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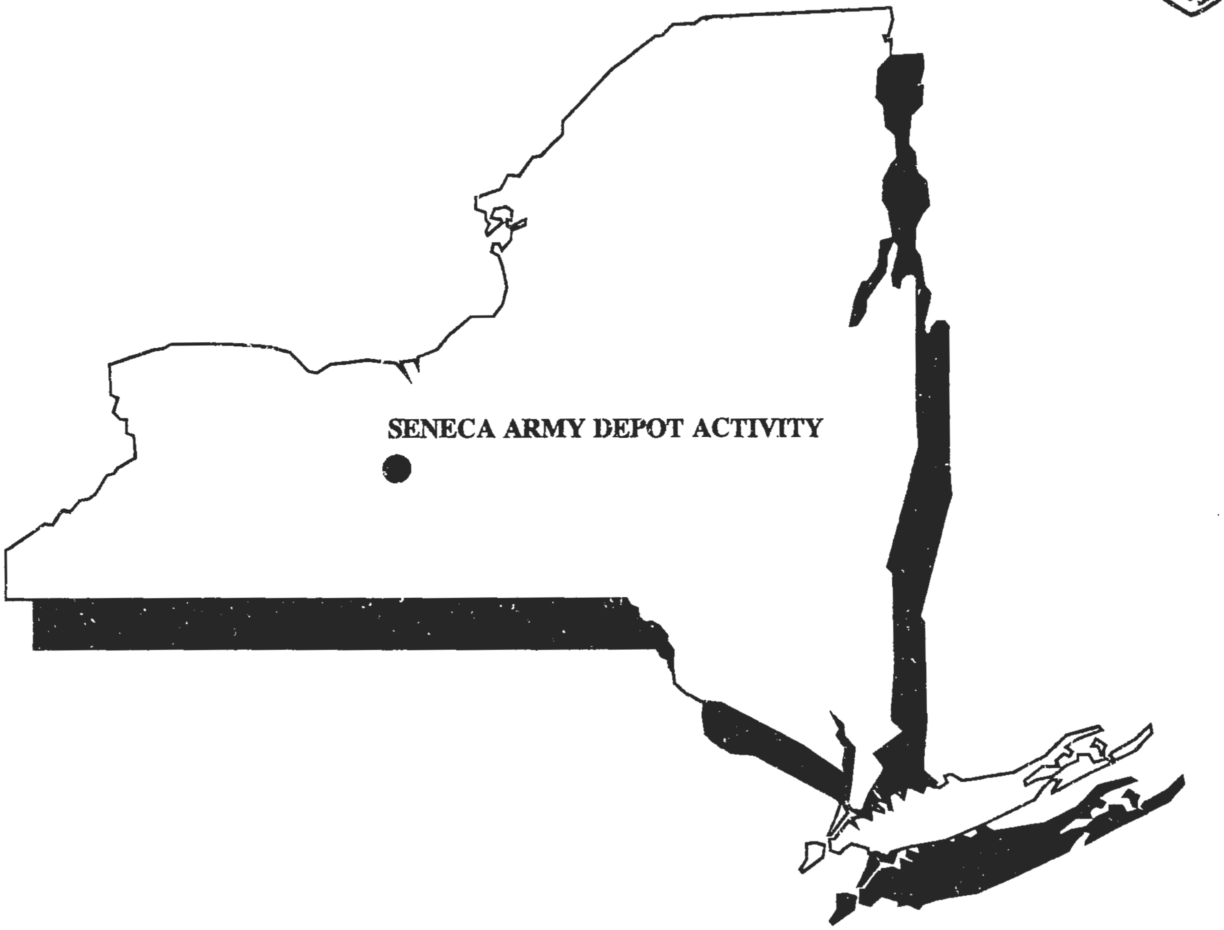

FINAL

SEAD-11, SEAD-64A, SEAD-64D

PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT THE CONSTRUCTION DEBRIS LANDFILL (SEAD-11) GARBAGE DISPOSAL AREAS (SEAD-64A AND SEAD-64D)

SEPTEMBER 1997

PROJECT SCOPING PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
AT SEAD-11, SEAD-64A, & SEAD-64D
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

726511

November 1995

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LIST OF ACRONYMS

1,2-DCA	1,2-Dichloroethane
1,2-DCE	1,2-Dichloroethylene (total)
AA	Atomic absorption
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
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
Cr	Chromium
$CaCO_3$	Calcium Carbonate
CRT	Cathode ray tube
DARCOM	Development and Readiness Command
DERA	Defense Environmental Restoration Account
DO	Dissolved oxygen
DOT	Department of Transportation
DQO	Data Quality Objective
DRMO	Defense, Revitalization and Marketing Office
EM	Electromagnetic
EPA	Environmental Protection Agency
ESI	Expanded Site Inspections
FS	Feasibility Study
ft	Feet
ft/ft	Feet per foot
ft/sec	Feet per second

LIST OF ACRONYMS
(CONT.)

ft/yr	Feet per year
GA	Classification: The best usage of Class GA waters is as a source of potable water. Class GA groundwaters are fresh water
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
MCL	Maximum Contaminant Level
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
MSL	Mean sea level
MW	Monitoring Well
NA	Not analyzed or not available
NBS	National Bureau of Standards
NGVD	National Geologic Vertical Datum
NO_2/N	Nitrite-Nitrogen
NO_3/N	Nitrate-Nitrogen
NPL	National Priority List
NTU	Nephelometric turbidity units
NYSDEC	New York State Department of Environmental Conservation
OB	Open Burning
OD	Open Detonation
OVM	Organic Vapor Meter
Pb	Lead

LIST OF ACRONYMS
(CONT.)

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
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
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
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
TDS	Total dissolved solids
TKN	Total Kjeldah Nitrogen
TOC	Total Organic Carbon

LIST OF ACRONYMS
(CONT.)

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
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
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
Vs	Volt Second

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

The purpose of this Remedial Investigation/Feasibility Study (RI/FS) Project Scoping Plan is to provide site specific information for the RI/FS project at SEAD-11, SEAD-64A, and SEAD-64D at the Seneca Army Depot Activity (SEDA) in Romulus NY. This plan outlines work to be conducted at SEADs-11, 64A, and 64D based upon recommendations specified in the Three Moderately High Priority SWMUs Expanded Site Inspection (ESI) Report (draft final, Parsons ES, June 1995) and in the Seven Low Priority SWMUs Expanded Site Investigation (ESI) Report (draft, Parsons ES, April 1995). The sites are called SWMUs because the Army elected in their Federal Facilities Agreement to combine RCRA and CERCLA obligations and the Army uses RCRA terms to describe the units.

The Generic Installation RI/FS Workplan that accompanies this document which was designed to serve as a foundation for this RI/FS Scoping Plan and provides generic information that is applicable to all site activities at SEDA.

This RI/FS Project Scoping Plan is based upon a conceptual site model that identified potential source areas, release mechanisms, and receptors pathways; determined data requirements for an evaluation of risks to human health and the environment; and developed a task plan to address the data requirements that have been identified. Following the completion of the field investigation, the data will be used as the basis of the risk assessment.

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 geological and hydrogeological 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.

1.3 SITE BACKGROUND

SEAD-11 is the Construction Debris Landfill located in the southwestern portion of SEDA immediately southwest of the intersection of Indian Creek Road and the SEDA railroad tracks as shown in Figure 1-1. It is characterized by an area which exhibits a pronounced topographic high that defines its general shape. The detailed site base map is shown in Figure 1-2. The landfill, which covers approximately four acres (590 feet by 300 feet), is currently abandoned and the surface is vegetated with grasses and weeds. There are no developed portions of the site. The landfill was active from 1946 to 1949, although the operating practices during this time are unknown.

SEAD-64A is a former garbage disposal area at SEDA in Romulus, NY located on the south-east side of the SEDA facility as shown in Figure 1-1. The site is a grassy area approximately 200 ft. by 350 ft. in area as shown in Figure 1-3.

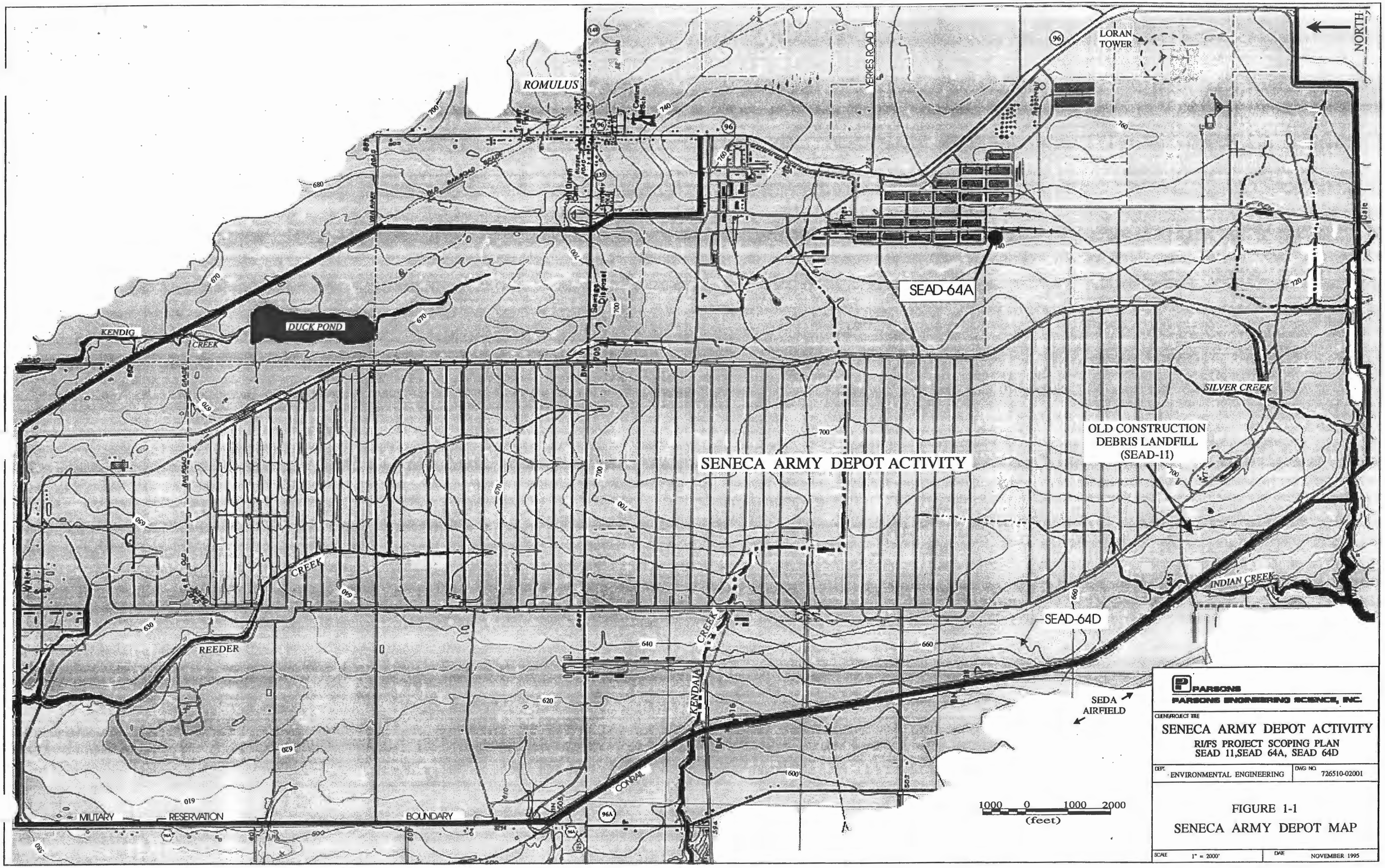
SEAD-64D is a former garbage disposal area at SEDA in Romulus, NY located on the southwest side of the SEDA facility as shown in Figure 1-1. The site is a large, heavily vegetated area as shown in Figure 1-4.

In accordance with the decision process outlined in the Interagency Agreement (IAG) between the US Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency, Region II (EPA), and New York State Department of Environmental Conservation (NYSDEC), an Expanded Site Inspection (ESI) was performed at SEAD-11 in 1993 and at SEADs 64A and 64D in 1994.

At SEAD-11, the draft final ESI Report (Parsons ES, June 1995) indicated a release of volatile and semivolatile organic compounds that have primarily impacted soil and potentially groundwater at the site. The ESI report also indicated that the release at SEAD-11 may pose a threat to human and environmental receptors. As part of the ESI report, a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation/Feasibility Study (RI/FS) has been recommended at SEAD-11.

At SEAD-64A, surface soil, subsurface soil, and groundwater samples were collected to determine if contaminants were present. The draft ESI report (April 1995) indicated a release of semivolatile organic compounds and metals has impacted subsurface soils and groundwater. Based on these results, the draft ESI report recommended that an RI/FS be performed at SEAD-64A.

At SEAD-64D, surface soil, subsurface soil, and groundwater samples were collected to determine if contaminants were present. The draft ESI report (April 1995) indicated a release of semivolatile organic compounds and metals has impacted surface and subsurface soils and groundwater. Based on these results, the draft ESI report recommended that an RI/FS be performed at SEAD-64D.



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD 11,SEAD 64A, SEAD 64D

DEPT. ENVIRONMENTAL ENGINEERING
DWG NO. 726510-02001

FIGURE 1-1
SENECA ARMY DEPOT MAP

SCALE 1" = 2000'
DATE NOVEMBER 1995

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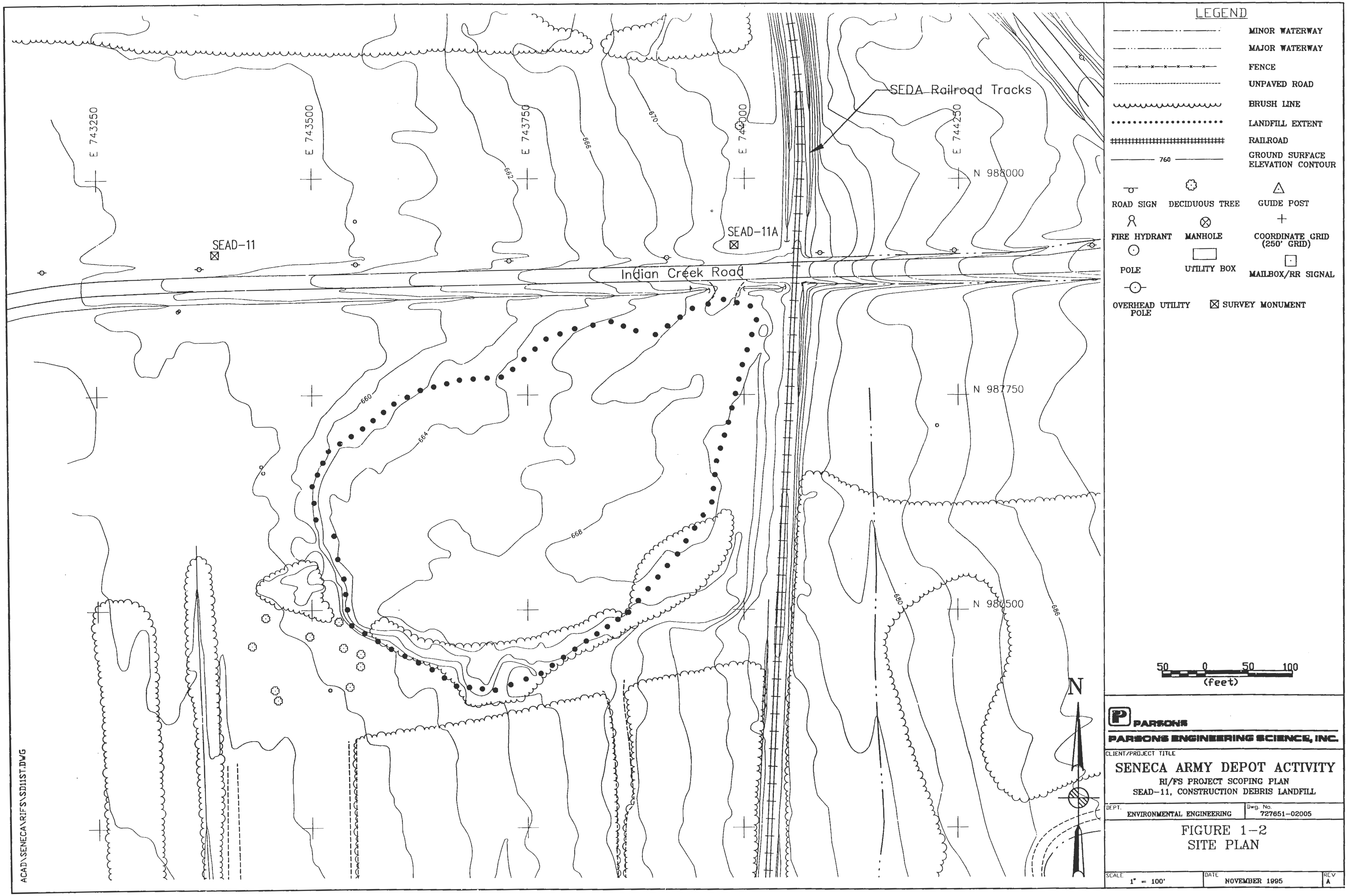

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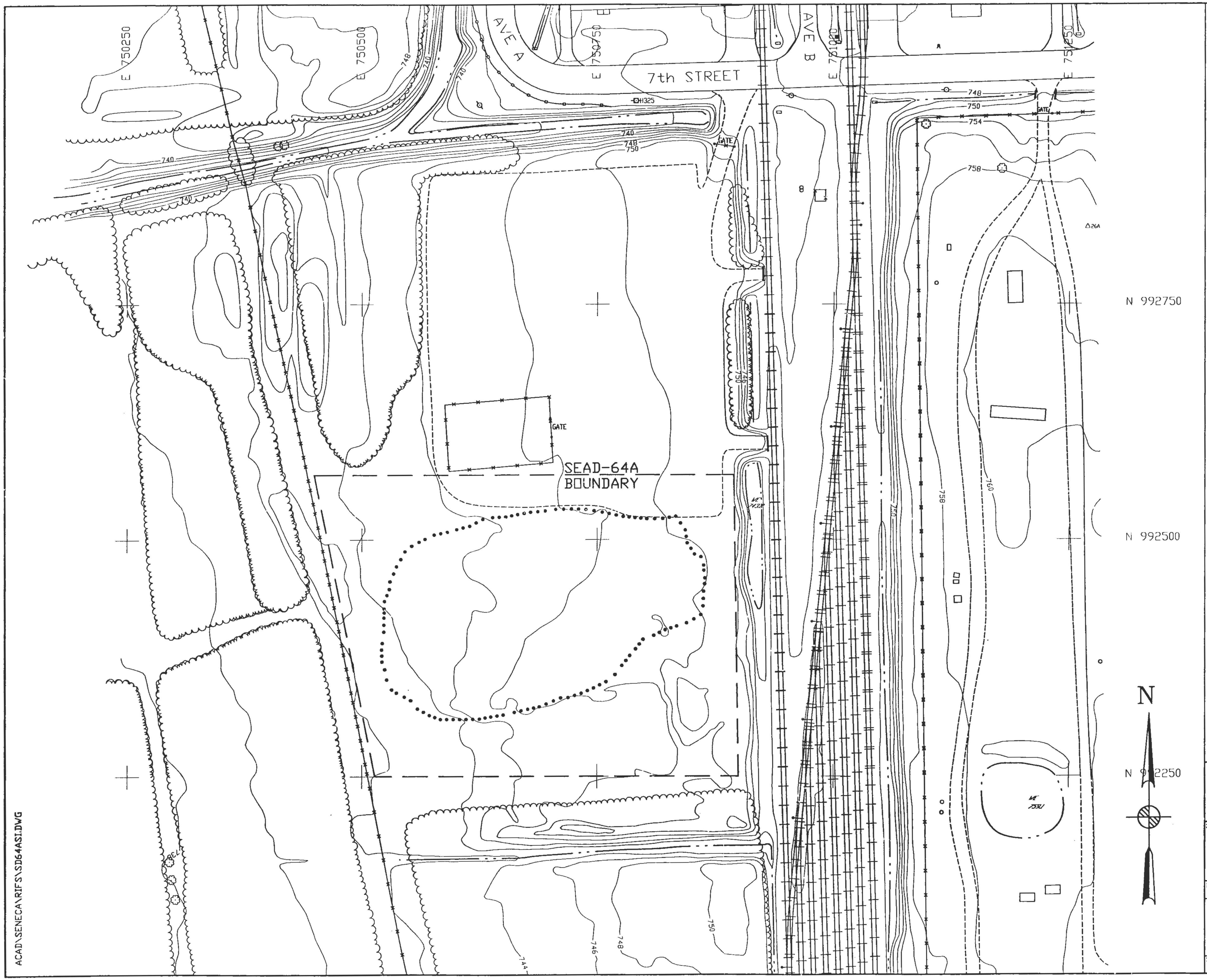
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-11, CONSTRUCTION DEBRIS LANDFILL

