALTH AND SAFETY PLAN

ADDENDUM

SAFETY AND HEALTH

This radiological sites Health and Safety Plan (HASP) addendum addresses issues associated with radiological material exposure, detection and decontamination. Key features of this HASP addendum include:

- the training of all field inspectors in the use of radiological monitoring equipment;
- the training of all contract site personnel (henceforth referred to as "project personnel") relative to concerns of personnel exposure to radiological materials;
- the provision of personnel dosimetry badges for all project personnel; and,
- the development and incorporation of Standard Operating Procedures for measurement of and response to radiological materials.

Site Personnel Training

All field inspectors will be provided training in the use of hand-held radiation meters, by a person who is knowledgeable in their use, prior to their assignment as lead representative on a survey crew. This training will focus on the proper use of radiological monitoring devices (Geiger-Mueller detectors and other detectors if considered appropriate) to assure that all radiation monitoring equipment is properly used during the field operations.

Additionally, as part of the planned Health and Safety kick-off meeting, all other project personnel will be informed of the possible implications of contact with or exposure to radiological materials. This briefing will focus on:

- identifying materials that are suspected of being present on site;
- tentatively identifying areas where exposure to radiological material is believed to be possible based on surface radiation surveys;
- defining levels that will be used as thresholds for triggering personal safety response actions;
- explaining how the selected exposure levels are set and why these levels are consistent with established guidance and protection of site worker health, safety and welfare; and,
- explaining and practicing decontamination procedures that will be implemented if radiological materials are found to be present.

All proposed project personnel will be required to complete this training prior to being allowed to work on site. Each worker's attendance and completion of this training will be documented by the site Health and Safety Officer (HSO).

Site Pre-Screening

Surface screening of all proposed work locations for the presence of unusually high levels of gamma radiation will be performed before allowing any site work to begin in the area.

As part of this operation, background levels of radiation will be defined. Background levels will be established by collecting field data from areas on- or off-site where there is no historic information to indicate that radiological materials have been used or handled and which are believed to be representative of other site conditions present at SEDA.

As part of the site clearance process for intrusive investigations, an area of roughly 900 square feet around the stake (i.e., 30 x 30 foot square) will be surveyed to determine radiation levels that are present. If radiation levels of greater than three times the background level are found, intrusive work at the proposed location will be postponed pending further clarification of the source of the radiation. If excessive radiation is not found, this information will be documented for the site and the site will be considered ready for initiation of intrusive operations.

In the event that elevated levels of radiation are found at areas that are not currently known to have such levels, efforts will be made to:

- investigate the cause or source of the elevated readings;
- review and modify, as necessary, the proposed intrusive investigation methodology and sample collection methodology;
- review and modify, as necessary, the handling and placement of IDW and/or of excavated materials.

Long-term Radiological Monitoring

All project personnel involved in building surveys or intrusive investigations shall wear personal radiation dosimeters during their work at the SEAD-12 or SEAD-63 sites. These badges will be used to determine each individual's exposure to radiation as a result of their involvement in the SEAD-12 and/or SEAD-63 RI/FS. This data will also be used to assure that individual employee exposures have not exceeded NRC's regulatory limits for non-radiation workers.

Each crew member will be assigned an individual, pre-numbered thermoluminescent dosimeter (TLD) badge. Whenever the employee is in the area, he/she will be required to wear their TLD in a prominent location, specifically in a region on the front of the body between the waist and the neck. At the end of each work shift or whenever the employee leaves the site, this badge will be returned to the field logistics support office for storage in a secure location. This badge will not be assigned or used by any other individual and is intended to provide data on the site worker's cumulative exposure while on site. At the end of each calendar quarter, all assigned badges will be recovered and sent to a laboratory for analysis. Project personnel will also be assigned a new badge for the next period of work on site.

Real-time Radiation Monitoring

Field inspectors assigned to site crews will be responsible for monitoring the work site for radiation. This monitoring will be performed periodically during the work day and continuously when intrusive activities are in progress.

At the beginning of each day, the assigned field inspector will measure and record the background radiation level present in the designated work zone. This measurement will be obtained using a meter that is in proper working condition and that has been calibrated within the preceding six months. Additional background measurements will be made and recorded during the work day.

If the measured background is found to be less than three times the background reading for the work site, work will be allowed to continue. If background radiation levels are found to be greater than three times the historic background level, work will be suspended and the HSO notified.

If work is allowed to continue, the field inspector will continuously monitor for an increase in radiation level. During intrusive operations such as drilling or test pitting, this operation will be completed by screening soils as they are raised to the surface. Radiation measurements obtained from soils will be recorded periodically on the field sheets (e.g., boring logs or inspectors daily reports).

Measurement of radiation levels at or above three times background at areas that are not currently known to have such levels will cause an immediate cessation of all work area activity. This condition will be immediately reported to the site HSO.

Once informed of an increase in radiation level, the HSO will be responsible for assessing and evaluating the radiological conditions. The HSO will independently confirm the validity of the reading to determine if the reading represents a real or false-positive measurement. If the reading is verified, the HSO will suspend intrusive work at the proposed location pending further evaluation. After this assessment is performed, the HSO may permit intrusive operations without restriction, may permit intrusive operations with additional radiological controls in place, or may recommend that the intrusive method be modified or a different method selected to minimize the potential hazard. The HSO will also prescribe or define appropriate short-term measures to control or limit the spread of radioactive materials from the immediate work location.

In the event that the recorded reading is determined to be a false positive reading by the HSO, the reasons for this determination will be documented. All pertinent facts leading to this conclusion will be recorded in the HSO's field log.

APPENDIX F

CHEMICAL DATA AQUISITION PLAN

Chemical data acquisition information for radiochemistry data is presented in the following pages of this appendix. Additional Appendix F information, which is specific for non-radiochemistry data, is contained in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping plan

EXAMPLE

RADIOCHEMISTRY
DATA COMPLETENESS CHECKLIST

Core Laboratories

Job/Case No. ______________________ Parameters ______________________

	Alpha Spectrometry	Gamma Spectrometry	Gas Proportional	Liquid Scintillation	Laser Phosphorimetry
1. Formulas used in Calculations					
2. Standards Certifications					
3. Instrument Performance Data					
a. Initial Calibration					
b. Continuing Calibration					
c. Instrument Background					
d. Resolution Checks		----------	----------	----------	----------
e. Plateau Information	----------	----------		----------	----------
f. Weight Curve	----------	----------		----------	----------
g. Quench Curve	----------	----------	----------		----------
4. Logs					
a. Standards Preparation Logs		----------			
b. Precipitation Logs		----------			----------
c. Planchet Logs	----------	----------		----------	----------
d. Run Logs					
5. Instrument Printouts					
a. Analysis Information					
b. Sample Measurement Activity					
c. Results Spreadsheets					
6. QC					
a. QC Data and Calculations					
b. Control Charts					
7. Other					

EXAMPLE

ANALYSIS REQUIREMENTS SUMMARY

Core Laboratories

Analysis Type Alpha Spectroscopy Method

Parameters Isotopic U, Th, Pu, Po, Am, and Np

	Description	Frequency	QC Limits - Level 4
INSTRUMENT CALIBRATION			
• Initial Calibration	Efficiency Calibration	Annually	Instrument specific
• Continuing Calibration	Energy Calibration Energy Check Resolution Check	Quarterly Weekly Weekly	Instrument specific
• Instrument Background	Background Check	Weekly	Instrument specific
BATCH QUALITY CONTROL			
• Laboratory Blank	Method blank	5% or 1 per batch	<DL
• Laboratory Control Sample	Blank spike	5% or 1 per batch	80-120% recovery
• Spike Sample	Matrix spike	5% or 1 per batch	75-125% recovery
• Duplicate Sample	Sample duplicate	5% or 1 per batch	RER ≤ 2 or RPD <30% for values ≥5X DL and ±2 X DL for values <5X DL
SAMPLE ANALYSIS			
• Preservative	HNO_3	All samples	------
• Holding time	Collection to analysis	All samples	6 months
• Tracer/carrier	Radionuclide tracer	All samples	50-100% recovery
• Detection limit			Variable

EXAMPLE

ANALYSIS REQUIREMENTS SUMMARY

Core Laboratories

Analysis Type Gamma Spectroscopy Method

Parameters Cs-134, Cs-137, Co-57, Co-60, Ba-133, Ru-106, and Zn-65

	Description	Frequency	QC Limits - Level 4
INSTRUMENT CALIBRATION			
• Initial Calibration	Efficiency Calibration	Annually	Instrument specific
• Continuing Calibration	Energy Calibration Energy Check Resolution Check	Monthly Daily Daily	Instrument specific
• Instrument Background	Background Check	Weekly	Instrument specific
BATCH QUALITY CONTROL			
• Laboratory Blank	Method blank	5% or 1 per batch	<DL
• Laboratory Control Sample	Blank spike	5% or 1 per batch	80-120% recovery
• Spike Sample	Not applicable	-----	-----
• Duplicate Sample	Duplicate sample	5% or 1 per batch	RER ≤ 2 or RPD <30% for values ≥5X DL and ± 2 X DL for values <5X DL
SAMPLE ANALYSIS			
• Preservative	HNO_3	All samples	-----
• Holding time	Collection to analysis	All samples	6 months (16 days for I-131)
• Tracer/carrier	Not applicable	-----	-----
• Detection limit			Variable

EXAMPLE

ANALYSIS REQUIREMENTS SUMMARY

Core Laboratories

Analysis Type Gas Proportional Counters

Method

Parameters Gross Alpha, Gross Beta, Ra-226, Ra-228, Sr-90, and Cs-137

	Description	Frequency	QC Limits - Level 4
Instrument Calibration			
• Initial Calibration	Efficiency for Specific Radionuclides Self-Absorption Curve Plateau	Annually Annually Annually	Instrument specific
• Continuing Calibration	Efficiency Check	Daily	Instrument specific
• Instrument Background	Background Check	Weekly & Daily	Instrument specific
Batch Quality Control			
• Laboratory Blank	Method blank	5% or 1 per batch	<DL
• Laboratory Control Sample	Blank spike	5% or 1 per batch	80-120% recovery
• Spike Sample	Matrix spike	5% or 1 per batch	75-125% recovery
• Duplicate Sample	Sample duplicate	5% or 1 per batch	RER ≤ 2 or RPD <30% for values ≥5X DL and ± 2X MDA for values <5X DL
Sample Analysis			
• Preservative	HNO_3	All samples	----
• Holding time	Collection to analysis	All samples	6 months
• Tracer/carrier	Carrier (certain analytes)	All samples	50-100% recovery
• Detection limit			Variable

EXAMPLE

ANALYSIS REQUIREMENTS SUMMARY

Core Laboratories

Analysis Type Liquid Scintillation

Method

Parameters Tritium, Radon, Tc-99, and Pb-210

	Description	Frequency	QC Limits - Level 4
INSTRUMENT CALIBRATION			
• Initial Calibration	Efficiency for Specific Radionuclides Quench Curve Interference Corrections	Annually Annually Annually	Instrument specific
• Continuing Calibration	Efficiency Check	Daily	Instrument specific
• Instrument Background	Background Check	Daily	Instrument specific
BATCH QUALITY CONTROL			
• Laboratory Blank	Method blank	5% or 1 per batch	<DL
• Laboratory Control Sample	Blank spike	5% or 1 per batch	80-120% recovery
• Spike Sample	Matrix spike	5% or 1 per batch	75-125% recovery
• Duplicate Sample	Sample duplicate	5% or 1 per batch	RER ≤ 2 or RPD <30% for values ≥5X DL and ±2 X DL for values <5X DL
SAMPLE ANALYSIS			
• Preservative	HNO_3	All samples (except for tritium analysis)	-----
• Holding time	6 months	All samples	6 months (8 days for radon, 5 days tritium)
• Tracer/carrier	Carrier	All samples	50-100% recovery
• Detection limit			Variable

EXAMPLE

ANALYSIS REQUIREMENTS SUMMARY

Core Laboratories

Analysis Type Laser Phosphorimetry

Method

Parameter Total Uranium

	Description	Frequency	QC Limits - Level 4
INSTRUMENT CALIBRATION			
• Initial Calibration	Calibration curve	Semi-annually & as needed	Instrument specific
• Continuing Calibration	Calibration verification	Weekly & Daily	Instrument specific
• Instrument Background	Background measurement	Semi-annually & as needed	Instrument specific
BATCH QUALITY CONTROL			
• Laboratory Blank	Method blank	5% or 1 per batch	<DL
• Laboratory Control Sample	Blank spike	5% or 1 per batch	80-120% recovery
• Spike Sample	Matrix spike	All samples	50-100% recovery
• Duplicate Sample	Sample duplicate	5% or 1 per batch	RER $\leq$ 2 or RPD <30% for values $\geq$5X DL and ± 2 X DL for values <5X DL
SAMPLE ANALYSIS			
• Preservative	HNO_3	All samples	-----
• Holding time	6 months	All samples	6 months
• Tracer/carrier	Not applicable	-----	-----
• Detection limit			Variable

CORE LAB

RADIOCHEMISTRY DATA REVIEW CHECKLIST

Project/Job No.(s) ______________________ Parameter/Method ______________________

Reviewed By ______________________ Date Received ______________________

REVIEW ITEM	YES	NO	NA	COMMENTS
A CALIBRATION VERIFICATION				
1 Standard: Correct source?				
2 Frequency: Daily ____ , weekly____ , or monthly ____				
3 Acceptance criteria: Met?				
B LABORATORY CONTROL STANDARD				
1 Standard: Independent, certified reference material?				
2 Frequency: Each batch?				
3 % Recovery 80-120% or _______ ?				
C METHOD BLANK				
1 Frequency: Each batch?				
2 Matrix: Matrix specific?				
3 Preparation: Entire procedure?				
4 Analytes concentration: <DL or <5x DL?				
D SPIKE				
1 Frequency: Each batch?				
2 Matrix: Matrix specific?				
3 Preparation: Entire procedure?				
4 % Recovery: 75-125% or ______ ?				
E DUPLICATE				
1 Type: Field sample?				
2 Frequency: Each batch?				
3 Matrix: Matrix specific?				
4 Preparation: Entire procedure?				
5 % RPD: <25% for values 5.x DL or ______ ?				

RADIOCHEMISTRY DATA REVIEW CHECKLIST

;

Project/Job No. (s) ______________________ Parameter/Method ______________________

Reviewed By ______________________ Date Received ______________________

REVIEW ITEM	YES	NO	NA	COMMENTS
F SAMPLE ANALYSIS				
1 Holding times: Met?				
2 Results: a Calculated correctly? b Within calibration curve? c Dilution factors (included)? d Rounding/significant figures acceptable? e Detection limit sample specific?				
3 Report: a Agrees with raw data? b Complete? c Correct?				

ADDITIONAL COMMENTS:

CASE NARRATIVE REQUIRED? ☐ Yes ☐ No

REVIEWED BY ______________________ DATE ______________________

CORE LAB

RADIOCHEMICAL DATA COMPLETENESS CHECKLIST
RADIOMETRIC AND GROSS α & β ANALYSES

Analytes ________________ **Method** _______________ **Job No.** ________________

I. Case Narrative

_____ Abnormalities explained
_____ Matrix problems explained
_____ Instrument problems explained
_____ Improper collection, storage, preservation, containers explained
_____ Holding time exceedances explained

II. Initial Calibration Data Package

_____ Detector ID
_____ Analyst initials
_____ Date and time calibrated
_____ Current batch date
_____ Name, activities, dates of certifications of all NIST standards
_____ Voltage settings, gain settings, or plot of voltage versus standard CPMs
_____ Plots of net standard CPMs versus gain settings at voltage giving highest net CPM to gain ration (crosstalk plot)
_____ Last service or repair date for detector

III. Continuing Calibration Data Package

_____ Detector ID
_____ Analyst initials
_____ Date and time of calibration check
_____ Name, activities, dates of certifications of all NIST standards
_____ CPMs observed, count duration, mean counts
_____ Control chart means
_____ Background CPMs observed, results of chi square test
_____ Mean of last 10 background checks and allowable limits
_____ Raw data from counter to verify crosstalk values

IV. Blanks Data Package

_____ ID number of each detector the blank is counted in
_____ Date and time of counts
_____ Samples and IDs used in set with the blank
_____ Type of blank used
_____ Detection limit reported

V. Lab QC Sample Data Package

_____ Sample ID, Detector ID
_____ Analyst initials
_____ Values obtained, true value of sample
_____ Statistical analysis of results
_____ Name, activities, certification date of QC samples

CORELAB

RADIOCHEMICAL DATA COMPLETENESS CHECKLIST
RADIOMETRIC AND GROSS α & β ANALYSES

Analytes ______________ **Method** ______________ **Job No.** ______________

VI. Lab Replicates Data Package

_____ Detector ID
_____ Analyst initials
_____ Date and time analyzed
_____ Value obtained for sample, replicates, mean values
_____ Count durations of sample and background
_____ Statistical analysis of range and control limits

VII. Self-Absorption, Recovery Factors Data Package

_____ Linear equation for calibration curve, coefficients
_____ Copy of self-absorption curve
_____ Raw data from counter to determine coefficients

VIII. Lower Limit of Detection

_____ Background measurements
_____ Detector ID
_____ Date and time of count, count duration
_____ Mean background CPM over long period
_____ Calculated LLD for isotope of interest

IX. Size of Aliquot in Gross α & β Determination Data Package

_____ Sample ID
_____ Data and time analyzed
_____ Measured specific conductance
_____ Calculated volume of sample to deliver 100 mg solids
_____ Efficiency factor used

X. Sample Data Package

_____ Printed report of results for sample, reruns
_____ Computer calculations
_____ Raw data from counter, copies of logbook pages

Comments:

Reviewed by:______________________________ **Date:**______________

CORELAB

RADIOCHEMICAL DATA COMPLETENESS CHECKLIST
ALPHA SPECTROMETRIC ANALYSES

Analytes ________________ **Method** ________________ **Job No.** ________________

I. Case Narrative

_____ Abnormalities explained
_____ Matrix problems explained
_____ Instrument problems explained
_____ Improper collection, storage, preservation, containers explained
_____ Holding time exceedances explained

II. Initial Calibration Data Package

_____ Detector ID
_____ Analyst initials
_____ Date and time calibrated
_____ NIST traceable standards with certification dates and DPM's
_____ Observed channel numbers of isotopes of interest
_____ Book values for proper channel numbers of isotopes of interest
_____ Voltage settings, gain settings
FWHMs in spectra, peak heights
Results of chi square test for background
_____ Background data on regions of interest (ROI) for each detector

III. Blanks Data Package

_____ ID number of each detector the blank is counted in
_____ Analyst initials
_____ Date and times of counts
_____ Number and ID of samples included with the blank
_____ Type of method blank used, LLD of method

IV. Replicate Sample Data Package

_____ Detector ID
_____ Analyst Initials
_____ Date and time Analyzed
_____ Value obtained for sample, replicates, mean values
_____ Count Durations of samples and backgrounds
_____ Statistical Analysis of Range, Control Limits

V. Lab QC Sample Data Package

_____ Sample ID, Detector ID
_____ Analyst initials
_____ Values obtained, true value of sample
_____ Statistical analysis of results

CORE LAB

RADIOCHEMICAL DATA COMPLETENESS CHECKLIST
ALPHA SPECTROMETRIC ANALYSES

Page 2 of 2

Analytes ________________ **Method** ________________ **Job No.** ________________

VI. Lower Limits of Detection

- _____ Background Measurements
- _____ Detector ID
- _____ Date and time of count, counting duration
- _____ Mean background CPM over long period
- _____ Calculated LLD for isotope of interest

VII. Internal Recovery Factors

- _____ Efficiency determined experimentally, copy of raw data, DPM values of check standards
- _____ Detector ID
- _____ Analyst initials
- _____ Date and time of count
- _____ Isotopic Tracer used and DPM value
- _____ Certification Data of Tracer
- _____ Net CPM obtained
- _____ Count duration
- _____ Overall Efficiency Factor
- _____ Instrument Efficiency
- _____ Calculated Chemical Recovery

VIII. Sample Data Package

- _____ Printed report on results for sample, reruns
- _____ Computer calculations

Comments:

Reviewed by:________________________________ **Date:**________________

CORE LAB

RADIOCHEMICAL DATA COMPLETENESS CHECKLIST
TRITIUM ANALYSES

Analytes ________________ **Method** _______________ **Job No.** _______________

I. Case Narrative

_____ Abnormalities explained
_____ Matrix problems explained
_____ Instrument problems explained
_____ Improper collection, storage, preservation, containers explained
_____ Holding time exceedances explained

II. Initial Calibration Data Package

_____ Detector ID with Program Settings
_____ Date of Performance Check
_____ Batch Number
_____ NBS Traceable Standards with Certification Date and DPMs
_____ Quench Monitor Values and CPM for Standard used to check long term performance of cocktail and instrument
_____ Background-Blank vials CPM Results

III. Blanks Data Package

_____ Detector ID
_____ Date Analyzed
_____ Collection Date
_____ Sample ID counted with blank
_____ Detection level reported

IV. Lab Replicate Data Package

_____ Detector ID
_____ Data Analyzed
_____ Collection Date
_____ Value obtained for sample, replicates, mean values
_____ Count durations of samples and backgrounds
_____ Statistical analysis of Range, Control Limits

V. Lab Control Samples Data Package

_____ Sample ID, Detector ID
_____ Values obtained, true value of sample
_____ Statistical Analysis of Results

VI. Lower Limits of Detection

_____ Background measurements
_____ Detector ID
_____ Date of count
_____ Calculated LLD comparison with Required Detection Level

CORE LAB

RADIOCHEMICAL DATA COMPLETENESS CHECKLIST
TRITIUM ANALYSES
Page 2 of 2

Analytes ________________ **Method** ________________ **Job No.** ________________

VII. Quench and Efficiency

_____ Quench Monitor used
_____ Quench Monitor Values and Efficiency Values
_____ Detector ID
_____ NBS traceable standards with certification date and DPM
_____ Batch number and sample IDs; Efficiency standard and background used
_____ Volume added to cocktail
_____ Cocktail used
_____ Vials used

VIII. Sample Data Package

_____ Printed Report of results for sample, reruns
_____ Computer calculations
_____ Analyst Initials
_____ Raw data from counter, copies of notebook pages

Comments:

Reviewed by:________________________________ **Date:**________________

RADIOCHEMISTRY DATA REVIEW AND QUALIFICATION CHECKLIST (page 1 of 2)

Core Laboratories

Project Example

Evaluation Criteria	Yes	No	If No - QUALIFY		Comments
			Detects	Non-Detects	
I. Instrument Calibration					
A. Initial Calibration					
1. Performed Annually ?			R	R	
2. Acceptable?			R	R	
B. Continuing Calibration					
1. Performed Weekly ?			R	R	
2. Acceptable?			R	R	
C. Instrument Background					
1. Performed Weekly ?			R	R	
2. Acceptable?			R	R	
II. Batch QC					
A. Laboratory Blank					
1. Performed 1/20 or per batch ?			J	UJ	
2. Activity <MDA ?			J	UJ	
3. If high contamination			R	R	
B. Laboratory Control Standard					
1. Performed 1/20 or per batch ?			J	UJ	
2. %Recovery within QC Limits 80-120% ?					
<LCL 50%			R	R	
<LWL 80%			J	UJ	
>UWL 120%			J	UJ	
>UCL 150%			R	R	
C. Spikes					
1. Performed 1/20 per batch ?			J	UJ	
2. %Recovery within QC Limits 75-125% ?					
<LCL 20%			R	R	
<LWL 50%			J	UJ	
>UWL 120%			J	UJ	
>UCL 150%			R	R	

RADIOCHEMISTRY DATA REVIEW AND QUALIFICATION CHECKLIST (page 2 of 2)

Core Laboratories

Project Example

Evaluation Criteria	Yes	No	If No - QUALIFY		Comments
			Detects	Non-Detects	
II. Batch QC (continued)					
D. Duplicates					
1. Performed 1/20 or per batch ?			J	UJ	
2. RPD or RER within QC limits RER ≤2 ?			J	UJ	
III. Sample Analysis					
A. Chain of custody and condition OK?					
B. Preservative					
1. Included HNO_3 ?			J	UJ	
C. Holding time 6 months					
1. Met?			J	UJ	
2. If grossly exceeded (>2X)			R	R	
D. Tracer/carrier					
1. Included All samples ?			R	R	
2. NIST traceable and/or standard within expiration date (other QC OK)?			J	UJ	
3. NIST traceable and/or standard within expiration date (other QC not OK)?			R	R	
4. %Recovery within QC limits 50-100% ?					
<LCL 20%			R	R	
<LWL 50%			J	UJ	
>UWL 100%			J	UJ	
>UCL 120%			R	R	
E. Calculations correct?					
F. Report matches data?					
G. Other					

APPENDIX G

UNITED STATES DEPARTMENT OF INTERIOR FISH AND WILDLIFE SERVICES ENDANGERED AND THREATENED SPECIES LETTER

Appendix G information is contained in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan

APPENDIX H

FIELD NOTES AND LABORATORY RESULTS FROM THE 1986 EXCAVATIONS AT SEAD-12A AND SEAD-12B

North End Decon

19 May 86

A Opened large pit

1) Discovered 3 concrete culvert pipes under large concrete slab - all filled with water

2) Discovered 1 large metal corrugated pipe that was back filled under a concrete slab.

3) Discovered 1 rectangular, back filled area under another concrete slab.

4) Talked w/ Howard Marchitell who stated that other items were buried at the north end of the pit.

B. Workers: T. Stincic, John Cleary, Ken Crantone Frank Anthony, Shirley Bentley, Frank D'Amico

C. Visitors: Bill Van Dusen, Phil Louvier, Howard Marchitell

20 May 86 - No work - Rain

21 May 86 " " "

22 May 86 " " "

23 May 86 " " SDO

27 May 86

A. Opened suspected pit behind Bldg 804

metal pit (Pit 4).

B. Workers: T. Strincic, C. Rance, J. Milligan, M Lewi

B. Owen, R Cartenuto.

C Visitors. J. Cleary CPT Kohodl, K. Crawford, F. Anthony

24 Jun 86

A. Alpha Team members continue to stake out pit.

B J. Jones, R. Wright, T. Strincic

C. Phil Louvier

25 Jun 86

A. Alpha Team members continue to stake out pit.

B.

26 Jun 86 - No work - Alpha Team couldn't support with people.

27 Jun 86

A. Alpha Team surveying w/ Fidler.

B. S. Bentley, R. Hamilton, T. Strincic

C. LTC Owen, B. Van Dusen, K Crawford, CPT Kohodl, R Wri

21 July (con't)

B. John Brungart, Frank Fisher, T Stancic

22 July

23 July Opened Pad

24 July Opened Pad

18 Aug Used large backhoe to dig
down to water tank. Struck
underground streams @ 18 feet
TJS. F. D'Amico, Bob Tansley, Tom Bennett
Visitors Bill VanDusen LTC Owen

19 Aug Pumped out water, used dozer w/winch
and large backhoe but couldn't move
the tank. Covered it over.
TJS F. D'Amico, Bob Tansley, Tom Bennett
Visitors Bill Van Dusen, J Quill, T Battaglia, P Matusik

20 Aug F. D'Amico restored site.

3 Sept TJS monitored culverts with PRS-1 w/AC-3
probe, No readings. also swiped all culverts.
#1 + #2 Large Concrete Culverts. #3 - #6 Small
Concrete culverts #7 Large metal culvert.