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	727651-02005

FIGURE 1-2
SITE PLAN

SCALE	DATE	REV
1" = 100'	NOVEMBER 1995	A



LEGEND

MINOR WATERWAY
MAJOR WATERWAY
FENCE
UNPAVED ROAD
BRUSH LINE
LANDFILL EXTENT
RAILROAD
GROUND SURFACE ELEVATION CONTOUR (760)
ROAD SIGN
DECIDUOUS TREE
GUIDE POST
FIRE HYDRANT
MANHOLE
COORDINATE GRID (250' GRID)
POLE
UTILITY BOX
MAILBOX/RR SIGNAL
OVERHEAD UTILITY POLE
☒ SURVEY MONUMENT

50 0 50 100
(feet)

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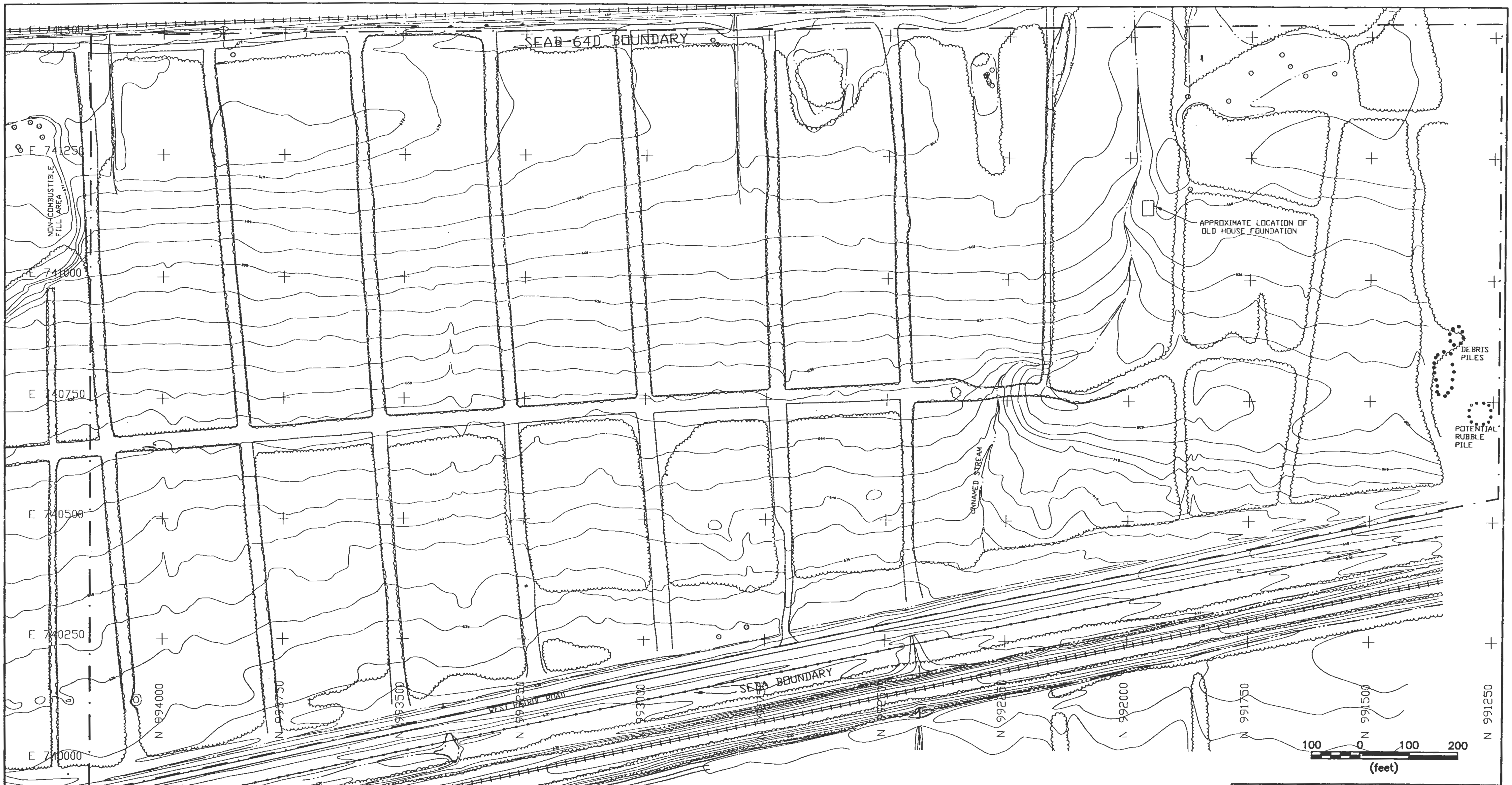
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 727651-02005

FIGURE 1-3
SITE PLAN

SCALE 1" = 100'
DATE NOVEMBER 1995
REV A



ACAD\SENECA\RIFS\SD64D\SD64DSI.DWG

APPROXIMATE EXTENT OF AOC

N

LEGEND

MINOR WATERWAY

MAJOR WATERWAY

FENCE

UNPAVED ROAD

BRUSH LINE

LANDFILL EXTENT

RAILROAD

760 GROUND SURFACE ELEVATION CONTOUR

☒ SURVEY MONUMENT

ROAD SIGN

DECIDUOUS TREE

FIRE HYDRANT

⊗ MANHOLE

△ GUIDE POST

⊙ POLE

▭ UTILITY BOX

\+ COORDINATE GRID (250' GRID)

OVERHEAD UTILITY POLE

⊡ MAILBOX/RR SIGNAL

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RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	727651-02006

FIGURE 1-4
SITE PLAN

SCALE	DATE	REV
1" = 200'	NOVEMBER 1995	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 SEAD-11, SEAD-64A, and SEAD-64D based upon the results of the ESI Reports (Parsons ES, June 1995 and April 1995). This includes the development of a conceptual model for each site describing all known contaminant sources and receptor pathways based upon actual sampling data. These conceptuals model 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 are data quality objectives (DQOs) and potential remedial actions for each site. These considerations have been integrated into the scoping process to ensure that adequate data is collected to complete the RI/FS process.

3.1 CONCEPTUAL SITE MODEL

Conceptual site models were developed for SEAD-11, SEAD-64A, AND SEAD-64D and are presented in the ESI Reports (Parsons ES, June 1995 and April 1995). For each site, the model identified potential source areas and release mechanisms and potential exposure pathways and receptors. Each model was based upon an understanding of historical usage, physical site characteristics and current site usage. No previous environmental sampling data was available for these sites prior to the ESI.

3.1.1 SEAD-11

3.1.1.1 Site History

The landfill was active from 1946 to 1949 and the operating practices during this time are unknown.

3.1.1.2 Physical Site Characterization

3.1.1.2.1 Physical Site Setting

The Construction Debris Landfill is located in the southwestern portion of SEDA as shown in Figure 1-1. It is characterized by an area of elevated topography that defines the landfill's general shape. The landfill, which covers approximately four acres (590 feet by 300 feet), is currently abandoned and the surface is vegetated with grasses and weeds. There are no developed portions of the site.

The site is bound to the east by SEDA railroad tracks beyond which is an upward sloping field with grass and low brush. South of the site is dense low brush. West of the site is an open grass field that ends at the fenced SEDA boundary. Indian Creek is located approximately 700 feet west of the "toe" of the landfill. The site is bounded to the north by Indian Creek Road beyond which is an open grass field which gives way to trees and low brush several hundred feet from the road.

The relief of the landfill is well defined on the generally west-sloping regional topography in the area. On the landfill surface the topography slopes mostly to the northwest. The apparent thicker fill in the southern and western portions of the landfill results in steep scarps on the south and southwestern sides of the landfill and more gently sloping hills on the north and northwestern sides. While the majority of the landfill surface is grass-covered, the southern perimeter of the landfill is vegetated with deciduous trees. Assorted construction debris including metal and scrap wood and several empty 55-gallon drums were observed on the southern and southwestern edges of the landfill.

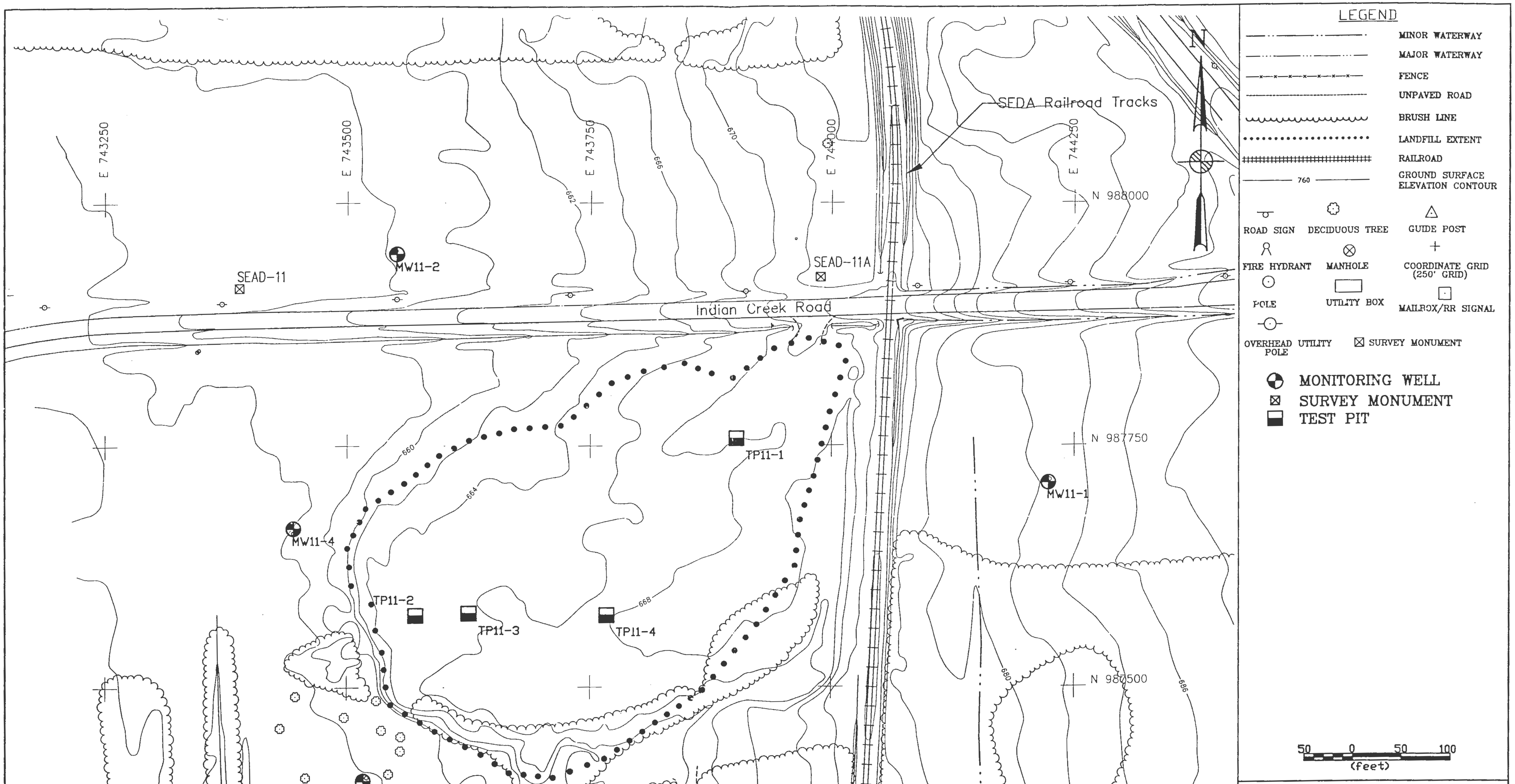
Access to the site is provided via a dirt road which enters the site approximately 50 feet west of the intersection of Indian Creek Road and the SEDA railroad tracks. Within SEDA, pedestrian and vehicular access to the site is restricted since the site is located within the ammunition storage area.

3.1.1.2.2 Site Geology

As part of the ESI program, 4 monitoring wells, 1 soil boring, and 4 test pits were completed at the locations shown in Figure 3-1. Based on the results of the ESI program, till and calcareous black shale are the two major geologic materials present at the site.

Immediately east of the Construction Debris Landfill (at MW11-3) the till is thicker compared to other areas on the site. The till is light brown and composed of silt and clay, and some black shale fragments, however, larger shale fragments (rip-up clasts) were observed at many locations near the till weathered shale contact. Some fine sand lenses were also observed. Weathered (oxidized) lenses were noted in the upper portions of the till.

Competent, calcareous black shale was encountered at depths between approximately 9 and 14 feet below the ground surface. The elevations of the competent bedrock determined during the drilling and seismic programs indicate that the bedrock surface slopes to the west



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SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-11, CONSTRUCTION DEBRIS LANDFILL

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 720476-02000

FIGURE 3-1
LOCATION OF
ESI SAMPLING POINTS

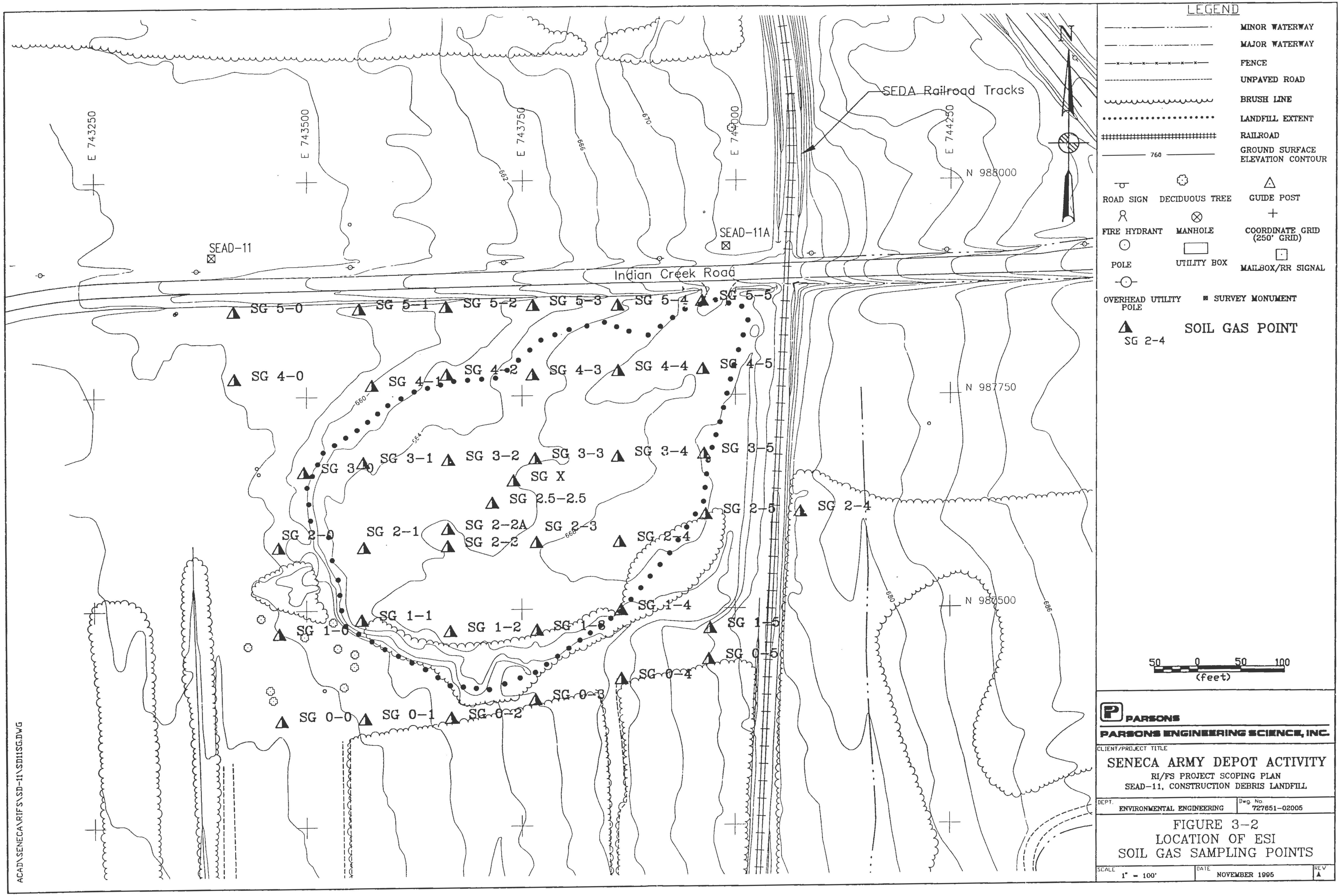
SCALE 1" = 100'
DATE NOVEMBER 1995
REV A

mimicking the land surface. The upper portion of the shale had a weathered zone that was from 1 to 3 feet thick.

3.1.1.2.3 Soil Gas Survey

As part of the ESI, a 39-point soil gas survey was conducted in order to locate areas on and in the immediate vicinity of the Construction Debris Landfill that have been impacted by volatile organic compounds. The location of the soil gas survey is shown in Figure 3-2 and the results of the soil gas survey are summarized in Table 3-1. For the soil gas data, detector responses were used in conjunction with calibration curve data to calculate concentrations which are expressed as TCE in parts per million by volume (ppmv). Table 3-1 shows the concentrations of volatile organic compounds calculated at each sampling point as well as the results of the OVM screening (maximum value) of the soil gas prior to sampling. Two areas on the landfill were identified where elevated concentrations of volatile organic compounds in soil gas were detected. The highest of the two concentrations was located at point SG 2-3 (14.6 ppmV as TCE). The next highest concentration was located at SG 2-1 (6.6 ppmV as TCE) which is approximately 200 feet west and hydrologically downgradient of SG 2-3. Up to five individual compounds were identified in the two soil gas samples, although more peaks were present in the chromatograms. The positively identified compounds that were present in sample SG 2-3 included vinyl chloride, 1,2-dichloroethene, trichloroethene, toluene, and ethylbenzene. Sample SG2-1 contained mostly 1,2-dichloroethene and trichloroethene. These two areas may be attributed to the same release, although at a sample point located midway between them no volatile organic compounds were detected. Based on the complete results, the areas impacted by elevated concentrations of volatile organic compounds in soil gas appear to be limited in extent. To summarize, the data indicate that the west-central portion of the landfill has been impacted by volatile organic compounds, with the extent of the impact limited.

Two test pits (TP11-3 and TP11-4) were excavated at soil gas sample points SG2-3 and SG2-1, respectively. The excavations uncovered mostly construction building materials including concrete blocks, wire, pipe, glass, and plastic in a clayey sand and gravel matrix. Neither excavation uncovered any material that could be pinpointed as a source for the volatile organic compounds detected at these locations. No volatile organic compounds were detected with an OVM in the soil excavated from the pits.



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RI/FS PROJECT SCOPING PLAN
SEAD-11, CONSTRUCTION DEBRIS LANDFILL

DEPT.	Dwg. No
ENVIRONMENTAL ENGINEERING	727651-02005

FIGURE 3-2
LOCATION OF ESI
SOIL GAS SAMPLING POINTS

SCALE	DATE	REV
1" = 100'	NOVEMBER 1995	A

Table 3-1
Expanded Site Inspection
Summary of Soil Gas Results

Seneca Army Depot Activity
SEAD-11 Construction Debris Landfill

Sample Name	Location (1)		OVM Screen (2) (ppm)	Concentration (3) (ppmV as TCE)
	Easting	Northing		
SG 0-0	743470.7	987372.538	no data (4)	no data (4)
SG 0-1	743568.5	987374.731	<0.1	0.2
SG 0-2	743668.5	987375.4469	no data	no data
SG 0-3	743765.7	987395.8324	no data	no data
SG 0-4	743867.8	987419.4692	<0.1	0.6
SG 0-5	743969.4	987441.8642	no data	no data
SG 1-0	743467.9	987473.2255	<0.1	<0.01
SG 1-1	743564.6	987488.5735	<0.1	0.5
SG 1-2	743667.2	987475.3362	<0.1	1
SG 1-3	743767.4	987476.1975	3.0	1.2
SG 1-4	743867.2	987499.1956	no data	no data
SG 1-5	743971	987477.7634	<0.1	<0.01
SG 2-0	743467	987573.5014	<0.1	0.1
SG 2-1	743567.1	987573.3771	9.2	6.6
SG 2-2	743664.2	987574.4089	3.0	<0.01
SG 2-2A	743664.5	987594.6074	<0.1	0.5
SG 2.5-2.5	743715.5	987624.9052	3.0	0.7
SG 2-3	743766.8	987578.3305	12.3	14.6
SG 2-4	743865.7	987578.8576	3.0	0.6
SG 2-5	743965.6	987610.5863	<0.1	0.8
SG 3-0	743496.9	987661.8324	<0.1	0.2
SG 3-1	743566.3	987672.6855	<0.1	0.1
SG 3-2	743664.8	987675.4015	0.9	3.2
SG 3-3	743765.2	987676.5335	3.2	4.9
SG 3-4	743863.2	987678.5625	1.3	1.2
SG 3-5	743963.6	987681.7443	1.3	1.8
SG 4-0	743414.5	987771.1101	no data	no data
SG 4-1	743576.1	987763.2403	<0.1	0.6
SG 4-2	743662.8	987775.5407	0.9	0.9
SG 4-3	743761.9	987775.1712	0.4	1
SG 4-4	743863.4	987779.2466	3.2	1
SG 4-5	743962	987780.9374	1.3	0.1
SG 5-0	743413.7	987850.044	<0.1	0.1
SG 5-1	743561.3	987852.6556	no data	no data
SG 5-2	743661.8	987854.4705	no data	no data
SG 5-3	743762.1	987855.946	5.0	<0.01
SG 5-4	743862.6	987855.6674	<0.1	<0.01
SG 5-5	743960.7	987860.7673	<0.1	0.9
SG X	743740.3	987650.7193	<0.1	2.5

1) New York State Plane Coordinates
2) Highest concentration based on in-line monitoring with OVM during collection of soil gas sample
3) Based on TCE calibration curves using a gas chromatograph
4) No data acquired due to high water table

H:\eng\seneca\scoping\sead11\tables\sd11sgas.wk3

3.1.1.2.4 Geophysics

Seismic Survey

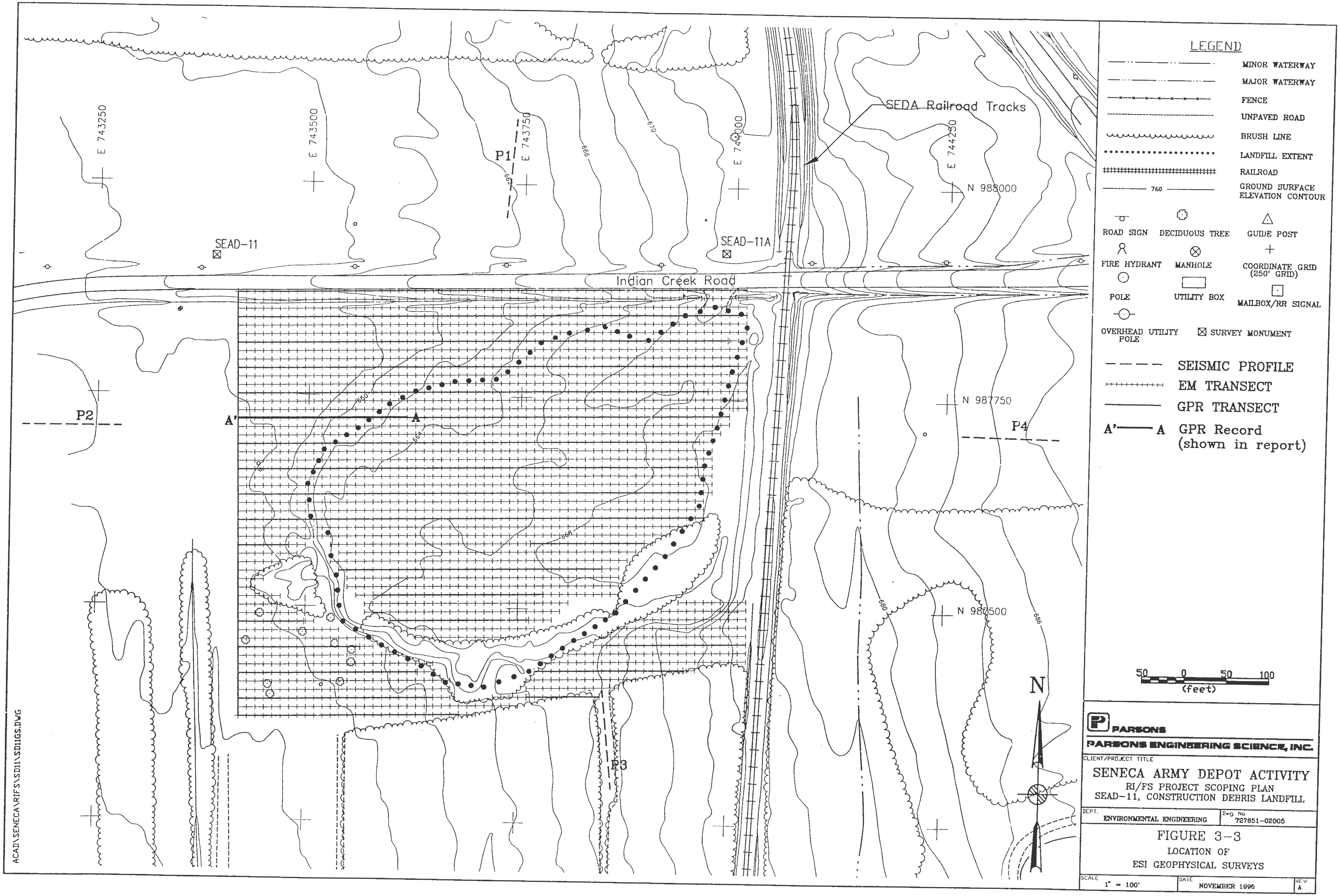
Four seismic refraction profiles, each 115 feet long, were performed as part of the geophysical investigations for the ESI at the locations shown in Figure 3-3. The results of the seismic refraction survey conducted in SEAD-11 are shown in Table 3-2. The seismic profiles detected 4 to 17 feet of till (1,100 to 5,400 feet per second) overlying bedrock (11,500 to 13,100 ft/s). In particular, the till material includes loose, unsaturated till (1,100 to 1,300 ft/s); compact unsaturated till (2,400 ft/s); and saturated till (5,000 to 5,400 ft/s).

Saturated till was detected only beneath profile P4. At the locations of the other profiles, either saturated till was not present or the saturated layer was too thin to be detected by the seismic refraction method. Profile P2 suggests that a layer of compact, unsaturated till is present at a depth of 4 to 5 feet.

A review of the relative elevation of bedrock demonstrates that the bedrock surface slopes to the west following the slope of the surface topography.

Electromagnetic Survey

An electromagnetic survey (EM-31) was performed at SEAD-11 along the transects shown in Figure 3-3. Figure 3-4 shows the apparent conductivity measured by the EM-31 survey at SEAD-11. The extent of the construction debris landfill is clearly shown as the roughly circular zone of low conductivity values occupying the central portion of the EM grid. Negative apparent conductivities have been grouped together and represented by the lowest conductivity range shown in the figure. The measured apparent conductivities over the landfill are predominantly negative. The minimum conductivity was -94 millisiemens per meter (mS/m). It is worth noting that negative conductivities are a physical impossibility. The Geonics EM-31 is calibrated to measure apparent conductivity under certain limiting conditions, including the assumption of a horizontally-layered earth model. Many of these assumptions are violated at the construction debris landfill due to the presence of metallic debris within the fill layer. The manner in which the EM-31's signal interacts with subsurface metallic debris results in negative conductivity values being calculated by the instrument's software. Actually, the quantity that is measured is proportional to the quadrature, or out-of-phase, component of the EM field.



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-11, CONSTRUCTION DEBRIS LANDFILL

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 727651-02005

FIGURE 3-3
LOCATION OF
ESI GEOPHYSICAL SURVEYS

SCALE 1" = 100'
DATE NOVEMBER 1996
REV A

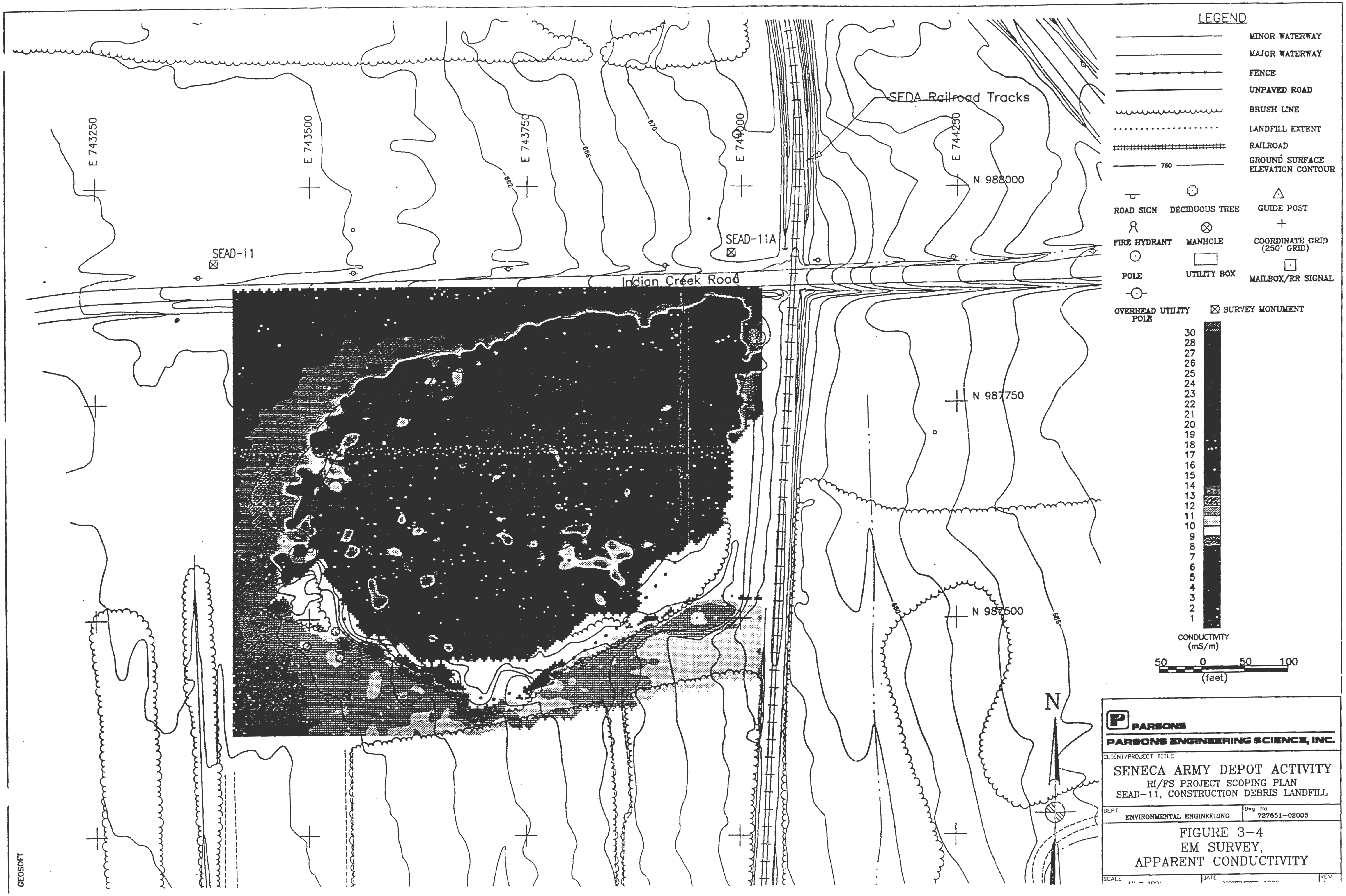
TABLE 3-2

SENECA ARMY DEPOT ACTIVITY
SEAD-11 PROJECT SCOPING PLAN
RESULTS OF ESI SEISMIC REFRACTION SURVEY

Profile	Distance[1]	Ground Elevation[2]	Bedrock	
			Depth	Elev[2].
P1	0 (South end)	662.0	4.1	657.5
	57.5	662.5	5.5	568.5
	115	663.5	5.4	658.0
P2	0 (West end)	654.5	11.0	643.5
	57.5	653.0	10.9	642.0
	115	652.5	10.3	642.5
P3	0 (South end)	664.0	7.0	657.0
	57.5	665.0	6.6	658.0
	115	665.5	6.8	658.5
P4	0 (West end)	684.5	15.8	669.0
	57.5	687.0	16.9	670.0
	115	689.0	13.5	675.5

1. All distances are in feet along each seismic profile.

2. All elevations are accurate to ± 1 foot and are rounded to the nearest half foot.



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

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FIGURE 3–4
EM SURVEY,
APPARENT CONDUCTIVITY

SCALE

DATE

REV

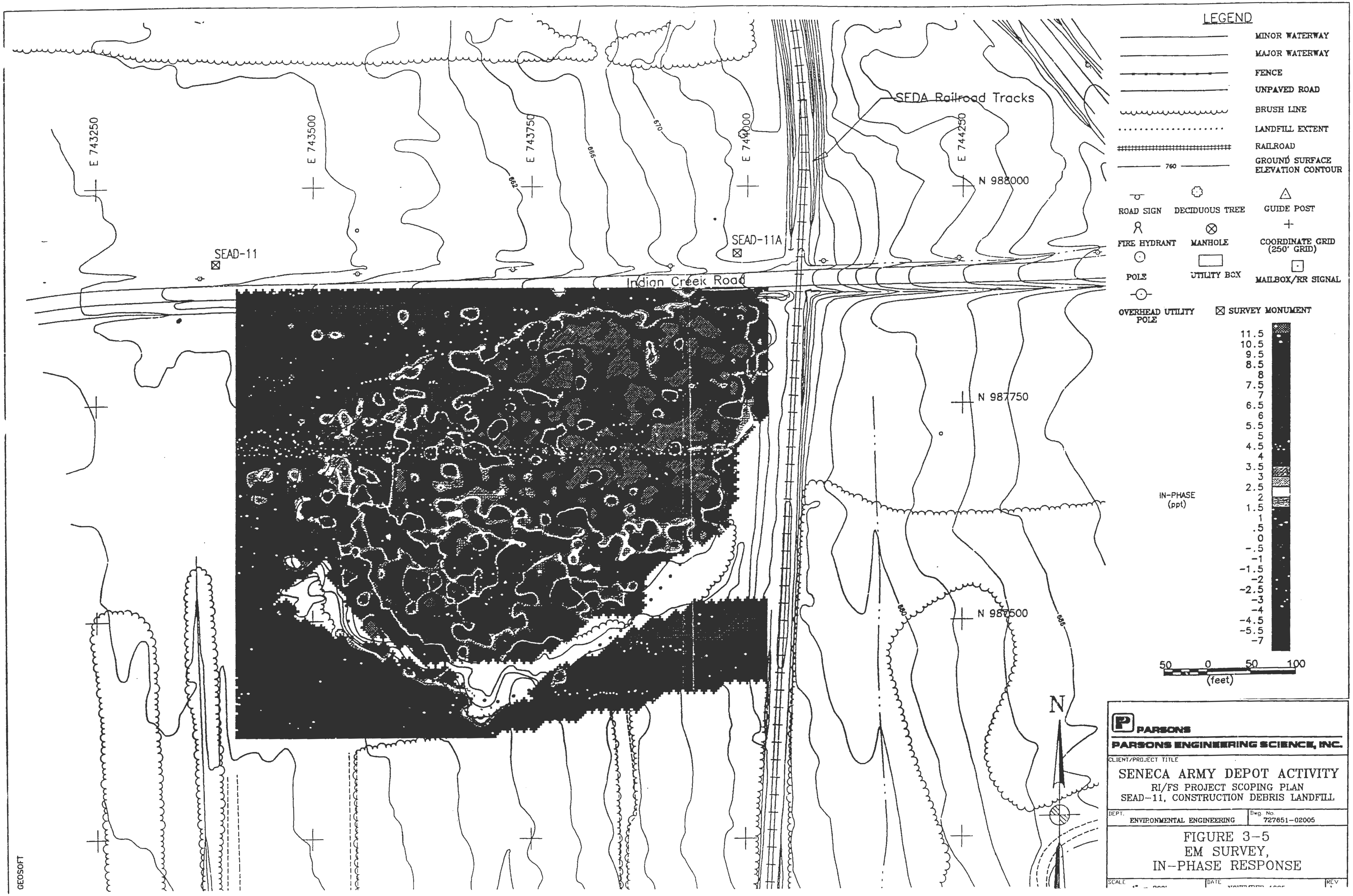
The EM grid was extended beyond the limits of the landfill to define background apparent conductivities of the subsurface. A substantial change in the electrical properties of the soil was observed across the site. The apparent conductivity increases by about 6 mS/m from south to north across the EM grid. The higher conductivities in the northern portion of the site could be attributed to several factors, such as increased clay content in the soil or a higher concentration of dissolved solids in the groundwater or soil moisture. Since the most conductive area was located along the roadway, road salt should be considered a possible explanation for the increase in the apparent conductivity.

The in-phase response of the EM-31 survey is shown in Figure 3-5. The extent of the landfill is again clearly defined by the chaotic response occupying the main portion of the surveyed area. The landfill can be divided into two parts on the basis of the in-phase response: the northeastern one-half of the landfill generally shows higher in-phase values than the southwestern portion. Since the in-phase response is particularly sensitive to ferrous material, it is inferred that the northeastern portion of the landfill has a higher concentration of buried metallic debris. A number of small isolated metallic objects were detected by the in-phase response beyond the limits of the landfill. A lineament in the apparent conductivity and in-phase response was detected along the south side of the roadway. This feature may be caused by buried utilities.

Ground Penetration Radar Survey (GPR)

A GPR survey was conducted at SEAD-11 along the transects shown in Figure 3-3 to confirm the extent of the construction debris landfill at SEAD-11. Figure 3-6 shows a typical radar record acquired over the boundary of the landfill. The left side of the record shows the chaotic response and multiple overlapping anomalies caused by buried debris. The right side of the record shows the relatively uniform and homogeneous response of undisturbed soil. The boundary of the landfill is generally marked by a sharp contact on the GPR records. The extent of the landfill as determined by the GPR survey is identical to that established by the EM-31 survey.

In the previous section, it was noted that the baseline conductivity of the subsurface increases towards the north within the study area. This change was also observed in the GPR records. The records acquired beyond the limits of the landfill along the northern and western portions of the grid exhibit weak, near-surface reflections. This is attributed to greater attenuation of radar waves travelling through more conductive soil. The GPR records acquired in the southern portion of the site show strong subsurface reflections and banding



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RI/FS PROJECT SCOPING PLAN
SEAD-11, CONSTRUCTION DEBRIS LANDFILL

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Dwg. No. 727651-02005

FIGURE 3-5
EM SURVEY,
IN-PHASE RESPONSE

SCALE

DATE

REV

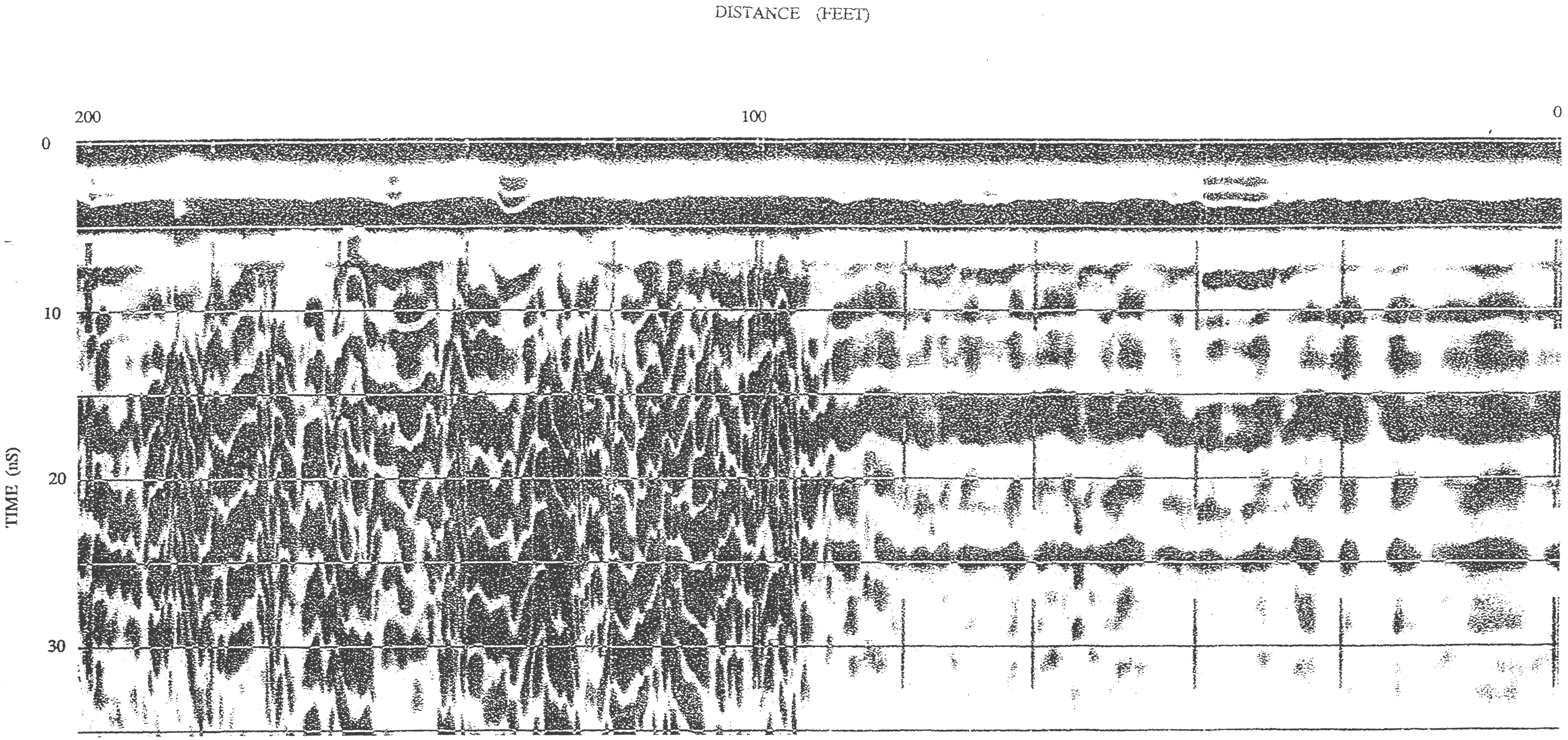

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FIGURE 3-6
GPR PROFILE A-A'

SCALE NA	DATE NOVEMBER 1995	REV A

across much of the time window of the records. The deeper penetration and stronger reflections are caused by the enhanced propagation of radar signals in more resistive overburden.