AMSDS-SF (SDSSE-LS/6 Dec 88) (385-11a) 1st End Mr. Owen/AV 570-9328
SUBJECT: Radiological Decontamination Report

CDR, U.S. Army Depot System Command, Chambersburg, PA 17201-4170 6 Apr 89

FOR CDR, U.S. Army Materiel Command, ATTN: AMCSF-P, 5001 Eisenhower Avenue,
Alexandria, VA 22333-0001

1. Reference telephone conversation between Mr. R. Owen, this office, and Mr. T. Stincic, SEAD (SDSSE-LS), 3 Apr 89, SAB.

2. Subject report is forwarded for your review and action.

3. Pursuant to our review and referenced telephone conversation, concur with adequacy of site cleanup and release of site for unrestricted use.

4. It should be noted that wipe test results are in dpm/100 sq.cm., and soil samples are in pCi/gm.

FOR THE COMMANDER:

John E. Rankin
JOHN E. RANKIN
Chief, Safety Office

Encl
nc

CF (w/o encl):
CDR, SEAD, ATTN: SDSSE-LS

Original

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
SENECA ARMY DEPOT
ROMULUS, NEW YORK 14541-5001

REPLY TO
ATTENTION OF

SDSSE-LS

6 December 1988

MEMORANDUM THRU: Commander, U.S. Army Depot System Command, ATTN: AMSDS-SF, Chambersburg, PA 17201-4170

FOR: Commander, U.S. Army Materiel Command, ATTN: AMCSF-P, Alexandria, VA 22333-0001

SUBJECT: Radiological Decontamination Report

1. Radioactive contamination was presumed to be located at two sites in Seneca Army Depot, Romulus, New York. This information was obtained from employees who worked here in the 1960's.

2. The two sites were a 5000 gallon tank with an associated pit and a burial area with five separate pits.

3. The 5000 gallon tank and associated pit were used by the AEC. When the site was turned over to the Army, the AEC removed all the waste. The other site was apparently of U.S. Army origin.

4. Operations began 19 May 1986 and ended on 3 September 1986.. The 5000 tank and associated pit were free from radioactive contamination (encl 1&2). The other site did have a sizeable amount of lab trash buried in the pits.

5. The trash was wet and handled by a backhoe. The trash and dirt was loaded into 23 each B25 containers which were shipped to Chem-Nuclear Systems, Inc., Barnwell, South Carolina in December, 1987.

6. All phases of the operation were monitored with appropriate survey instruments. In addition, dry swipes were taken and read on a Nuclear Measurements Corp PC-5 Proportional Counter (encl 3). Soil samples were taken and analyzed at the Ballistics Research Laboratory (encl 4).

7. The Seneca Army Depot Alpha Team performed a radiological survey of the entire area where the lab trash was buried with negative results.

8. Request you review the enclosed information and concur that the sites have been cleaned and are certified for unrestricted use.

FOR THE COMMANDER:

Thomas C. Battaglia

5 Encls

THOMAS C. BATTAGLIA
Safety Manager

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY BELVOIR RESEARCH & DEVELOPMENT CENTER
FORT BELVOIR, VIRGINIA 22060-5606

REPLY TO
ATTENTION OF

STRBE-VR

21 July 1986

SUBJECT: Spectroscopic Analysis

Commander
US Seneca Army Depot
ATTN: SDSSE-AX (T. Stincic)
Romulus, NY 14451-5001

1. Reference letter SDSSE-AX, dated 3 June 1986, subject: Request for Analysis.

2. A gamma spectroscopic analysis of 4 samples of water is forwarded:

Sample	Concentration
Pit #1	560 pCi/L
Pit #2	630 pCi/L
Pit #3	550 pCi/L
Tank	540 pCi/L
Background	300 pCi/L

3. Licenses shall not release radioactivity in effluents to unrestricted areas in concentrations which exceed the limits specified in Appendix B, Table II of 10 CFR 20. This limit for natural uranium is 3 X 10^{-5} microcurie per milliliter.

4. The highest concentration from pit #2 is 630 picocuries per liter or 6.3 X 10^{-7} microcurie per milliliter.

5. The concentrations of gamma emitting radioactivity at Para 2 do not exceed limits at Para 3.

6. A beta analysis of 4 samples of water is forwarded:

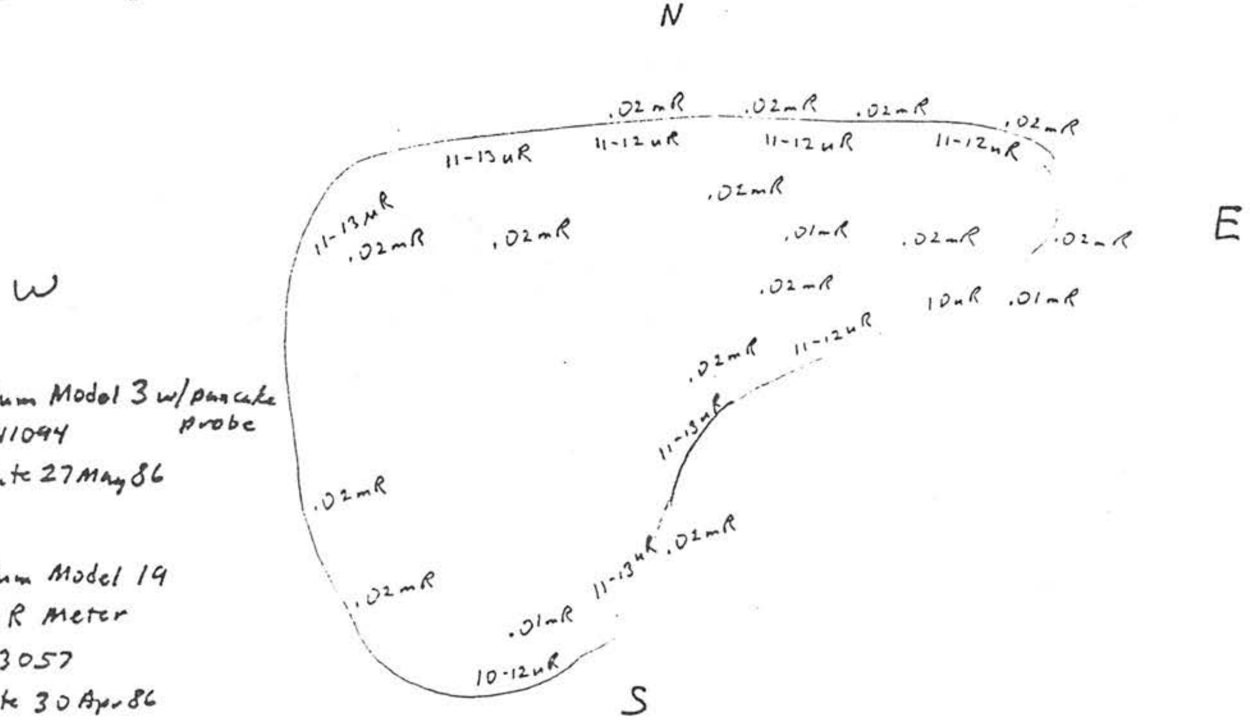
Sample	Concentration
Pit #1	79 dpm/mL
Pit #2	83 dpm/mL
Pit #3	79 dpm/mL
Pit #4	75 dpm/mL
Background	80 dpm/mL
Lower limit of detection	93 dpm/mL

PIT NEAR BUILDING 804

Pit was opened on 27 May 1986. No suspicious debris were encountered except for pieces of plywood. The pit was approximately 18 feet long by 10 feet wide by 4.5 feet deep.

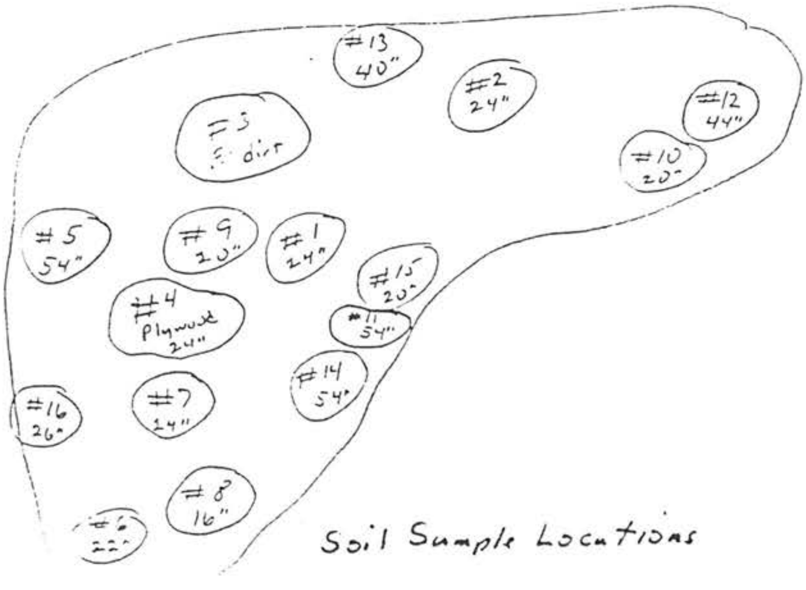
Readings were taken with a Ludlum Model 3 equipped with a pancake beta/gamma probe and a Ludlum Model 19 MicroR Meter. No readings above background were noted.

Soil samples were taken from the bottom of the pit (54") and when the pit was partially back filled (22").



llum Model 3 w/pancake probe
S/N 41094
Cal date 27May86

Ludlum Model 19
MicroR Meter
S/N 33057
al date 30Apr86



Soil Sample Locations

Sample No.	Description	Findings
# 1	24 inches	< MDA
# 2	24 inches found	< MDA
# 3	Mass 79.4 g	< MDA
# 5	54 inches West	< MDA
# 6	22 inches	< MDA
# 7	stuck to plywood at 2 feet	< MDA
# 8	16 inches	< MDA
# 9	20 inches	< MDA
# 10		< MDA
# 11	54 East	< MDA
# 12	44 inches East	< MDA
# 13	40 inches North	< MDA
# 14	54 inches SE	< MDA
# 15	20 inches	< MDA
# 16		< MDA
# 4	Plywood found in hole	< MDA

Encl 23

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO

ERENCE OR OFFICE SYMBOL SUBJECT Grid Survey

SDSSE-NX

TO: Safety Officer FROM: Chief Alpha Team DATE: 5 July 88 CMT 1
RPO

1. Subject survey has been completed for some time but final compass readings were not established.

2. Attached is a copy of the initial DF that established the requirements and instrumentation to be used. In addition to this initial DF the following information is provided:

a. Instrumentation - One Ludlum Model 2220 w/SPA3 probe, S/N 31992 Probe S/N NA

One Ludlum Model 2220 w/Fidler probe, S/N 31963 Probe S/N MD734.

b. Standardization as stated on initial DF.

3. Survey was conducted for initial start point as depicted on attached portion of a current Depot map. Grid starting at 27.50 by 86.65 approx. Compass readings from start point were taken utilizing the peak of the water tower and a intersecting reading taken utilizing the peak of the commo tower n[illegible] Bldg 812. The readings are; commo tower 268w, water tower 287w. C[illegible]ently the start point is marked by a stake and red flag.

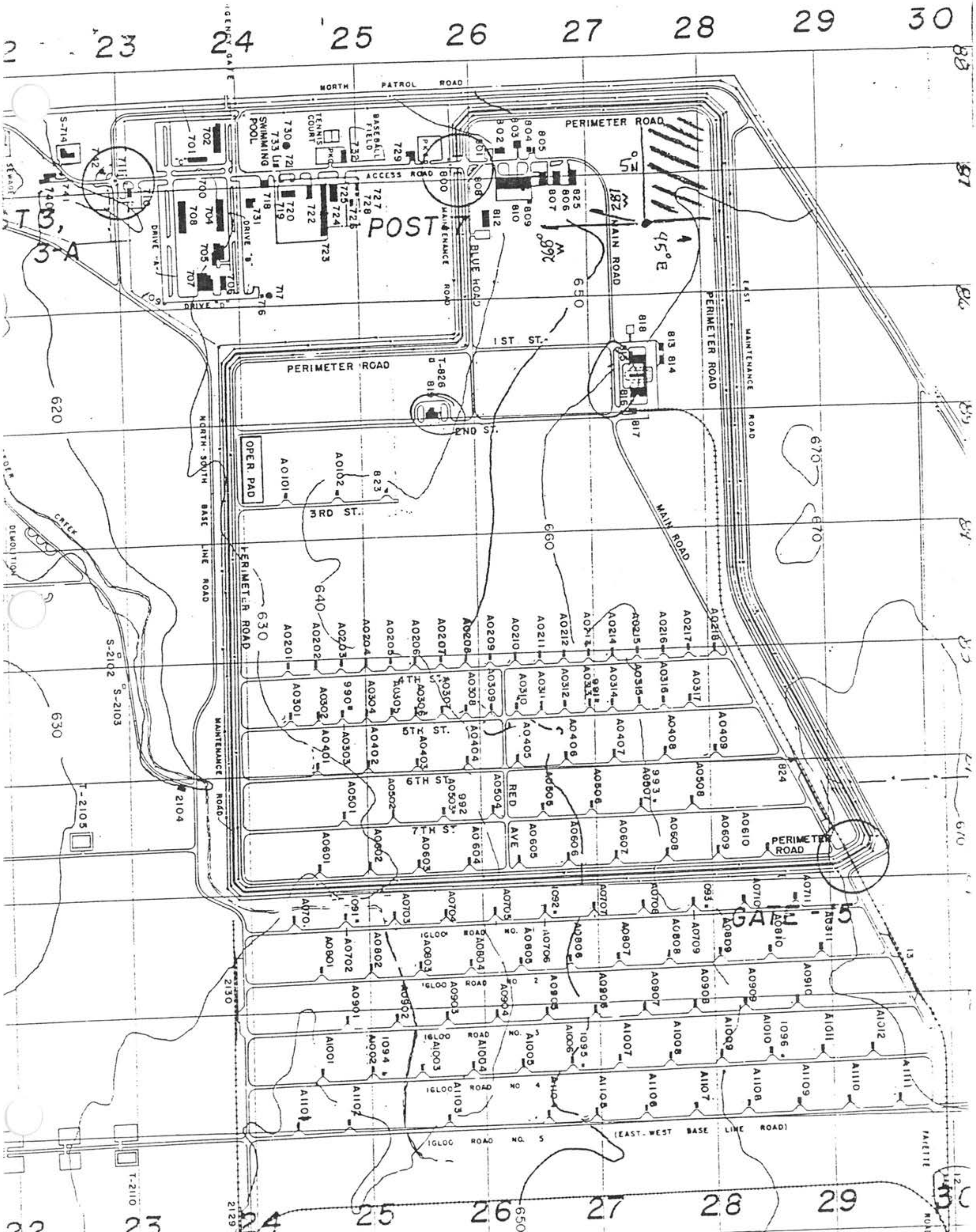
4. The survey consisted of a back and forth slow walk by two alpha team members. Each member carried an instrument as listed in para 2 above. The initial direction was on compass heading 95e until intersection of the patrol road. One step, approximately 3 feet, was taken in an easternly direction and the team headed in a back azimuth of 275w. This process continued until the entire noted area was completed. The western boundry of the survey area was determined by the start point and an azimuth of 5e.

5. This survey was conducted with no readings above background being noted. The background during each days survey by various teams did vary but in all cases each team noted no readings above their starting background.

6. Point of contacts for the survey are, Mr. J. Cleary or Mr. P. Louvier, at ext 30-207/560.

PHILIP T. LOUVIER
CHIEF ALPHA TEAM

2 encl
as



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NORTH PATROL ROAD
PERIMETER ROAD
ACCESS ROAD
MAINTENANCE ROAD
BLUE ROAD
MAIN ROAD
EAST MAINTENANCE ROAD
1ST ST.
2ND ST.
3RD ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
RED AVE
NORTH-SOUTH BASE LINE ROAD
MAINTENANCE ROAD
IGLOO ROAD NO. 1
IGLOO ROAD NO. 2
IGLOO ROAD NO. 3
IGLOO ROAD NO. 4
IGLOO ROAD NO. 5
(EAST-WEST BASE LINE ROAD)
FAYETTE ROAD
DRIVE "A"
DRIVE "B"
DRIVE "D"
SWIMMING POOL
TENNIS COURT
BASEBALL FIELD
PKG
OPER. PAD
CREEK
DEMOLITION
SEWAGE
POST 7
T3, 3-A
GATE 5
45° E
5° E
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630
640
650
660
670
S-714
S-2102
S-2103
T-2105
T-2110
T-826
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Encl 53

North

Quad # 1

WEST

Fence

	1	2	~~310~~ 2	4	6	6	7	8	8	10	11	12Fence	13	14	15	16	17	18	18	20	21	22		27	25
	450	450	450	450	450	460	450	500	500	450	550	450	450	450	450	500	500	450	450	450	450	400	450	450	450
1	450	450	450	450	450	450	450	500	500	450	450	450	450	450	450	450	500	450	450	450	450	400	450	450	450
2	450	450	450	450	450	450	450	550	500	450	450	450	450	450	500	450	500	500	450	450	500	450	450	450	500
3	450	450	450	450	450	450	450	550	500	450	450	450	500	450	450	450	500	450	450	500	450	450	450	450	450
4	450	450	450	450	450	450	450	500	500	450	500	450	500	450	500	450	400	450	500	450	500	450	450	500	450
5	450	450	500	450	450	450	450	600	450	450	600	450	500	500	500	500	450	500	450	450	450	450	450	500	500
6	450	450	500	450	450	500	450	450	450	500	600	500	500	500	500	500	500	500	600	500	450	500	500	450	450
7	450	450	500	500	450	500	450	450	450	500	600	500	600	600	500	600	500	500	500	500	450	500	500	500	500
8	450	450	500	500	450	500	500	450	500	500	600	500	620	550	600	600	600	600	500	500	500	500	600	500	500
9	450	450	500	500	500	500	500	450	500	500	600	550	600	600	600	600	600	600	800	500	500	500	600	500	500
10	450	450	500	500	500	450	500	450	500	500	620	600	600	620	600	700	600	700	800	600	600	600	700	600	500
11	450	450	500	500	500	450	500	450	500	500	600	600	650	600	600	800	650	800	700	700	600	600	600	600	600
12	450	450	500	500	500	500	500	450	500	500	600	600	650	700	600	700	700	800	800	700	640	700	600	600	600
13	450	450	500	500	500	450	450	450	500	500	600	600	600	700	650	620	800	700	700	700	800	600	600	600	600
14	450	450	500	500	500	450	450	500	500	500	600	600	600	600	600	600	800	600	600	800	700	600	700	600	500
K	450	450	500	500	450	500	450	450	500	500	600	600	600	600	600	600	700	600	600	600	800	700	600	600	500
16	450	450	500	500	450	450	450	450	500	500	450	450	600	600	600	600	700	600	600	600	600	600	600	500	450
17	450	450	500	500	450	500	450	450	500	500	450	450	600	550	500	500	800	600	600	800	600	600	600	500	450
18	450																								

27 JUNE 86

NORTH

Quad #3

West

Fence

	1	2	3	4	5	6	7	8	9	10	10	12	13	13	15	16	17	18	18	20	21	22	23	24	25
18	400 ~~500~~	450	400	400	400	450	400	450	450	450	450	450	450	450	400	500	500	500	500	500	500	500	500	500	400
19	400 ~~500~~	450	450	400	400	450	400	450	450	450	450	450	450	450	500	500	500	500	500	500	500	500	500	450	400
20	450 ~~500~~	450	450	400	400	450	400	450	500	500	450	450	500	450	450	500	500	500	500	500	500	500	500	450	400
21	400 ~~450~~	450	450	400	400	450	400	450	500	450	450	450	500	500	450	500	500	450	500	500	500	500	450	500	500
22	400	450	400	400	400	450	400	400	450	450	400	450	450	400	450	500	500	500	500	500	500	500	500	450	500
23	450	400	450	400	400	450	500	400	500	450	400	450	450	400	400	500	500	500	500	500	500	500	450	500	500
24	450	400	400	450	450	450	450	400	450	450	450	450	450	400	450	500	500	500	500	500	500	500	450	400	500
25	450	450	400	450	450	450	400	400	450	400	450	500	450	500	450	400	500	500	500	500	500	500	450	450	450
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33	450	400	450	400	400	450	450	450	450	500	450	450	500	450	500	450	500	500	500	500	500	500	500	500	500
34	450	450	450	400	400	450	450	450	450	500	450	450	500	400	500	500	450	500	500	500	500	500	450	500	500
35	450	450	450	400	400	400	450	450	500	500	450	450	450	400	500	500	500	500	500	500	500	500	500	500	450
36																									

30 Jun 86

Background 350 CPM on [illegible]
Readings given are actual, background not subtracted,

NORTH

Quad #5

FENCE

WEST

Fence

400	36	325	350	350	300	300	350	375	350	375	350	350	350	350	300	300	400	475	475	500	450	400	400	400	350
400	37	350	350	350	300	350	375	300	300	350	350	350	300	325	350	325	400	400	450	475	425	425	450	400	400
400	38	350	350	350	300	350	350	300	300	250	350	325	350	325	335	350	425	425	425	475	475	450	350	350	350
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420	42	300	275	300	350	350	375	350	325	350	350	400	350	375	375	425	400	500	550	450	450	500	400	400	400
420	43	350	350	350	300	350	350	300	325	350	400	350	350	350	375	375	475	475	450	450	450	475	400	375	375
420	44	350	350	300	400	400	400	300	350	375	400	450	450	350	425	400	550	450	475	600	550	475	450	375	350
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420	52	500	500	500	500	500	500	400	450	400	300	500	500	550	550	600	500	475	500	500	600	500	500	500	500
400	53	500	500	500	500	500	500	400	375	375	350	400	500	550	500	500	400	425	500	600	600	500	500	450	600
	54																								

NORTH

Quad #7

Fence

1 54	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
55	420	420	700	700	700	650	500	500	500	500	500	500	550	600	550	550	500	500	500	500	500	500	500	500
56	440	460	650	650	650	600	500	500	500	500	500	500	500	500	550	550	500	500	550	550	500	500	550	550
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68	420	420	420	420	440	380	500	500	500	500	450	400	450	450	550	500	450	450	450	450	400	400	400	400
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70	420	400	400	400	400	400	500	500	500	500	450	450	450	450	500	500	500	500	400	400	450	450	500	500
71	400	380	380	400	400	400	500	500	500	500	450	450	450	450	500	500	500	500	400	400	400	450	500	500
72	420	400	400	400	400	420	500	500	500	500	450	450	450	450	500	500	500	500	450	450	450	450	500	500

8 JUL 86 BG 500

Sunny, Clear About 80°

800 HRS

NORTH

Quad #9

WEST

Fence

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500	500	550	500	500	500	450	450	500	450	400	450	450	450	450	450	450	450	400	400	450	400	500	450	450
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450	400	500	500	550	550	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	500	450	500
450	450	500	450	450	450	450	450	450	500	500	500	450	450	450	450	400	450	450	450	500	450	500	500	500

8 JULY 86

APPENDIX I

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APPENDIX J

LETTER OF CONFIRMATION OF TELEPHONE CONVERSATION BETWEEN PARSONS ES AND THE NEW YORK STATE DEPARTMENT OF CONSERVATION, ON JULY 17, 1995

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7255
518-457-2225 FAX 518-485-8390

Michael D. Zagata
Commissioner

JUL 27 1995

Mr. Andy Swartz
Parsons Engineering Science
101 Huntington Ave.
Boston, MA 02199-7697

The purpose of this letter is to confirm the details of the July 17, 1995 telephone conversation you had with Jack Kadlecek, Ph.D., of my staff. The project under discussion is the characterization of a trench used by the U.S. Department of Army at the Seneca Army Depot for disposal of radioactive materials. The following three issues were discussed.

Your primary concern was what to do with the dirt that was disturbed as part of the process of obtaining samples during the characterization phase of the project. It is our understanding that you will be using a backhoe down to the water line, not only to obtain samples but also to get a visual indication of the condition of the waste filled trench. Below that, you plan to use a soil boring device to complete the sample to the bottom of the trench. After you have completed the sampling, it is appropriate to return the soil to the hole from which it came. You should not plan to take the soil removed from the trench to a different location. Also, if you find material with high concentrations of radionuclides, that if left on the surface would create a significant dose, you will need to either keep the material away from the surface or otherwise keep people from receiving that dose.

Since the radionuclide of greatest interest is likely to be Ra226, it would be useful to know what fraction of the Ra226 is still as discrete sources (or parts of sources) and how much has become dispersed into the soil. When calculations are done to estimate doses, the potential mobility of the radionuclides is an important piece of information.

Since we do not have any way of insuring that this land would be kept under the control of the U.S. Army (or other agency of the Federal Government), it is possible that someday unrestricted public access to this land might occur. While it is too early in the process to determine the final cleanup guidelines, we anticipate that it will be necessary to meet the UMTRA standards at a minimum. Because some of the plausible future uses for the property would be unrestricted, we would like to be present during the characterization effort, have a chance to comment on any decommissioning plan, and to participate in a final site survey.

Please contact Dr. Kadlecek, if you have any other questions.

Sincerely yours,

Paul J. Merges

Paul J. Merges, Ph.D.
Chief, Bureau of Radiation
Division of Hazardous Substances
Regulation

JAK/jab

APPENDIX K

RESPONSE TO COMMENTS

Response to Comments for
The New York State Department of Environmental Conservation (NYSDEC) and
the New York State Department of Health (NYSDOH)
Draft Scoping Plan for the Radioactive Waste Sites
SEAD-12, 48 and 63
Seneca Army Depot Activity
Romulus, NY
July 1996

General Comment:

Comment #1 In order for us to assure that we have adequately verified the site status prior to release, we request access to archival documentation covering present and past radiological uses of the site. We understand that much of this information is currently classified. We are not requesting access to detailed information regarding systems that may still be in use, but we do need to verify what isotopes were on site, when and where they were stored or used and any actions or incidents that have the potential to impact public health or the environment.

To this end, we would like to utilize staff members in our Radiation Section with Department of Energy (DOE) Q-Clearance. One of these people is a former military member who had a Department of Defense (DOD) top secret clearance. We need to know from the Army whether these clearances are sufficient to allow us access to the needed files, or if they are insufficient, what else could be done to gain access.

Response #1 Acknowledged. This topic has been discussed in recent correspondence and meetings between NYSDEC and the Army. It is our understanding that NYSDEC will be allowed to review those documents that are available, and that these documents are not classified.