Test Pitting Program

Four test pits were excavated in SEAD-11 to characterize the types of geophysical anomalies present within the landfill. The GPR and EM conductivity surveys detected dense concentrations of overlapping anomalies throughout the landfill. The in-phase component of SEAD-11 delineated a zone of enhanced response in the northeast portion of the landfill. Since the in-phase response is sensitive to ferrous material, it was inferred that the northeastern portion of the landfill has a higher concentration of buried metallic debris. Two test pit locations were selected to test this hypothesis. Test pit TP11-1 was excavated in the center of the zone of elevated in-phase values, while TP11-2 was excavated in the southwestern portion of the landfill. Test pits TP11-3 and TP11-4 were situated over the two highest VOC concentration anomalies detected from the soil gas survey. TP11-3 was situated at soil gas sampling location SG2-1 which had a detected VOC concentration of 6.6 ppmv (as TCE). Test pit TP11-4 was situated at soil gas sampling location SG2-3 which had a detected VOC concentration of 14.6 ppmv (as TCE). Figure 3-1 shows the locations of the test pits.

The test pit logs are presented in Appendix G. The thickness of fill at TP11-1 was approximately 4 feet. As predicted by the in-phase response, much of the excavated material was metallic debris, including various scrap metal, metallic rods, and metallic webbing. The thickness of fill at TP11-2 was approximately 8 feet. Although abundant metallic material was encountered, the dominant type of fill was nonmetallic, including soil, large concrete slabs and fragments, and asphalt. The fill material at test pit locations TP11-3 and TP11-4 was similar to that observed in test pit TP11-2. The predominant fill materials observed in these two test pits were construction debris (concrete, glass, and nails) dark brown soil, gravel, and boulders.

3.1.1.2.5 Site Hydrology and Hydrogeology

Surface water flow from precipitation events is controlled by local topography. The west-trending topographic gradient is relatively steep and uniform in the areas north and south of the landfill, but the gradient becomes less steep and somewhat irregular beyond the "toe" of the landfill. Based on the topographic expression, surface water flow on most of the landfill surface is to the north-northwest and it is likely to be captured by the east-west trending swale located on the south side of Indian Creek Road. The swale drains west toward the

SEDA boundary. Some surface water likely drains off of the landfill "toe" where it collects in a relatively flat area and eventually drains either to the north into the swale along Indian Creek Road or to the south in a relatively straight drainage swale which is covered by vegetation. An elongated topographically low area that abuts the southeastern corner of the landfill collects surface water which drains from the eastern portion of the site, between the landfill and the SEDA railroad tracks.

Previous hydrogeologic studies conducted as part of the RI/FS investigations at the Ash Landfill and OB/OD grounds at SEDA confirmed that the till and weathered shale are one aquifer. As part of the ESI program, four monitoring wells were installed at the site and were screened in the till/weathered shale aquifer from 3 feet above the water table (if space allowed) to the top of competent bedrock.

As part of the ESI program, groundwater elevations were determined in the four monitoring wells on April 4, 1994. The data are listed in Table 3-3 and shown graphically in Figure 3-7. Based upon these data, the groundwater flow direction in the till/weathered shale aquifer is generally towards the west. It is likely that the landfill is responsible for the slight westward bulge in the groundwater contours (i.e., semi-radial flow) near the "toe" of the landfill, although the array of wells does not allow a more detailed portrayal of the flow patterns. The groundwater flow contours were established using a straight-line interpolation method between monitoring wells combined with some modifications based on topographic expression. At this site, saturated soil was noted at the base of the till.

3.1.1.2.6 Chemical Analysis Results

An Expanded Site Inspection (ESI) was conducted at SEAD-11 by Parsons Engineering Science, Inc. (Parsons ES) in 1993. The investigation involved the collection of 15 subsurface soil samples from soil borings and test pits, and the installation and sampling of 4 monitoring wells. Soil boring logs, test pit logs and monitoring well construction diagrams are presented in Appendices G, H, and I. The following sections describe the nature and extent of contamination identified at SEAD-11.

It is important to note that in some instances the detection limit for individual analyses may be raised (sometimes above the criteria value) due to dilution or matrix effects in the sample. Also, note that the total number of samples found to exceed the criteria in analytical results tables may include estimated concentrations (i.e., J-qualified data). This should be noted when considering further investigation or remedial action activities.

Soil

The analytical results for the 15 subsurface soil samples collected as part of the SEAD-11 investigation are presented in Table 3-4. The sample locations are shown in Figure 3-1. The following sections describe the nature and extent of contamination identified in SEAD-11 soil.

TABLE 3-3
GROUNDWATER MONITORING WELL WATER LEVEL SUMMARY

SENECA ARMY DEPOT ACTIVITY
SEAD-11 CONSTRUCTION DEBRIS LANDFILL

MONITORING WELL NUMBER	TOP OF PVC CASING ELEVATION (MSL)	WELL DEVELOPMENT			SAMPLING			WATER LEVEL MEASUREMENTS		
		DATE	DEPTH TO GROUNDWATER WATER TOC (FT)	GROUNDWATER ELEVATION (MSL)	DATE	DEPTH TO GROUNDWATER WATER TOC (FT)	GROUNDWATER ELEVATION (MSL)	DATE	DEPTH TO GROUNDWATER WATER TOC (FT)	GROUNDWATER ELEVATION (MSL)
MW11-1	685.18	12/17/93	3.48	681.70	1/18/94	4.31	680.87	4/4/94	2.85	682.33
MW11-2	660.73	11/23/93	5.92	654.81	1/18/94	4.37	656.36	4/4/94	3.45	657.28
MW11-3	657.26	11/6/93	10.2	647.06	1/24/94	4.84	652.42	4/4/94	2.97	654.29
MW11-4	657.77	11/6/93	10.3	647.47	11/16/93	8.86	648.91	4/4/94	2.6	655.17

H:\ENG\SENECA\SCOPING\SEAD11\TABLES\SD11ELEV.WK3

TABLE 3-4

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT ACTIVITY
SEAD-11 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM		NO. ABOV TAGM	SOIL SEAD-11 0-2 11/02/93 SB11-3.1 203222	SOIL SEAD-11 2-4 11/02/93 SB11-3.2 203223	SOIL SEAD-11 10-12 11/03/93 SB11-3.6 203224	SOIL SEAD-11 0-0 8 11/20/93 TP11-1 1 205264	SOIL SEAD-11 3 3 11/20/93 TP11-1.2 205265	SOIL SEAD-11 4 2 11/20/93 TP11-1 3 205266	SOIL SEAD-11 0-0 7 11/19/93 TP11-2 1 205111
VOLATILE ORGANICS													
1,2 Dichloroethene (total)	ug/kg	61	13.3%	300(b)		0	12 U	11 U	11 U	22 U	61 U	12 U	12 U
Trichloroethene	ug/kg	460	66 7%	700		0	12 U	11 U	11 U	410	460	34	13
Tetrachloroethene	ug/kg	370	20 0%	1400		0	12 U	11 U	11 U	22 U	61 U	12 U	12 U
Toluene	ug/kg	3	20 0%	1500		0	12 U	2 J	3 J	22 U	61 U	12 U	12 U
Ethylbenzene	ug/kg	3	6.7%	5500		0	12 U	11 U	11 U	22 U	61 U	12 U	12 U
Xylene (total)	ug/kg	4	6.7%	1200		0	12 U	11 U	11 U	22 U	61 U	12 U	12 U
HERBICIDES													
2 4-DB	ug/kg	550	13.3%	NA		NA	62 U	56 U	54 U	75	60 U	60 U	61 U
2,4 5-T	ug/kg	7 6	6 7%	1900		0	6.2 U	5 6 U	5.4 U	5.8 U	6 U	6 U	6 1 U
Dalapon	ug/kg	2500	6.7%	NA		NA	150 U	140 U	130 U	140 U	150 U	150 U	150 U
NITROAROMATICS													
1,3-Dinitrobenzene	ug/kg	770	6.7%	NA		NA	130 U	130 U	130 U	130 UJ	130 UJ	130 UJ	130 U
2 4,6-Trinitrotoluene	ug/kg	130	6.7%	NA		NA	130 U	130 U	130 U	130 UJ	130 UJ	130 UJ	130 U
2-amino-4,6-Dinitrotoluene	ug/kg	680	6.7%	NA		NA	130 U	130 U	130 U	130 UJ	130 UJ	130 UJ	130 U
2 6 Dinitrotoluene	ug/kg	400	6.7%	1000		0	130 U	130 U	130 U	130 UJ	130 UJ	130 UJ	130 U
2,4-Dinitrotoluene	ug/kg	440	13.3%	NA		NA	130 U	130 U	130 U	130 UJ	130 UJ	440	130 U
SEMIVOLATILE ORGANICS													
Naphthalene	ug/kg	100000	67.0%	13000		3	410 U	370 UJ	360 UJ	23 J	39 J	400 U	220 J
2-Methylnaphthalene	ug/kg	28000	60.0%	36400		0	410 U	370 UJ	360 UJ	27 J	27 J	400 U	1400 U
Acenaphthene	ug/kg	84000	60.0%	50000	*	1	410 U	370 UJ	360 UJ	380 U	400 U	400 U	630 J
Dibenzofuran	ug/kg	60000	66.7%	6200		4	410 U	370 UJ	360 UJ	23 J	25 J	400 U	250 J
Fluorene	ug/kg	88000	66.7%	50000	*	1	410 U	370 UJ	360 UJ	21 J	20 J	400 U	510 J
Phenanthrene	ug/kg	350000	73.3%	50000	*	4	410 U	370 UJ	360 UJ	230 J	260 J	400 U	5800
Anthracene	ug/kg	150000	73.3%	50000	*	1	410 U	370 UJ	360 UJ	53 J	42 J	400 U	1100 J
Carbazole	ug/kg	81000	53 3%	50000	*	1	410 U	370 UJ	360 UJ	380 U	400 U	400 U	820 J
Fluoranthene	ug/kg	350000	80.0%	50000	*	5	410 U	370 UJ	360 UJ	450	340 J	21 J	9800
Pyrene	ug/kg	280000	73 3%	50000	*	4	410 U	370 UJ	360 UJ	420	260 J	400 U	8500
Benzo(a)anthracene	ug/kg	190000	73.3%	220		8	410 U	370 UJ	360 UJ	150 J	160 J	400 U	4200
Chrysene	ug/kg	170000	73.3%	400		8	410 U	370 UJ	360 UJ	320 J	230 J	400 U	4500
bis(2-Ethylhexyl)phthalate	ug/kg	61000	26.7%	50000	*	0	670 J	760 UJ	1400 UJ	380 U	67 J	25 J	1400 U
Benzo(b)fluoranthene	ug/kg	110000	73.3%	1100		8	410 U	370 UJ	360 UJ	230 J	200 J	400 U	4700
Benzo(k)fluoranthene	ug/kg	130000	73.3%	1100		8	410 U	370 UJ	360 UJ	190 J	140 J	400 U	3000
Benzo(a)pyrene	ug/kg	140000	73 3%	61		11	410 U	370 UJ	360 UJ	210 J	130 J	400 U	3800
Indeno(1,2,3-cd)pyrene	ug/kg	100000	73.3%	3200		6	410 U	370 UJ	360 UJ	140 J	66 J	400 U	2800
Dibenz(a h)anthracene	ug/kg	52000	66.7%	14		11	410 U	370 UJ	360 UJ	60 J	37 J	400 U	1100 J
Benzo(g h,i)perylene	ug/kg	53000	66 7%	50000	*	1	410 U	370 UJ	360 UJ	81 J	400 U	400 U	1000 J

TABLE 3-4

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT ACTIVITY
SEAD-11 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOV TAGM	SOIL SEAD-11 0-2 11/02/93 SB11-3 1 203222	SOIL SEAD-11 2-4 11/02/93 SB11-3.2 203223	SOIL SEAD-11 10-12 11/03/93 SB11-3 6 203224	SOIL SEAD-11 0-0.8 11/20/93 TP11-1 1 205264	SOIL SEAD-11 3 3 11/20/93 TP11-1.2 205265	SOIL SEAD-11 4 2 11/20/93 TP11-1.3 205266	SOIL SEAD-11 0-0.7 11/19/93 TP11-2 1 205111
PESTICIDES/PCB												
alpha-BHC	ug/kg	24	6.7%	110	0	2.1 U	1.9 U	1.8 U	2 U	2 U	24 J	10 U
delta-BHC	ug/kg	15	20.0%	300	0	2.1 U	1.9 U	1.8 U	2 U	2 U	15 J	10 U
Dieldrin	ug/kg	29	20.0%	44	0	4.1 UJ	3.7 UJ	3.6 UJ	3.2 J	8.4 J	29 J	20 U
4,4'-DDE	ug/kg	1800	66 7%	2100	0	4.1 U	3.7 U	3 6 U	10	5 6 J	200 J	120
Endrin	ug/kg	49	26.7%	100	0	4.1 UJ	3.7 UJ	3.6 UJ	3.8 U	4 U	49 J	20 U
Endosulfan II	ug/kg	66	40.0%	900	0	4.1 U	3.7 U	3.6 U	3 8 U	3 1 J	40 U	20 U
4,4'-DDD	ug/kg	1400	53.3%	2900	0	4.1 U	3.7 U	3.6 U	2.9 J	4 U	28 J	18 J
Endosulfan sulfate	ug/kg	2.5	7.7%	1000	0	4 1 U	3.7 U	3.6 U	3.8 U	2.5 J	40 U	20 U
4,4'-DDT	ug/kg	4300	73 3%	2100	2	4.1 U	3.7 UJ	3 6 UJ	12	3 5 J	290 J	140 J
alpha Chlordane	ug/kg	190	33 3%	540	0	2.1 U	1.9 U	1 8 U	3 3 J	9 1	190 J	10 U
METALS												
Aluminum	mg/kg	21700	100.0%	20650	1	17600	6330	10900	13300	12200	11100	15300
Antimony	mg/kg	285	40.0%	6.27	5	10 8 UJ	8 UJ	7.6 UJ	285 J	118 J	8 1 UJ	9 4 UJ
Arsenic	mg/kg	23 2	100 0%	9 6	4	5.6 R	3.4 R	6 R	15 5	11.8	4.7	23 2 J
Barium	mg/kg	1090	100.0%	300	4	113	57.4	62.7	1090	953	106	96.9
Beryllium	mg/kg	0 93	100.0%	1.13	0	0.85 J	0.34 J	0.47 J	0.63 J	0.59 J	0.54 J	0.76 J
Cadmium	mg/kg	18	40.0%	2.46	5	0.67 U	0.5 U	0.48 U	2.3	3.9	0.51 U	0 59 U
Calcium	mg/kg	103000	100 0%	125300	0	4950	91300	48600	30300	41700	54100	18600
Chromium	mg/kg	242	100.0%	30 95	6	24	11 1	18.8	67 2	53.9	18 7	23 9
Cobalt	mg/kg	27.5	100.0%	30	0	11.3	6.5 J	10 1	15 9	15.3	9.4	10 8
Copper	mg/kg	1090	100.0%	32.94	8	20	12.2	21.7	492	374	32.4	35.5
Iron	mg/kg	118000	100.0%	38110	3	27200	13200	28300	83600	42000	22700	29200
Lead	mg/kg	4050	100.0%	23.49	7	27.9	11.4	10.1	4050	2090	193	84.1
Magnesium	mg/kg	44600	100 0%	21890	2	4160	12900	10100	6760	10800	10100	11300
Manganese	mg/kg	946	100 0%	1095	0	674	356	434	801	611	637	446 R
Mercury	mg/kg	2 9	86 7%	0 1	7	0 05 J	0.04 U	0.03 U	0 07 J	2.9	0.7	0 5 J
Nickel	mg/kg	117	100 0%	52 58	3	28 3	16 7	29 5	70.1	56.5	25 2	30.6
Potassium	mg/kg	2980	100 0%	2623	1	2110	1110	1230	1810	1620	1280	1430
Selenium	mg/kg	0.74	60 0%	2	0	0.24 J	0 13 UJ	0.21 UJ	0.25 UJ	0.25 J	0 15 UJ	0 68 J
Silver	mg/kg	11.3	46.7%	0.77	6	1.4 UJ	1 UJ	0.97 UJ	2.4	1.5 J	1 U	1 2 U
Sodium	mg/kg	1660	100.0%	187.8	7	68.3 J	138 J	146 J	288 J	296 J	111 J	75 1 J
Vanadium	mg/kg	31.8	100.0%	150	0	31.8	13.3	17	24.5	19.5	17.3	23.8
Zinc	mg/kg	7980	100.0%	115.3	9	83.2 R	65 R	77 3 R	3600	7980	377	139
OTHER ANALYSES												
Nitrate/Nitrite-Nitrogen	mg/kg	2.2	100.0%	NA	NA	0.47	0.27	0.05	0.27	1.09	0.02	0.81
Total Solids	%W/W	92.2	100 0%	NA	NA	81.1	89.1	92.2	86.5	83.2	83 5	81 3
Total Petroleum Hydrocarbons	mg/kg	6000	100.0%	NA	NA	64	65	67	2700	1350	66	103

TABLE 3-4

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT ACTIVITY
SEAD-11 EXPANDED SITE INSPECTION

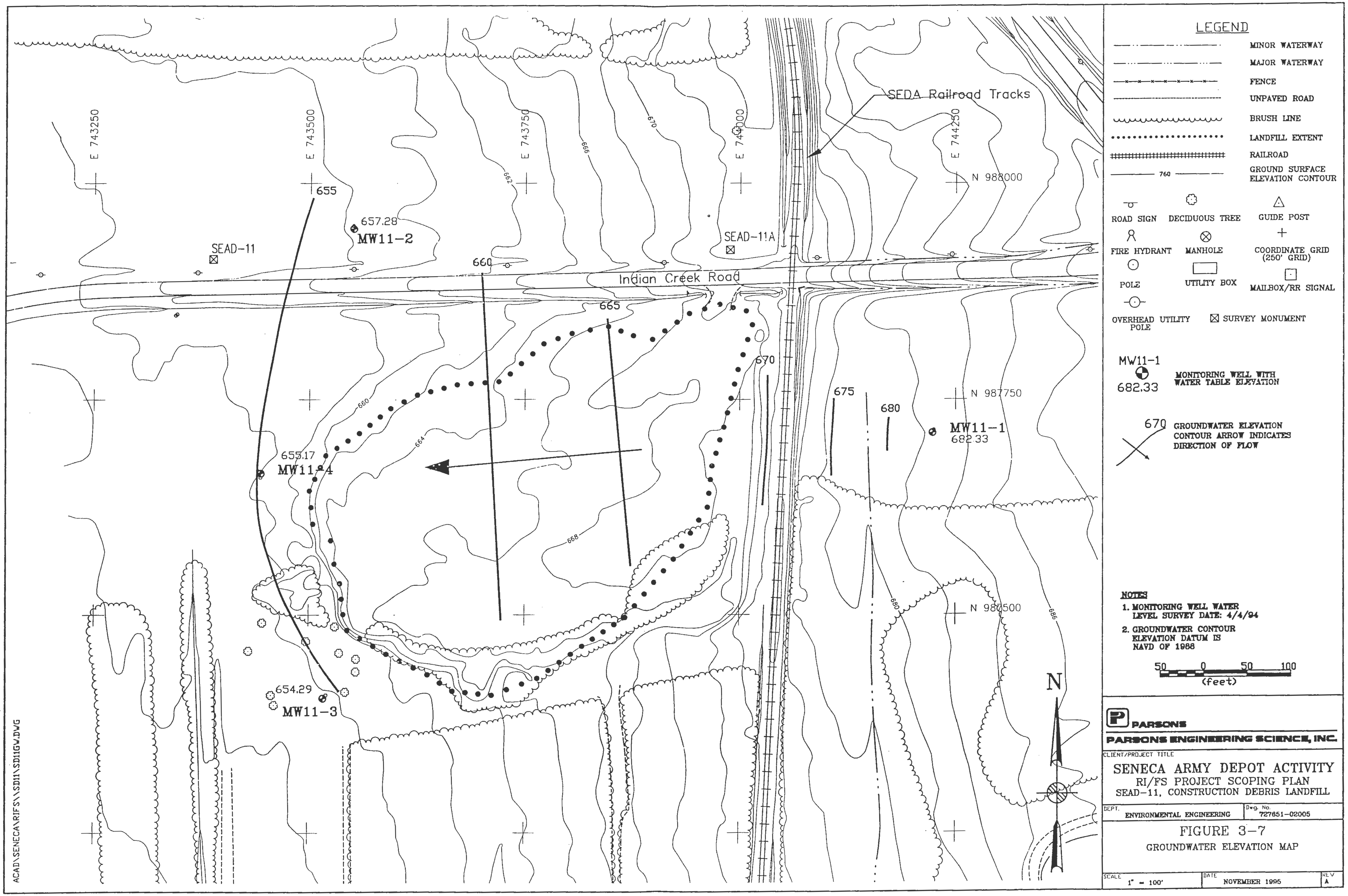
COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOV TAGM	SOIL SEAD-11 5 11/20/93 TP11-2.2 205267	SOIL SEAD-11 5 11/20/93 TP11-2.3 205268	SOIL SEAD-11 0-2 12/14/93 TP11-3.1 206880	SOIL SEAD-11 2-4 12/14/93 TP11-3.2 206881	SOIL SEAD-11 4-6 12/14/93 TP11-3 3 206882	SOIL SEAD-11 0-2 12/14/93 TP11-4.1 206883	SOIL SEAD-11 2-4 12/16/93 TP11-4 2 206884	SOIL SEAD-11 4-6 12/16/93 TP11-4 3 206885
VOLATILE ORGANICS													
1,2-Dichloroethene (total)	ug/kg	61	13 3%	300(b)	0	12 U	12 U	33 U	4 J	3 J	11 U	12 U	11 U
Trichloroethene	ug/kg	460	66.7%	700	0	15	12 U	69	40	40	40	11 J	11 U
Tetrachloroethene	ug/kg	370	20 0%	1400	0	12 U	12 U	370	260	200	11 U	12 U	11 U
Toluene	ug/kg	3	20.0%	1500	0	1 J	12 U	33 U	22 U	12 U	11 U	12 U	11 U
Ethylbenzene	ug/kg	3	6.7%	5500	0	3 J	12 U	33 U	22 U	12 U	11 U	12 U	11 U
Xylene (total)	ug/kg	4	6.7%	1200	0	4 J	12 U	33 U	22 U	12 U	11 U	12 U	11 U
HERBICIDES													
2,4-DB	ug/kg	550	13.3%	NA	NA	550	60 U	61 U	59 0 U	58 U	59 U	63 U	56 UJ
2,4 5-T	ug/kg	7.6	6.7%	1900	0	5.9 U	6 U	6.1 U	7.6	5.8 U	5.9 U	6 3 U	5 6 UJ
Dalapon	ug/kg	2500	6 7%	NA	NA	150 U	150 U	150 U	150.0 U	140 U	140 U	2500	140 UJ
NITROAROMATICS													
1 3-Dinitrobenzene	ug/kg	770	6.7%	NA	NA	130 UJ	130 UJ	130 U	130.0 U	770 J	130 U	130 U	130 U
2,4 6-Trinitrotoluene	ug/kg	130	6.7%	NA	NA	130 J	130 UJ	130 U	130.0 U	130 U	130 U	130 U	130 U
2-amino-4 6-Dinitrotoluene	ug/kg	680	6.7%	NA	NA	130 UJ	130 UJ	130 U	130.0 U	680 J	130 U	130 U	130 U
2 6-Dinitrotoluene	ug/kg	400	6 7%	1000	0	130 UJ	130 UJ	130 U	400.0 J	130 U	130 U	130 U	130 U
2,4-Dinitrotoluene	ug/kg	440	13 3%	NA	NA	170 J	130 UJ	130 U	130.0 U	130 U	130 U	130 U	130 U
SEMIVOLATILE ORGANICS													
Naphthalene	ug/kg	100000	67 0%	13000	3	100000	1700	19000 J	8600 J	21000 J	2500 J	400 J	370 U
2-Methylnaphthalene	ug/kg	28000	60.0%	36400	0	28000 J	460 J	7700 J	3200 J	7300 J	850 J	170 J	370 U
Acenaphthene	ug/kg	84000	60.0%	50000 *	1	84000	1400	28000 J	14000 J	25000 J	4100 J	1100 J	27 J
Dibenzofuran	ug/kg	60000	66.7%	6200	4	60000	1000 J	18000 J	7900 J	16000 J	2200 J	520 J	370 U
Fluorene	ug/kg	88000	66.7%	50000 *	1	88000	1600	27000 J	14000 J	24000 J	3300 J	1000 J	370 U
Phenanthrene	ug/kg	350000	73 3%	50000 *	4	350000	9200	210000 J	110000	180000	40000	9700	240 J
Anthracene	ug/kg	150000	73 3%	50000 *	1	150000	2800	49000 J	27000 J	44000 J	7700	2200	49 J
Carbazole	ug/kg	81000	53 3%	50000 *	1	81000	1600	33000 J	16000 J	30000 J	6400 J	1300 J	370 U
Fluoranthene	ug/kg	350000	80 0%	50000 *	5	350000	11000	320000 J	150000	230000	54000	14000	400
Pyrene	ug/kg	280000	73.3%	50000 *	4	280000	7800	190000 J	120000	140000	38000	12000	340 J
Benzo(a)anthracene	ug/kg	190000	73.3%	220	8	190000	4600	110000 J	67000	79000	20000	6600	160 J
Chrysene	ug/kg	170000	73.3%	400	8	170000	4300	110000 J	64000	74000	22000	6900	180 J
bis(2-Ethylhexyl)phthalate	ug/kg	61000	26 7%	50000 *	0	39000 U	1300 U	61000 UJ	29000 U	58000 U	7700 U	2100 U	22 J
Benzo(b)fluoranthene	ug/kg	110000	73.3%	1100	8	99000	2900	110000 J	67000	68000	26000	8400	220 J
Benzo(k)fluoranthene	ug/kg	130000	73.3%	1100	8	130000	3700	94000 J	48000	66000	10000	3000	94 J
Benzo(a)pyrene	ug/kg	140000	73 3%	61	11	140000	3400	110000 J	60000	73000	19000	6100	160 J
Indeno(1,2 3-cd)pyrene	ug/kg	100000	73.3%	3200	6	100000	2300	60000 J	37000	45000 J	11000	3700	120 J
Dibenz(a,h)anthracene	ug/kg	52000	66.7%	14	11	52000	1200 J	16000 J	9300 J	12000 J	3500 J	1000 J	370 U
Benzo(g,h,i)perylene	ug/kg	53000	66 7%	50000 *	1	32000 J	630 J	53000 J	11000 J	39000 J	9100	2900	160 J

TABLE 3-4

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT ACTIVITY
SEAD-11 EXPANDED SITE INSPECTION

	MATRIX					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION		FREQUENCY			SEAD-11	SEAD-11	SEAD-11	SEAD-11	SEAD-11	SEAD-11	SEAD-11	SEAD-11
	DEPTH (FEET)		OF		NO. ABOV	5	5	0-2	2-4	4-6	0-2	2-4	4-6
	SAMPLE DATE	MAXIMUM	DETECTION	TAGM	TAGM	11/20/93	11/20/93	12/14/93	12/14/93	12/14/93	12/14/93	12/16/93	12/16/93
	ES ID					TP11-2.2	TP11-2 3	TP11-3.1	TP11-3.2	TP11-3 3	TP11-4.1	TP11-4 2	TP11-4 3
	LAB ID					205267	205268	206880	206881	206882	206883	206884	206885
COMPOUND	UNITS												
PESTICIDES/PCB													
alpha BHC	ug/kg	24	6.7%	110	0	2 U	2 U R	41 U	20 U	9.9 U	9 9 U	2 1 U	1 9 U
delta-BHC	ug/kg	15	20 0%	300	0	2 U	1 3 J	41 U	20 U	9.2 J	9 9 U	2 1 U	1 9 U
Dieldrin	ug/kg	29	20.0%	44	0	3.9 U	4 U R	80 U	39 U	19 U	19 U	4.1 U	3 7 U
4 4'-DDE	ug/kg	1800	66.7%	2100	0	3.9 U	5 J	1800 J	1000 J	670 J	34 J	12 J	3 7 U
Endrin	ug/kg	49	26 7%	100	0	3 9 U	3 J	80 U	35 J	45 J	19 U	4 1 U	3 7 U
Endosulfan II	ug/kg	66	40.0%	900	0	3.9 U	4.3 J	66 J	36 J	31 J	14 J	4 1 U	3 7 U
4 4'-DDD	ug/kg	1400	53 3%	2900	0	3 9 U	4 U R	1400 J	630 J	320 J	13 J	4.8 J	3 7 U
Endosulfan sulfate	ug/kg	2 5	7.7%	1000	0	3.9 U	4 U R	80 U	39 U	19 U	19 U	4 1 U	3 7 U
4.4'-DDT	ug/kg	4300	73.3%	2100	2	3.9 U	11 J	4300 J	2400	1500	72	17	1 6 J
alpha-Chlordane	ug/kg	190	33.3%	540	0	2 U	11 J	41 U	20 U	9.9 U	9 9 U	2.1 U	1 9 U
METALS													
Aluminum	mg/kg	21700	100.0%	20650	1	8720	14000	21700	12100	12300	9660	15000	7170
Antimony	mg/kg	285	40.0%	6.27	5	12.3 UJ	10.6 UJ	8.6 J	4 J	11.3 J	25.3 J	5.2 UJ	4.1 UJ
Arsenic	mg/kg	23.2	100.0%	9.6	4	6.4	6.4	8.2	6.9	6.9	12.4	5.7	5.7
Barium	mg/kg	1090	100.0%	300	4	66.6	119	415	133	477	244	131	44 1
Beryllium	mg/kg	0.93	100.0%	1 13	0	0.45 J	0.71 J	0.6 J	0.55 J	0.38 J	0.48 J	0.93 J	0 39 J
Cadmium	mg/kg	16	40.0%	2.46	5	0.77 U	0.66 U	9.2	3	16	5.6	0.51 U	0.4 U
Calcium	mg/kg	103000	100.0%	125300	0	63700	9090	73600	85300	41300	95300	4340	103000
Chromium	mg/kg	242	100.0%	30 95	6	15.5	19.5	78.2 J	41.4 J	172 J	242 J	21.3 J	25.9 J
Cobalt	mg/kg	27.5	100.0%	30	0	7.2 J	10.8	13.5	12.3	27.5	11.1	10 4 J	6.6 J
Copper	mg/kg	1090	100.0%	32.94	8	121	25.7	1090 J	225 J	642 J	154 J	22.9 J	19 4 J
Iron	mg/kg	118000	100.0%	38110	3	19100	27400	34800	30200	118000	27100	28300	15100
Lead	mg/kg	4050	100.0%	23.49	7	82.5	84.9	1170 R	474 R	1330 R	1890 R	27 3 R	161 R
Magnesium	mg/kg	44600	100 0%	21890	2	21100	6010	6860	12700	9190	44600	3710	26300
Manganese	mg/kg	946	100 0%	1095	0	480	868	648	512	946	440	602	420
Mercury	mg/kg	2 9	86 7%	0.1	7	0 07 J	0 08 J	0 4	0.4	0.41	0 37	0.04 J	0 02 J
Nickel	mg/kg	117	100 0%	52.58	3	20.4	30.1	45.2	41.3	117	33	25	20 2
Potassium	mg/kg	2980	100.0%	2623	1	1080 J	1220	2980	2380	2040	1450	1530	1200
Selenium	mg/kg	0 74	60.0%	2	0	0 2 UJ	0.26 UJ	0.58 J	0.66 J	0 74 J	0 7 J	0.6 J	0 17 J
Silver	mg/kg	11.3	46 7%	0.77	6	1.6 U	1.3 U	10.8	5.2	11.3	1.3 J	1 U	0.81 U
Sodium	mg/kg	1660	100.0%	187.8	7	226 J	102 J	1660	315 J	508 J	236 J	48 U	156 J
Vanadium	mg/kg	31.8	100.0%	150	0	14.1	22.7	31	24.1	30.2	18.7	26.1	12 9
Zinc	mg/kg	7980	100.0%	115.3	9	153	111	1250	777	1720	632	99 7	92 4
OTHER ANALYSES													
Nitrate/Nitrite-Nitrogen	mg/kg	2.2	100.0%	NA	NA	0.87	0.34	0.36	0.7	0.55	0.59	2.2	0.62
Total Solids	%W/W	92.2	100.0%	NA	NA	84.7	83.3	81.6	85.3	85.6	86.1	80	89 9
Total Petroleum Hydrocarbons	mg/kg	6000	100.0%	NA	NA	6000	48	960	1060	970	560	320	104

Notes:
a) * = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm
b) The TAGM for 1,2-Dichloroethene (trans) was used for 1,2-Dichloroehtene(total) since it was the only value available.
c) NA = Not Available
d) U = Compound was not detected.
e) J = the reported value is an estimated concentration
f) R = the data was rejected in the data validating process
g) UJ = the compound was not detected; the associated reporting limit is approximate



NOTES
1. MONITORING WELL WATER LEVEL SURVEY DATE: 4/4/94
2. GROUNDWATER CONTOUR ELEVATION DATUM IS NAVD OF 1988

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-11, CONSTRUCTION DEBRIS LANDFILL

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 727651-02005

FIGURE 3-7
GROUNDWATER ELEVATION MAP

SCALE 1" = 100'
DATE NOVEMBER 1995
REV A

Volatile Organic Compounds

A total of 6 volatile organic compounds (VOCs) were found in the 15 soil samples collected at SEAD-11. None of these volatile organic compounds were detected at concentrations above the associated TAGM values. The compound trichloroethene was found in 67% of the samples and at a maximum concentration of 460 μg/kg in soil sample TP11-1.2. The compound tetrachloroethene was found at a maximum concentration of 370 μg/kg in soil sample TP11-3.1. The compounds 1,2 dichloroethene, ethylbenzene, and xylene were found only in one or two samples each. Toluene was found in 3 samples at a maximum concentration of 3 μg/kg.

Semivolatile Organic Compounds

A total of 19 semivolatile organic compounds (SVOCs) were found at varying concentrations in the 15 soils samples analyzed. With the exception of bis(2-ethylhexyl)phthalate, all of the SVOCs detected were polynuclear aromatic hydrocarbons (PAHs), which may be derived from petroleum products, asphalt or burning activities. The PAHs were more widespread than the VOCs with most detected in 60% to 80% of the soil samples analyzed. The highest concentrations of PAHs were found in soil samples collected from the test pits TP11-2, TP11-3 and TP11-4. Eight soil samples had concentrations of benzo(a)anthracene, chrysene, benzo(b)fluoranthene, and benzo(k)fluoranthene that exceeded the associated TAGM values. Eleven soil samples had concentrations that exceeded the associated TAGM value for benzo(a)pyrene and dibenz(a,h)anthracene.

The sampling results indicated that high concentrations were present in the test pits, with almost all maximum concentrations found in soil sample TP11-2.2 collected on the west side of the landfill at a depth of approximately 8 feet.

Pesticides and PCBs

Ten pesticides were found in the soil samples collected at SEAD-11. The compound 4,4' DDT was reported in samples TP11-3.1 and TP11-3.2 at concentrations of 4300 μg/kg and 2400 μg/kg, respectively. These were the only reported compound concentrations that exceeded the TAGM value. The remaining pesticide detections were all reported at concentrations below the associated TAGM value.

Herbicides

Three herbicides were detected in the soil samples collected at the site. The frequency of detection ranged from 6.7% to 13.3%. No herbicides were found at concentrations above the associated TAGM values. Dalapon was detected in sample TP11-4.2 at a maximum concentration of 2500 μg/kg. 2,4-DB was detected in sample TP11-2.2 at a maximum concentration of 550 μg/kg. The final herbicide detected, 2,4,5-T, was found in the soil sample TP11.3-2 at a concentration of 7.6 μg/kg.

Metals

A number of soil samples were found to contain various metals at concentrations that exceeded the associated TAGM values. The soil TAGM values were derived by considering both concentrations specified by NYSDEC in HWR-94-4046 and SEDA site-wide background concentrations. The site background values represent the 95th percentile of the background data, so they allow for a significant amount of variability within the background data set. The TAGM allows for background concentrations of metals in soil to be incorporated into all but one of the values (mercury). The value specified by the TAGM for mercury is 0.1 mg/kg however, the 95th percentile of the site-wide background data is 0.11 mg/kg. Of the 22 metals reported, 16 of these were found in one or more soil samples at concentrations above the TAGM value. Several metals were identified at highly elevated concentrations and/or in a large number of samples above the TAGM value. Of particular note are the metals copper, lead and zinc, where a large percentage of the samples exceed the TAGM value, and where the concentrations of the exceedances are generally an order of magnitude or greater above the TAGM value.

The maximum concentration of copper, 1090 mg/kg, was identified in the soil sample TP11-3.1 which was collected approximately in the center of the landfill. This sample also had an elevated concentration of zinc (1250 mg/kg). The maximum concentration of zinc, 7980 mg/kg, was identified in the soil sample TP11-1.2. This test pit is located on the east side of the landfill. The maximum concentration of lead was identified in TP11-1.1, which is located at the northeast corner of the landfill.

Nitroaromatic Compounds

Five nitroaromatic compounds were found at low concentrations in the soil samples collected at SEAD-11. Most were detected in only one sample, except for 2,4-dinitrotoluene which was detected in two samples. The four soil samples in which nitroaromatic compounds were found were TP11-1.3, TP11-2.2, TP11-3.2, and TP11-3.3.

Indicator Compounds

The soil samples at SEAD-11 were analyzed for nitrate/nitrite nitrogen. Nitrate/nitrite nitrogen was detected in all soil samples, with the maximum concentration (2.2 mg/kg) being detected in sample TP11-4.2.

Groundwater

Four monitoring wells were installed and sampled as part of the SEAD-11 investigation. The summary results of the chemical analysis of these samples are presented in Table 3-5 and the monitoring well construction diagrams are presented in Appendix G. The following sections describe the nature and extent of groundwater contamination identified at SEAD-11.

Volatile Organic Compounds

No VOCs were found in the four groundwater samples collected at SEAD-11.

Semivolatile Organic Compounds

The SVOC diethylphthalate was detected at very low concentrations in two of the four groundwater samples analyzed. The maximum value of 0.5 μg/L was reported in both monitoring wells MW11-1 and MW11-2. This concentration is well below the NYS AWQS criteria value of 50 μg/L for class GA water.

Pesticides and PCBs

No pesticides or PCBs were found in the four groundwater samples collected at SEAD-11.

Herbicides

No herbicides were found in the four groundwater samples collected at SEAD-11.