Comment #2 As one result of the conference call of 2/8/96 with Parsons, the Corps of Engineers, Seneca Army Depot, and the NYSDOH, we understand that there is interest in arranging a meeting at SEDA between the State, Parsons, and the Corps of Engineers. This would help orient State personnel to the site and allow for a discussion of land use scenarios, pathways, and application of the RESRAD computer code. We are interested in discussing with the Army and Parsons the possibility of their updating from RESRAD version 5.19 to version 5.61.

Response #2 Agreed. This meeting was held on August 22, 1996

Comment #3 We agree with the types and location of the proposed sampling, and believe that adequate consideration has been given to the likely exposure pathways and their relative importance. In some areas we have determined that the number of samples and analysis proposed are excessive for the purpose of site characterization. If the long-range plan is to use the data generated for the RI/FS as the primary data for the final release survey, then this may justify some of the apparent excess of samples. Parsons should explain why the data needs require the number of proposed samples. In addition, why is chemical analysis proposed where historical information and site investigation results do not indicate chemical contamination. It appears that an adequate job can be accomplished using a more modest sampling and analytical program.

Response #3

Agreed. The data needs for the draft project scoping plan site were defined using the NUREG guidance for decomissioning radioactive sites. Since SEDA's mission at SEAD 12 primarily involved the storage of nuclear materials, and not the use or production of those materials, professional judgment was used to reduce the scope of work detailed in NUREG 5849 to a more reasonable and appropriate scope for this site. The work proposed in this Draft Final project scoping plan is intended to be used as a final release survey for survey units in SEADs 12 and 63 to show that they can be released from radiological concerns and the lands/buildings of those areas released for unrestricted use. This draft final plan was revised and is re-written using guidance from NUREG-5849m NUREG-1500, NUREG-1505, NUREG-1506, NUREG-1507 and MARSSIM.

It is also agreed that the TAL/TCL analyses on most of the samples is excessive, however, comments received by the USEPA have required the full TAL/TCL analyses on environmental samples collected at SEDA.

Comment #4

Parsons commits, in several locations in the draft, to following the US Nuclear Regulatory Commission's (NRC) NUREG-5849, "Manual for Conducting Radiological Surveys in Support of License Termination," during the RI/FS. The RI/FS is essentially a characterization survey, while NUREG-5849 is designed to prove that a site can be released for unrestricted use. If the intent is to utilize the data generated from the RI/FS as part of the final release survey, then use of NUREG-5849 is appropriate. It should save significant time and money during the release process. Data requirements need to be established based on clearly stated goals in order to ensure a consistent approach and make the best use of time and money available.

If final release is the purpose, and NUREG-5849 is not just being used as a general guide for a characterization survey, then a review of the NUREG is in order. The Draft Project Scoping Plan differs from the recommendations in NUREG-5849 in several areas. For example:

a. Draft Section 4.2.3 refers to the first four feet of wall as the "lower wall" for survey purposes. NUREG-5849, Section 4.2.2, describes the first two meters as meeting this purpose.

b. Draft section 4.2.3 also specifies a survey speed of 1.5 feet per second for Beta/Gamma instruments. This appears to refer to a GM or Gas Flow Proportional counter for surface contamination. NUREG-5849, Sec. 6.4.2, specifies that it should not exceed 1 detector width per second.

c. No minimum detector-to-surface distance is specified. NUREG-5849 and most other published decommissioning guidance specify minimum distances based upon instrument and radiation type.

This need for review of NUREG-5849 also applies to sample collection and gamma dose rates. The Draft Project Scoping Document does not conform to NUREG-5849 in those areas, either.

Response #4 Agreed. As described in the response to Comment # 3, the work proposed in this work plan is intended to serve as the final release survey.

Responses to alphabetized comments:

a. Agreed. Lower walls are now considered to 2 meters of elevation.

b. Agreed. However, the intended instrument for the alpha screening is a gas proportional instrument that can survey for alpha and beta radiations simultaneously. At the time the scoping document was sent to NYSDEC, it stated that the beta-gamma screening would be performed using a G-M instrument, and the scanning speed for gamma radiation using a G-M instrument can be as fast as 1.5 feet per second. This scoping document has been modified to state that alpha and beta scanning will be performed at speeds of 1 detector width per second and that the gamma scanning will be performed at speeds of 1.5 feet per second.

c. Agreed. Following NUREG 5849 guidance, the text has been revised to indicate that the nominal distance between the detector and the surface should be less than one centimeter for scans where alpha radiation is being monitored, and less than two centimeters when only beta radiation is being monitored.

Comment #5 We agree with the proposed general exposure pathways and the conclusion that consumption of deer flesh from animals on the property is likely to be the most significant current exposure pathway for local residents. We also agree with the selection of the residential scenarios as the most restrictive plausible future use scenario. We would like to discuss the scenario and pathways with the Army in more detail.

Response #5 Agreed. This topic should be proposed for the agenda for a future RAB meeting.

Comment #6 A survey of the ground around an affected building should not be limited to a 5-foot radius below each window. The entire perimeter of a building should be surveyed, out to at least one meter. Special attention should be paid to all wall penetrations (windows and doors) and roof downspouts.

Response #6 Agree. The text has been revised.

Comment #7 It is highly desirable to have some flexibility regarding the number and location of samples when performing a characterization of a site for the presence of hazardous materials/waste. As a means of building in some flexibility to the project, we propose the following:

a. A radiation survey should be performed for the full length of each two-foot split spoon sample collected during the boring operations. The results should be recorded using a detailed log of meter readings.

b. All split spoon samples should be archived until the extent of additional analysis needs is determined. If this is not possible, then samples should be taken from every segment where the survey meter readings are more than 50% above readings without a sample present. Those samples should be archived. Samples for archiving should also be collected from the segments immediately above and below the potentially contaminated segments.

c. After completion of the initial sample analysis for all three SEADs, the data generated should be used with the field survey records to choose up to a maximum of 30 additional samples from those archived. These would be analyzed to more precisely determine the volume of subsurface contamination.

Response #7

a. Agreed. All split spoon samples will be logged for alpha, beta and gamma radiations using the same instrumentation and techniques that are described in the Alpha, Beta and Gamma Screening Surveys section (Section 4.2.3).

b. Agreed. Archive samples will be collected and stored following the guidance detailed in the comment.

c. Agreed. However, should the results of the initial radiological analyses for a particular area (such as a specific affected area) show that contamination is not present (e.g. the results are within the 95th UCL of the mean of the background measurements), then additional samples will not be analyzed.

Comment #8

A similar flexibility should be built into the test pit protocol. Currently only two subsurface samples can be collected per test pit. If the visual and field screening process determines that two discrete samples are not sufficient to characterize the contamination in a pit, additional samples should be collected and archived in order to cover the total depth of the affected region. A maximum of 30 of these samples would be analyzed to provide a better characterization of subsurface contamination.

The analysis of archived samples would not increase the number of samples above the current proposed total. In actuality, the total would be reduced due to the reduction in what we consider to be an excessive number of fixed sample locations in the current plan proposal.

Response #8

Agreed If the radiation screening of the materials removed from the test pits indicates that radioactive materials are present, and two samples does not appear sufficient to characterize the site, then additional samples will collected and archived until it is determined which radionuclides are present. If the results of the radiological analyses indicate that the same radionuclides are present throughout the disposal pit area and that the relative concentrations appear to be proportional to the screening measurements made during the excavations, then no archived samples will be analyzed.

SPECIFIC COMMENTS

Comment #1 **Table of Contents, page V:** There appears to be a typographical error in the page numbers given for sections 4.3 through 4.8.

Response #1 Agreed. The page numbers have been revised.

Comment #2 **Section 1.3, page 1-5**: The second paragraph is related to SEAD-63 and therefore should be moved to section 1.5 Back ground, SEAD-63.

Response #2 Agreed. The paragraph has been revised to discuss SEAD-12A and 12B.

Comment #3 **Section 1.5, page 1-7:** The last sentence in the first paragraph on page 1-7 reads, "The 'operations' that were performed at the operations pad are unknown." Is this due to security reasons or lack of documentation? It would be very helpful to know what the operations were.

Response #3 Agreed. The type of operations which were conducted at the operations pad would be useful, however, the information was unavailable because of security reasons. The area is within the former nuclear weapons storage area.

Comment #4 **Section 3.1.1.1, page 3-3:** Were any samples collected during the July 1986 attempt to remove the 5,000 gallon underground storage tank (UST) behind building 804? If so, what were the results?

The second paragraph on page 3-3 needs to be expanded to better explain the history of the dry waste disposal pit. It should explain what was done with the material removed from the dry waste pit in 1957, 1965, and 1986, whether waste was found in the pit during the 1957 excavation, and if so, what type of waste it was. If there are any records of analyses performed on the waste, the results should be presented. Given the lack of any waste in the pit, please explain why it was excavated in 1965 and again in 1986.

Response #4 a. Agreed. Unofficial field notes from the 1986 fieldwork, as well as the results of samples collected from that fieldwork are now included in Appendix I.

b. Agreed. However,The only additional information that is currently avaliable concerning the fate of any excavated material is that the location of the pit was excavated in 1986 and the pit was then backfilled with the excavated soils. It should be noted that the reported excavation in 1957 was taken from notes on a 1977 site drawing, indicating that the occurrence of this excavation was based upon a review of informal data maintained by AEC. The notes from these drawings also indicated that no radioactive material was found and that a negative reading was recorded during the 1965 excavation.

Comment #5	**Table 3-24 - Standard Assumptions for Calculation of Chemical Intake:** Both the inhalation pathway and the ingestion of water pathway rows in this table lack an inhalation rate and an ingestion rate, respectively, for a child in the noncarcinogenic risk scenarios. The ingestion of soil pathway row incorrectly cites an "inhalation rate" of 200 mg/day for a child. Please change this to an "ingestion rate". Furthermore, no soil ingestion rate for an adult is listed in this row under the noncarcinogenic scenario. This gives the impression that the consultant does not intend to evaluate this exposure scenario. Please add the adult intake assumptions to this section.
Response #5	Agreed. The child ingestion rate of 1 liter/day has been added. The inhalation pathway is not done for a child. The text has been revised to ingestion rate. A soil ingestion rate of 100 mg/day for an adult has been added.
Comment #6	**Section 3.1.1.2.5, page 3-36:** The paragraph entitled, "Radioactivity" needs to be revised. The third sentence refers to, "the New York State TAGM of 90 mrem/year." This implies that our dose guideline is 90 mrem/yr. The dose guideline in our TAGM-4003 is 10 mrem/yr, in addition to the dose from background radiation. If the 90 mrem/yr is a total background dose of 80 mrem/yr plus our 10 mrem/yr above background guideline, this should be made clear. Normally a representative background is established, and this value is subtracted from affected area values prior to reporting dose contributions above background.
Response #6	Agreed. The text has been revised. The suggested method of dose reporting will be followed when reporting dose levels in the RI report.
Comment #7	**Section 3.1.1.2, pages 3-45 through 3-48:** On pages 3-45 through 3-48, the results of radioanalysis of groundwater samples are presented. The groundwater samples at SEAD-12B were subject to a full spectral analysis, gross alpha/beta analysis, and tritium analysis. Those from SEAD-12A were analyzed only for gross alpha/beta and K-40. If there is a reason why 12A did not receive full spectral and H-3 analyses, this should be explained in the plan. Otherwise, we would expect all SEAD-12 samples to receive full analysis.
Response #7	Disagree. For any particular suite of analyses at any particular site, only analytes or radionuclides that were detected in at least one sample are presented in the summary of results. All of the groundwater samples at SEAD-12A and SEAD-12B were analyzed by spectral gamma analysis. Only SEAD-12B groundwater samples were analyzed for H-3 as this radionuclide was only suspected to have potentially been stored or maintained during the early periods of operations at Buildings 803 and 804. There was no indication that H-3 would have been disposed of in the pits at SEAD-12A. The current plan calls for H-3 analyses in all samples.
Comment #8	**Sec. 3.1.1.3, page 3-55:** We agree that there is some indication of a possible radiological release to the groundwater at pit A. However, since only gross alpha activity is currently indicated, it is prudent to perform gamma and alpha spec

analyses on these samples, or new samples should be collected and have these analyses performed. This data would help to determine the isotopes contributing to this gross activity. They may help to better define the appropriate steps to follow in the RI/FS.

Response #8

Acknowledged. As stated in the previous response, all of the groundwater samples collected at SEADs 12A and 12B were analyzed by gamma spectral analysis. No radionuclides, other than those presented in Table 3-4, were detected in the groundwater analyses. It should be noted that the groundwater sampling plan proposed in the current scope of work includes collecting two rounds of groundwater samples which will be analyzed by gamma spectral and alpha spectral methods.

Comment #9

Section 3.2.1.2 - Potential Exposure Pathways and Receptors, Current Uses: This section states there are three primary receptor populations that could be affected by potential releases of contaminants from SEAD-12, only two are listed. Please correct this misstatement.

Response #9

Agreed. There are two primary receptor populations. The text has been revised.

Comment #10

Section 3.2.3.4, page 3-123: This section is apparently mislabeled as 3.2.4.

This section indicates that data collected will be considered to be normally distributed and treated as such in statistical considerations of the data. As a rule, environmental data is not normally distributed. This has been recognized by many authorities and is being incorporated into the statistical treatment in the forthcoming Multiagency Manual or MARSIM Document. Draft NUREG-1505 "A Nonparametric Statistical Methodology for Design and Analysis of Final Status Decommissioning Surveys" by Gogolak, Huffert and Powers is being used in the creation of the MARSIM document and is available for use. Another good reference for this application is Gilbert, R.O. and Simpson, J.C.,Statistical Methods for Evaluating the Attainment of Cleanup Standards, Volume 3: Reference Based Standards for Soils and Soil Media, PNL-7409 (Revision 1), Richland, Washington, December 1992, published for the EPA . We would be happy to discuss statistical approaches to data treatment with the Army.

Response #10

Agreed. In Parson's most recent RI report submittal to NYSDEC (the RI report for SEADs 25 and 26), the methodology used to establish RME and CT concentrations for analytes applied a three tiered approach that was based upon the frequency of detection for each analyte. In this approach, both the normal and log normal 95th UCLs are calculated for each analyte, and, based upon the frequency of detection for that analyte, the most relevant and conservative value is chosen as the RME and CT values. This methodology will be used to determine the SEAD-12 RME and CT values in the exposure assessment. The section was not mislabeled.

In addition, Parsons uses the statistical tests that are detailed in Statistical Methods for Evaluating the Attainment of Cleanup Standards, Volume 3: Reference Based Standards for Soils and Soil Media, PNL-7409, NUREG-1505 and MARSSIM to perform statistical analyses on the analytical data that are reported.

Comment #11 **Section 3.4, page 3-128:** The reference for our TAGM "Technical and Operational Guidance Series, (Memorandum 4003)" should read, "Technical Administrative Guidance Memorandum: 4003, Cleanup Guideline for Soils Contaminated with Radioactive Materials (TAGM 4003)." It is important to note that exposures from radon (Rn) are not covered under TAGM-4003.

Response #11 Agreed. The reference has been changed.

Comment #12 **Section 3.5, page 3-132:** In the last paragraph on this page, it is stated that soils obtained from the split-spoon sampler will be screened for the presence of volatile organics. In addition, they should also be routinely screened with a radiation survey instrument.

Response #12 Agreed. The text has been revised.

Comment #13 **Section 3.6.1, page 3-135:** Under "Buildings and Structures Data," add "determination of radionuclide concentrations in building ventilation systems." If ventilation surveys or historical evidence indicate the potential for airborne releases, the roof of the suspect building also needs to be surveyed.

Response #13 Agreed. The text has been revised.

Comment #14 **Section 3.6.2, pages 3-136 to 3-137:** a. This section describes the data needs for SEAD-48. Extensive radiological survey work has been performed at SEAD-48 over a number of years, including a site decontamination. The June 1993 NYS follow-up survey of the bunkers and surrounding area did show a small number of areas in need of further radiological decontamination that had not been previously identified. However, the rest of the area was considered to be acceptable for release. While there is a need to clean up these three areas and verify the decontamination of the rest of the site, it does not seem reasonable to require an extensive, final-release radiological survey of the entire site as is proposed for SEAD-48.

However, further work does appear to be needed to verify the lack of any residual subsurface contamination. In addition, the previously identified area of ground surface contamination needs to be delineated, and a verification survey should be performed on the rest of the exterior area. Biased surveys should concentrate on the soils in front of the bunkers, in floor drain outfalls, and in surface drainage pathways. After removal of the contamination from the affected areas, a final release survey should then be performed in those areas.

b. The Corps should consult with the New York State Department of Labor regarding surveys of the interiors of buildings that are being left intact on the site.

c. In addition, it is our understanding that the only concern at SEAD-48 is the radiation from residual pitchblende ore, stored in 1940s. If there are other concerns which required chemical analysis then that should be stated, otherwise Parsons should explain why all samples are proposed for chemical analysis. To eliminate uncertainties with the historical data, a few samples should undergo chemical analysis, but to analyze all samples as proposed appears to be excessive.

Response #14

This project scoping plan now presents the proposed RI/FS scope for SEADs 12 and 63 only. This comment will be addressed at a later date when the Draft Final Project Scoping Plan for SEAD-48 is issued.

Comment #15

Section 4.2.2 pg 4-5: The next to last sentence reads, "Based upon the soil gas survey results, 2 test pits, 2 soil borings and four monitoring wells will be spatially located to better define the extent of ^{226}Ra in the site's soils." This should be the minimum number of test pits, borings, and wells. At this time, there is no way to ensure that the specified number of locations will be adequate. While a soil gas survey for Rn is an interesting technique to delineate buried radium, there are factors that could provide false negative results. Given the fact that some of the pits excavated showed that the disposal pits extend below the water table, Rn from deposited radium may never make it out of the groundwater.

Response #15

Disagree. Because the area of the disposal pits is relatively small (approximately 65 feet by 40 feet), the proposed number of soil borings and test pits is believed to be appropriate. Also, one test pit was performed in this pit during the ESI. It should be noted that four monitoring wells cited in the text will be spacially located based upon the radon survey. An additional 4 monitoring wells will be spacially located in the immediate vicinity of the disposal pit based upon the results of seismic refraction surveys. Also, Army costing procedures require a fixed number of investigatory locations be specified prior to allocating a budget for this RI/FS.

Comment #16

Section 4.2.5, page 4-9 and Sec 4.2.9.1 page 4-11: Archival information may provide enough information to determine that the rest of SEAD-12 (other than 12A and 12B) has little potential for impact, but without this information, the limited number of gamma dose rate measurements and surface soil samples (30) proposed for that portion of the site is inadequate.

Response #16

Agreed. The text has been revised and Section 4.2.3, Radiological Surveys at SEAD-12, now discusses how survey units were defined. This section also now has a table, Table 4-1 which presents the rationale for each survey unit classification.

Comment #17

Section 4.2.8, page 4-11: The second sentence on this page states that three samples/smears will be taken from the interior of the 5,000 UST north of Buildings 804 and 805. This sentence should start with, "A minimum of". Three samples may not be sufficient to characterize the interior of the UST, especially given the fact that it may have been partially filled with soil during the previous failed attempt to remove it. Breaching the top of the tank with a drill rig to collect the samples may be inadequate. If the samples collected from the bore hole cannot be determined to be representative of the contents, the tank top may need to be excavated and the previous hole exposed, to better establish the interior state of the tank.

Response #17 Agreed. However, due to the location of the tank (currently believed to be at least 18 feet below the ground surface), collecting more than three samples/smears may not be possible. The text has been modified as suggested in the comment.

Comment #18 **Section 4.2.9.1, pages 4-11 to 4-12:** Beginning at the bottom of page 4-11 it is written, "If possible one of the surface soil samples collected as part of this grid sampling will be collected at each downspout drain location around Buildings 804, 805, and 819." The sentence should be revised to read, "Biased surface soil samples will be collected in conjunction with this grid sampling at each downspout drain location around Buildings 804, 805, and 819." Downspouts are important biased sample locations that should not be passed up solely because they do not fall at one of the grid intersections.

Response #18 Agreed. The text has been revised.

Comment #19 **Section 4.2.9.1 page 4-11:** Eight surface soil samples are proposed from background locations to establish a surface soil background radionuclide concentration data base, but the Table 4-2 indicate that these samples will also be tested for VOCs, Semi-VOCs, pesticides/PCBs and metals. We do not see a need for VOCs, Semi-VOCs and pesticides/PCBs analysis from upgradient locations.

Response #19 Agreed. See response to Comment #3.

Comment #20 **Section 4.2.9.2, page 4-12:** Soils brought up during boring should be checked with a radiation survey meter, as is proposed in section 4.2.9.3 for test pits.

Response #20 Agreed. The text has been revised.

Comment #21 **Sections 4.2.9.3 and 4.4.7.3 - Test Pitting Programs:** These sections state that soil sample results from the test pits at SEAD-12 and SEAD-48 will be excluded from the risk assessment. It is inappropriate to exclude the results of the test pit soil samples from the risk assessment for these, or any, sites. Because it is reasonable to anticipate excavation and exposure to subsurface soils under a future residential use scenario, all data gathered regarding soil contamination is relevant to the risk assessment. It would be improper to exclude these test pit soil sample results from the risk assessment because the consultant expects to encounter high levels of contamination. The sample selection process it self is biased under the RI/FS process. We try to take samples, where the possibility of finding contamination is greater. If we apply the theory that biased samples should not be used for risk assessment, then all the samples from the suspected disposal areas should be excluded.

The introduction of this document also state, "the purpose of the RI/FS is to determine the nature and extent of environmental impacts, and to evaluate and select appropriate remedial actions". By selectively excluding sampling results, the consultant may be hindering the attainment of the stated goals of this investigation.

In addition, the New York State Department of Health (NYSDOH) encourages the use of a more conservative approach so that a maximally exposed individual is evaluated. Consistent with this, the NYSDOH recommends that maximum detected values of each contaminant in each media of concern be used to calculate risk.

Response #21 Agreed. The sentences stating that test pit samples will be excluded from the risk assessment have been deleted.

Comment #22 **Section 4.2.13, page 4-21:**

a. We do not see the purpose of performing radon emanation analysis on **all** samples collected from the SEAD-12. Parsons should reconsider the need for radon emanation analysis of samples such as swipes, surface soils, waters, and sediments. The likely purpose is to differentiate between uranium-235 and radium-226, given their very similar gamma energies. However, soil samples can be accurately analyzed for radium using gamma spec, if time is allowed for daughter products to build in after the sample is prepared for gamma spectrum analysis. Parsons needs to rethink this proposed analysis, and if they believe it is still necessary, then a justification should be included in the proposal.

b. Since historical information is classified and the scope of SEAD-12 has been increased to include the remaining open area of the weapon storage area, a full target compound list (TCL) analysis for samples from areas where no information is available is understandable. But, the proposed sampling plan requires all samples to undergo full TCL analysis, including samples from SEAD 12-A and SEAD 12-B, for which site investigation results indicate some concern for few metals and radionuclides only. We therefore do not see a need for all samples to undergo full TCL analysis.

Response #22 a. Agreed. The text has been revised to indicate that the soil samples will be analyzed by Method 901.1

b. Agreed. See response to Comment #3.

Comment #23 **Section 4.3, SEAD-48, pages 4-24 through 4-47:**

a. Previous comment on section 3.6.2 regarding SEAD-48 also apply to this section.

b. The use of NUREG/CR-5849 to classify igloos E0804 through E0811 as affected is questionable. This work qualifies as a characterization survey and not a final release survey. Regulatory bodies routinely responsible for decommissioning of nuclear facilities would not require NUREG/CR-5849 to be used for the RI/FS, since the guidance applies to final release surveys (Refer to the NRC's "Draft Branch Technical Position on Site Characterization for Decommissioning," Section 4.2., paragraph two, which states " In general, site characterization will not require the level of detail prescribed in the NUREG/CR-5849 for the final and confirmatory survey").

Furthermore, given the decontamination work, release surveys, and verification surveys already performed for this SEAD, it does not appear to be necessary to do another full characterization survey of the area.

Instead of following NUREG/CR-5849, it may be more appropriate to proceed as follows:

i. Remediate the areas determined to contain residual activity during the NYSDEC/DOH verification survey.

ii. Perform a final release survey of these remediated areas per NUREG/CR-5849.

iii. Perform a verification survey (up to 10% of surfaces), rather than a 100% coverage final release type survey, of the interior of the remaining bunkers and of the loading areas in front of them.
iv. Perform a verification survey of the grounds around the bunkers.

v. Unless they have already been investigated as part of a previous survey, roadway shoulders should be surveyed near the igloos and road intersections to look for ore that may have been deposited during transport.

vi. Sediment and surface water samples should be collected as indicators of possible past runoff problems. The pattern of sampling proposed is appropriate, but again it appears that excessive sampling is proposed. If Parsons has reason to suspect activity in these waterways that warrants the larger number of samples, that information should be included in the plan.

vii. The previous studies have not fully addressed the potential for subsurface and groundwater contamination. Therefore, borings and monitoring wells are needed. However, the number proposed is excessive for the history of contamination at the site and the potential impact from it. A small number of biased soil borings should be performed at igloos where past soil contamination has occurred. An up-gradient and a couple of down-gradient borings are also needed. Each of these borings should then be developed as a monitoring well.

c. Verification at the rail yard is worth including.

Response #23 This project scoping plan now presents the proposed RI/FS scope for SEADs 12 and 63 only. This comment will be addressed at a later date when the Draft Final Project Scoping Plan for SEAD-48 is issued.

Comment #24 **Section 4.4 Field Investigation at SEAD-63:**

a. There is only a <u>possible</u> impact from Ra-226 on soils in this area, not a definite impact. The range of concentrations reported is within the range of background values for the State.

b. Given the elevated Gross Alpha activity in groundwater at MW63-3, we agree that isotopic analysis of groundwater is warranted. However, this should be done now in order to determine if it is necessary to install the comparatively large number of wells proposed for this SEAD. Parsons should justify the need for these proposed wells.

c. Given the lack of evidence for significant radiological contamination in this area to date, there is little justification for requiring 48 surface soil samples as noted in table 4-8. We believe that characterization purposes can be served by the analysis of a smaller number of samples, concentrated in the area of known disposal pits, the former operations pad, and former vehicle access points.

d. For the same reasons noted above, we believe that the proposed number of surface water/sediment sample analyses may be unnecessarily large. The local depression and adjacent roadway drainage ditches should be sampled, but fewer samples would suffice.

e. Test pits in uninvestigated geophysical anomalies are needed and should remain in the proposal.

f. Soil borings could be limited to SB63-1, SB63-2 and SB63-3, and the smaller number of additional monitoring wells recommended above.