Metals

The four metals iron, lead, magnesium, and sodium were found in one or more of the groundwater samples at concentrations above the criteria value. Iron was found in two of the four monitoring wells at concentrations above the criteria value of 300 μg/L. The maximum iron concentration of 653 μg/L was found in the sample collected from monitoring well MW11-4. Lead exceeded the criteria value of 25 μg/L in one well, MW11-3, which contained an estimated concentration of 33.7 μg/L. The metal sodium was found at a concentration above the criteria value of 20,000 μg/L in the sample collected from monitoring well MW11-2 (36,700 μg/L). Magnesium exceeded the NYSDEC Class GA criteria of 35000 μg/L in one

TABLE 3-5

GROUNDWATER ANALYSIS RESULTS
SENECA ARMY DEPOT ACTIVITY
SEAD-11 EXPANDED SITE INSPECTION

COMPOUND	MATRIX	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	NO. ABOVE CRITERIA	WATER	WATER	WATER	WATER	WATER
	LOCATION					SEAD-11	SEAD-11	SEAD-11	SEAD-11	SEAD-11
	SAMPLE DATE					01/18/94	01/18/94	01/24/94	01/24/94	11/16/93
	ES ID					MW11-1	MW11-2	MW11-3	MW11-5	MW11-4
	LAB ID					209093	209094	209335	209337 MW11-3DUP	204663
	UNITS									
NITROAROMATICS										
2,4,6-Trinitrotoluene	ug/L	0.43	25.0%	5	0	0.13 U	0.13 U	0.13 U	0.13 U	0.43 J
SEMIVOLATILE ORGANICS										
Diethylphthalate	ug/L	0.5	50.0%	50	0	0.5 J	0.5 J	11 U	10 U	11 U
METALS										
Aluminum	ug/L	254	100.0%	NA	NA	53.7 J	88.3 J	150 J	161 J	254
Arsenic	ug/L	1.1	25.0%	25	0	0.8 U	0.79 U	0.8 U	1.1 J	1 U
Barium	ug/L	53.4	100.0%	1000	0	25.2 J	38.2 J	38.6 J	37.1 J	53.4 J
Calcium	ug/L	223000	100.0%	NA	NA	97500	109000	223000	215000	137000
Cobalt	ug/L	7.2	25.0%	NA	NA	4.4 U	4.4 U	4.4 J	7.2 J	4.9 U
Iron	ug/L	653	100.0%	300	2	41.4 J	200	384	308	653
Lead	ug/L	33.7	75.0%	25	1	1.1 J	2 J	33.7 J	0.5 U	0.6 U
Magnesium	ug/L	41900	100.0%	35000	1	29700	28100	41900	40000	28300
Manganese	ug/L	281	100.0%	300	0	278	218	233	204	281
Mercury	ug/L	0.04	50.0%	2	0	0.04 U	0.04 J	0.04 J	0.04 J	0.07 UJ
Potassium	ug/L	13600	100.0%	NA	NA	7100	8300	8660	9310	13600
Selenium	ug/L	2	50.0%	10	0	0.7 U	0.69 U	1.6 J	2 J	1.3 J
Sodium	ug/L	36700	100.0%	20000	1	4860 J	36700	17200	15900	16900
Zinc	ug/L	34.3	100.0%	300	0	21.4	34.3	18.3 J	15.9 J	3.8 J
OTHER ANALYSES										
Nitrate/Nitrite-Nitrogen	mg/L	0.8	100.0%	10	0	0.19	0.09	0.18	0.21	0.8
Total Petroleum Hydrocarbons	mg/L	1.81	75.0%	NA	NA	0.4	0.36 U	1.81	1.34	0.76
pH	standard units	7.5				7.5	7.4	7.11		7.35
Specific Conductivity	umhos/cm	725				380	500	725		650
Turbidity	NTU	13.9				0.6	2.3	13.9		NA(Clear)

NOTES:

a) NY State Class GA Groundwater Regulations
b) NA = Not Available
c) U = compound was not detected
d) J = the report value is an estimated concentration
e) UJ = the compound was not detected; the associated reporting limit is approximate
f) R = the data was rejected in the data validating process

of the four wells sampled, MW11-3, which also contained the maximum concentration of 41,900 μg/L.

Nitroaromatic Compounds

The nitroaromatic compound, 2,4,6-trinitrotoluene was found in one sample collected from monitoring well MW11-4 at an estimated concentration of 0.43 μg/L, which is below the NYSDEC Class GA groundwater standard of 5 μg/L.

Indicator Parameters

None of the four groundwater samples analyzed had nitrate concentrations above the criteria value of 10 mg/L. The maximum nitrate value detected was 0.19 mg/L in the sample collected from MW11-1.

3.1.1.3 Data Summary and Conclusions

Characterization studies that have been conducted at SEAD-11 have included geophysical surveys, a soil gas survey, monitoring well installation, and groundwater and soil sampling. Based upon the results of the ESI conducted at SEAD-11 it appears that a threat due to SVOCs, metals and VOCs exists and that further investigations should be conducted to fully define the impacts and the risks from site soil, groundwater, sediment, and surface water.

It is important to note that in some instances the detection limit for individual analyses may be raised (sometimes above the criteria value) due to dilution or matrix effects in the sample. Also, note that the total number of samples found to exceed the criteria in analytical results tables may include estimated concentrations (i.e., J-qualified data). This should be noted when considering further investigation or remedial action activities.

Soil Data

The results of the Expanded Site Inspection (ESI) conducted at SEAD-11 indicate that impacts to the surface and subsurface soil have occurred at this site.

Soil at the site has been impacted primarily by SVOCs and metals. Other constituents that were detected, but are considered to be of less significance, include VOCs, pesticides, PCBs, herbicides, nitroaromatics, and nitrate/nitrite nitrogen. These constituents are not considered to be significant because they are either present at low concentrations and/or only a small number of samples exceed or slightly exceed their respective TAGM values.

A total of 19 SVOCs were found at varying concentrations in the soil samples analyzed. With the exception of bis(2-ethylhexyl)phthalate, all of the SVOCs detected were PAHs, which are derived from petroleum products. Eight soil samples exceeded the TAGM values for benzo(a)anthracene, chrysene, benzo(b)fluoranthene, and benzo(k)fluoranthene. Eleven soil samples exceeded the TAGM values for benzo(a)pyrene and dibenz(a,h)anthracene. The highest concentrations were found in soil samples collected from the test pits TP11-2, TP11-3,and TP11-4 with almost all maximum concentrations found in the soil sample TP11-2.2.

Of the 22 metals reported in the soil samples analyzed, 17 of these were found in one or more samples at concentrations above the associated TAGM values. Several metals were identified at highly elevated concentrations and/or above the TAGM values. Of particular note are the metals copper, lead and zinc, where a large percentage of the samples exceed the TAGM value and where the concentrations of the exceedances are generally an order of magnitude or greater above the TAGM value. The maximum concentration of copper (1090 mg/kg) was identified in the soil sample TP11-3.1. This sample also had an elevated concentration of zinc (1250 mg/kg). The maximum concentration of zinc (7980 mg/kg) was identified in soil sample TP11-1.2, while the sample collected directly above, TP11-1.1, had the highest concentration of lead reported (4050 mg/kg).

In summary, based upon the results of the data collected, it appears that the site soil has been impacted primarily by the release of SVOCs and metals. In particular, the SVOCs benzo(a)anthracene, chrysene, benzo(a)pyrene, and dibenz(a,h)anthracene were detected at concentrations above the associated TAGM values. Additionally, the metals copper, lead and zinc were identified in soil samples at concentrations above either the TAGM values or background concentrations.

Groundwater Data

Groundwater at the site appears to have been impacted by metals. The results of the groundwater sampling program at SEAD-11 indicate that iron, lead, magnesium and sodium were present in individual wells at concentrations above the TAGM values. No VOCs, SVOCs, pesticides and PCBs, herbicides, nitrate/nitrite, and nitroaromatics were detected in any of the wells.

The four metals, iron, lead, magnesium, and sodium were found in one or more of the groundwater samples at concentrations above the criteria value. Other than lead, the three remaining metals are not considered to represent a significant health risk. Lead was detected in one well, MW11-3, at a concentration of 33.7 μg/L, which is over the NYSDEC Class GA groundwater standard of 25 μg/L.

3.1.2 SEAD-64A

3.1.2.1 Site History

SEAD-64A was used as a landfill during the time period from 1974 to 1979 when the on-site solid waste incinerator was not in operation. The types of wastes disposed of at the site are suspected to be primarily household items, although according to the SWMU Classification Report (Parsons ES, September 1994), metal drums and other industrial items were reported to have been disposed of at this site. SEDA personnel also reported the operation of small burning pits within this area when it was being landfilled.

3.1.2.2 Physical Site Characterization

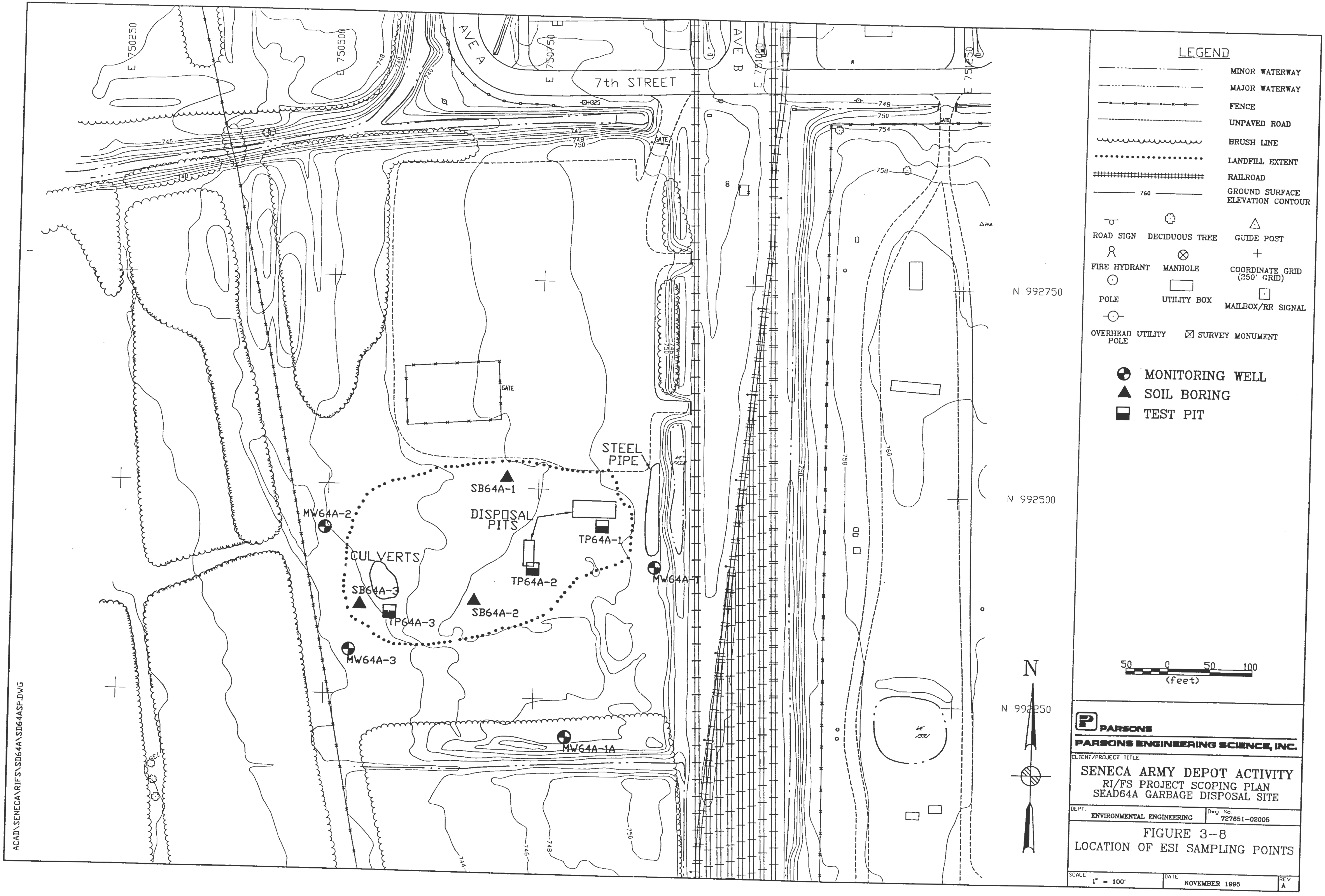
3.1.2.2.1 Physical Site Setting

The disposal area at SEAD-64A is located south of the storage pad at the intersection of 7th Street and Avenue A in the east-central portion of SEDA (Figure 1-1). The site is bounded to the north by a square storage pad, to the east by the SEDA railroad tracks beyond which is the elevated fire training pad (SEAD-26), and to the south and west by undeveloped grassland (Figure 1-3).

The land on site is relatively flat, is covered with low grassland vegetation, and gently slopes downward to the west from the east end of the landfill. East of the landfill, the land slopes downward to the east to an intermittent surface water body located beside the railroad tracks. A drainage channel is located 30 feet south of monitoring well MW64A-1A as shown in Figure 3-8. Access is restricted only by clearance through the main gates for SEDA. The disposal area is approximately 350 feet by 200 feet. Some debris was visible on the ground surface during the SWMU classification site visit.

3.1.2.2.2 Site Geology

Surface and subsurface soil samples were obtained from three borings (SB64A-1,2, and 3) and four borings in which monitoring wells were installed (MW64A-1, 1A, 2, and 3) as located on Figure 3-8. Three test pits were also excavated into the landfill to observe the subsurface conditions. The soil descriptions from the borings and test pits, presented in Appendix G, were used to define the site geology.



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PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	727651-02005

FIGURE 3-8
LOCATION OF ESI SAMPLING POINTS

SCALE	DATE	REV
1" = 100'	NOVEMBER 1995	A

The following strata were observed with increasing depth: topsoil, fill material, till, weathered shale, and shale.

Topsoil was encountered in all of the exploration locations ranging from 0.3 to 1.1 feet thick.

The fill material was encountered in borings SB64A-1 and 2 and in the three test pits at thicknesses from 1.7 to 3.0 feet. The fill consisted of layers of till, shale fragments, and sand. A variety of waste material was observed in the test pits, such as asphalt, metal, car parts, wood and concrete.

The till was observed to be 2.1 to 6.1 feet thick in all the borings across the site. It generally consisted of brown silt and very fine sand with small (less than 1 inch) fragments of shale. Clay or clayey till layers were observed occasionally. Larger shale fragments, thought to be rip-up clasts, were encountered in some of the borings.

Weathered shale, 0.6 to 6.0 feet thick, was observed in all the borings.

Bedrock was composed of grey shale. The bedrock surface, as defined by auger refusal, was encountered at depths from 5.5 to 10.7 feet in four of the borings.

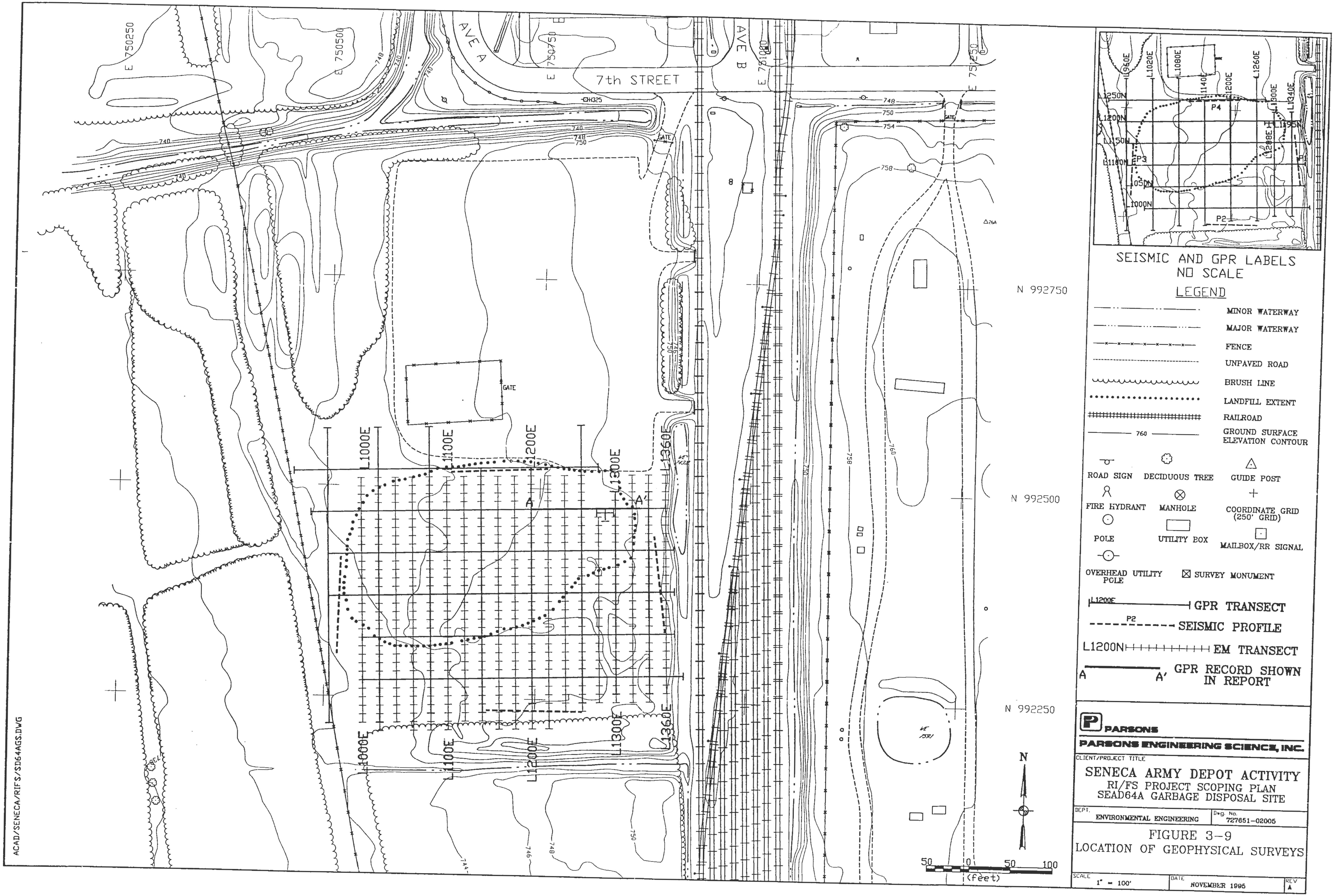
3.1.2.2.3 Geophysics

Seismic Survey

Four seismic refraction profiles, each 120 feet long, were performed as part of the geophysical investigations for the ESI at the locations shown in Figure 3-9. The results of the seismic refraction survey conducted at SEAD-64A are shown in Table 3-6. Saturated overburden was not detected by the seismic survey. The seismic refraction profiles detected 6 to 9 feet of unconsolidated overburden (1,200 to 7,875 ft./sec.) overlying bedrock (9,000 to 13400 ft./sec.). In particular, the unconsolidated material included unsaturated overburden (1,200 to 1,450 ft./sec.) and dense glacial till (7,875 ft./sec.).