Response #24

a. Agreed. The text of Section 3.1.3.3, Data Summary and Conclusions (SEAD-63 has been revised).

b. Agreed. The proposed number of monitoring wells is now five, and justifications for the five proposed monitoring wells is provided in **Table 4-5** of the scoping document.

c. Agreed. The data collected during this RI is intended to serve as the final release survey data. Following the NUREG 1505 and MARSSIM guidance, the minimum number of random surface soil samples required for this site is 17. However, in order to economize the soil sample analysis program, 14 biased surface soil samples will be collected and only an additional 10 will be collected at random locations.

d. Acknowledge. However, the proposed number of surface water and sediment samples is believed to be necessary in order to demonstrate the types and degrees of any impacts to those media to perform the risk assessment for this site and to provide sufficient power for the statistical tests that will be performed to compare these samples to background samples.

e. Agreed.

f. Acknowledged. However the five additional monitoring wells will provide data on the extent and level of any impacts to groundwater as well as provide data for the baseline risk assessment at this site.

Comment #25 **Section 4.4.2, page 4-49:** What is the distinction made here between a beta instrument and a beta-gamma instrument? The Draft Project Scoping Plan correctly identifies a pancake GM as a beta-gamma instrument but then specifies a survey rate of 1.5 feet per second for it. This is an extremely fast rate. The rate of one detector width per second, which the plan specifies for a beta instrument, is correct for a pancake GM.

Response #25 Agreed. The text has been revised to indicate that the beta screening will be performed only using gas proportional detectors. The use of a NaI instrument will be limited to gamma surveys only, and will be performed at a rate of 1.5 feet per second (following NUREG 5849 guidance.)

Comment #26 **Section 4.4.11 Analytical Program:** The site investigation results indicate that concerns at SEAD-63 are few metals and radionuclides. Please explain why all samples are proposed for full TCL analysis.

Response #26 Agreed. See the second paragraph of the response to General Comment #3.

Comments from the NYSDOH's Bureau of Environmental Radiation Protection:

Comment #1 **Page 3-45:** The Uranium-235 concentrations found in ground water (44pCi/l) would appear to be extremely high from well MW12B-1. Since no U-238/234 concentrations are shown, it could be assumed that highly enriched U-235 somehow entered the ground water. The report also implies on page 3-44,3.1.1.3, that this result may be due to laboratory error, yet no follow up analysis was conducted.

Response #1 Agreed. Two samples were collected at the MW12B-1 monitoring well location: sample MW12B-1 and MW12B-5, a duplicate sample. Since sample MW12B-5 did not have any detected concentrations of radionuclides from the uranium, thorium or actinium series, the MW12B-1 results were considered to be potentially extraneous. As part of the RI at this site, monitoring well MW12B-1 will be resampled during both the first and second rounds of groundwater sampling. If no radionuclides from the uranium or actinium series are detected in these samples, or if any levels of such radionuclides can be demonstrated to be equivalent to background concentrations, then the reported concentrations of the MW12B-1 groundwater sample will be rejected. If these data re rejected, they will be excluded from any discussions of site impacts and they will not be used in the risk assessments for SEAD-12.

Comment #2 **Appendix A; Page 1 of 2, SEAD-12A, Test Pit 12A-3:** This diagram shows what may have been a thermal battery. Since many thermal batteries contain high concentrations of radionuclides, the type of unit should be identified and if radioactive material was incorporated in the battery, the radioisotope should be identified and addressed in the sampling plan.

Response #2

Acknowledged. The test pit log incorrectly identified this as a thermal battery. The Army has identified this as an MC193A NiCd battery.

Comment #3

Page Table 3-6B: The Tritium (HTO) results shown for these samples are questionable. Typical Minimum Detection Levels (MDL) for HTO in water are approximately 100-150 pCi/l. As reported, these samples range from 0.06 to 0.27 pCi/l, which is considerably lower than the background levels of 200 pCi/l found in N.Y.S.

Response #3

Agreed. The units reported in the scoping document are incorrect. The units for the values presented should be pCi/ml. The HTO result reporting has been corrected accordingly.

Comment #4

Page 4-3: This states that alpha surveys will only be performed in buildings and on pavement. Since some of the radioisotopes potentially involved emit relatively low energy gammas, the presence of an alpha emitter may be determined by using appropriate instrumentation. While alpha survey meters cannot be effectively used on soils, grass or rough surfaces, detectors such as FIDLER (Field Instrument to Detect Low Energy Gammas) or other Sodium Iodide (NaI) crystal detectors with an appropriate single channel analyzer can be used to survey these areas. These types of instruments are used extensively by the military as well as federal and state agencies to search for special nuclear materials as well as isotopes of Uranium, Plutonium, Americium and other low energy gamma emitters.

Although not directly confirmed, it is assumed that fissionable material was stored and/or maintained in the NWS (Nuclear Weapons Storage) area. To be sure that contamination, primarily alpha emitters, has not been covered or limited to one decay series, use of the FIDLER or other NaI detector to locate areas of contamination would be essential.

Response #4

Agreed. The use of sodium iodide (NaI) detectors has been included as the instrument type for the gamma screening surveys.

Comment #5

Section 4: In the description of the Task Plan for RI in Section 4, it is stated that the investigation will follow the procedures outlined in the USNRC's "Manual for Conducting Radiological Surveys in Support of License Termination" (NUREG/CR-5849). The first decision to be made is what type of survey is to be conducted. From the description in Section 4, it would appear that a final status survey is being proposed and that scoping and characterization surveys have been completed. It is our assumption, however, that this is primarily a characterization survey to precisely define the extent and magnitude of the contamination.

Guideline values for soil contamination will need to be determined in conjunction with the appropriate state agencies based on future use scenarios and dose limits prior to initiation of the survey. Likewise, comparison of the agreed upon guidelines for fixed and removable contamination with the detection sensitivity or Minimal Detectable Activity (MDA) of the proposed survey instruments must be predetermined to insure that systematic measurement are performed at appropriate intervals, i.e. 1.0 meter or 2.0 meters.

According to Section 4.2.3 and 4.2.4, a 100% scan of affected areas in the buildings will be performed with direct measurements taken at 10 foot intervals. Unless the scanning technique can be demonstrated to have a detection sensitivity of <25% of the guideline values with the instruments proposed, a direct measurement would be required in each 1.0 meter grid interval.

Since alpha contamination may have been covered or imbedded in floors or walls and only the G.M. meters are proposed to detect Beta/Gamma associated emissions, the typical detection sensitivities (Table 5-5, NUREG/CR-5849) of 2,000 to 3,000 dpm/100 cm with a count rate instrument and 500 to 1,000 dpm/100 cm for a digital scaler (static count), would not be sufficient to meet the <25% guideline value figure. The NUREG document also states on page 4.13 that .... “floors and wall surfaces be scanned for all radiations which may be emitted....”. Since some of the potential contaminants emit low energy gamma, NaI probes should be used for this survey.

Assuming that the <25% guideline value figure will not be met would also require that swipe samples be taken in each 1.0 meter grid location.

Response #5

Agreed. As stated in previous responses the data to be collected as part of this RI is intended to serve as the final status survey data for SEADs 12 and 63. The scope of work now proposed in this document has been discussed with NYSDOH and it was stated by them that the proposed surveys should be sufficient to address all of their concerns.

The guidelines that will be used for the building surveys will be those of Table 5 as published in 12 NYCRR part 38.

RESPONSE TO COMMENTS
U.S. ENVIRONMENTAL PROTECTION AGENCY
DRAFT SEAD-12, SEAD-48, SEAD-63 PROJECT SCOPING PLAN
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NY
JULY 1996

General

Comment #1 The table-of-contents is incomplete, the page numbers should be completed to allow for easier review and referencing of the document.

Response #1 Agreed. The table of contents has been revised with the appropriate page numbers.

ECOLOGICAL

Comment #1 Although the Ecological Description sections (4.2.12, 4.3.10 and 4.4.10) mention that regulated wetlands will be identified within the project vicinity, no mention is made that wetland delineations will be conducted at any of the sites. Also, if remedial actions involve disruption of wetland areas, a wetland functional assessment should also be conducted. This possibility should be discussed in the scoping plan.

Response #1 Agreed. The U.S. Fish and Wildlife Service has recently conducted a wetland delineation of the entire SEDA facility as part of the BRAC95 program. The National Wetlands Inventory (NWI) map (1980s) was compared with the present ground conditions during the growing season (early April through September). Wetlands were identified by standing hydrology, soil condition, and wetland associated flora and fauna. A site was evaluated if wetlands were indicated on the NWI or existing SEDA maps. The ground area was observed for saturated soil for more than 15 days of the growing season and the site had obligate or facultative wetland plant and animal species present. Select sites were cored for soil identification and further validations. The wetland areas were marked with plastic flagging and a map was produced showing all identified wetlands. This information will be included in the ecological assessment of the sites. A wetland functional assessment will be conducted as part of the FS when remedial alternatives have been developed. The text has been revised in the three referenced sections to state the source of the wetland delineation information. If this information is not adequate, a wetland delineation will be conducted.

Specific Comments

Comment #1 **Page 3-1, p2:**
Current and future land uses should be added as an aspect evaluated in the development of the conceptual site models.

Response #1 Agreed. Current and future land uses have been added as an aspect evaluated in the development of the conceptual site models.

Comment #2 **Page 3-5, p1:**
The locations of the five remaining prior borings around the UST should be located on the appropriate site figures to aid in the definition of the site geology.

Response #2 Disagree. The exploratory borings were performed only in an attempt to penetrate the 5,000 gal UST. Only the boring that was used to collect the soil sample was located during the geodetic survey. The locations of the other five borings were not surveyed. They were located within approximately 10 feet of the SB12B-1 sample location.

Comment #3 **Page 3-8 EM Survey:**
The text gives the approximate dimensions of Area 1 as 65 feet long by 40 feet wide, Figure 3-4 shows this area as being approximately 90 feet long by 85 feet wide. Similar differences were also noted when comparing the text and figure for the remaining three areas. These discrepancies should be resolved.

Response #3 Agreed. The dimensions of Area 1 should be 90 feet by 80 feet. The text has been revised. The dimensions of the remaining three areas have also been revised in the text.

Comment #4 **Page 3-20, p1:**
The measurements cited for the region of weak GPR signal are incorrect in the text based on a review of Figure 3-8.

Response #4 Agreed. The region of weak GPR signal extends 600 feet north and is approximately 100 to 150 feet wide. The text has been revised.

Comment #5 **Figure 3-11:**
The date for water level measurements does not match that presented in Table 3-2. This discrepancy should be corrected.

Response #5 Agreed. The date for water level measurements should be July 6, 1994; the date has been corrected in the figure.

Comment #6 **Page 3-24 Section 3.1.1.2.5, Soil:**
The results of the analyses have been compared to the 1992 TAGM No. 4046. A new version of recommended soil clean-up TAGM was published in January 1994, this version should be used for the comparison of the results.

Response #6 Agreed. The text has been revised to state that the NYSDEC TAGM No. 4046, dated January 1994 was used for comparision of results. In addition Tables 3-3A and 3-3B have been revised with updated TAGM criteria.

Comment #7 **Page 3-62 and elsewhere:**
Data are presented in incorrect units. For ease of comparison to release criteria, wipe sample results should be presented in disintegrations per minute (dpm) per 100 cm^2. Soil sample data should be in picoCuries per gram (pCi/g). A "count" is not the same thing as a concentration and should not be expressed as such. The second paragraph states that a Pb-214 result of 6.2 pCi/g is reflective of background radiation. This is not true, as background concentration for members of the uranium series should fall in the range of 0.5 - 2 pCi/g. This should be noted, even if the information is excerpted from previous studies done by other groups.

Response #7 This project scoping plan now presents the proposed RI/FS scope for SEADs 12 and 63 only. This comment will be addressed at a later date when the Draft Final Project Scoping Plan for SEAD-48 is issued.

Comment #8 **Page 3-110, Section 3.2, General Comment:**
More attention should be paid to the development of this section as, in theory, its the basis for the RI/FS. As outlined, not all potential receptors were considered and there are inconsistencies between the text and the figures that should be corrected. Specific examples follow.

Response #8 Agreed. The specific items listed in the following comments have been addressed and the changes made.

Comment #9 **Figure 3-20, Figure 3-21, Figure 3-22:**
Since radon gas may emanate from sources on the sites, “volatilization” as a primary release mechanism should be revised to “release/volatilization”. Since exposure via radon gas, contaminated particulates, and volatilized chemicals may be possible “dust/radon” as a pathway should be revised to “air”. Since the text discusses uptake by both flora and fauna, “uptake by flora” as a secondary release mechanism should be revised to include both.

Response #9 Agreed. The figures have been revised.

Comment #10 **Pages 3-115, p3; 3-118, p4; and 3-121, p3:**
For consistency with Figures 3-20, 3-21, and 3-22, respectively, site visitors and aquatic biota should be added to the list of receptor populations.

Response #10 Agreed. Site visitors and aquatic biota have been added to the list of receptor populations.

Comment #11 **Page 3-116, p2:**
Since the unnamed creek “eventually flows beyond the AOC boundary and into Reeder Creek” and since Reeder Creek flows off SEDA, consideration should be given to the potential for exposure of individuals who may contact Reeder Creek downstream of SEDA. The potential for impacts to aquatic biota that inhabit the unnamed creek and Reeder Creek should be addressed. According to Section 4.2.10, surface water and sediment samples will be collected from Reeder Creek at off-site locations. Figure 3-20 should be revised accordingly.

Response #11 Agreed. Off-site residents and aquatic biota have been added as potential receptor populations.

Comment #12 **Pages 3-116, p4; 3-119, p5; and 3-122, p5:**
It is not clear why the potential for “uptake in site flora” is limited to radionuclides. Some discussion should be provided or the potential for uptake of other contaminants should be considered.

Response #12 Agreed. The text has been revised.

Comment #13 **Page 3-116 and elsewhere:**
Contrary to what appears in the text, radon does not accumulate in the respiratory system of fauna. Radon is generally not an outdoor inhalation hazard due to the enormous dilution of radon gas with air. Since radon is an inert gas, the vast majority of radon inhaled by fauna (or humans) will also be exhaled. Inhaled short-lived radon decay products deposit on bronchial tissue. However, as a result of the short half-times, they do not "accumulate" in the respiratory system. Rather, they decay there.

Response #13 Agreed. The text has been revised.

Comment #14 **Page 3-119, p3:**
Since Silver Creek "flows . . . beyond the site boundary and eventually drains into Indian Creek", consideration should be given to the potential for exposure of individuals who may contact Silver Creek and Indian Creek downstream of SEDA. According to Section 4.3.9, surface water and sediment samples will be collected from Silver Creek and Indian Creek. Figure 3-21 should be revised accordingly.

Response #14 This project scoping plan now presents the proposed RI/FS scope for SEADs 12 and 63 only. This comment will be addressed at a later date when the Draft Final Project Scoping Plan for SEAD-48 is issued.

Comment #15 **Page 3-127 and 3-128:**
Chemical-specific ARARs for New York State should include New York State Department of Environmental Conservation's "Technical Guidance for Screening Contaminated Sediments", July 1994.

Response #15 Agreed. The referenced NYSDEC TAGM for sediments has been added as a chemical-specific ARAR.

Comment #16 **Page 3-134, Groundwater Data; bullet 1:**
Why use geophysical data to access groundwater flow directions? Existing wells can be used to aid in determining groundwater flow directions at the site.

Response #16 Seismic surveys are proposed in areas where local topography is likely affecting the groundwater flow directions. In addition, there are a limited number of existing monitoring wells to use fo determining groundwater flow direction.

Comment #17 **Page 4-3; bullet 7:**
What are "Special measurements and sampling "? This should be better defined.

Response #17 Disagree. Section 4.3.8 fully describes what "special measurements and sampling" are.

Comment #18 **Page 4-3; bullet 9:**
Wells within the bedrock should also be considered since the UST is at a depth of approximately 18 feet, which indicates that the bottom of the tank is within the bedrock. Contaminants may have migrated in the bedrock and this should be investigated through the installation of bedrock monitoring wells.

Response #18 Agreed. A bedrock well downgradient of the 5,000 gal UST has been proposed.

Comment #19 **Page 4-3, Section 4.2.1:**
See previous comment on the use of geophysical data for the determination of groundwater flow direction where there are existing monitoring wells.

Respone #19 The seismic surveys are proposed in areas where local topography is likely affecting the local groundwater flow directions.

Comment #20 **Page 4-5, Section 4.2.2:**
The text states that "Based upon the soil gas survey results, 2 test pits, 2 soil borings and four monitoring wells will be spatially located...". However, the text does not discuss the basis for locating these areas. Will a threshold value from the soil gas survey be used to identify areas

which require investigations? Have criteria been established to determine if more (or fewer) test pits or borings would be conducted? EPA should be consulted for concurrence.

Response #20 Agreed. The text has been revised to include the following statement: The soil borings and test pits will be located in areas where the soil gas surveys detected elevated concentrations of radon-222 in the interstitial pore spaces of the fill/soil matrix in and immediately surrounding the disposal pit. The monitoring wells (MW12-5, MW12-7, MW12-8, and MW12-9) will be located in areas where the soil gas survey indicates that radium-226 is being transported down gradient of the disposal pit.

Comment #21 **Page 4-5, Section 4.2.2:**
This section states that soil gas sample locations are shown in Figure 4-1. The locations are not shown on the legend of Figure 4-1. Using soil radon data to delineate a volume of soil contaminated with radium may not be the best approach since the radon emanation rate of the soil is unknown. Further, it is not likely that the radon emanation rate in the areas of concern are constant. The use of downhole gamma count rates to delineate contaminated areas should be considered. Estimate of Radium Contaminated Soil On Five Sites In Ottawa, Illinois, September-October 1988, prepared for the USEPA Region 5 (ANL/ESH/TS-89/100, March 1989), describes how this type of measurement may be used to estimate subsurface soil radium concentrations.

Response #21 Disagree. Radium and most of its associated radionuclides are primarily alpha emitters. Additionaly, ^{222}Rn is an alpha emitter and using an instrument that monitors for that alpha emitter should be acceptable. It is understood that the radon emanation rate from the soil is not known at this time, but, the data collected from the radon soil gas survey, the groundwater sampling survey, and the soil sampling surveys could be used to establish radon emanation rates for the site. Also, it may be possible to use the radon detection instrument proposed for the soil gas survey to obtain level 1 data on the radon concentrations in any water that may seep into the soil gas holes.

The soil gas sample locations are shown on the legend of Figure 4-1.

Comment #22 **Page 4-9 Section 4.2.6:**
If total surface activity measurements are in the range of background, it appears unnecessary to collect wipe tests for removable activity, as currently described. Where a wipe test result exceeds the relevant criterion, the document calls for taking five additional wipes from adjacent areas. This level of effort is not necessary. The wipe data are to be used to determine if a surface meets release criteria and if not, to evaluate decontamination and disposal options. Those goals could be accomplished without performing the quantity of wipe tests described in the document.

Response #22 Agreed. The text has been revised and only a single wipe measurement will be collected at each direct measurement location.

Comment #23 **Page 4-12, p3:**
The locations of the stated borings/monitoring wells should be checked against Plate 4-1, e.g. MW12-9 appears to be downgradient and not upgradient of the stated location, MW12-12 is not located near the disposal pits. The Army should review the groundwater flow map presented on Figure 3-11, since the stated flow directions in this section do not match Figure 3-11. This discrepancy should be corrected.

Response #23 Agreed. The stated flow direction of the groundwater in the northeastern portion of SEAD-12 and the assumed flow direction which was used to select locations for the monitoring wells in this area of the site are different. The groundwater flow direction shown in Figure 3-11 is to the northwest and the assumed direction used for monitoring well locations was a radial flow following the ground surface contours. The groundwater flow direction presented in Figure 3-11 was based on data from three monitoring wells, which are not enough data points to accurately depict the groundwater flow direction. In addition, the groundwater elevations in the three wells differs by only 0.68 feet, which does not indicate a strong gradient in any direction. Generally the groundwater flow driection at SEDA is consistent with the ground surface elevation. The ground surface contours and the presence of the unnamed stream south of the disposal area indicate that the groundwater may flow radially from the topographcial high near monitoring well MW12A-1 toward the unnamed stream and toward the west following the ground surface contours. This explanation has been added to the text on page 4-12.

Comment #24 **Page 4-14, p1:**
The purpose of collecting a soil sample below the water table is unclear. It would be more appropriate to collect the sample from just above the water table, since any contamination below the water table would probably be considered a groundwater issue.

Response #24 Disagree. The referenced text describes the location of the soil samples to be collected for limited chemical and physical testing. This information will be used to evaluate the fate and transport as well as to determine sand and screen size in the well construction. Therefore, the soil samples must be collected at a location below the groundwater table.

Comment #25 **Page 4-15, Section 4.2.10, p2:**
The text here should reference Plate 4-1 and Figure 4-1.

Response #25 Agreed. The text should reference Plate 4-1 and has been changed accordingly.

Comment #26 **Page 4-16, Section 4.2.11.1, p1:**
The text states that wells will be installed in the saturated overburden; however, if no saturated overburden is encountered, it does not state if wells will be installed in the first water bearing unit (bedrock).

Response #26 Disagree. The text states that the wells will be screened "... in the saturated overburden overlying the bedrock". Since it is well known that significant seasonal fluctuations in the overburden groundwater level can occur at SEDA, and that during some periods of the year the overburden may not be sufficiently saturated to the point of yeilding water in groundwater monitoring wells, it was assumed that the intended meaning of this sentence would be understood. To address this comment, the sentence has been re-written to state that the monitoring wells will be screened in the till/weathered shale overlying the bedrock. Bedrock wells will not be installed in place of till/weathered shall monitoring wells.

Comment #27 **Sections 4.2.12, 4.3.10 and 4.4.10, Ecological Descriptions:**
These sections are adequate as generic discussions, but for the purposes of the scoping plan, it would be more useful to tailor the sections to the individual sites, using existing information on habitats present and taking into account the complexity of each site.

Response #27 Disagree. Ecological investigations have not been conducted at the sites and therefore it would be difficult to present a more detailed discussion on the habitats present at each site.

Comment #28 **Table 4-1:**
A review of the monitoring well location rationale should be conducted to ensure that stated locations match those presented on Plate 4-1.

Response #28 Agreed. The monitoring well location rationale have been reviewed and revised as necessary. Particularly, the rationale for monitoring wells MW12-5 and MW12-6 were reversed. In addition, the labeling of MW12-17 on Plate 4-1 has been corrected.

Comment #29 **Page 4-32, Section 4.3.6, p1:**
The location and former use of the background Igloo's should be given in the text.

Response #29 This project scoping plan now presents the proposed RI/FS scope for SEADs 12 and 63 only. This comment will be addressed at a later date when the Draft Final Project Scoping Plan for SEAD-48 is issued.

Comment #30 **Figure 4-5:**
a) A larger map should be provided to show the location of the surface water and sediment sampling points which are off this figure.

b) The locations and configurations of the monitoring wells at this SEAD should be re-evaluated. The gap in the line of monitoring wells between MW48-4 and MW48-5 versus between MW48-5 through MW48-12 should be explained. The present locations of the monitoring wells would not adequately define the hydrogeology, or groundwater flow direction at this SEAD. Additional monitoring wells should be installed to adequately define the groundwater flow.

Response #30 This project scoping plan now presents the proposed RI/FS scope for SEADs 12 and 63 only. This comment will be addressed at a later date when the Draft Final Project Scoping Plan for SEAD-48 is issued.

Comment #31 **Page 4-35, Section 4.3.8.2, p3:**
Monitoring well MW48-14 is referred to twice in the text. As presently written it appears as if these wells are in two different locations.

Response #31 This project scoping plan now presents the proposed RI/FS scope for SEADs 12 and 63 only. This comment will be addressed at a later date when the Draft Final Project Scoping Plan for SEAD-48 is issued.

Comment #32 **Page 4-36, p2:**
See previous comment on the collection of soil samples below the water table.

Response #32 Disagree. Please refer to the response to Comment # 24.

Comment #33 **Table 4-5:**
The rationale for the proposed monitoring well locations should be checked against Figures 3-16 and 3-18, relative to whether they are upgradient and downgradient of the trenches.

Response #33 Agreed. The rationale for the proposed monitoring well locations were checked and were found to be accurate. The wells located west of the trench are downgradient, and the wells east of the trench are upgradient.

Comment #34 **Figure 4-5:**
The flow direction of the surface water should be shown on this figure.

Response #34 Agreed. The flow direction of surface water has been added to the figure.

Comment #35 **Section 6.1:**
The project schedules should be revised. The first activities shown on the figures were scheduled for January 22, 1996. At this time no plans have been approved for the sampling at these SEADs.

Response #35 Agreed. The project schedules have been updated and the revised schedules have been included in this section.

Comment #36 **Section 7.0:**
Several of the references are incorrect, e.g. the TAGM reference should read New York State Department of Environmental Conservation ... and not “New York State Department of Environmental Protection...”.

Response #36 Agreed. The reference has been changed.

Comment #37 **Appendix D:**
See previous comment on the use of a soil gas (radon) survey for determining the extent of radium-226 contamination. All pages in this appendix are labeled D-1.

Response #37 Please refer to the Response to Comment #21. The page numbers have been revised.

Comment #38 **Appendix D, Section 1.1.2:**
The depth to which the probe will be driven (five feet) is deeper than “standard” soil gas surveys, which typically drive the probe to approximately three feet below grade. A rationale for the stated depth should be given in the text.

Response #38 Agreed. The following rationale has been provided in the text. The depth to which the probe will be driven is dependent on the groundwater elevation. The probe will be driven to just above the groundwater table (which may be approximately 5 feet) and withdrawn to within no less than 1 foot below the ground surface. The elevation of the groundwater at the time of sampling will determine the depth to which the probe is driven.

Comment #39 **Appendix D, Section 1.1.2, bullet 6:**
If the sample effluent is redirected into the sampling hole, the sampling may be biased by the introduction of the purge air. The effluent should be directed to the atmosphere.

Response #39 Disagree. The purge air will not be introduced into the sampling hole. The purpose of having the option to redirect the effluent back into the sampling hole is to assure that sufficient sample air is flowing through the instrument. The effluent would be redirected into the sampling hole only if a sufficient volume of air can not be drawn through the instrument under conditions where the soils have a poor soil vapor yield. Therefore, although the effluent may be redirected in to the sampling hole, only air that has been pumped out of the sampling hole will be recycled through the radon measuring instrument.

Comment #40 **Appendix D, Quality Assurance:**
The flow rate of the equipment should also be checked daily and noted for every sample collected.

Response #40 Acknowledged. The RAD7 instrument has a built-in air pump which has a nominal flow rate of 1 liter per minute. All available information relating to instrument performance will be recorded during the survey.

Comment #41 **Appendix F:**
The plan does not contain the contract laboratory's Quality Assurance Project Plan (QAPP), as stated in the generic work plan. This recurring cross-referencing error should be corrected.

Response #41 Disagree. The Final Generic Workplan contains the contract laboratory's Quality Assurance Project Plan and does not cross-reference the Scoping Plan.

TOXIC AND HAZARDOUS WASTE SECTION

General Comment

The comments summarized in EPA's May 7, 1996 letter regarding the Generic Workplan apply to this SEAD as well, but will not be reiterated. The Generic Workplan should be revised to address all comments in the May 7, 1996 correspondence and resubmitted prior to commencing sampling activities at SEAD 4, SEADs 16 and 17, and SEADs 12, 48 and 63.

Response Agreed. The Generic Workplan has been revised according to the EPA comments dated May 7, 1996. The revisions have been submitted to the EPA.

The following comments pertain to SEADs 12A and 12B only:

Comment #1 **Section 3.1.1.1, Page 3-3**
The second paragraph here states that the dry waste disposal pit was excavated by the AEC in 1957, yet the preceding paragraph indicates that the pit was presumably in use at this time. Please clarify this discrepancy.

Response #1 Agreed. A site plan that was prepared in 1977 indicated that informal data maintained by AEC showed that AEC personnel excavated and removed the contents of the dry waste disposal pit in August of 1957. This date appears to be very close to the time period when this site became active. The text has also been modified to include a statement that AEC reportedly excavated the dry waste disposal pit prior to their leaving the site.

Comment #2 **Section 3.1.1.2.5, Page 3-24, Table 3-3A**
a) The reporting limits listed here for sample TP12A-2-1, semi-volatile organic compounds, are approximately ten times higher than expected. Please clarify this discrepancy indicating if this is due to a required dilution, the dilution factor used, and an explanation as to why all compounds are reported as non-detect at 4500 ppb.

b) Upon comparison of the TAGM values with the attained reporting limits for certain semi-volatile organic compounds as well as metals, it is evident that the TAGM values have been exceeded. As per prior response to EPA comments on the Generic Workplan, alternate analytical methods are being evaluated in conjunction with the contracted laboratory for use on the upcoming RI sampling. These alternatives must be documented in the corresponding Scoping Plan prior to approval and initiation of field activities. If the lab proceeds using the methodologies currently proposed in the CDAP, data will be acquired which exceeds ARARs for certain parameters.

Response #2 b) Acknowledged. We recognize and have pointed out that for some constituents the analytical method detection limits are above the ARAR. This is an unfortunate limitation of the protocols. It should be noted that at the beginning of the Superfund program at SEDA, the Army Corps of Engineers, EPA, and NYSDEC agreed that NYSDEC Anlaytical Services Protocols would be used for the remedial investigations at SEDA. These are the identical protocols used by NYSDEC in their Superfund work throughout New York State. Special analytical services could be arranged with the contracted laboratory to reduce the detection limits, however, this would involve an R&D program that the Army believes is outside of what should be performed. But, if alternative methods were developed, then these methods would no longer be NYSDEC ASP Methods (which the laboratory is currently contracted to perform) and also, they would require EPA, NYSDEC, and MRD approval prior to being used. No changes were made to the text.

Response #2 a) The soil sample, TP12A-2-1, was diluted because of a large concentration of the matrix compounds phosphoric acid and 2-pentanone. These compounds were listed as Tentatively Identified Compounds. The sample dilution factor was 10. Although the compounds are reported as non-detects at 4500 ppb, a review of the data from the second sample (TP12A-2-2) collected from the test pit indicates that no semi-volatile organic compounds were detected in that sample at the normal detection limit.

Comment #3 **Section 3.1.1.2.5, Pages 3-35 and 3-36**

a) The paragraphs summarizing the semi-volatile organic and metals results that exceeded TAGM values do not include those results where the reporting limit is greater than the TAGM. Please address this omission.

b) In both the soil and sediment samples analyzed during the ESI, chromium was detected above the corresponding regulatory criteria. At present, the Scoping Plan does not discuss the analysis of hexavalent Chromium (Cr(VI)) in addition to the planned analysis for Cr(III). Please provide the justification supporting the omission of sample analysis for Cr(VI) in the affected matrices.

Response #3 a) Agreed. A discussion about the analytes with detection limits greater than the TAGM has been added to Section 3.1.1.2.5. Contract Required Detection Limits (CDRL) that are greater than TAGM values are artifacts of variable sample weights, matrix effects, and instrument sensitivity. As stated in the Response to Comment #1 above, the CDRLs are determined by the NYSDEC Analytical Services Protocols which were selected to be used for remedial investigations at SEDA. Special analytical services would have to be arranged with the contracted laboratory to reduce the detection limits and this would involve an R&D program. In addition to the CDRLs, the TAGM values are also set by NYSDEC. It should be noted that the lab often reports values which are below the CDRL.

b) Disagree. There is no record of any practices at SEAD-12 that would include the production of or use of Cr(VI), and, there is no record that Cr(VI) or components containing Cr(VI) were ever stored at SEAD-12. In addition, since the elevated levels of chromium that were detected in soils were found in the samples collected from miscellaneous military components disposal pits, it is most likely that these levels of chromium are due to chrome plating debris within the disposal pits. During the additional test pit excavations that are planned for these sites, the contents and characteristics of the disposal pits will be logged. Any observations of chrome plating will be noted in the logs. Also, it should be noted that only a single reported chromium level in sediment exceeded the NYS sediment criteria, and the detected concentration (26.3 mg/Kg) was only 1% greater than the NYS sediment criteria value (26 mg/Kg). This slight exceedance of a NYS sediment criteria does not warrant the level of effort and expense that is required for Cr(VI) analyses in sediment samples.

Comment #4 **Section 3.1.1.2.5, Page 3-53**
The summary for the metals results in sediment samples should include a statement on the impact of obtaining rejected results for Lead in these samples.

Response #4 Disagree. As the EPA is fully aware of, the impact of having rejected data is that that data can not be used in the characterization of a site nor can it be used in a risk assessment for that site.

Comment #5 **Section 3.1.1.3, Page 3-55**
Page 3-55 states that the radionuclide concentrations detected in the groundwater at Area 12B of the ESI samples can be attributed to lab contamination and/or analysis interferences, not site conditions. In order to support these statements, this Scoping Plan should include the conclusions drawn from validation of the QC sample results associated to these surface and subsurface soils. For example, the results obtained from the trip blank, field blank and laboratory blank may be indicative as to the source of the detected contaminants and support the statement that is presented. If these QC samples do not contain the contaminants detected in the groundwater samples, then these results should not be considered extraneous.

If it is demonstrated that the source of the contamination is the analytical laboratory, then the subsequent sampling and analytical program should take the appropriate precautionary measures to ensure that this situation is not repeated. This can become problematic if the contaminant concentrations detected exceed the associated ARARs.

Response #5 Agreed. The duplicate sample for the SDG that the MW12B-1 sample was part of was collected from the same groundwater monitoring well as MW12B-1. Since the duplicate sample, MW12B-5, contained none of the uranium or actinium series radionuclides that were detected in sample MW12B-1, the results of sample MW12B-1 were considered to be potentially extraneous. Even though the MW12B-1 sample results may be extraneous, these results were the basis for planning five additional groundwater monitoring wells as well as two test pit excavations in the upgradient vicinity of the MW12B-1 groundwater monitoring well.

Comment #6 **Section 3.5, Pages 3-131 thru 3-133**
The appropriate terminology used to define the data deliverables package to be produced is the NYSDEC Analytical Services Program Category B deliverables. The NYSDEC ASP is intended to support the Superfund Program and defines two types of deliverables packages: ASP Category A and ASP Category B. In this investigation, use of ASP Category B is warranted. Please replace the text here (as well as in the Generic WP) with the correct NYSDEC terminology.

Response #6 Agreed. A combination of ASP Category A and ASP Category B deliverables will be used for this program. Category A deliverables are produced for NYSDEC CLP methods, and Category B deliverables are produced for the remaining analytes such as herbicides and explosives.

Comment #7 **Section 4.2, Page 4-1**
This section should reference the corresponding, matrix specific sample collection procedures delineated in the generic Work Plan. Currently this Scoping Plan references it's Appendix D, which in turn, references the generic Work Plan. However, it is recommended that each subsection of this Scoping Plan, ie., subsurface soil, test pits, surface soil, surface water and sediment, and groundwater, reference the specific section in the generic Work Plan where the actual sampling procedures can be found.

Response #7 Agreed. The specific sample collection procedures in Appendix A of the Generic Workplan have been referenced in the Scoping Plan.

Comment #8 **Section 4.2.7, Page 4-10**
Define the field and trip blank mentioned here as the QC samples relevant to the radon detectors. Since equipment decontamination is not performed for a radon detector, a field blank is not needed.

Response #8 Agreed. The text has been revised to include only trip blanks.

Comment #9 **Section 4.2.9.2, Page 4-13**
Correct the reference to the Field Sampling and Analysis Plan in the second paragraph here to Appendix D.

Response #9 Agreed. The reference has been corrected.

Comment #10 **Section 4.2.13, Table 4-2**
a) This table specifies Method 352.1 for the nitrate/nitrite analyses. This contradicts with the information presented in the generic Work Plan, Table C-2 which lists Method 353.2 for this parameter for aqueous samples only. Please correct this inconsistency to agree with the generic Work Plan. Remove reference to this analysis for soil matrices, or provide the method modification which the lab will utilize to accommodate soil samples. If the method is modified, the lab is to include information which demonstrates acceptable performance of their technique.

b) Method 524.2, Revision 4.0, August 1992 is the correct reference for the analysis of VOCs in groundwater. In addition, it should be noted that the compound list for Method 524.2 varies from that contained in the NYSDEC CLP SOW for VOCs. SEDA must decide which compound list is appropriate for this investigation.

In addition, the SOP for validating data acquired through Method 524.2 must be included in the Plan, preferably as an attachment to the Generic WP. In lieu of using Method 524.2 for groundwater VOC sample analysis, the EPA CLP SOW entitled "Superfund Analytical Method for Low Concentration Organics in Water" (most recent revision) and corresponding regional data validation SOP HW-13, Revision 1, 10/92 may be used. This SOP was included in the comment memo for SEAD 4 as Attachment 3. This option presents a more cost effective approach to low concentration VOC analysis since the data validation SOP is provided and would eliminate the need for it's development by the A-E contractor.

c) The number of surface soils listed here is inconsistent with that provided in Section 4.2.9.1 which states the total is 131. Do the numbers in the table include the 0-2 inch sample to be collected from each of the 34 soil borings?

d) Provide the method modifications on Method 150.1 for pH and Method 415.1 for TOC to be used by the lab to accommodate soil samples. Attachment 2 of the comment memo for SEAD 4 contains a Region II method for the analysis of TOC on soil/sediment matrices which may be used in lieu of modifying Method 415.1.

e) Explain the data quality objective for the 12 subsurface soil samples to be analyzed by the "TCLP." This information is not included in Section 3.5 or 3.6.1. In addition, additional information is required since the TCLP is only an extraction procedure. In order to obtain sample results, corresponding analysis methods for the TCLP extracts must be provided which include the specific compound list of interest to this project.

Response #10 a) Agreed. The analysis method for nitrate/nitrite has been modified in Table 4-2 as recommended. A note has been added to Table 4-2 that briefly describes the modified method that will be used for soil. The modified method for nitrate/nitrite in soil (an extract method) that is cited in Table C-2 of the Generic Work Plan (Appendix C) was used in Table 4-2 of this Scoping Plan. In the modified method, a known volume of soil and a known volume of water are combined, stirred, and then filtered to form an aqeous extract. Also, it is unclear in the comment what type of information would demonstrate acceptable performance of their technique.

b) Agreed. The Method has been changed as recommended. The discussion of the difference in the list of compounds for NYSDEC CLP TCL and Method 524.2 has been conducted many times in the past. At the beginning of the Superfund program at SEDA, all parties (EPA, NYSDEC, and the Army) agreed that NYSDEC CLP Methods would be used. Subsequent to this agreement, EPA recommended that Method 524.2 be used to meet the drinking water ARAR. At this time, we made it known to EPA that the compound lists for the two methods were different. We are not in the position to manage or develop analytical protocols, which is a responsibility that is shared by state and federal agencies. Therefore, we use the analytical methods that are approved by these agencies. The approach of using both NYSDEC CLP TCL for VOCs followed by EPA Method 524.2 was incorporated into the RI/FS programs. The consequence of this is that we are left with additional data for the Method 524.2 analysis compared to the data obtained from the NYSDEC CLP analysis. This is a limitation of the analytical methods that we acknowledge. No change was made to the text.

With regard to validating Method 524.2 data, currently we obtain an equivalent NYSDEC ASP Category B data deliverable from the laboratory for the 524.2 analysis that contains the appropriate information (duplicates, matrix spikes, etc.) so that NYSDEC data validation methods can be used. No change was made to the text in the Scoping Plan.

SECOND PART

c) Agreed. The number of surface soil samples listed in the Table 4-2 include the 0-2 inch samples from the soil borings. More specifically, the number of surface soil samples for chemical testing includes

47 surface soil samples including 8 background samples, 3 from test pits investigated during the ESI, 4 from potentially impacted areas, 30 randomly selected, and 2 near the Building 715 discharge point;

34 surface soil samples from soil borings; and

20 surface soil samples from test pits.

These total to 101 samples.

d) Agreed. The methods for pH and TOC in soil were included in Table 4-2 of this Scoping Plan. Table C-2 in the Generic Work Plan was also updated.

e) Agreed. The text has been revised.

Comment #11 **Appendix D, Soil Gas Sampling**

Provide the calibration procedures to be utilized daily in Section 1.1.3 of this Appendix.

Response #11 Acknowledged. The analytical instrument will be calibrated prior to being sent into the field. No daily field calibration is required. A functional field test will be conducted each day prior to the analysis of samples. The text has been revised accordingly.

BIOLOGICAL TECHNICAL ASSISTANCE GROUP

Comment #1 a) Soil analysis results are compared to NYSDEC TAGM values which do not address ecological concerns. Soil COCs for ecological receptors should be screened against site reference values, not two times the screening values, as was referenced for soil and sediment metals. Guidelines which are established for surface activities and surface soil concentrations (radionuclides) should also take into account risk to ecological receptors.

b) Further, for ecological purposes, gamma exposure rates should be taken as close to ground surface as possible (as opposed to the 3' referenced on page 4-9). Proposed surface soil samples for SEAD-12 (page 4-11) should undergo a full TCL organic and TAL inorganic analyses to determine what levels of contaminants may be present. Previous surface soil analyses indicated the presence of elevated levels of metals and PAHs. For SEAD-48 (page 4-35) the surface soil samples which will only be undergoing radioanalyses should be noted in Figure 4-5.

Response #1 a) Agreed. The ecological risk assessment that will be performed for this site will follow the guidance of EPA's Framework for Ecological Risk Assessment, as well as NYSDEC's Fish And Wildlife Impact Analysis For Inactive Hazardous Waste Sites and the US army's Procedural Guidelines For Ecological Risk Assessments At US Army Sites. As part of the ecological risk assessment, threshold reference values will be determined for the ecological measurement endpoint(s) that is(are) determined for the site. Also, since gamma radiation is not attenuated to any appreciable degree at three feet above ground level, the gamma exposure survey will be conducted following the procedure defined in the scoping document.

b) Disagree. The scoping plan states that only the grid sampling of surface soils in the affected areas will be analyzed for radiological parameters only. Table 4-2 shows that 101 surface soil samples, which includes 47 surface soil samples and 54 surface soil samples that will be collected at soil boring and test pit locations, will be analyzed for full TAL and TCL compounds. Also, the text of Sections 4.3.8.1, 4.3.8.2, and 4.3.8.3 clearly describe which soil samples will be analyzed for radionuclides only and which samples will be analyzed for TAL, TCL compounds and radionuclides.

Comment #2 a) On page 3-53 the discussion concerning SVOCs in sediment states that there are no criteria for fluoranthene in sediment. This is incorrect. We recommend that freshwater sediments be screened against the lowest effect levels (LELs) and severe effect levels (SELs) taken from "Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario" (Persaud, et. al., 1993). This guidance provides screening criteria for fluoranthene.

b) A review of the sediment samples (page 3-55) indicates that SD12A-1 has been impacted by a variety of metals yet, "the SD12A-1 sample location is situated upgradient of the SEAD-12A boundaries and is unlikely to have been affected by the constituents found within the area of SEAD-12A." The likelihood of this area being impacted by neighboring SEADs should be explored.

c) Proposed sediment sampling should indicate that the depth of the samples will be from 0-6".

Response #2 a) Agreed. The criteria for fluoranthene (190 ug/kg) has been added to Table 3-9 and the referenced disucssion revised.

b) Acknowledged. As shown on Plate 4-1, four surface water and sediment sample locations are proposed in immediate upgradient locations of the SW/SD12-1 location.

c) Section 3.7.3 of Appendix A in the Generic Workplan provides the sediment sampling procedures and indicates a depth of sampling at 0 to 6 inches. Section 3.7.3 is now referenced in the Sections of the Scoping Plan describing the proposed sediment sampling plan.

Comment #3 Sediment data for SEAD-63 are presented in Table 3-19. The sediment screening values are referenced as the 1969 NYDEC Sediment Criteria guidance. This should be revised to the 1994 document. Further, the values for the SVOCs (page 3-87) are not contained in the most recent document. TOC values must be factored into SVOC, pesticide and PAH data screened against the NYDEC Sediment Criteria.

Response #3 The sediment screening values have been revised in Table 3-19 using the 1994 NYSDEC Sediment Criteria guidance. The values for the SVOCs listed on page 3-87 are listed in the 1994 NYSDEC Sediment guidance as a footnote. TOC data were not available for sediments at the site. This data will be collected as part of this RI and the screening values for SVOCs, pesticides, and PAHs revised accordingly.

Comment #4 All wetland areas associated with SEAD-48 (page 3-57) and SEAD-63 (page 4-54) should be delineated and identified in site figures. It should also be noted whether there are any wetlands associated with the unnamed creek which flows through the north part of SEAD-12. In order to comply with federal wetland ARARs, the three parameter method should be used to delineate wetlands. Also note that a wetlands assessment and restoration plan will be needed for any wetlands impacted or disturbed by contamination or remedial activities.

Response #4 Agreed. The U.S. Fish and Wildlife Service has recently conducted a wetland delineation of the entire SEDA facility as part of the BRAC95 program. The three criteria which were used to identify the wetlands include standing hydrology, soil condition, and wetland associated flora and fauna. This information will be included in the ecological assessment of the sites. A wetland functional assessment will be conducted as part of the FS when remedial alternatives have been developed. The text has been revised in the three referenced sections to state the source of the wetland delineation information.

Comment #5 In Section 3.4, "Preliminary Identification of Applicable or Relevant And Appropriate Requirements (ARARs)," the Fish and Wildlife Coordination Act (16 USC 661) which requires the protection of fish and wildlife and their habitat, should be included under federal sources of location specific ARARs.

Response #5 Agreed. The Fish and Wildlife Coordination Act has been added as a location-specific ARAR.

Comment #6 In the "Potential Exposure Pathways and Receptors - Current Uses" section for all three areas, potential receptor population should include aquatic receptors on or near the site. In the section entitled, "Ingestion and Dermal Exposure Due to Surface Water Runoff and Erosion," it should be indicated (for SEAD-12) that aquatic receptors may be currently exposed to contaminated surface water and sediment. This exposure pathway should be evaluated in the ecological risk assessment. Additionally, for all three SEADs, terrestrial and aquatic receptors may also be impacted by sediment, as well as surface water. Under "Uptake to Site Flora," for all three SEADs, it should be noted that site flora may uptake other soil contaminants in addition to radionuclides, such as inorganics.

Response #6 Agreed. Aquatic receptors on or near the site have been added as potential receptor populations for the three sites. For SEAD-12, aquatic receptors have been added as current exposed populations to contaminated surface water and sediment. The text has been revised to state that terrestrial and aquatic receptors may be impacted by sediment and surface water. Finally, the text has been revised to state that site flora may uptake other soil contaminantenat in addition to radionuclides.

RADIOLOGICAL

Comment #1 Rather than identifying each page of text or table which contains erroneous radiation dosimetry values and/or improper comparison to standards, a general explanation of the deficiencies in the areas of radiation dosimetry and evaluation of dosimetry data are presented.

Radiological Dose From Ingestion Of Radionuclides In Groundwater

The document includes numerous calculations of internal radiation dose resulting from the "beta radiations from the Ra-226 decay chain." These consist of Bi-214, Bi-210, Pb-214, and Pb-210. The "dose" calculated to the skeleton in the document is really the dose equivalent. The problem here is not so much with the methodology, but with the applicability of the modeled doses to existing and proposed drinking water standards. The beta dose from these naturally occurring radionuclides are compared to the 4 mrem per year maximum contaminant level (M.C.L.) which appears in the National Primary Drinking Water Regulations for gamma and beta emitters. That is not the intent of that M.C.L.

A brief description of the National Primary Drinking Water Regulations might be helpful. In 1976, the National Interim Primary Drinking Water Regulations for radionuclides were promulgated by the USEPA. One of the standards was a 4 mrem per year MCL from man-made radioactivity (intended to cover gamma and beta emitters). An advanced notice of proposed rulemaking was published in the Federal Register in 1986 (40 CFR 141 Water Pollution Control; National Primary Drinking Water Regulations). Contained therein was the following: "The gross beta particle activity standard was intended as a screening device to measure for man-made (emphasis added) radionuclides." Screening protocols are described which includes gross beta measurements and a decision tree which includes quantifying tritium and strontium concentrations if the gross beta concentration exceeds 50 pCi/L. Indeed, 40 CFR 141.16 reads "Maximum contaminant levels for beta particle and photon radioactivity from man-made (emphasis added) radionuclides in community water systems." Appendix C of 40 CFR 141 contains a table of radionuclides included in the definition of gross beta and photon emitters; it excludes the radioactive daughter products of thorium-232, uranium-235, and uranium-238 (which include the bismuth and lead beta-emitters which are the subjects of the document's beta radiation model).

In 1991, proposed revisions to the drinking water regulations for radionuclides were published in the Federal Register; they have never been adopted. In the proposed revision, beta and photon-emitting radionuclides are still referred to as man-made, although the USEPA proposed monitoring Pb-210 as an unregulated contaminant. Two monitoring alternatives are presented, but they both continue to consist of quantifying gross beta, tritium, and strontium concentrations (they do not include decay products of the natural series, such as the decay products of Ra-226). The wording in 40 CFR 141.16 is clear - the MCL for beta particle and photon radioactivity applies to man-made radionuclides.

The comparison of SEDA groundwater data to existing and proposed drinking water standards is flawed. In addition to the beta/gamma 4 mrem standard, the USEPA has set a MCL specifically for Ra-226. (The existing MCL for the sum of Ra-226 and Ra-228 is 5 pCi/L; the proposed standard relaxes the MCL for each radium isotope to 20 pCi/L.) The radium MCLs incorporate the radiological significance of the decay of all radiations resulting from ingestion of the radium parent, including the bismuth and lead beta emitters. Segmenting out the beta emitting decay products of Ra-226 and comparing the resultant dose equivalent to the MCL established for man-made beta and gamma emitters is inappropriate. Further, the dosimetric impact from beta particles following ingestion of radium is minimal compared to the total dose from radium ingestion (which is primarily due to the interaction of alpha particles with skeletal tissue). In short, the USEPA has set a specific MCL for radium (which accounts for the dose from radium and its decay products. The drinking water regulations are not intended to regulate radium twice (once with the radium-specific MCL and a second time with the beta/gamma MCL).

Response #1 Acknowledged. As stated in responses to previous comments made by the EPA concerning these dose calculations, the beta dose model used in the ESI was intended to determine whether a release of potential constituents of concern has occured, and to do so based upon a limited number of samples and a limited number of analyses on those samples. This model will not be used in this RI. Rather, the alpha spectral and gamma spectral analyses proposed in the project scoping plan will be used to quantify the site concentrations of potassium 40 as well as radionuclides from the uranium, thorium, and actinium series. These results will then be used to compare the total beta emmissions of these radionuclides to the gross beta radiations detected in the groundwater samples. Since the only radiological concerns at SEADs 12,48 and 63 appear to be from naturaly occuring radionuclides, and if there does not appear to be a concern for man made radionuclides at these SEADs following the RI radiological analyses, the 4 mrem/year MCL for man made beta emmiters will not be considered as an ARAR.

Soil Dosimetry - Use Of The RESRAD Code

Comment #1 The RESRAD computer code models multi-pathway radiation dose based on the presence of radionuclides in environmental media. To our knowledge, the USEPA (nationally, or in Region II) has not endorsed its use for CERCLA risk assessments or for other applications. Its use in this document is not preferable to the risk assessment guidance published by the USEPA.

There is an extensive body of literature on the population dose from sources of natural background radiation. One authoritative text, Environmental Radioactivity, states that an individual will receive 13.9 mrad per year from 1 pCi/g of terrestrial U-238 in equilibrium with its decay products over an infinite plane (Eisenbud, 1987). The National Council on Radiation Protection and Measurements (NCRP) published the same value in Exposure of the Population in the United States and Canada from Natural Background Radiation, NCRP Report No. 94 (NCRP, 1987). In that document, the NCRP states that the average U.S. and Canadian resident receive 28 mrem per year from all terrestrial radionuclides combined. Average concentrations of uranium and thorium series nuclides fall in the 0.8-1.8 pCi/g range.

The RESRAD results which appear in the SEDA documents equates annual dose equivalents of as high as 75 mrem per year to one pCi/g of Ra-226 in soil. For example, annual dose equivalents of 1342 mrem and 492 mrem are attributed to 24 pCi/g and 8.6 pCi/g of Ra-226, respectively. The RESRAD results with these high dose equivalents indicate that they are not accurate assessments of the dosimetric impact of radium in soil due to their variance with scientifically valid, peer-reviewed dosimetric data.

The RESAD values lead to problems when they are compared to ARARs. For example at site SEAD-63, soil sample TP63-9 contained 2 pCi/g of Ra-226, a concentration which could be due solely to natural background[1]. Based on the flawed dosimetry described above, an annual dose

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[1] The background concentration of any naturally occurring radionuclide is represented by a range, not a single value. While 2 pCi/g is approximately 2.5 times the frequently published value of 0.8 pCi/g for Ra-226, it is possible that such a concentration could occur in the absence of any technologically enhanced Ra-226.

equivalent of 150 mrem is attributed to this sample, half of which is suggested to be an "above background dose." That being the case, one would conclude that the "extra" 1 pCi/g of radium, in addition to the 1 pCi/g from background sources, would cause an additional 75 mrem annual dose equivalent, or 75% of the 100 mrem per year limiting acceptable dose equivalent set for members of the general public by the Nuclear Regulatory Commission, Department of Energy and others. This is simply not the case, as supported by the published relationship between terrestrial radionuclide concentration and dose referenced above. Based on this alleged "dose," the document erroneously concludes that the 2 pCi/g datum is evidence that SEAD-63 soil has been moderately impacted by radium contamination.

Response #1 Acknowledged. As stated in the ESI document (the document from which those dose model results were taken), the RESRAD Ver. 5.19 model default values were used. Only those site specific values that were know to be different from the default values were changed. In recent discussions with users of this model, Parsons has learned that the default values used in that version do not accurately reflect reasonable exposure factors. When this model is used for this RI, data from the RI field work will be used to re-define the model parameters to better represent reasonable and acceptable exposure factors.

It should be noted that the use of this model in this RI is fully endorsed by NYSDEC and it is referenced and was used to write the Multi Agency Remediation Site and Survey Investigation Manual (MARSSIM), which was co-written by the EPA, the NRC, the DOE, and the DOD.