Electromagnetic Survey

An electromagnetic (EM-31) survey was performed at SEAD-64A along the transects shown in Figure 3-9. Figure 3-10 shows the results of the quadrature response which is proportional to the apparent ground conductivity. A series of conductivity anomalies, forming an arc



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RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT.	Dwg. No.
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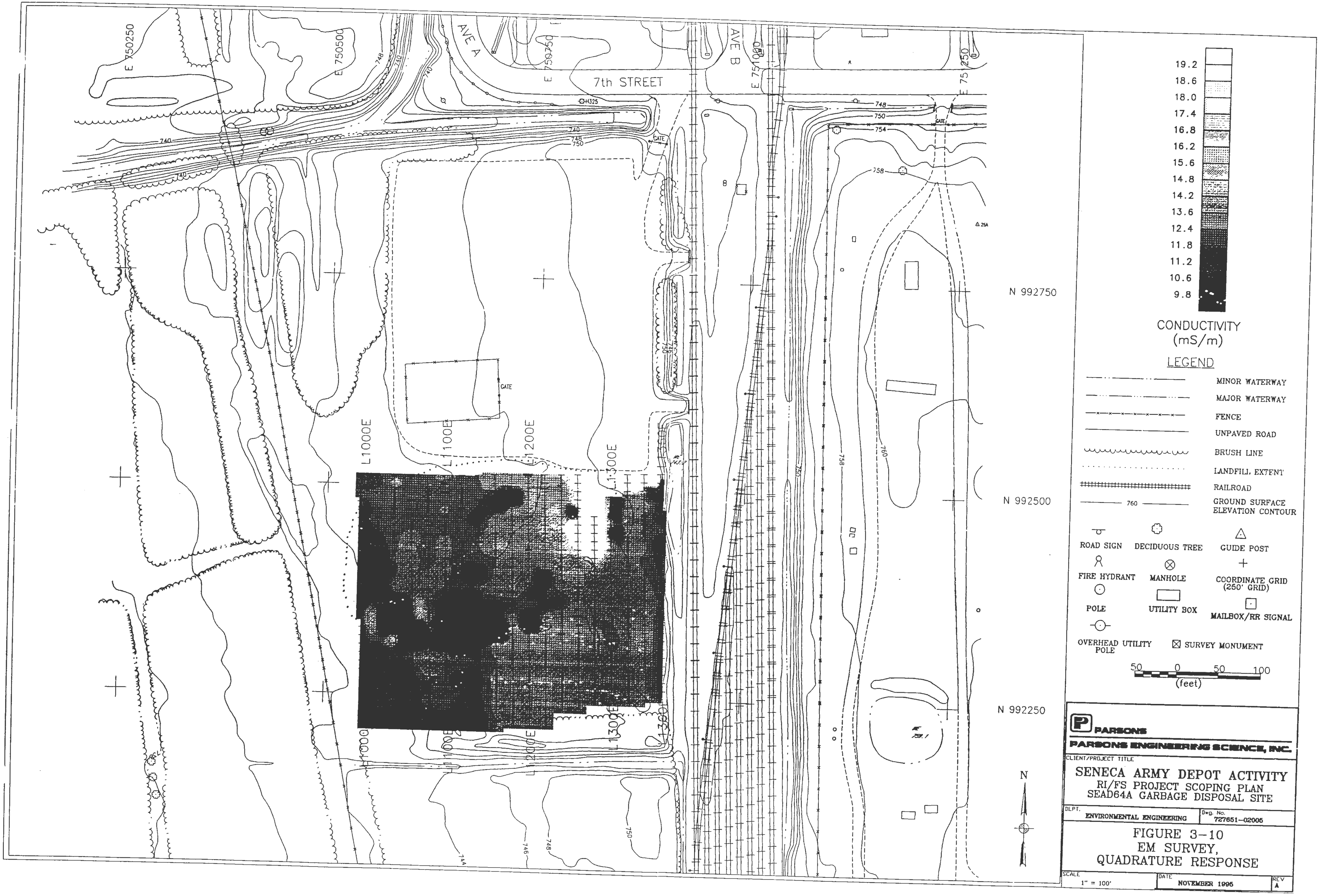
FIGURE 3-9
LOCATION OF GEOPHYSICAL SURVEYS

SCALE	DATE	REV
1" = 100'	NOVEMBER 1995	A



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RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING

Dwg. No. 727651-02005

FIGURE 3-10
EM SURVEY,
QUADRATURE RESPONSE

SCALE 1" = 100'

DATE NOVEMBER 1995

REV A

TABLE 3-6

SENECA ARMY DEPOT ACTIVITY
SEAD-64A PROJECT SCOPING PLAN
RESULTS OF ESI SEISMIC REFRACTION SURVEY

Profile	Distance[1]	Ground Elevation[2]	Bedrock	
			Depth	Elev[2].
P1	.5 (South end)	750.5	7.5	743
	57.5	749	6.8	742
	112.5 (North end)	750	7.5	742.5
P2	.5 (West end)	746	10.5	735.5
	57.5	747	8.6	738.5
	112.5 (East end)	748.5	9.2	739.5
P3	.5 (South end)	741.5	7.1	734.5
	57.5	742	5.9	736
	112.5 (North end)	743	6.3	736.5
P4	.5 (West end)	745.5	7.7	738
	57.5	746.5	6.9	739.5
	112.5 (East end)	747	7.8	739

1. All distances are in feet along each seismic profile.

2. All elevations are accurate to ± 1 foot and are rounded to the nearest half foot.

approximately 75 feet in width, were detected that extends from the west central section to the northeastern section of the survey area. The southern boundary of this arc coincided with a 1 to 2 foot drop in the ground topography which was interpreted as the southern boundary of the landfill area. In addition, the large negative anomalies in the western portion of the arc were associated with culverts that were present on the ground surface. The linear anomaly along the eastern portion of the grid was caused by six inch diameter steel pipe being stored at this site. The data over the remainder of the survey grid, including a large portion of the suspected area of the landfill, displayed a relatively uniform distribution of apparent ground conductivities.

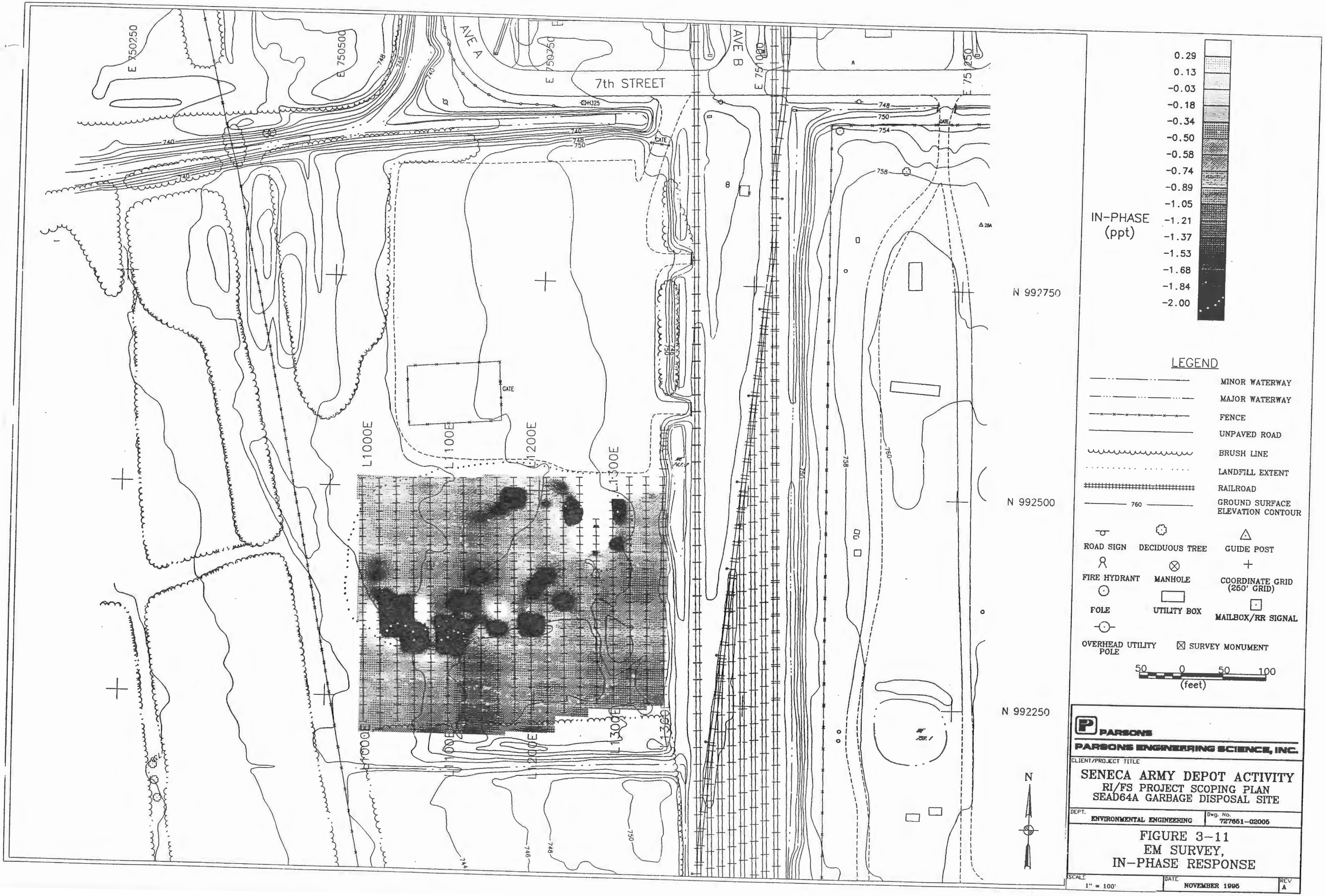
The in-phase response of the EM survey, which reflects the presence of buried ferrous objects, is shown in Figure 3-11. These results show the same anomaly features as described above.

The electromagnetic survey results suggest that the landfill may extend west and north of the surveyed area.

Ground Penetrating Radar (GPR) Survey

A GPR survey was conducted at SEAD-64A along the transects shown in Figure 3-9 to determine the extent of the landfill, to provide additional information on the depth of the fill, 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. One pit was approximately 35 feet long by 15 feet wide and was situated near the center of the suspected landfill area. The second pit, which measured 60 feet by 20 feet, was located near the northeastern boundary of the suspected landfill area, at the same location as one of the more pronounced EM anomalies. The location of these disposal pits are shown in Figure 3-8. Figure 3-12 shows the GPR data collected over this second burial pit.

The interpretation of the GPR data identified a subsurface contact in the suspected landfill area which appears to be associated with the base of the fill. Figure 3-13 shows an isopach contour map of the fill layer. Due to the conductive nature of the soils at this site, areas where the fill thickness was less than one foot could not be accurately resolved; therefore, the isopachs of the fill layer have a minimum contour level of 1 foot. Based on the GPR data, the approximate areal extent of the landfill is estimated to be 250 by 350 feet.



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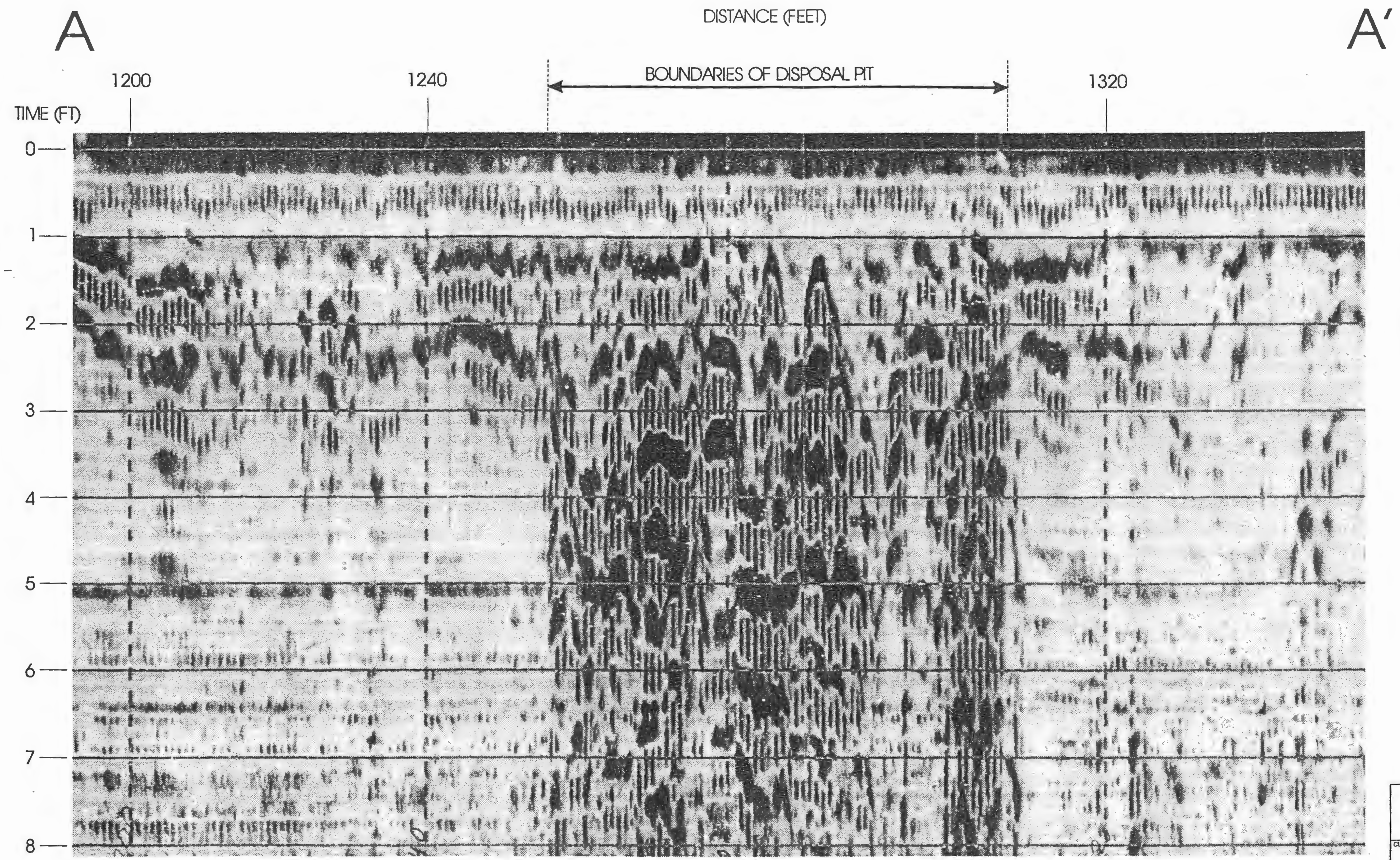
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	727651-02005

FIGURE 3-11
EM SURVEY,
IN-PHASE RESPONSE

SCALE	DATE	REV
1" = 100'	NOVEMBER 1995	A



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RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

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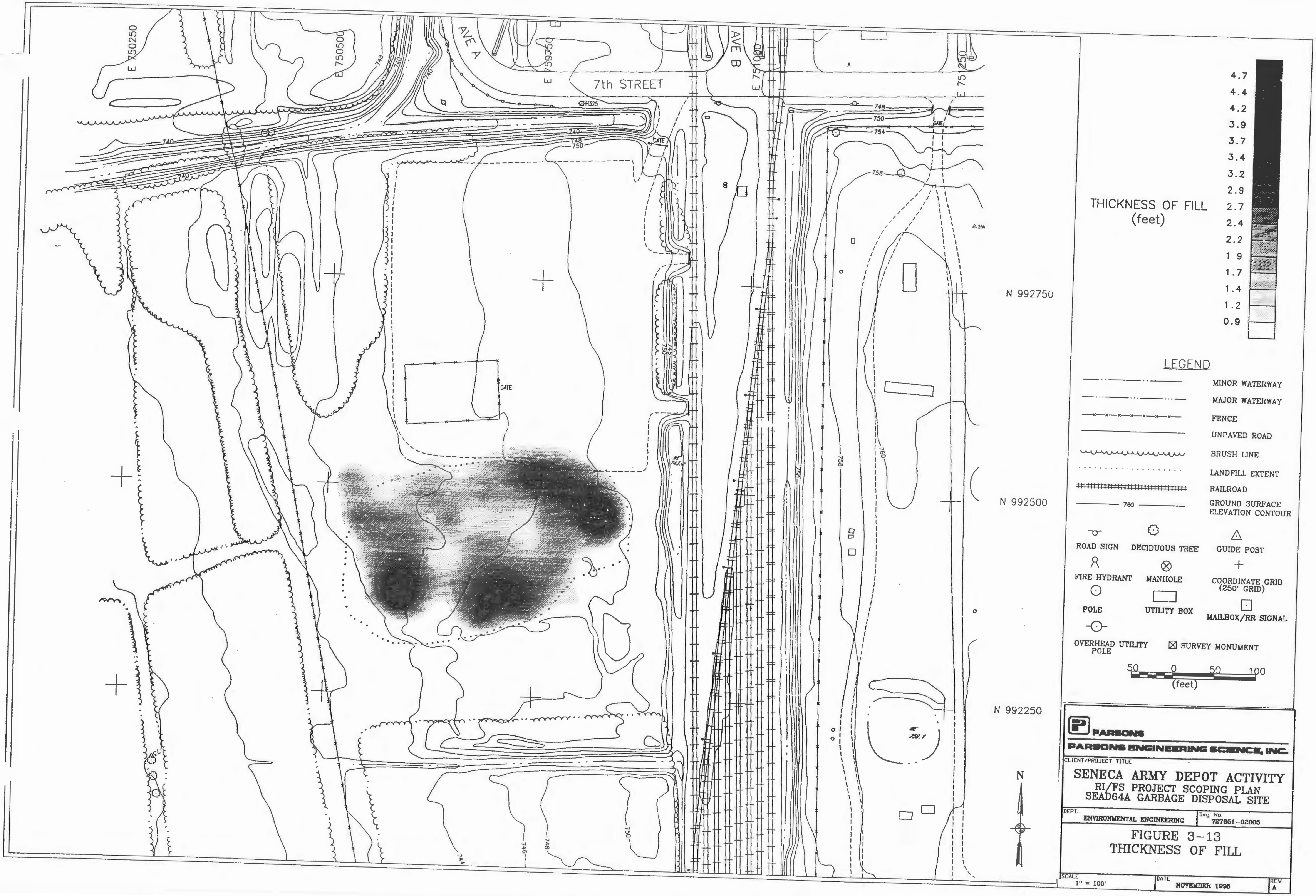
DWG NO. 727651-02005

FIGURE 3-12
GPR PROFILE A-A'

SCALE NA
DATE NOVEMBER 1995

R:\GRAPHICS\SENECA\RADAR\FIG3-4.CDR



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RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING	Dwg. No. 727651-02005

FIGURE 3-13
THICKNESS OF FILL

SCALE 1" = 100'	DATE NOVEMBER 1996	REV A

Test Pitting Program

A total of three test pits were excavated in SEAD-64A to characterize the sources of the geophysical anomalies. All three test pits (TP64A-1, TP64A-2, and TP64A-3) were excavated in the suspected landfill area at EM and GPR anomalies (Figure 3-8). The test pit logs are presented in Appendix G.

TP64A-1 was excavated in the disposal pit identified by GPR in the northeast section of the landfill. Crushed, empty metal canisters, originally 12 inches in diameter and 14 inches long, as well as railroad ties and construction debris, were the majority of the fill material from this excavation. Stencilling on the canisters indicated that they had, at one time, contained magnesium powder. The base of the fill at this location was measured at three feet three inches below the ground surface.

TP64A-2 was excavated in the disposal pit identified by GPR located in the center section of the landfill. Large slabs of reinforced concrete and sections of asphalt were found during the excavation. Lenses of dark gray silt were also noted in the test pit. A two foot ten inch thick fill layer was identified at this location.

TP64A-3 was excavated at the EM anomaly in the southwestern section of the landfill. Buried drainage culverts, wire, municipal waste, and construction debris were encountered. The base of fill at this location was measured at two feet eight inches below grade.

Soils excavated from the test pits were continuously screened for volatile organic compounds and radioactivity with an OVM-580B and a Victoreen-190, respectively. No readings above background levels (0 ppm of organic vapors and 10-15 microRhems per hour of radiation) were observed during the excavation.

3.1.2.2.4 Site Hydrology and Hydrogeology

Surface water flow at SEAD-64A is controlled by the local topography as shown in Figure 3-14. There is a topographic high along the east side of SEAD-64A, as defined by the 750 foot contour, that separates the site from the intermittent surface water body in the drainage channel to the east. Surface water flows primarily westward following the regional topographic slope in this area. There are no sustained surface water bodies present, although intermittent drainage channels are present to the east and south of the site.

As part of the ESI program, four monitoring wells were installed and groundwater elevations were measured. The monitoring well installation and development reports are presented in Appendices H and I, respectively. MW64A-1A was not developed or sampled during the ESI because it was installed at the wrong location. The elevations are listed in Table 3-7. Groundwater elevation contours are shown in Figure 3-14. Based on these data, the groundwater flow direction is primarily southwest across SEAD-64A.

3.1.2.2.5 Chemical Analysis Results

Soil and groundwater were sampled as part of the ESI conducted at SEAD-64A in 1994. The results of the 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 surface and subsurface soil samples were collected at SEAD-64A on and in the immediate vicinity of the landfill. Groundwater from three monitoring wells was also sampled as part of this investigation. The following sections describe the nature and extent of contamination identified at SEAD-64A in soil and groundwater.

It is important to note that in some instances the detection limit for individual analyses may be raised (sometimes above the criteria value) due to dilution or matrix effects in the sample. Also, note that the total number of samples found to exceed the criteria in analytical results tables may include estimated concentrations (i.e., J-qualified data). This should be noted when considering further investigation or remedial action activities.

Soil

The analytical results for the 12 soil samples collected as part of the investigation of SEAD-64A are presented in Table 3-8. These data are compared to the criteria in the Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels (NYSDEC, 1992). The following sections describe the nature and extent of contamination in SEAD-64A soils. The sample locations are shown in Figure 3-8.

Volatile Organic Compounds

Three volatile organic compounds were detected in two of the 12 soil samples collected. They were found at concentrations of 1 to 2 μg/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 the soil samples collected at SEAD-64A.