Specific Comments

Comment #1 Page 3-36, Table 3-4A and elsewhere: 40 CFR 192, or UMTRCA, is cited as an ARAR. The USEPA has utilized the 5 pCi/g Ra-226 standard for the upper 15 cm of soil at several CERCLA sites in Region II. However, the USEPA has specifically chosen not to use the 15 pCi/g standard for the subsurface at many of those same CERCLA sites. Therefore, the documents should be amended to delete that reference to the 15 pCi/g subsurface radium standard.

Response #1 Agreed. The tables have been revised.

Comment #2 Page 3-110: The statement that "The presence of ^{226}Ra wastes in soils presents a significant (emphasis added) radiological hazard due to...radon" is an exaggeration. Obviously, radium is the source of radon gas which could cause an inhalation hazard in a structure built on top of or adjacent to radium-contaminated soil. However, given the conditions described at SEDA, it does not seem appropriate to describe the radon hazard as having radiological significance.

Response #2 Agreed. However, as stated in the project scoping plan, the most conservative scenario, that of a residential setting, was used to calculate exposure doses. The model considered that a structure was built on the site and the radon hazard calculated by the model for such a scenario was significant. Therefore, the statement in the text is not an exaggeration.

Comment #3 Figure 3-20 and Figure 3-21: In addition to ingestion, inhalation, and dermal contact, the potential for "direct exposure" should be added as a possible exposure route for radionuclides.

Response #3 Agreed. Direct exposure was added as a possible exposure route for radionuclides in the buildings at SEADs 12 and 48.

Comment #4 Pages 3-123 and 3-124, Section 3.2.4: The intent of this section is unclear and the potential receptors identified are inconsistent with those identified in prior sections. Consideration should be given to eliminating this section.

Response #4 Agreed. The section has been re-written.

Comment #5 Page 3-124: Rather than using the actual data values, exposure point concentrations are often best estimated by computing the upper 95 percent confidence limit of the arithmetic mean of the log transformed data.

Response #5 Agreed. The section has been re-written to explain that a two step method will be used to establish reasonable maximum exposure point concentrations and central tendency exposure point concentrations.

Comment #6 Section 3.6 (3.6.1, 3.6.2, and 3.6.3): One goal described for the remedial investigation is to determine the distribution coefficients for ^{226}Ra and ^{238}U. Given that the USEPA has consistently chosen to remediate diffuse naturally occurring radioactive materials (NORM) via excavation and disposal, it is not certain that these parameters are necessary. The document should indicate how knowledge of this parameter will be used in the feasibility study.

Response #6 Agreed. The text has been revised to indicate that the distribution coefficients will be used for dose calculation purposes.

Comment #7 Section 4.4: The radionuclide data for SEAD-63 was consistently at or very near the background range. The extensive sampling/investigation planned does not seem appropriate. A more reasonable investigation protocol would consist of an exposure rate scan (ground level) of the area; collection of soil samples in areas where the exposure rate exceeds a pre-set limit, such as twice background; and scanning all soil samples collected for radiological parameters with a GM pancake detector, or equivalent, to identify subsurface radiological contaminants.

Response #7 Acknowledged. However, as stated in the project scoping plan, the work proposed for this RI is also intended to be used as the final release survey following the guidance of NUREG 5849, NUREG 1500 and MARSSIM.

RESPONSE TO COMMENTS
U.S. ENVIRONMENTAL PROTECTION AGENCY
DRAFT SCOPING PLAN FOR SEAD 63
(REMAINING COMMENTS PERTAINING TO CERCLA RI/FS FIELD WORK)
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NY
OCTOBER 1996

Comment #1 a) The reporting limits listed here for sample TP6-3 and -4, semi-volatile organic compounds, are approximately 3-6 times higher than expected. Please clarify this discrepancy indicating if this is due to a required dilution, the dilution factor used.

b) Upon comparison of the TAGM values with the attained reporting limits for certain semi-volatile organic compounds as well as metals, it is evident that the TAGM values have been exceeded. As per prior response to EPA comments on the Generic Workplan, alternate analytical methods are being evaluated in conjunction with the contracted laboratory for use on the upcoming RI sampling. These alternatives must be documented in the corresponding Scoping Plan prior to approval and initiation of field activities. If the lab proceeds using the methodologies currently proposed in the CDAP, data will be acquired which exceeds ARARs for certain parameters.

Response #1 a) Agreed. This discrepancy was due to the required dilution factor. As with comments identical in nature to this, which were addressed in the EPA's comments on the SEAD-12 portion of this document, the section referenced in this project scoping plan will be revised when the RI Draft report is submitted. At the time that Section 3 of this document was sent for reproduction, this comment had not been received by the EPA, and therefore this project scoping plan does not contain the revised text.

b) Acknowledged. We recognize and have pointed out that for some constituents the analytical method detection limits are above the ARAR. This is an unfortunate limitation of the protocols. It should be noted that at the beginning of the Superfund program at SEDA, the Army Corps of Engineers, EPA, and NYSDEC agreed that NYSDEC Analytical Services Protocols would be used for the remedial investigations at SEDA. These are the identical protocols used by NYSDEC in their Superfund work throughout New York State. Special analytical services could be arranged with the contracted laboratory to reduce the detection limits, however, this would involve an R&D program that the Army believes is outside of what should be performed. But, if alternative methods were developed, then these methods would no longer be NYSDEC ASP Methods (which the laboratory is currently contracted to perform) and also, they would require EPA, NYSDEC, and MRD approval prior to being used. No changes were made to the text.

Comment #2 a) The paragraphs summarizing the semi-volatile organic and metals results that exceeded TAGM values do not include those results where the reporting limit is greater than the TAGM. Please address this omission.

b) This Scoping Plan should include the conclusions drawn from validation of the QC sample results associated to subsurface soil sample TP63-8 and -9 in order to determine the source of these common contaminants. If the associated field, trip and laboratory blanks do not contain the contaminants detected in the samples, then these results should not be considered extraneous.

sediment, and groundwater, reference the specific section in the Generic Work Plan where the actual sampling procedures can be found.

Response #7 Agreed. The text has been revised.

Comment #8 Correct the reference in the third paragraph regarding the Analytical Program section of this Scoping Plan to 4.4.11.

Response #8 Agreed. The text has been revised.

Comment #9 a) This table specifies Method 352.1 for the nitrate/nitrite analyses. This contradicts with the information presented in the Generic Work Plan, Table C-2 which lists Method 353.2 for this parameter for aqueous samples only. Please correct this inconsistency to agree with the Generic Work Plan. Remove reference to this analysis for soil matrices, or provide the method modification which the lab will utilize to accommodate soil samples. If the method is modified, the lab is to include information which demonstrates acceptable performance of their technique.

b) Method 524.2, Revision 4.0, August 1992 is the correct reference for the analysis of VOCs in groundwater. In addition, the SOP for validating data acquired through Method 524.2 must be included in the Plan, preferably as an attachment to the Generic WP. In lieu of using Method 524.2 for groundwater VOC sample analysis, the EPA CLP SOW entitled "Superfund Analytical Method for Low Concentration Organics in Water" (most recent revision) and corresponding regional data validation SOP HW-13, Revision 1, 10/92 may be used. This SOP was included in the comment memo for SEAD 4 as Attachment 3. This option presents a more cost effective approach to low concentration VOC analysis since the data validation SOP is provided and would eliminate the need for it's development by the A-E contractor.

Response #9 a) Agreed. The analysis method for nitrate/nitrite has been modified in this table as recommended. A note has been added to the table that briefly describes the modified method that will be used for soil. The modified method for nitrate/nitrite in soil (an extract method) that is cited in Table C-2 of the Generic Work Plan (Appendix C) was used in this table. In the modified method, a known volume of soil and a known volume of water are combined, stirred, and then filtered to form an aqueous extract. Also, it is unclear in the comment what type of information would demonstrate acceptable performance of their technique.

b) Agreed. The Method has been changed as recommended. The discussion of the difference in the list of compounds for NYSDEC CLP TCL and Method 524.2 has been conducted many times in the past. At the beginning of the Superfund program at SEDA, all parties (EPA, NYSDEC, and the Army) agreed that NYSDEC CLP Methods would be used. Subsequent to this agreement, EPA recommended that Method 524.2 be used to meet the drinking water ARAR. At this time, we made it known to EPA that the compound lists for the two methods were different. We are not in the position to manage or develop analytical protocols, which is a responsibility that is shared by state and federal agencies. Therefore, we use the analytical methods that are approved by these agencies. The approach of using both NYSDEC CLP TCL for VOCs followed by EPA Method 524.2 was incorporated into the RI/FS programs. The consequence of this is that we are left with additional data for the Method 524.2 analysis compared to the data obtained from the NYSDEC CLP analysis. This is a limitation of the analytical methods that we acknowledge. No change was made to the text.

Response to Comments for
The New York State Department of Environmental Conservation (NYSDEC) and
the New York State Department of Health (NYSDOH)
Draft Final Scoping Plan for Conducting RI/FS at Sead 12 and 63
Seneca Army Depot Activity
Romulus, NY
March 1997

General Comments:

Comment #1 Records: The currently available documents have been adequately summarized in the draft final report. The release of the additional documents is appreciated. We strongly urge the Army to continue to review and declassify all relevant records and reports regarding use of radioactive materials and any potential emissions or accidental releases of these materials to the grounds, water or air, on or off the base.

Response #1 Agreed.

Comment #2 Guidance Documents: The use of the Draft MARSSIM and NUREGs referenced in this version of the plan is seen as a substantive improvement. We do have a question regarding the use of NUREG-5849 vs. The Army Generic Survey Plan. As a result of the August 1996 meeting at the base, our understanding was that it was actually the Army survey plan that was being used as a basis for this plan, not NUREG-5849, and that the Army plan was generally based upon that NUREG. After a review of the Army plan it is obvious that it is indeed based on NUREG-5849, but with much editing. What we would like to know is if the Army Generic Survey Plan is still considered as a guidance document for this plan, or if it has been dropped in favor of the NUREG and MARSSIM guidance documents. Please send a brief explanation of this subject to our attention.

Response #2 Acknowledged. As discussed at the June 26 meeting between NYSDEC, USEPA, and the Army, It was explained that MARSSIM was used to prepare the SEAD-12 and SEAD-63 Project Scoping Plan.

Specific Comments:

Comment #1 Page 3-54, Radionuclides: The last three sentences are unclear. It appears that the gross beta analysis used to calculate the H-3 content, and this was then compared to the New York Class GA Gross Beta Criteria of 1000 pCi/l. Since most Gross Beta analytical methods have comparatively low efficiencies for the low H-3 beta energy, it is an extremely ineffective way to calculate H-3 concentrations. Please clarify this in the final approach.

Response #1

Agreed. Tritium was analyzed for during the ESI. The gross beta analysis was not used to calculate the H-3 content. Since H-3 is a beta emitter, and since their is no specific NYS Class GA Tritium guideline, it was believed appropriate to compare the H-3 analysis results to the NYS Class GA standard for gross beta radiations for the purposes of the ESI (which was to determine whether a threat existed from the detected levels of radionuclide emissions). The text has been revised to state this information.

Comment #2

<u>Section 3.2.3, Exposure Assessment Assumptions:</u> The application of the basic statistical tests chosen seems both legitimate and appropriate. Indeed, the Wilcoxon Ranked Sum in many cases may be more sensitive to differences between independent populations than a parametric t-test. However, we have some specific concerns in regards to certain aspects of the proposed procedures. The Plan states on page 3-128 that it will use two basic statistical measures as criteria for making determinations concerning analyses. It used both detection frequency and 95th upper confidence limits to define the Reasonable Maximum Exposure (RME) and Central Tendency (CT), presuming data to be either normally distributed or log-normally distributed.

The whole idea behind using nonparametric statistical procedures is that the shape of a distribution need not be known. It is true that many data distributions normally found in the environment are observed to be log-normal, however, this is certainly not always the case. Before using REM and CT, which presumes a log-normal distribution, it is necessary to demonstrate that this distribution is appropriate for you data.

Should it not be possible to fit the data to any selected distribution (e.g., the chi-square test), utilization of such measure might lead to misleading interpretations. One needs to examine distribution not only to determine their basic form, but also to make sure that one is not dealing with bimodal distributions, etc.

Concerning methods used for selecting the REM and CT values presented for each of three different detection frequencies for analyses: It is stated in the Plan on page 3-129 that for chemicals with 50% or greater detects, the log-transformed data 95% UCL and the maximum detected value are compared and the RME is selected as the lesser of the two. The CT is the lesser of the log-transformed mean and the maximum detected value.

First, an assumption seems to be made that using log-transformed data will somehow protect against all biases introduced by ignoring censored data. Nothing is stated about how censored data will be handled. There are many methods for dealing with these data points; for instance, actual results that are less than the MDA can be used, a zero value can be used for all nondetects, all nondetects can be ignored and left out of the data set, or a linear regression can be used to calculate a value for nondetects based upon their frequency. No matter which method is chosen the way that censored data will be handled is significant and can bias results. An explicit description of how these data will be included in the analyses should be provided.

Next, page 3-129 states that the CT value will be determined as the lesser of the log-transformed mean and the maximum detected value. We do not understand the utility of generating a measure of central tendency using a maximum detected value. If we read this correctly, the maximum detected value could not possibly be less than a log-transformed mean value of the data --- the mean value, whether log-transformed or not, will always be less than the maximum value, unless there is only a single value. A clear explanation of this point is necessary before we are able to judge the appropriateness of this measure.

The same sort of objection as above concerning the derivation of the CT value holds for cases with other detection frequencies as well, as described on pages 3-129 and 3-130. The use of non-parametric analyses of environmental pollutant data is the right approach, but a more detailed explanation of the concerns expressed above is needed.

Response #2 Disagree. The text states that the statistical analyses will be performed in order to determine whether the detected concentrations of radionuclides and inorganic elements is distinguishable from background or not. Once a constituent has been determined to be present at concentrations (on site) that are distinguishable and above background, the RME and CT levels that will be used in the risk assessment for that constituent will be determined using the selection criteria that are described in Section 3.2.3, Exposure Assessment Assumptions. These selection criteria assure that conservative and realistic exposure point concentrations (EPCs) are selected. Specifically, the EPC selection criteria that are presented ensure that an EPC is not selected, for any given analyte, at a concentration that is above the maximum detected concentration.

Concerning the use of non-detect data, the text of Section 3.2.3 has been revised to indicate that one half of a non-detect value will be used in the statistical analyses. Also, un-ususally high CRQLs will be systematically removed from the data set if the 95th upper limit of the mean is above the maximum detected value.

It should be noted that the text as been changed to indicate that the CT EPC will be the same as the RME EPC. All other aspects of the CT assessments will not be changed (i.e. exposure frequencies, exposure factors, etc..)

Comment #3 Table 6-1: Is the time line depicted by this table current? Specifically, has all of the GPR and EM survey work for SEAD-12 been completed? If not, the table should be updated.

Response #3 Agreed. The EM and GPR surveys have been completed, as well as the archeological survey. Concerning the remainder of the schedule, the Peer Review Process that has been implemented at SEDA by the Army has changed the schedule of RI activities at SEAD-12. The current schedule is now presented in Table 6-1.

Comments from NYSDOH's Bureau of Environmental Radiation Protection

General Comments

Comment #1

Radon in Soil Gas: The proposed plan includes a substantial number of soil gas samples to screen for potential radium contamination. While this type of screening has been used at other sites contaminated with Ra-226 it has not been explained how military "components" containing Ra-226 which are presumably intact or at least not dispersed, provide a sufficient source term to pin point the burial location.

Other factors, such as radon background variability, emanation rate, soil permeability, soil moisture content, soil Ra-226 concentration, and underlying bedrock can cause soil gas measurements to be highly variable. In New York State, soil gas measurements have been shown to vary by hundreds to thousands of pCi/l.

Given the possibility of variable levels of radon in soil gas; what guideline value above background will be used to trigger an area to be included for further study?

What other means will be employed to localize the buried components if the radon in soil gas method is inconclusive.

Response #1

Agreed. The soil radon survey has been dropped in favor of a borehole geophysical survey using a NaI(Tl) borehole tool. The proposed borehole gamma radiation survey is detailed in the Geophysical Investigation section (Section 4.2.1) of the Final Project Scoping Plan. The proposed methodologies for obtaining the borehole gamma radiation data are consistent with those described in the document "Estimate of Volume of Radium Contaminated Soil On Five Sites In Ottawa, Illinois, September-October 1988", Argonne National Laboratory publication ANL/ESH/TS-89/100. The gamma profiles for this survey will be collected from the same locations originally described for the soil gas survey, except only 5, rather than 10, background locations will be surveyed. The gamma radiation profiles will be used to qualitatively identify horizons of potential radium contamination. Following the completion of the soil sampling program, it might be possible to calculate a conversion factor to relate the gamma radiation data (which will be recorded in counts per minute) to soil concentrations. The text of Section 4.2.1 has been revised appropriately.

Comment #2

Building 815 & 816 Sub-Floor Gas Samples: As part of the characterization for hazardous materials, a number of soil gas samples are contemplated for building 815 and 816. Since penetration through the concrete floor will be made, it would be advantageous to obtain 0-15 cm soil samples from a representative number of these locations to help characterize for radiological contamination in the sub-slab region of these buildings. Other buildings listed as Class I, especially those which have sub-slab drains or utilities will also require characterization.

Response #2

Acknowledged. The project scoping plan does not call for sub-floor penetrations in Buildings 815 or 816. It does describe sub-floor penetrations for Buildings 813, 814, and 817, which will be used to perform volatile organic soil vapor surveys to search for rumored paint disposal areas. To address the need for sub-floor drain characterization in Class 1 areas, the Army proposes to use specialized detectors that can be 'snaked' through the drain lines and ventilation ducts. These specialized detectors will be either gas proportional, ZnS, and/or NaI(Tl) type detectors. Section 4.2.3.6, Special Measurement and Sampling, has been revised to describe the proposed surveys.

Comment #3

Tritium Screening: The proposed plan does not address the methods to be employed to detect tritium contamination other than by wet swipe techniques on interior building surfaces. While windowless gas proportional counters will detect the presence of tritium, assuming no other beta emitter is present, there has not been any other means described which could field screen these swipes. Scanning instruments and probes described will not detect tritium contamination. Perhaps it would be better to count swipes on a liquid scintillation counter. Lacking that capability would necessitate that all swipes would require laboratory analysis for tritium.

It's stated that soil samples will be analyzed for tritium using the LANL Method 906, which presumably vacuum distills all soil moisture out of the soil, with the results reported in pCi/l of soil. While this value is needed to fit an agricultural uptake model, it does not provide enough information, specifically the moisture content of the soil, i.e., wet weight versus dry weight. Without this information it is impossible to determine, in pCi/l, the tritium levels in ground water and consequently compare these values to drinking water standards.

Response #3

First paragraph. Acknowledged. It is stated that all tritium wipes are to be liquid scintillation (LS) wipes, and that all LS wipes are going to be analyzed by a laboratory. The Army laboratory at Red Stone Arsenal in Alabama, IRDC Nuclear Counting Laboratory, will perform the tritium analyses.

Second paragraph. Agreed. The moisture content of the soil is reported as part of the analytical data package for the organic and in-organic analyses. For those analyses that do not undergo organic or inorganic analyses, and are analyzed only for radionuclides, the analyzing laboratory will furnish soil moisture information in units of percent moisture.

Comment #4

Additional Swipes: During previous discussions agreement was reached concerning the survey and swipes of horizontal surfaces above two meters and interior drains. However, in this plan no mention is made of the characterization of the interior surfaces of ventilation ducting in the Class I and Class II buildings. These surfaces must be addressed in the final survey report.

An additional item to be considered is the interpretation of fixed contamination limits as shown under NYS Department of Labor, Part 38 regulations. Since these buildings may undergo renovation for future use, the concept of contamination being fixed under layers of paint or other coverings cannot apply. Therefore, all contamination limits will be considered removable and the appropriate limits applied for any review of a final survey.

Response #4

First paragraph. Agreed. The project scoping plan now identifies ventilation ducting, as well as drain and wastewater lines, as being the subjects of special measurements, which will include being surveyed using specialized detectors

Second paragraph. Disagree. The release criteria for fixed and removable radiation under NYS Department of Labor, Part 38, will be used as intended. If NYSDEC provides codified documentation that the removable radiation release guideline is intended to be used as a fixed radiation guideline to protect a potentially exposed individual in a building renovation scenario or a post renovation building occupation scenario, then the Army will use the removable radiation guideline as stated in the comment. The Army believes that using a standard that is intended to be protective for long-term scenarios (such as commercial or industrial use of a structure) is not a reasonable requirement for a very short-term exposure scenario (i.e. a building renovation scenario). It is also understood that the fixed radiation guideline would have been calculated with the assumption that renovation to a surface would occur and that a percentage of the fixed radiation would become removable. Therefore, the fixed radiation guideline is already protective of a future renovation scenario. Lastly, it is not reasonable to expect that any surfaces that may be exposed in the future would remain exposed. It is very likely that any such surface would be re-surfaced, either with a new coat of paint, wall paneling, or some other type of covering. However, if a surface were stripped of its surface coatings and left exposed, it is likely that most removable radiation would also be removed during the stripping process.

<u>Specific Comments:</u>

Comment #1

Page 4-11, Site Specific Guidelines: This paragraph refers to setting of an exterior dose limit of 10 mRem/yr. above background. The radioisotopes of concern are listed on Table 4-3, with the applicable NUREG 1500 concentrations for each radionuclide. What seems to be lacking in the guidelines is any reference to the sum of fractions rule for determining total exposure. As written, it appears that the concentrations shown would be equivalent to 10 mRem/yr. for each radioisotope. Section 4.2 and 4.3 of the draft MARSSIM document specifically states that where multiple radionuclides are involved, the unity rule must be used in establishing Derived Concentration Guideline Levels (DCGL's), and that the DCGLs would be proportionately lower than those calculated for each radionuclide alone.

Response #1

Agreed. However, use of the unity rule requires prior knowledge of the activity ratios for all radionuclides that are present at levels that are distinguishable from background. Since these ratios are not known, the unity rule can not be used at this stage of the SEAD-12 investigation to establish DCGLs that are based on the unity rule. The text has been revised to indicate that the unity rule will be used to compare site data wherever more than one principal radionuclide of concern is identified. It should be noted that the unity rule will not be used when all of the radionuclides that are distinguishable from background are from the same decay chain, and the guideline value for the principal radionuclide of that chain accounts for all of the radiations from its progeny. In such instances, the levels of the principal radionuclide will be compared directly to its guideline level.

Comment #2

Table 4-4 Table of Estimated Minimum Detectable Concentrations or Activities: This table lists various probes contemplated for use at this site along with approximate efficiencies to be used in calculating Minimum Detectable Activity (MDA). In reviewing these efficiencies it appears that the manufacturer's published data was used, which is normally expressed as the efficiency in 2π geometry. Prior to calculating MDA's these numbers should be revised to show the estimated efficiencies in 4π geometry, which more accurately depicts activity.

Alternatively, probes and instrument package pairs should have efficiencies calculated using NIST traceable standards in appropriate physical source sizes and activities, emissions and energy levels prior to calculating MDA's. As shown, these efficiencies would underestimate contamination levels (dpm/100cm^2) by at least a factor of two.

Response #2

First paragraph. Agreed. The table has been revised and the 4π geometry efficiencies have been used.

Second paragraph. Agreed. As described in the project scoping plan, the probes and instrument package pairs will have efficiencies calculated on a daily basis using the sources listed in Section 4.2.3, under the heading Discussion On MDCs.

Comment #3

Section 4.2.3.2 - Flag Values: Flag values for alpha and beta emissions would be established on a daily basis for each instrument, based in part, on the instrument's efficiency. Since instrument efficiency is a key value, 4π efficiencies in cpm/dpm/100cm^2, corrected for probe size, would be required in the calculation. In some cases the <25% detection guideline value might not be met.

Response #3

Acknowledged and disagree. As stated above, the instrument efficiencies will be calculated on a daily basis. At present, the selection of instruments and the proposed survey methodology are believed to be adequate to meet the <25% of the guideline value detection requirement. The estimated MDC listed in Table 4-4 (calculated using the 4π geometries published by the manufacturers) shows that the MDC for at least two instruments (the floor monitor and the 100cm^2 ZnS detector) are less than 25% of the lowest guideline value. It should be noted that the background rates used in this table were also estimated, and were estimated conservatively. If a more realistic background rate of 3 cpm or less for the 100 cm^2 gas proportional detector is used, the estimated 4π efficiency of the 100 cm^2 detector also has an MDC that is below 25% of the lowest preliminary guideline value.

Comment #4

Page 4-17 Calibration Sources: The list of available calibration sources does not include an Americium-241 standard for the NaI detectors proposed.

Response #4

Agreed. SEDA has located an Am-241 calibration source and it is now included in the list NIST traceable sources that will be available for the survey.

Comment #5

Page 4-19, 20 - Class I Survey Units: While NaI detectors are referenced for use to scan for gamma surveys, no mention is made of utilizing FIDLER probes to detect the presence of Am-241, (or by surrogate measurement Pu-239) from the 60KeV gamma associated with Americium decay. Americium-241, Pu-239, U-238 and U-235 are only listed as alpha emitters.

In discussing this issue at our meeting at Seneca, FIDLER probes were suggested for use both inside buildings where paint, dirt, grease or porous surface etc., could mask alpha emissions and outside, where these materials could have been incorporated into the shallow surface soil. The availability of these probes to the surveyors was not conceived to be a problem at that time by Army personnel. In addition, as part of this draft plan supporting documentation of previous surveys by Army personnel in Appendix H, indicates that surveys were conducted using single-channel analyzers and FIDLER probes.

Also on page 4-19, please note that Co-57 is not a beta emitter and H-3 cannot be detected be any of the probes listed for beta scans.

Response #5

Agreed. The text has been revised to indicate that FIDLER or equivalent types of detectors will be used. Also, Co-57 and H-3 have been removed as sources of radionuclides that will trigger the scanning for beta radiations.

Comment #6

Section 4.2.3.4, page 4-26, Removable Radiation Surveys: The statement is made that swipes will be submitted for analysis if site guidelines are exceeded, based on field screening measurements. Since field screening is typically a much less sensitive method than laboratory analysis, it would seem that if a field screening measurement exceeded the site guideline values the area would be posted for further study or be targeted for decontamination. A more prudent method might be that if a sample exceeded some agreed upon percentage of the guideline value, then the sample would undergo more sensitive to insure that cleanup or regulatory guides were not exceeded.

Conversely, if a swipe is field screened or counted on site and found to be only a small fraction of the site specific guidelines, the sample should be submitted for lab analysis. If the results confirm that the area sampled is below the release criteria the data may then be used as evidence for the final release survey and no further sampling would be necessary.

Response #6

Agreed. All wipe samples, both alpha/beta wipes and LS wipes, will be submitted to the IRDC Nuclear Counting Lab at Red Stone Arsenal in Alabama. If a gross alpha or gross beta count from a wipe sample is found to exceed the site guideline for removable radiation, then that sample will be further analyzed to identify the source of the elevated radiation. The text has been modified accordingly.

Comment #7 **Section 4.2.3.6, page 4-27, Special Measurement and Sampling:** According to this procedure "Swabs" or pieces of cloth used to access floor drains or waste piping would be screened using the gas proportional counting instruments used for the survey and if they exceed the guideline value they would be submitted for analysis. Given that there could not be any efficiency established with any standard for this type of geometry, self absorption, dirt loading, etc., a flag value could not be determined other than some multiple of background. It would thus be necessary to submit all such samples for laboratory analysis.

Response #7 Acknowledged. The Final Draft Scoping Plan now indicates that specialized measuring probes will be used to scan drain pipes and ventilation ducts. Swabs will not be collected.

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Comments for
United States Environmental Protection Agency
(USEPA)
New York, NY 10007-1866
April 09, 1996

GENERAL COMMENT

Comment #1 Section 3 contains a review of existing data on which the current RI will expand. These include radionuclide concentrations in soil, sediment, groundwater, and surface water samples. As we have pointed out previously, the treatment of the soil data is flawed in that it ascribes annual radiation doses to individual samples. The Army contends in their response to comments that they are being conservative; we believe that the analysis is not meaningful.

Response #1 Agreed. All dose values have been deleted from the project scoping plan.

SPECIFIC COMMENTS

Comment #1 p. 3-22: The text attributes an exposure rate of 40-75 mR/hour to sample TP12A-1 and TP12A-2. It should read 40-75 μR/hour.

Response #1 Agreed. The text has been revised.

Comment #2 p. 3-23: The background exposure rate range is given as 10-15 mR/hour, rather than 10-15 μR/hour.

Response #2 Agree. The text has been revised.

Comment #3 Table 3-2B has multiple typographical errors, including misspelling of the word "exposure" and numerous misspellings of the abbreviation for disintegrations per minute (dpm), which appears as dmp.

Response #3 Agreed. The table has been revised.

Comment #4 p. 3-46, 3-47 and Table 3-4A: Annual radiation doses are calculated from individual soil samples and conclusions are reached relating individual sample concentrations to an annual dose equivalent clean-up criterion. These should be deleted. Equating an annual dose equivalent to a single datum is incorrect and not meaningful.

For example in Table 3-4A, the Army equates 1.6 pCi/g ^{226}Ra with a 88 mrem annual dose equivalent. In Table 3-14, a ^{226}Ra of 1.9 pCi/g is equated with a 141 mrem annual dose. Does this mean that the difference in the two, 0.3 pCi/g, results in the difference in the two dose estimates, i.e., 53 mrem? Note that in the USNRC NUREG 1500 guidance document on release criteria for site decommissioning, the New York State TAGM dose equivalent limit of 10 mrem per year for the general public is achieved by reducing the ^{226}Ra soil concentration to 3.7 pCi/g above background. Two other dosimetric calculations illustrate the magnitude of the dosimetric error.

(1) Utilizing USEPA's health effects assessment summary table dose conversion factors for radium plus decay products, one can easily calculate an annual cancer risk of 6.74 E-06 from a 1 pCi/g soil concentration from the predominant pathway (external exposure). Multiplying this risk by the lower and upper range of the widely published risk per unit dose factors (4E-04-8E-04 per rem), the annual dose equivalent ranges from approximately 8 to 17 mrem based on the 1 pCig soil concentration.

(2) Federal Guidance Report Number 12(USEPA, 1993) lists dose coefficients for exposure to various layers of contaminated soil. For radium and its radioactive decay products, the significant dose is incorporated in the coefficient for its bismuth-214 decay product. Multiplying the 4.89E-17Sv-m3/Bq-s coefficient by 1 pCi/g and an assumed soil density of 1.6E3 kg/m^3 and applying conversion factors, one calculates a 9.1 mrem per year dose equivalent due to an infinite layer of 226Ra at 1 pCi/g. The calculated dose equivalents are lower when the coefficients for 1 com, 5 cm, or 15 cm layers are used, rather than the coefficient for the infinite layer of contamination.

On page 3-83, the text indicates that the soil concentration radium data at SEAD-63 is reflective of natural background. Yet the analysis of this "background data" results in dose equivalents which exceed the New York, State TAGM criterion. The response to comments indicates that this type of dosimetric analysis will not be used in the RI; however, its use is not appropriate in this document.

Recommendation: Soil concentrations should be presented and values which exceed the upper range of natural background should be pointed out.

Response #4 Agreed. All dose values have been deleted from the project scoping plan and radiation levels which are above background are pointed out.

Comment #5 p. 3-54: The text states "...gamma radiation from ^{226}Ra and 2 of its associated radionuclides were found at concentrations ranging from 56 pCi/L..." Radionuclides have concentrations in media. Gamma radiation is energy emitted from some radionuclides and is not measured in media as a concentration.

Response #5 Agreed. The text has been revised and the word concentration has been replaced with the word level.

Comment #6 p. 3-54: The MCL for ^{226}Ra is not 20 pCi/L; rather, the MCL for total radium (the sum of 226Ra and ^{226}Ra) is 5 pCi/L.

Response #6 Agreed. The text and tables have been revised.

Comment #7

p. 3-54: Text regarding annual doses based on gross beta concentration in water samples should be deleted. The dosimetry model used is not meaningful.

Previously, we have identified problems with the approach to groundwater dosimetry. We have pointed out the USEPA MCLs for radioactivity in drinking water are misinterpreted and are generating ingestion dosimetry which is not meaningful. This approach is still a part of the RI scoping document.
According to a response to a previously submitted comment, the Army intends to use "alpha and gamma spectral analyses...to quantify the site concentrations of K-40 as well as the radionuclides from the uranium, thorium, and actinium series. These results will then be used to compare the total beta emissions of these radionuclides to the gross beta radiations detected in the groundwater samples." Potassium-40 data should not be used in any comparison to the gross beta concentration data. The gross beta analysis is simply a screening measurement for man-made beta/gamma emitters. It is not intended to be use to evaluate radionuclide-specific concentration data of beta-emitters in the natural series.

Compliance monitoring for drinking water supplies calls for waters having greater than 50 pCi/L gross beta, 20,000 pCi/L tritium, and 8 pCi/L ^{90} Sr to be measured for additional man-made beta-emitters. Doses from each radionuclide of concern can then be calculated and summed using the dose per unit intake conversion factors (such as those published by USEPA in the health effects assessment summary tables (HEAST) for radionuclides. Note that naturally occurring beta-emitters (such as ^{226}Ra and ^{40}K) are not included in the dose assessment.

Response #7

Agreed. All dose values have been removed from the project scoping plan.

Comment #8

Tables 3-6A, 3-6B: As stated before, the data are not meaningful and the dose column could be deleted.

Response #8

Agreed. All dose values have been removed from the project scoping plan.

Comment #9

Table 3-10: Quantifying an annual dose from an individual sediment sample is not meaningful and the dose column could be detected.

Response #9

Agreed. All dose values have been removed from the project scoping plan.

Comment #10

p. 3-66: It is stated that groundwater has been impacted by a release of radionuclides. It goes on to say that analysis of a duplicate sample failed to confirm the release and that the results were due to a laboratory problem. That being the case, one should not conclude that a release had occurred.

Response #10

Agreed. The text has been revised to indicate that the groundwater may be impacted by a release of radionuclides.

Comment #11 p. 3-83: Text regarding doses calculated from individual test pit sample data should be deleted. See Comment 4.

Response #11 Agreed. All dose values have been removed from the project scoping plan.

Comment #12 Table 3-14: For the reasons mentioned above, the dose column could be deleted.

Response #12 Agreed. All dose values have been removed from the project scoping plan.

Comment #13 Table 3-16: For the reasons mentioned above, the dose column could be deleted.

Response #13 Agreed. All dose values have been removed from the project scoping plan.

Comment #14 p. 3-91: The "calculated annual dose from the concentration of gross beta radionuclides in groundwater samples were below...4 mrem per year." should be deleted. The calculated doses are not meaningful.

Response #14 Agreed. All dose values have been removed from the project scoping plan.

Comment #15 Table 3-20: For the reasons mentioned above, the dose column could be deleted.

Response #15 Agreed. All dose values have been removed from the project scoping plan.

Comment #16 p. 3-98: Text regarding annual doses from the concentrations of radionuclides in the sediment samples should be deleted.

Response #16 Agreed. All dose values have been removed from the project scoping plan.

Comment #17 p. 3-116: Text states that "...presence of ^{226}Ra wastes in soils presents a significant radiological hazard due to the nature of...radon-222. In normal atmospheric conditions, ^{222}Rn exists as an inert gas." Radium-226 in soil may produce a significant radiological hazard, given a set of conditions relating to source strength, exposure pathways, occupancy patterns, land usage, etc. The text should be amended. Further, radon is an inert gas in any atmospheric condition, not only in a normal atmosphere as the text implies.

Response #17 Agreed. The text has been amended to include the wording in the comment.

Comment #18 p. 3-124f: Dermal contact with radon gas is not a potential exposure pathway, as indicated. Radon is solely an inhalation hazard.

Response #18 Agreed. The text has been revised.

Comment #19 pp. 3-124, 3-127: Sections 3.2.1.2.7 and 3.2.2.2.6 lists radon gas as an inhalation hazard to terrestrial biota. It appears unlikely that the carcinogenic potential of radon decay products is causing elevated incidences of lung cancer in any species of terrestrial biota. There is no discussion on how this claim can be evaluated. It should be deleted.

Response #19 Agreed. The text has been revised to indicate that dust exposure is a potential pathway for current site workers and terrestial biota and that radon exposure is a potential exposure pathway for the current site workers.

Comment #20 p. 3-127, top: See comment 19.

Response #20 Agreed. The text has been revised and the reference to radon inhalation by hunted fauna has been removed.

Comment #21 p. 3-127, middle: See comment 19.

Response #21 Agreed. The text has been revised and the reference to radon inhalation by terrestrial biota has been removed.

Comment #22 p. 3-127, bottom: See comment 19.

Response #22 Disagree. The bottom of p 3.-127, Section 3.2.2.3, does not indicate that terrestrial biota are included in future exposure scenarios that are any different than those for current scenarios. The text has been changed, however, to indicate that radon is not a dermal contact exposure pathway.

Comment #23 p. 3-139: The text states that when high radiation screening measurements are found (above normal background levels), samples collected should be "subjected to more rigorous analytical techniques." The text does not explain what is meant by this. More importantly, (1) analytical techniques should be identical on all samples collected, and (2) if any additional "rigor" were applied to the analyses of a subset of samples, it would be the low activity, i.e., background samples which should be emphasized, since data at the low end will be used to release property for unrestricted use.

Response #23 Agreed. The text was meant to indicate that level one data screening is going to be used to identify any sample matrix at a given sampling location that shows any signs of a possible contaminant being present. As the USEPA is fully aware, many constituents can be present in discrete forms, such as debris collected from within a test pit excavation or a layer of stained soil from a soil boring. The level one field screening is intended to identify if there are any non-visual indications that a possible contaminant is present. If a level one screening measurement does indicate that a possible contaminant is present, then that portion of the sample matrix (i.e. that portion of the soil boring or area within a test-pit excavation) will be submitted for chemical and/or radiochemical analysis by a laboratory. The text has been revised and the word 'rigorous' has been removed.

Comment #24 p. 4-22: The text indicates that surface measurements will be compared to two screening levels. The first is the unit specific guideline value. This type of protocol is appropriate. However, the proposed program also intends to compare readings made in the field to a daily flag value as a means of identifying surfaces with elevated quantities of radioactivity. This procedure should not be followed. The "daily flag" is based on several parameters, including detector efficiency and change from day to day. For example, the flag could fluctuate due to a malfunctioning detector.

Recommendation: The use of a daily flag should be deleted.

Response #24 Disagree. The use of the daily flag value is equivalent to setting an action level from MARSSIM guidance, or the ≤25% of the guideline level (for interior surveys) prescribed by NUREG 5849. The use of such a value is standard when planning and performing decommissioning surveys for radiation sites and it assures that the survey designs are sufficiently conservative to allow for release. Further, the use of a flag value is required by NYSDEC.

Comment #25 p. 4-25. The text states that survey instruments will be cross calibrated to a pressurized ion detector (PIC) on a daily basis. This is not necessary. The gamma scintillation detectors utilized should be field calibrated to a PIC. Once this is done, normal quality control monitoring of the scintillation detectors (e.g., voltage, background, battery, and source checks), can be used to determine the operability of the survey instruments. There is no need to continually repeat the PIC cross calibration.

Response #25 Acknowledged. Since the issue of the Draft Project Scoping Plan, the Army has identified the Bicron MicroRem/Hr meter as the instrument that will be used in the field. This instrument provides measurements in units of microrems per hour. The text has been revised to indicate that this instrument will be used for all exposure measurement surveys.

Comment #26 p. 4-54: See comment 26.

Response #26 This comment can not be responded to. The topic of the comment is not evident.

Comment #27 p. 4-56: See comment 27.

Response #27 This comment can not be responded to. The topic of the comment is not evident.

Comment #28

Section 4 and Appendix D: The previous data (presented in Section 3) consist of 24 samples which have a mean ^{226}Ra concentration of 2.7 ± 4.8 pCi/g. Only two of the sample values clearly exceed the range of background (8.6 and 24 pCi/g, respectively) and only two other samples have ^{226}Ra concentrations greater than 2 pCi/g. Removing the 8.6 and 24 pCi/g samples (which clearly exhibit some degree of radium contamination) from the data set results in a 1.4 ± 0.4 pCi/g average, which is representative of a population of background data. The soil investigation at SEAD-12 (Section 4.2.4) will include collection of 540 samples for analysis of radiological parameters (from 47 borings, 26 test pits, and 318 surface soil locations). This effort will generate more than enough data to delineate the radium contamination which is suggested by the two elevated datum in the existing data set (if combined with subsurface gamma ray logging measurements). Yet, in addition to the comprehensive soils investigation, document proposes an extensive soil gas (i.e., radon) survey, the objective of which is to locate the extent of ^{226}Ra contamination in SEAD-12 soil.

The text states that the soil gas data "...will allow a delineation of source areas..." The text notes that assumption that radium is being transported downgradient of the disposal pit. The theory is that this transport will be evident in the radon gas contours which will be drawn from the radon gas survey data. However, there is no way to quantitatively relate, with reasonable certainty, the radon data to the soil radium concentration.

In a perfectly controlled environment, this type of study might have some merit. However, under field conditions, there is no way to predict the source of the radon gas relative to the measurement location in the unsaturated zone. An inert gas with a 3.8 day half-life, radon will travel through pores in the soil away from its point of origin. The transport will be affected by numerous parameters including barometric pressure, temperature, soil moisture, the presence of organic material, etc. For example, what would the "correct" conclusion be from a radon measurement three times that of an adjacent measurement? Perhaps, soil in the immediate vicinity contained a somewhat higher radium concentration. On the other hand, it may result from nothing more than the influence of the various parameters such as those mentioned above. The point is that one can not attain the stated objective, i.e., to determine the boundaries of source areas, from these data. This type of investigation is not generally used to delineate subsurface radium contamination. Rather, a combination of soil concentration data and surface and subsurface gamma ray flux measurements are collected and combined, resulting in a three dimensional picture of the contaminated soil.

The response to earlier comments on the plan for the soil gas survey was to state that radium and most of its decay products are primarily alpha emitters, which is incorrect (there are several alpha-emitters, but also several beta- and gamma-emitters). More importantly, as discussed above, the survey is not appropriate.

Recommendation: The radon soil gas survey should be deleted. It is unnecessary and will not provide the accurate, quantifiable data necessary to achieve the study objective. It is retained, technical literature, supporting its use, should be provided.

Response #28

Agreed.. The radon soil gas survey has been deleted and replaced with a borehole gamma survey (using a NaI(Tl) detector). The proposed borehole gamma survey is detailed in the Geophysical Investigation section (Section 4.2.1) of the Final Project Scoping Plan. The proposed methodologies for obtaining the borehole gamma data are consistent with those described in the document "Estimate of Volume of Radium Contaminated Soil On Five Sites In Ottawa, Illinois, September-October 1988", Argonne National Laboratory publication ANL/ESH/TS-89/100. The gamma radiation profiles for this survey will be collected from the same locations originally described for the soil gas survey. The gamma profiles will be used to qualitatively identify horizons of potential radium contamination. Following the completion of the soil sampling program, it might be possible to calculate a conversion factor to relate the borehole gamma radiation data (which will be recorded in counts per minute) to soil concentrations. The text of Section 4.2.1 has been revised appropriately.

Comment #29

p. D-4: The text states that groundwater which seeps into the void space created by the radon probe will be collected and that the radon concentration of the water will be measured in the field. The text offers no procedure for this measurement, nor does it indicate how the data will be evaluated. Will any quality control measurements be performed on these water analyses? How will the method distinguish between radon emanating from suspended sediment and radon which is actually dissolved in the water? If the data are to be used in the radiological site characterization, details are needed to describe how the data are to be generated.

Response #29

This section of Appendix D has been removed as the radon soil-gas survey has been deleted.

Comment #30

p. D-7: The text states that the radon detection instrumentation will be calibrated by the manufacturer. Unlike most hand held radiation detectors which can be response monitored in the field with check sources, radon detectors can not undergo calibration checks in the field. Blank measurements (ambient air) and duplicate measurements will be collected, but there will be no way to assure that the instrument is responding accurately. It is possible that the response of the instrument can shift, which would not be evident from duplicate measurements and may not be evident from blanks. This issue should be addressed in the text.

Response #30

This section of Appendix D has been removed as the radon soil-gas survey has been deleted.

Comment #31

p. D-8: The text states "The acquired vapor phase concentrations are evaluated to determine the relationship between soil gas and source soils." Radon is an inert gas. The term "vapor phase" is incorrect.

Response #31

This section of Appendix D has been removed as the radon soil-gas survey has been deleted.

RADIATION AND INDOOR AIR BRANCH

Comment #1 It should be acknowledged that the MARSSIM document referenced and used in this Scoping Plan is currently draft. It is undergoing review within each contributing agency as well as by the public until July 1997 and is not yet official for reference. As such, it should not be used, cited, or quoted from in any report or work document. Until the guidance given in MARSSIM is finalized, which the MARSSIM workgroup anticipates may be December 1997, the NUREG guidance should be considered an applicable or relevant and appropriate requirement (ARAR). This may be a minor issue to correct since it appears that little more than terminology has been borrowed from MARSSIM. However, there is still concern on that account.

Response #1 Following the receipt of EPA's letter regarding the use of MARSSIM, received by the Army on 25 July 1997, this comment is no longer valid, and it will not be responded to.

Comment #2 NUREG 5849 (and the previous incarnation of the Scoping Plan) use the terms Affected and Unaffected Areas to describe the level to which an area has been or is suspected to have been impacted by radioactive contamination. MARSSIM, on the other hand, classifies areas as either impacted or non-impacted. An impacted area is further sub-categorized as being either Class 1, Class 2, or Class 3. The current Scoping Plan adopts this nomenclature in its classification of the AOCs. We recommend the use of terminology that is consistent with the NUREG documents.

Response #2 Disagree. See response #1 above.

Comment #3 The Scoping Plan does define these terms as they apply to site areas. Unfortunately, in their attempt to modify the document to fit MARSSIM, the Army appears to be indecisive about the true condition of the site. For example, SEAD-63 goes from having been "moderately impacted by Ra-226" in the previous Scoping Plan (p. 3-92) to "Possibly...impacted by Ra-226" in the current version (p. 3098). Why the change? The Army should be consistent in its characterization of site condition. Furthermore, the classification of the AOC should be consistent with the site condition.

Response #3 Acknowledged. As stated in the comment, the current classification of the AOC is consistent with the site condition. It is classed as a Class Two Area. Whether moderately or possibly impacted, a Class Two area will receive the same level of effort.

Comment #4 Moreover, when using NUREG 5849, guideline values for surface contamination in structures should be supported with risk analysis modeling (RESRAD-Build is one such program) to show that the desired level of risk has been attained before any structures are released for unrestricted use. Additional guidance may also be found in the NRC document Residual Radioactive Contamination from Decommissioning, NUREG/CR-5512.

Response #4

Disagree. As discussed in the June 26 199 7 meeting in Albany New York, the guideline values that will be used to show that a structure can be released, whether restricted or unrestricted (which will be determined after the data have been collected and analysed), will be those that are shown in Table 4-3 of the project scoping plan for indoor results, and will be those provided by NYSDEC for outdoor results. If additional radionuclides, which are not currently listed, are identified during the surveys, the guideline values that will be used will be taken from the same sources as those shown on Table 4-3: the New York State Department of Labor Part 38 release criteria and the building guidelines taken from NUREG 1500, Appendix B, Column 2. The latter guidelines are calculated from the dose algorithms contained in the NRC document Residual Radioactive Contamination from Decommissioning, NUREG/CR-5512 referenced in the comment.

Comment #5

In the event that the structures are found to possess residual radiological contamination, it is our recommendation that the affected areas (buildings and otherwise) be remediated such that the combined residual radioactive materials are present at concentration levels which express a combined excess lifetime risk, at a point of exposure, to an average individual no greater than between 10^{-4} and 10^{-6} (40 CFR 192.20).

Response #5

Disagree. See response #4. Also, the NYS Depratment of Labor criterial are promulgated standards that appear in the New York Code of Rules and Regulations. And the NUREG 1500 guidelines are dose based values that were calculated using the dose models and formulas in the NUREG guidance document suggested by the USEPA in comment #4 above. It should also be noted that the guideline values used from NUREG 1500, Table B2, are calculated to show the release criteria for a 15 mrem/year exposure limit. These values are therefore consistent with the EPA guidance value of 15 mrem refered to in the April 22 series of comments (general comment # 3B).

HAZARDOUS WASTE SUPPORT SECTION

Comment #1 The Revised Draft Scoping Plan for SEADs 12 and 63, dated November 1996, has been reviewed by this office. Following are comments generated upon review of this document, which includes SEDA's individual responses to prior EPA concerns as provided in Appendix K. These documents were transmitted to SEDA in July 1996 for SEAD 12 and in October for SEAD 63.

Response #1 Agreed.

SEAD 12

All previous comments have been addressed except for those that follow.

Comment #1 The issue regarding the Army's proposal to modify existing NYSDEC CLP analytical methods for certain constituents remains unresolved. The method modifications would result in a ten-fold reduction of current detection limits, thus demonstrating compliance with groundwater standards. In EPA's letter dated 11/15/96 to SEDA, the specific requirements which must be addressed in order to obtain approval of the modified methods, were delineated. EPA is awaiting response on this issue which will impact the Scoping Plan for SEAD 12. If the Army has reconsidered their prior proposal and will not have their lab modify the existing NYSDEC CLP methods, then the resultant data for certain compounds will be reported at concentrations exceeding the corresponding ARARs. This applies to prior EPA comment 2b and 3a.

Response #1 Agreed. The proposed modifications to the NYSDEC CLP methods were transmitted to the USEPA on September 9, 1997.

Comment #2 The response to prior EPA comment 10b requires further information. SEDA has stated that the NYSDEC ASP Category B deliverables package will be provided for data acquired by Method 524.2 in order to validate as per the NYSDEC data validation methods. A copy of the validation methods/procedures to be used on this data is to be included either in this Scoping Plan or in the Generic RI/RS Workplan.

Response #2 Acknowledged. The original response erroneously stated that NYSDEC data validation methods would be used. This is incorrect. The validation procedures used are those that the USEPA stated the Army must use; the USEPA's functional guidelines for data validation. As for the validation procedures for the Method 524.2 groundwater analyses, which the USEPA requires the Army to perform, these data are validated using the same functional guidelines that are used for CLP data. Where the 524.2 data package is deficient for some of the specific aspects of the CLP validation process (such as different surrogate compounds), professional judgment is used and the information provided in the 524.2 data package is applied to the fullest extent possible to follow the functional guidelines used in the CLP data validation.

Comment #3

Prior EPA comment 10b has not been fully addressed. The intended use of the acquired TCLP data for 12 of the subsurface soil samples must be documented in this Scoping Plan. The most common reasons for performing the TCLP are: determining if an unknown waste is hazardous according to 40 CFR261.24, determining what type of disposal (hazardous or solid waste) is appropriate, demonstrating the effectiveness of treatment processes to comply with Land Disposal Restrictions, or fulfilling shipping or transportation requirements. An inappropriate use of the TCLP is for risk assessments. The TCLP model does not assess risk when potentially TC waste is disposed in any matrix except with garbage into sanitary landfills. The proposed TCLP analyses must be carefully evaluated and if deemed necessary, explicit justification is to be provided in the Scoping Plan. Additional information regarding TCLP may be found in EPA-902-B-96-001, revised June 25, 1996.

Response #3

Agreed. The TCLP data will not be used in the risk assessment. The TCLP data will be used to determine the leachability characteristics of any wastes that are identified, and will also be used for the feasibility study. Its uses will also be applied to the reasons for performing the TCLP listed in the comment. The text has been revised.

Comment #4

Section 4.4, Data Reduction, Assessment and Interpretation does not specifically delineate the procedure(s) that will be used to validate, assess and interpret the collected radiological data. Components of this plan of action are partially included on pgs. 3-140 thru 3-142 and in the Discussion on MDCs on pages 4-15 thru 4-17. Topics to be addressed may include but are not limited to: identification of the personnel to perform the validation of the collected radiochemical data, definition of the required information to be provided to the validator from the laboratory (specified in the contract and in the laboratory method's SOPs), definition of the flexibility necessary to optimize/streamline the process, specification of the data validation tests (quality control, detection, and unusual uncertainty) and performance criteria (statistical confidence intervals and/or fixed limits) deemed appropriate to achieve this project's objectives, identification of data qualifiers, definition of how final qualifiers are assigned, and definition of the final content of the validation report.

Response #4

Acknowledged. As the EPA is aware, there are no mandated federal or New York state standards or guidelines for validating radiological data. The laboratory that has been selected to perform the radiological analyses for the SEAD-12 and SEAD-63 RIs is certified by the state of New York to perform such analyses. As such, this laboratory is documented as using protocols that are acceptable and sufficient for radiological analyses for the state of New York. To address data assessment, Appendix F of the project scoping plan now contains radiochemistry data review checklists, radiochemical data completeness checklists, data qualification summary report forms, analysis requirement summaries, and radiochemistry data review and qualification checklists. These checklists and forms will be used for the SEAD-12 and SEAD-63 RI programs.

Comment #5 Many of the contracted laboratory's certifications expire on 4/1/97. Documentation of renewed certification must be provided for all analytes of interest from all contracted labs involved in this investigation and any other sampling done at SEDA.

Response #5 Agreed. The two laboratories that are currently identified to perform the radiological analyses, Core Laboratories and the Army's IDRL Nuclear Counting Laboratory at the Red Stone Arsenal will be certified for the analyses they will be contracted to perform.

SEAD 63

All previous comments have been addressed except for those that follow.