TABLE 3-7

SENECA ARMY DEPOT ACTIVITY
SEAD-64A PROJECT 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)
MW64A-1	747.30	5/23/94	10.86	736.44	7/18/94	11.11	736.19	7/6/94 7/26/94	9.14 10.42	738.16 736.88
MW64A-2	740.98	5/23/94	7.42	733.56	7/21/94	7.28	733.70	7/6/94 7/26/94	6.45 8.04	734.53 732.94
MW64A-3	739.85	5/23/94	6.59	733.26	7/7/94	6.01	733.84	7/6/94 7/26/94	5.77 7.92	734.08 731.93
MW64A-1A	745.77	NA	NA	NA	NA	NA	NA	7/6/94 7/26/94	11.02 12.06	734.75 733.71

Note: MW64A-1A was not developed or sampled because it was not installed at the appropriate location for the ESI.

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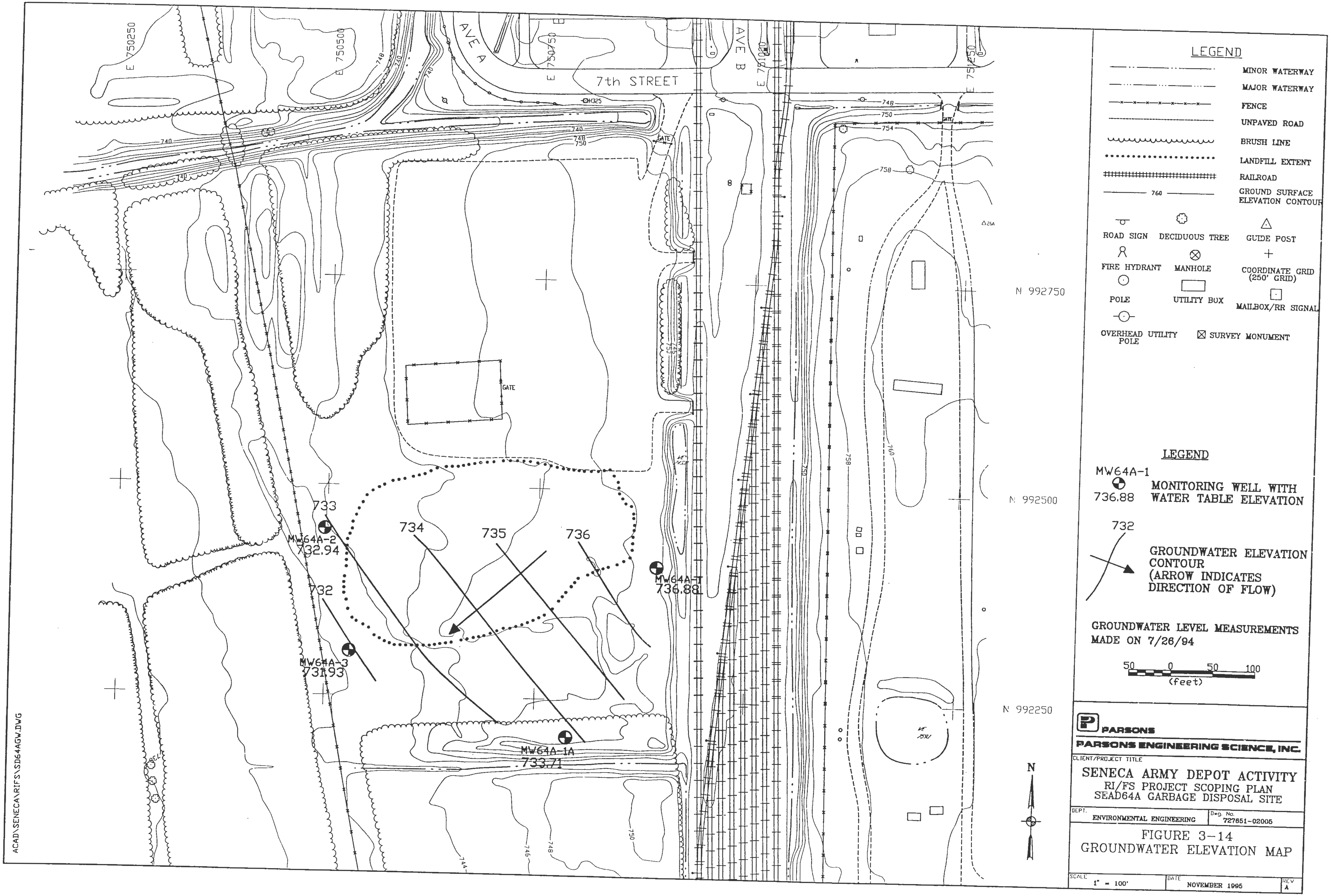

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RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING

Dwg. No. 727651-02005

FIGURE 3-14
GROUNDWATER ELEVATION MAP

SCALE 1" = 100'

DATE NOVEMBER 1995

REV A

TABLE 3-8

SENECA ARMY DEPOT ACTIVITY
SEAD-64A PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM 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-64 0-0.2 05/27/94 SB64A-1-00 222484 44410	SOIL SEAD-64 2-4 05/27/94 SB64A-1-02 222485 44410	SOIL SEAD-64 6-8 05/27/94 SB64A-1-04 222502 44410	SOIL SEAD-64 0-0.2 06/10/94 SB64A-2-00 223894 44725	SOIL SEAD-64 2-4 06/10/94 SB64A-2-02 223895 44725	SOIL SEAD-64 4-7 06/10/94 SB64A-2-03 223896 44725
VOLATILE ORGANICS											
Trichloroethene	ug/Kg	1	8%	700	0	12 U	12 U	11 U	11 U	11 U	12 U
Benzene	ug/Kg	2	8%	60	0	12 U	12 U	11 U	11 U	11 U	12 U
Toluene	ug/Kg	2	8%	1500	0	12 U	12 U	11 U	11 U	11 U	12 U
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	44	6%	NA	NA	1000 U	400 U	360 U	2300 U	3700 U	370 U
Naphthalene	ug/Kg	3800	25%	13000	0	1000 U	400 U	360 U	340 J	3800	370 U
2-Methylnaphthalene	ug/Kg	2900	33%	36400	0	54 J	400 U	360 U	150 J	2900 J	370 U
Acenaphthylene	ug/Kg	400	33%	41000	0	250 J	400 U	360 U	400 J	310 J	370 U
Acenaphthene	ug/Kg	1300	33%	50000*	0	140 J	400 U	360 U	250 J	1300 J	370 U
Dibenzofuran	ug/Kg	1400	25%	6200	0	90 J	400 U	360 U	120 J	1400 J	370 U
Fluorene	ug/Kg	4100	42%	50000*	0	260 J	36 J	360 U	350 J	4100	370 U
Phenanthrene	ug/Kg	15000	50%	50000*	0	2300	290 J	360 U	2700	15000	23 J
Anthracene	ug/Kg	1900	42%	50000*	0	540 J	58 J	360 U	1100 J	1900 J	370 U
Carbazole	ug/Kg	780	42%	50000*	0	720 J	39 J	360 U	420 J	780 J	370 U
Di-n-butylphthalate	ug/Kg	290	8%	8100	0	1000 U	400 U	360 U	2300 U	3700 U	370 U
Fluoranthene	ug/Kg	11000	50%	50000*	0	5700	470	360 U	6900	11000	26 J
Pyrene	ug/Kg	8700	50%	50000*	0	4400	340 J	360 U	5400	8700	50 J
Benzo(a)anthracene	ug/Kg	5600	42%	220	4	3600	180 J	360 U	5600	4000	370 U
Chrysene	ug/Kg	4800	50%	400	4	3400	180 J	360 U	4800	4500	22 J
bis(2-Ethylhexyl)phthalate	ug/Kg	13000	75%	50000*	0	1000 U	41 J	40 J	13000	3700 U	52 J
Benzo(b)fluoranthene	ug/Kg	9600	42%	1100	3	6600 J	320 J	360 U	9600 J	3700 UJ	370 UJ
Benzo(k)fluoranthene	ug/Kg	5900	33%	1100	1	1000 UJ	400 UJ	360 U	2300 UJ	5900 J	37 J
Benzo(a)pyrene	ug/Kg	5400	58%	61	5	3000	180 J	360 U	5400	3100 J	21 J
Indeno(1,2,3-cd)pyrene	ug/Kg	3500	50%	3200	1	1900	92 J	360 U	3500	1500 J	370 U
Dibenz(a,h)anthracene	ug/Kg	1500	50%	14	6	1200	70 J	360 U	1500 J	820 J	370 U
Benzo(g,h,i)perylene	ug/Kg	4000	58%	50000*	0	1100	140 J	24 J	4000	1500 J	370 U
PESTICIDES/PCB											
Heptachlor epoxide	ug/Kg	1.9	8%	20	0	4.1 UJ	2.1 UJ	1.8 UJ	3.6 U	1 9 U	1 9 U
Endosulfan I	ug/Kg	33	42%	900	0	22 J	5.1 J	1.8 UJ	33 J	7.8 J	1 9 U
Dieldrin	ug/Kg	7.5	17%	440	0	5.9 J	4 UJ	3 6 UJ	7 5 J	3 7 U	3 7 U
4 4'-DDE	ug/Kg	9	25%	2100	0	4 5 J	4 UJ	3.6 UJ	9 J	3 7 U	3 7 U
4 4'-DDD	ug/Kg	3 7	8%	2900	0	8 UJ	4 UJ	3.6 UJ	3 7 J	3 7 U	3 7 U
Endosulfan sulfate	ug/Kg	5	17%	1000	0	8 UJ	4 UJ	3 6 UJ	5 J	3 7 U	3 7 U
4 4' DDT	ug/Kg	24	33%	2100	0	4.6 J	4 UJ	3.6 UJ	24 J	4.4 J	3 7 U
alpha-Chlordane	ug/Kg	6.3	25%	540	0	4.2 J	2.1 UJ	1.8 UJ	6.3 J	1.9 U	1.9 U

TABLE 3-8

SENECA ARMY DEPOT ACTIVITY
SEAD-64A PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM ESI

	MATRIX					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64
	DEPTH (FEET)					0-0.2	2-4	6-8	0-0.2	2-4	4-7
	SAMPLE DATE					05/27/94	05/27/94	05/27/94	06/10/94	06/10/94	06/10/94
	ES ID		FREQUENCY		NUMBER	SB64A-1-00	SB64A-1-02	SB64A-1-04	SB64A-2-00	SB64A-2-02	SB64A-2-03
	LAB ID		OF		ABOVE	222484	222485	222502	223894	223895	223896
	SDG NUMBER	MAXIMUM	DETECTION	TAGM	TAGM	44410	44410	44410	44725	44725	44725
COMPOUND	UNITS										
METALS											
Aluminum	mg/Kg	19800	100%	20650	0	11800	17100	12800	11800	18400	12400
Antimony	mg/Kg	4 3	25%	6.27	0	0.36 J	0.26 UJ	0.26 UJ	4.3 J	0 2 UJ	0.19 UJ
Arsenic	mg/Kg	8.4	100%	9.6	0	4.7	6	8.4	5.8	7 1	4 8
Barium	mg/Kg	133	100%	300	0	59.3	133	53.7	96.3	90.9	68 7
Beryllium	mg/Kg	0.8	100%	1.13	0	0.54 J	0.8 J	0.55 J	0.55 J	0.78 J	0.54 J
Cadmium	mg/Kg	1	92%	2.46	0	0.45 J	0 48 J	0.33 J	1	0 72 J	0 7 J
Calcium	mg/Kg	72400	100%	125300	0	36300	4450	4580	62800	4040	64900
Chromium	mg/Kg	35.5	100%	30 95	1	19.7	23 9	21.4	35.5	27	17 5
Cobalt	mg/Kg	14	100%	30	0	10.6	10.3	14	10.3	9.5	8 9
Copper	mg/Kg	56.3	100%	32.94	1	23.3	20.1	24.6	56.3	23.5	24.3
Iron	mg/Kg	35900	100%	38110	0	25500	28600	35900	23000	30000	21200
Lead	mg/Kg	391	100%	23.49	1	18.5	14.5	11.1	391	10 1	10 7
Magnesium	mg/Kg	14800	100%	21890	0	6940	4510	5420	8000	5610	11900
Manganese	mg/Kg	968	100%	1095	0	528	968	619	517	310	405
Mercury	mg/Kg	0 1	100%	0.1	0	0.04 J	0.06 J	0.03 J	0.1	0.09 J	0 02 J
Nickel	mg/Kg	36.1	100%	52.58	0	33.3	29.2	36.1	31.1	31.5	26 5
Potassium	mg/Kg	2820	100%	2623	2	1530 J	2070 J	1150 J	2060 J	2820 J	2170 J
Selenium	mg/Kg	1.7	83%	2	0	0.98	0.94 J	0.82 J	0.49 J	0.72 J	0.39 U
Sodium	mg/Kg	92 1	75%	0.77	0	50.9 J	22.1 J	39.2 J	78.4 J	39 4 J	85 5 J
Thallium	mg/Kg	0.42	8%	187.8	0	0.26 U	0.38 U	0.39 U	0.33 U	0 3 U	0.27 U
Vanadium	mg/Kg	33.5	100%	150	0	20	29.3	19.1	25.4	31.1	20 8
Zinc	mg/Kg	167	100%	115.3	1	83	87	106	167	76.7	61 2
OTHER ANALYSES											
Total Solids	%W/W					81.5	81.9	92.1	94 4	89	89 4

TABLE 3-8

SENECA ARMY DEPOT ACTIVITY
SEAD-64A PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM 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-64 0-0.2 06/10/94 SB64A-3-00 223897 44725	SOIL SEAD-64 0-2 06/10/94 SB64A-3-01 223906 44748	SOIL SEAD-64 2-3 06/10/94 SB64A-3-02 223907 44748	SOIL SEAD-64 0-0.2 04/02/94 MW64A-1 00 216351 43257	SOIL SEAD-64 2-4 04/02/94 MW64A-1 02 216352 43257	SOIL SEAD-64 4-6 04/02/94 MW64A-1 03 216353 43257
VOLATILE ORGANICS											
Trichloroethene	ug/Kg	1	8%	700	0	1 J	11 U	12 U	13 U	12 U	12 U
Benzene	ug/Kg	2	8%	60	0	12 U	2 J	12 U	13 U	12 U	12 U
Toluene	ug/Kg	2	8%	1500	0	12 U	2 J	12 U	13 U	12 U	12 U
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	44	8%	NA	NA	44 J	370 U	370 U	450 U	390 U	370 U
Naphthalene	ug/Kg	3800	25%	13000	0	51 J	370 U	370 U	450 U	390 U	370 U
2-Methylnaphthalene	ug/Kg	2900	33%	36400	0	52 J	370 U	370 U	450 U	390 U	370 U
Acenaphthylene	ug/Kg	400	33%	41000	0	170 J	370 U	370 U	450 U	390 U	370 U
Acenaphthene	ug/Kg	1300	33%	50000*	0	50 J	370 U	370 U	450 U	390 U	370 U
Dibenzofuran	ug/Kg	1400	25%	6200	0	390 U	370 U	370 U	450 U	390 U	370 U
Fluorene	ug/Kg	4100	42%	50000*	0	120 J	370 U	370 U	450 U	390 U	370 U
Phenanthrene	ug/Kg	15000	50%	50000*	0	680	370 U	370 U	450 U	390 U	370 U
Anthracene	ug/Kg	1900	42%	50000*	0	230 J	370 U	370 U	450 U	390 U	370 U
Carbazole	ug/Kg	780	42%	50000*	0	110 J	370 U	370 U	450 U	390 U	370 U
Di-n butylphthalate	ug/Kg	290	8%	8100	0	390 U	370 U	370 U	290 J	390 U	370 U
Fluoranthene	ug/Kg	11000	50%	50000*	0	1500	370 U	370 U	450 U	390 U	370 U
Pyrene	ug/Kg	8700	50%	50000*	0	1200	370 U	370 U	450 U	390 U	370 U
Benzo(a)anthracene	ug/Kg	5600	42%	220	4	1200	370 U	370 U	450 U	390 U	370 U
Chrysene	ug/Kg	4800	50%	400	4	970	370 U	370 U	450 U	390 U	370 U
bis(2 Ethylhexyl)phthalate	ug/Kg	13000	75%	50000*	0	140 J	21 J	370 U	750	280 J	320 J
Benzo(b)fluoranthene	ug/Kg	9600	42%	1100	3	1500	29 J	370 U	450 U	390 U	370 U
Benzo(k)fluoranthene	ug/Kg	5900	33%	1100	1	550	25 J	370 U	450 U	390 U	370 U
Banzo(a)pyrene	ug/Kg	5400	58%	61	5	1200	35 J	370 U	450 U	390 U	370 U
Indeno(1,2,3-cd)pyrene	ug/Kg	3500	50%	3200	1	930	27 J	370 U	450 U	390 U	370 U
Dibenz(a,h)anthracene	ug/Kg	1500	50%	14	6	390 J	19 J	370 U	450 U	390 U	370 U
Benzo(g h,i)perylene	ug/Kg	4000	58%	50000*	0	1000	27 J	370 U	450 U	390 U	370 U
PESTICIDES/PCB											
Heptachlor epoxide	ug/Kg	1.9	8%	20	0	1.9 J	1.9 U	1.9 UJ	2.3 U	2 U	1 9 U
Endosulfan I	ug/Kg	33	42%	900	0	23 J	1.9 U	1 9 UJ	2 3 U	2 U	1 9 U
Dieldrin	ug/Kg	7 5	17%	440	0	3.9 U	3.7 U	3.7 UJ	4 5 U	3 9 U	3 7 U
4 4'-DDE	ug/Kg	9	25%	2100	0	3 J	3 7 U	3 7 UJ	4.5 U	3 9 U	3 7 U
4,4'-DDD	ug/Kg	3.7	8%	2900	0	3.9 U	3.7 U	3.7 UJ	4.5 U	3 9 U	3 7 U
Endosulfan sulfate	ug/Kg	5	17%	1000	0	3.7 J	3.7 U	3.7 UJ	4.5 U	3 9 U	3 7 U
4,4'-DDT	ug/Kg	24	33%	2100	0	5	3.7 U	3.7 UJ	4.5 U	3 9 U	3 7 U
alpha-Chlordane	ug/Kg	6 3	25%	540	0	2.9 J	1 9 U	1.9 UJ	2.3 U	2 U	1 9 U

TABLE 3-8

SENECA ARMY DEPOT ACTIVITY
SEAD-64A PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM ESI

COMPOUND	MATRIX	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64
	DEPTH (FEET)					0-0.2	0-2	2-3	0-0 2	2-4	4-6
	SAMPLE DATE					06/10/94	06/10/94	06/10/94	04/02/94	04/02/94	04/02/94
	ES ID					SB64A-3-00	SB64A-3-01	SB64A-3-02	MW64A-1.00	MW64A-1.02	MW64A-1 03
	LAB ID					223897	223906	223907	216351	216352	216353
	SDG NUMBER					44725	44748	44748	43257	43257	43257
	UNITS										
METALS											
Aluminum	mg/Kg	19800	100%	20650	0	16500	14500	15000	16100	19800	12600
Antimony	mg/Kg	4.3	25%	6.27	0	0.24 UJ	0.25 UJ	0.21 UJ	0.23 J	0.2 UJ	0 2 UJ
Arsenic	mg/Kg	8.4	100%	9.6	0	5.7	6.1	5.9	7.1	8.2	5
Barium	mg/Kg	133	100%	300	0	109	103	86.1	83.7	91.2	62.3
Beryllium	mg/Kg	0.8	100%	1.13	0	0.74 J	0.72 J	0.65 J	0.68 J	0.74 J	0.53 J
Cadmium	mg/Kg	1	92%	2.46	0	0.83 J	0.4 J	0.32 J	0.11 J	0 02 U	0 12 J
Calcium	mg/Kg	72400	100%	125300	0	27600	3560	3130	7210	4300	72400
Chromium	mg/Kg	35.5	100%	30.95	1	23.7	20.8 J	22.1 J	23	25	19
Cobalt	mg/Kg	14	100%	30	0	9.1 J	11.3	11	11.8	11.3	9 1 J
Copper	mg/Kg	56.3	100%	32.94	1	21	23.4	25.8	25.5	21	23 7
Iron	mg/Kg	35900	100%	38110	0	24600	26700	26800	28500	28000	22600
Lead	mg/Kg	391	100%	23.49	1	24.4	13.6 R	10.8 R	21 6	13.6	15 4
Magnesium	mg/Kg	14800	100%	21890	0	5870	4410	5190	5480	5010	14800
Manganese	mg/Kg	968	100%	1095	0	664	753	556	558	604	402
Mercury	mg/Kg	0.1	100%	0.1	0	0.05 J	0.05 J	0.04 J	0.05 J	0.03 J	0 02 J
Nickel	mg/Kg	36.1	100%	52.58	0	26.5	29	