Comment #1 Comment 1 above also applies to SEAD 63 (see prior EPA comment 1b).

Response #1 See response to comment #1 above.

Comment #2 Comment 2 above also applies to SEAD 63 (see prior EPA comment 9b).

Response #2 See response to comment #2 above.

Comment #2 Comments 3, 4, and 5 above also apply to SEAD 63.

Response #3 See responses to comments #3,4, and 5 above.

Comments for
United States Environmental Protection Agency
(USEPA)
New York, NY 10007-1866
April 22, 1996

GENERAL COMMENTS

General Response: Most of these comments are copied from USEPA comments on the Draft project scoping plan. To address these recuring comments, the Army has deleted all of the preliminary dose calculations that were previously performed. It should be noted that in the Army's original responses, it was stated that these numbers were preliminary estimates, and that the methodology used was only intended to determine whether a threat existed at these sites or not. It was clearly stated that the methodology used for the RI would not be that which was used previously.

Comment #1 Rather than identifying each page of text or table which contains erroneous radiation dosimetry values and/or improper comparison to standards, a general explanation of the deficiencies in the areas of radiation dosimetry and evaluation of dosimetry data are presented.

Response #1 Agreed. All dose values have been removed.

Comment #2 The document includes numerous calculations of internal radiation dose resulting from the "beta radiations from the Ra-226 decay chain." These consist of Bi-214, Bi-210, Pb-214, and Pb-210. The "dose" calculated to the skeleton in the document is really the dose equivalent. The problem here is not so much with the methodology, but with the applicability of the modeled doses to existing and proposed drinking water standards. The beta dose from these naturally occurring radionuclides are compared to the 4 mrem per year maximum contaminant level (MCL) which appears in the National Primary Drinking Water Regulations for. gamma and beta emitters. That is not the intent of that M.C.L.

A brief description of the National Primary Drinking Water Regulations might be helpful. In 1976, the National Interim Primary Drinking Water Regulations for radionuclides were promulgated by the USEPA. One of the standards was a 4 mrem per year MCL from man-made radioactivity (intended to cover gamma and beta emitters). An advanced notice of proposed rulemaking was published in the Federal Register in 1986 (40 CFR 141 Water Pollution Control; National Primary Drinking Water Regulations). Contained therein was the following: "The gross beta particle activity standard was intended as a screening device to measure for man-made radionuclides." Screening protocols are described which includes gross beta measurements and a decision tree which includes quantifying tritium and strontium concentrations if the gross beta concentration exceeds 50 pCi/L. Indeed, 40 CFR 141.16 reads "Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in community water systems. " Appendix C of 40 CFR 141 contains a table of radionuclides included in the definition of gross beta and photon emitters; it excludes the radioactive daughter products ofthorium-232, uranium-

235, and uranium-238 (which include the bismuth and lead beta-emitters which are the subjects of the document's beta radiation model).

In 1991, proposed revisions to the drinking water regulations for radionuclides were published in the Federal Register; they have never been adopted. In the proposed revision, beta and photon-emitting radionuclides are still referred to as man-made, although the USEPA proposed monitoring Pb-210 as an unregulated contaminant. Two monitoring alternatives are presented, but they both continue to consist of quantifying gross beta, tritium, and strontium concentrations (they do not include decay products of the natural series, such as the decay products of Ra-226). The wording in 40 CER 141.16 is clear - the MCL for beta particle and photon radioactivity applies to man-made radionuclides,

The comparison of SEDA groundwater data to existing and proposed drinking water standards is flawed. In addition to the beta/garnrna 4 mrem standard, the USEPA has set a MCL specifically for Ra-226. (The existing MCL for the sum of Ra-226 and Ra-228 is 5 pCi/L; the proposed standard relaxes the MCL for each radium isotope to 20 pCi/L.) The radium MCLs incorporate the radiological significance of the decay of all radiations resulting from ingestion of the radium parent, including the bismuth and lead beta emitters. Segmenting out the beta emitting decay products of Ra-226 and comparing the resultant dose equivalent to the MCL established for manmade beta and gamma emitters is inappropriate. Further, the dosimetric impact from beta particles following ingestion of radium is minimal compared to the total dose from radium ingestion (which is primarily due to the interaction of alpha particles with skeletal tissue). In short, the USEPA has set a specific MCL for radium (which accounts for the dose from radium and its decay products. The drinking water regulations are not intended to regulate radium twice (once with the radium-specific MCL and a second time with the beta/gamma MCL).

Response #2 Agreed. All dose values have been removed.

Comment #3 It is stated that the computer code RESRAD will be used in the RI. The RESRAD code is acceptable for use provided the following modifications are made:

A) Whenever applicable, default. parameters cited in OSWER Directive 9285.6-03 *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors",* March25, 1991 and *Risk Assessment Guidance for Superfund (RAGS)* should be substituted in the RESRAD code.

B) Section 4.6.3.1 Contaminated Zone Parameters of the *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0* gives 30 mrem/year as the radiation dose limit. EPA guidance recommends an upper limit of 15 mrern/year (equal to approximately 3 x 10-4 carcinogenic risk). The parameter for radiation dose limit in RESRAD should be modified to read 15 mrem/ year.

C) After the RESRAD program has been run, the Army's report to EPA should include the Health Risk Report (INTRISK.REP FILE) and the Summary Report

(SUMMARY.REP FILE). In addition, EPA needs a copy of the input parameters on diskette.

D) Erroneous results can be generated by RESRAD users if they have not been trained at a DOE sponsored workshop (taught by the individuals from Argonne National Laboratory who wrote the RESRAD code). It is recommended that the Army request that Argonne National Laboratory run the RESRAD code for SEADs 12 and 63.

Response #3 A) Acknowledged. As discussed during the June 26 meeting between the Army, NYSDEC, and the USEPA, the RESRAD code will be run by NYSDEC to determine what the exterior guideline values will be. NYSDEC will use their default parameters when using RESRAD. It should be noted that a preliminary review of the default factors for Ra-226 in the RESRAD Version 5.62 indicate that the program uses the same exposure factors as those in the HEAST and EPA Dose Conversion Factors Federal Guidance Report #11 documents.

B) Acknowledged. However, it is very likely that NYSDEC will use an upper limit of 10 mrem per year for the RESRAD dose limit. The radiation dose limit in RESRAD is used only to derive soil guidelines for cleanup. When the RESRAD code is used to calculate doses, this parameter is not used by the program.

C) Acknowledged. However, since the guideline values for the radiological data evaluations are being calculated by NYSDEC (using RESRAD Ver. 5.62 to model a residential exposure scenario) the Army will not include the radiological data in the risk assessments for SEAD-12 or for SEAD-63, and the Army will not use RESRAD. The project scoping plan has been revised and all references to performing a radiological risk assessment as part of the baseline risk assessment have been removed.

D) Acknowledged. However, the Army no longed intends to use this program for the SEAD-12 or SEAD-63 RI.

Comment #4 There is an extensive body of literature on the population dose from sources of natural background radiation. One authoritative text, *Environmental Radioactivity,* states that an individual will receive 13.9 mrad per year from I pCi/g of terrestrial U-238 in equilibrium with its decay products over an infinite plane (Eisenbud, 1987). The National Council on Radiation Protection and Measurements ~CRP) published the same value in *Exposure of the Population in the United States and Canada from Natural Background Radiation, NCRP Report No.94* QJCRP, 1987). In that document, the NCRP states that the average U.S. and Canadian resident receive 28 mrem per year from all terrestrial radionuclides combined. Average concentrations of uranium and thorium series nuclides fall in the 0.8-1.8 pCi/g range.

The RESRAD results which appear in the SEDA documents equates annual dose equivalents of as high as 75 mrem per year to one pCi/g of Ra-226 in soil; For example, annual dose equivalents of 1342 mrem and 492 mrem are attributed to 24 pCi/g and 8.6

pCi/g of Ra-226, respectively; The RESRAD results with these high dose equivalents indicate that they are not accurate assessments of the dosimetric impact of radium in soil due to their variance with scientifically valid, peer-reviewed dosimetric data.

Response #4 Agreed. The dose values have been deleted from the project scoping plan.

Commend #5 The RESAD values lead to problems when they are compared to ARARs. For example at site SEAD-63, soil sample TP63-9 contained 2 pCi/g of Ra-226, a concentration which could be due solely to natural background'. Based on the flawed dosimetry described above, an annual dose equivalent of 150 mrem is attributed to this sample, half of which is suggested to be an "above background dose." That being the case, one would conclude that the "extra" 1 pCi/g of radium, in addition to the 1 pCi/g from background sources, would cause an additional 75 mrem annual dose equivalent, or 75% of the 100 mrem per year limiting acceptable dose equivalent set for members of the general public by the Nuclear Regulatory Commission, Department of Energy and others. This is simply not the case, as supported by the published relationship between terrestrial radionuclide concentration and dose referenced above. Based on this alleged "dose,'[1] the document erroneously concludes that the 2 pCi/g datum is evidence that SEAD-63 soil has been moderately impacted by radium contamination.

[1] The background concentration of any naturally occurring radionuclide is represented by a range, not a single value. While 2 pCi/g is approximately 2.5 times the frequently published value of 0.8 pCi/g for Ra-226, it is possible that such a concentration could occur in the absence of any technologically enhanced Ra-226.

Response #5 Agreed. The dose values in the project scoping plan have been deleted.

SPECIFIC COMMENTS

General Response: Most of these comments are copied from the USEPA's comments on the Draft version of the project scoping plan. Almost all of the page and paragraph references provided below (by the USEPA) refer to pages and paragraphs in the Draft Document and not the Draft-Final document. Although the Army is providing responses to these comments to address what the Army sees as the source of the USEPA's concerns, many of these comments were apparently submitted without reviewing the Draft-Final project scoping plan, which was supposed to have been the document reviewed by the USEPA. The Draft-Final project scoping plan contained many updated paragraphs which were modified from the Draft version based on USEPA comments.

Comment #6 Page 3-36, Table 3-4A and elsewhere: 40 CFR 192, or UMTRCA, is cited as an ARAR. The USEPA has specifically chosen not to use the 15 pCi/g standard for the subsurface at many CERCLA sites. Therefore, the documents should be amended to delete that reference to the 15 pCi/g subsurface radium standard.

Response #6 Agreed. The tables have been revised and all mention of the 15 pCi/g standard have been deleted.

Comment #7 Page 3-110: The statement that "The presence of ^{226}Ra wastes in soils presents a significant radiological hazard due to.. ,radon" is an exaggeration. Obviously, radium is the source of radon gas which could cause an inhalation hazard in a structure built on top of or adjacent to radium-contaminated soil. However, given the conditions described at SEDA, it does not seem appropriate to describe the radon hazard as having radiological significance.

Response #7 See response to EPA comment #17, dated April 9, 1997, above.

Comment #8 Figure 3-20 and Figure 3-21: In addition to ingestion, inhalation, and dermal contact, the potential for "direct exposure" should be added as a possible exposure route for radionuclides.

Response #8 Agreed. Direct exposure has been added as a possible exposure route for the soil, goundwater, and surface water and sediment secondary sources as well as those already identified.

Comment #9 Page 3-54: To assess the dose equivalent from the potential ingestion of Seneca groundwater, one can simply measure the concentration of the radionuclides of concern and utilize the ingestion slope factors published by USEPA. Continued use of the "beta dosimetry" model will continue to fail to properly evaluate the dosimetric consequence of the groundwater data.

Response #9 Agreed. All dose values have been removed from the project scoping plan. Use of the ingestion slope factors will be looked at as To Be Considered levels when site data are tabulated for presentation in the RI report.

Comment #10 Pages 3-123 and 3-124, Section 3.2.4: The intent of this section is unclear and the potential receptors identified are inconsistent with those identified in prior sections. Consideration should be given to eliminating this section.

Response #10 Disagree. This section describes the exposure assessment assumptions that will be used in the conceptual site model for the risk assessment. The text of Section 4.5, Baseline Risk Assessment, now explicitly references Section 3.2.3, Exposure Assessment Assumptions.

Comment #11 Page 3-124: Rather than using the actual data values, exposure point concentrations are often best estimated by computing the upper 95 percent confidence limit of the arithmetic mean of the log transformed data.

Response #11 Disagree. Parsons has worked closely with EPA Headquarters to develop a conservative and realistic methodology for selecting EPCs. The methodology presented is consistent with draft EPA Headquarters guidance on this topic. Further, the Army believes that the methodology proposed is a better way to evaluate EPCs, rather than always selecting the 95th UCL of the geometric mean. The proposed methodology assures that a conservative value is selected from either the 95th UCL of the arithmetic or geometric mean and the maximum detected value. However, the selected EPC will never be greater than the maximum detected value. Using the 95th UCL of the geometric mean as the EPC would often result in the EPC being greater than the maximum detected value if the data set had few positive detections and/or most of those detections were below the contract required quantitation limit.

Comment #12 Section 3.6 (3.6.1, 3.6.2, and 3.6.3): One goal described for the remedial investigation is to determine the distribution coefficients for ^{226}Ra and ^{238}U. The document should indicate how knowledge of this parameter will be used in the feasibility study.

Response #12 This data may not be used in the FS. The intended use of this data is presented in Section 4.2.8.1

Comment #13 Section 4.4: If sampling takes place before MARSSIM becomes final and NUREG guidance is used; the following comment applies:

A) The radionuclide data for SEAD-63 was consistently at or very near the background range. The extensive sampling/investigation planned does not seem appropriate. A more reasonable investigation protocol would consist of an exposure rate scan (&ground level) of the area; collection of soil samples in areas where the exposure rate exceeds a pre-set limit, such as twice background; and scanning all soil samples collected for radiological parameters with a GM pancake detector, or equivalent, to identify subsurface radiological contaminants.

If sampling occurs after MARSSIM becomes final, the following comment applies:

B) The investigation of SEAD 63 should be designed to be consistent with the MARSSIM survey criteria. The approach described in MARSSIM enables the investigator to review existing data and classify an area as "impacted' or non-impacted". Impacted areas are further classified based on a comparison to derived concentration guideline levels (DCGLs), which are residual levels of radioactivity that correspond to allowable radiation dose standards. For naturally occurring radionuclides such as the radionuclides of concern at SEDA, the DCGLs refer to average levels above appropriate background levels.

Without knowledge of the DCGL values for SEDA radionuclides of concern, it is not possible to conclude whether SEAD 63 can be designated as a non-impacted area, a Class 2 impacted area, or a Class 3 impacted area. Section 4 of MARSSIM states that areas that have no potential for residual contamination do not require any level of survey coverage and are designated as non-impacted areas, these may. be released for unrestricted use. Characterization surveys are necessary for Class 2 and 3 impacted areas.

Response #13 A) MARSSIM is being used, and this comment will not be addressed.
B) Agreed. The project scoping plan for SEAD-63, as well as for SEAD-12, was designed to meet the MARSSIM requirements for release based upon the information that is available for these sites.

Comment #14 The first paragraph states that the scenarios evaluated in the baseline risk assessment will be based on the community reuse plan and that the Generic Installation RI/FS workplan will be revised when the community reuse plan is written. If the Army plans to include scenarios in the Risk Assessment that are not currently addressed in the Generic Installation RI/FS workplan, revised text to the workplan should be proposed by the Army and agreed to by EPA before the risk assessment is completed and submitted for regulatory review.

Section 4.4 BASELINE RISK ASSESSMENT of the Generic Installation RI/FS workplan states, "in an attempt to reduce quantitative recalculations, a risk assessment workplan and a pathway analysis (as two separate and consecutive deliverables) will be submitted to the USEPA, Region II for review before proceeding with quantitative aspects of the evaluations."

We strongly urge the Army to follow through with this task, which will ultimately save DoD, EPA and NYSDOH time and resources. These deliverables would have been beneficial before the Risk Assessments for SEADs 25, 26, 16 and 17 were submitted to EPA.

Response #14 Disagree. Section 4.5, Baseline Risk Assessment, states that Risk Assessment Guidance for Superfund (RAGS) will be used in the risk assessment. The potential exposure pathways (pathway analysis) are presented and discussed in Section 3.2, Preliminary Identification of Receptors and Exposure Scenarios. This section (Section 3.2) also includes discussions on the exposure assessment assumptions and the selection of exposure point concentrations that will made for the risk assessment. Section 4.5 has been revised to explicitly indicate that the information in Section 3.2 will be used in the risk assessment.

It should be noted that SEAD-12 and SEAD-63 are both in an area that the community reuse plan intends to setup as a wildlife conservation area. This future intended use was developed by the Local Redevelopment Authority (LRA). Therefore, as requested in the comment, the future exposure pathways that are now presented in Section 3.2, and which will be evaluated in the risk assessment, are consistent with this future intended use. Specifically, the risk assessment for future scenarios at these sites will only consider potential exposure to a recreational visitor population.

It should also be noted that funding from the Army has not been appropriated to re-write the Generic Work Plan, which is a final document. Rather, any aspects of the risk assessment that are not covered in the Generic Work Plan, including modifications to exposure assumptions presented in the Generic Work Plan, are included in this site specific project scoping plan.

Comments from
the Department of the Army
on the
SEAD-12 and SEAD-63 Draft-Final Project Scoping Plan

Comments on Draft Project Scoping Plan for SEAD-12 and SEAD-63

Comment #1 Have the Project Plans been reviewed by Mr. John Manfre, the AMC Radiation Safety Officer? He can be reached at (703) 617-9340.

Response #1 The project scoping plan has been reviewed by the Peer Review Committee, which includes Mr. Micheal Borisky from the Army Research Laboratory. It is not known whether this document was reviewed by Mr. John Manfre.

Comment #2 Approximately 50 monitoring wells will be installed for this effort. these will require either maintenance or closure, can well points or hydropunch be used for some of the locations? Also, rather than looking at individual disposal points, can an area-wide assessment of groundwater be performed to reduce the number of wells? Downgradient wells at one point may serve as an upgradient well for another disposal point.

Response #2 Acknowledged. The total number of proposed groundwater monitoring wells is believed to be appropriate to investigate the potential areas where impacts may occur over the 360 acre site. Historical groundwater flow characteristics at SEDA indicate that using fewer wells than those proposed would be inadequate to determine whether the groundwater downgradient of a possible disposal site is being impacted. It should be noted that up to 14 wells may not be installed if the results of test pit excavations indicate the wastes are not present at currently suspected disposal areas.

Comment #3 Because SEAD-63 is located within the boundary of SEAD-12, it may be more appropriate to do one ecological risk assessment.

Response #3 Agreed. However, CERCLA requires that an ecological risk assessment be performed for each site where an RI/FS is being performed. The field work for the ecological risk assessment at SEAD-63 will be performed at the same time as that for SEAD-12, and it is very likely that the site specific ecological risk assessments will use much, if not all, of the same data in both of the RI reports.

Healy/TLB

Comment #1 Paragraph 3.2.1.3. Future on-site residents are included here as potential receptors under any future use scenarios. Please verify that this is only as one potential scenario (i.e., the most conservative) amongst several and not the scenario that is likely to govern. Now that a reuse plan is nearing completion, only the scenario that is currently envisioned should govern. I believe that "Institutional" is the designated reuse for the SEAD-12 area.

Response #1 Agreed. Since the issue of the Draft Final version of this project scoping plan, the Local Redevelopment Authority (LRA) has determined that the intended future use of the SEAD-12 and SEAD-63 areas are to be for conservation. As such, the document has been revised and all references to a residential scenario have been deleted and replaced with an on-site recreational visitor scenario.

Comment #2 Paragraph 3.2.2.3. Refer to Comment #1, above.

Response #2 Agreed. See response to Comment #1, above.

Comment #3 Page 3-140. In the ninth line from the bottom, please correct "NCR". I do not believe that National Cash Register has anything to do with this site!

Response #3 Agreed. The text has been revised.

Comment #4 Section 4.0. In line two, please delete the reference to "SEAD-48".

Response #4 Agreed. The text has been revised.

<u>Nebelsick</u>

Comment #1 Page 1-1, Section 1.1. The section made reference to SEAD-48 investigations. According to the cover sheet provided, this site will have the project scoping plan submitted under separate cover. Clarify.

Response #1 Agreed. This reference has been deleted.

Comment #2 Page 4-47, Section 4.2.8. One issue that is currently being reviewed is the modification of methods to meet lower detection limits for hexeachlorobenzene, Arochlor and benzo(a)pyrene. Therefore, the analytical program should specify these changes. This office has received the modifications to the NYSDEC CLP SOW for the compounds (methods) mentioned and will provide an approval letter based on satisfactory review.

Response #2 Acknowledged. The text has been revised to indicate that the proposed modifications have been submitted to EPA and NYSDEC, and that once they are approved, will provide the detection limits that are required.

Comment #3 Page 4-62, Section 4.3.5.1. Recommend the text clearly identify that the modifications discussed in the previous comment would only apply to the second round. Clarify.

Response #3 Disagree. The first round will be analyzed using these modifications, and if a particular well is found to have contaminants, then the second round will also be analyzed using the modified CLP methods. Only if a well is shown not to have any impacts by the CLP analysis can subsequent analyses be performed by the 524.2 method. Performing a 524.2 analysis on a sample from a well that is known to have contaminants could damage the laboratory apparatus.

Comment #4 Page 4-47, General. Recommend the project scoping plans reference the laboratories to be used for this project. This is especially true if the project uses more than one laboratory. This information should be specified for both environmental and radiological samples. The laboratory validation program is project specific and the HTRW-CX should be notified of the laboratory(s) that will be used on each project.

Response #4 Acknowledged. The text does now state that the wipe samples that will be collected in the building structures will be analyzed by the army's IRDL Nuclear Counting Laboratory at Red Stone Arsenal. Because a sub-contract with an environmental lab has not yet been established for the radiological analyses of environmental samples, this information can not be included in the document. At this time, Core Laboratories in Casper Wyoming has been selected to perform these analyses. It is very likely that a sub-contract with Core Laboratories will be arranged for the environmental analyses at SEAD-12 and SEAD-63.

<u>McCormick/Health Phys.</u>

Comment #1 Chapter 3. The radiological data presented in this section is inaccurate, poorly presented and technically indefensible. This has been commented on before. My understanding is that no moneys are to be expended to correct this data. Suggest that a caveat regarding use of any radiological data presented in Chapter 3 be added to the report.

Response #1 Acknowledged. All dose values have been removed from Section 3 of the project scoping plan.

Comment #2 Chapter 4, Section 4.2.2. Soil gas survey for disposal pit A. This reviewer is not familiar with this methodology being used to determine radium belowground. Please explain what information will be gained by performing this survey. Please explain the methodology and calculations for determining the radium content of the pit from radon emanation. How will the natural (often hourly) variance in background radon be accounted? How will the soil gas volume be determined? How is the radon emanation from the radium paint matrix determined? Radon is easily transported by water for great distances, and Radon gas emanation follows the route of least resistance. Please explain how the location of the radium will relate to the radon emanation? Since a reading of no radon above background would not ensure that no radium is buried in the pit, if the location of discrete underground radium sources cannot be accurately related to a point radon emanation measurement and if there is not a defensible method for quantifying the radium content of the pit from the radon readings, then there is no reason for performing the soil gas survey for radon at Disposal Pit A.

Response #2 Agreed. The plan now proposes a geophysical borehole survey. A NaI(Tl) detector will be used for the survey. Section 4.2.1, Geophysical Investigation, describes the proposed survey.

Comment #3 Chapter 4, Table 4-1. Disposal Pit A is not listed in the table. Please explain the rationale for this omission or add Disposal Pit A to the table.

Response #3 Agreed. This omission has been added to Table 4-1.

Comment #4 Chapter 4, Section 4.2.3.1, Pp1. Shouldn't the gridding be the other way around; 1x1 meter grids on the floor and up the walls for 2 meters then 2x2 meter grids for the walls over 2 meters and the ceiling? The 2x2 gridding on the floor is used throughout the chapter. Suggest that the gridding be changed, here and at Pg. 4-23, Pg. 4-24, Pg. 4-25.

Response #4 Disagree. Since these areas are going to be scanned over 100% of their surface, the use of 2 meter grids below 2 meters means that 75% fewer direct measurements, 75% fewer wipe samples, and 75% fewer LS samples will be required. The use of 1 meter grids above 2 meters was selected to facilitate the actual measuring in the field, since many of these structures have 15 to 20 foot ceilings. The smaller grids will be easier to establish and survey at these heights. NYSDEC has acknowledged that the proposed gridding methodology is acceptable.

Comment #5 Chapter 4, Section 4.2.3.1, Pg. 4-20 Class 2 survey units. Since these areas are determined to be less likely to be contaminated than Class 1 Survey Units, a lowered effort should be directed toward their survey. Suggest that the lower walls, floor surfaces, pavement, access points be surveyed randomly over 20% of the surface, but with a bias toward those areas most likely to be contaminated, and if there is any detection of radionuclides over an action level, than the area be reclassified as a Class 1 Survey Unit.

Response #5 Agreed. The survey coverage has been reduced to 50% rather than 100%. Also, several decision trees have been added to allow for potential reclassification of areas.

Comment #6 Chapter 4, Pg. 4-25 First Pp. Daily cross calibration is unnecessary and time consuming. Suggest that a single point daily check against a dedicated check source be used instead.

Response #6 Acknowledged. The Army now proposes the use of a Bicron MicroRem/Hr meter. All references to cross-calibrating a CPM instrument have been deleted.

Comment #7 Chapter 4, Section 4.2.3.5. Radon is not an issue at SEAD. The NY TAGM specifically excludes dose from Radon, and EPA has no regulations on radon in buildings, only guidance. Any EPA radon in occupied building concerns, should be addressed by the U.S. Army radon monitoring and mitigation plan. No action would occur as a result of discovery of elevated radon in the buildings since the area is slated for closure. Strongly suggest deletion of the radon concentration in Air investigation. If for some reason the investigation is performed under this project, the DA regulation, AR 200-1 for radon sampling locations and numbers of samples should be followed. This regulation states that one 90 day track etch type detector be placed in the lowest part of each occupied building. And for large warehouse type buildings, one additional track etch type detector for each additional 2000 square feet be placed in an alternate low area. 16 buildings should require 16-20 detectors.

Response #7 Acknowledged. However, the current plan has already been reviewed by the EPA and NYSDEC, and neither agency has objected to the currently proposed indoor radon survey. To modify this small portion of the RI would invariably result if further delays and additional expenses, which would likely outweigh any savings incurred from reducing the scope of the proposed indoor radon survey. The AR 200-1 regulation will be used, if appropriate, to determine the sampling locations.

Comment #8 Pg. 4-53, Section 4.3.2.1. For the Class 2 survey areas, please see comment #5.

Response #8 Agreed. See response #5

Comment #9 Pg. 4-56 first Pp. See Comment #6.

Response #9 Acknowledged. The Army now proposes the use of a Bicron MicroRem/Hr meter. All references to cross-calibrating a CPM instrument have been deleted.

Comment #10 Appendix D. See Comment #2.

Response #10 Agreed. The addendum to Appendix D has been deleted.

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APPENDIX L

SCOPE OF WORK

Appendix L information is contained in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan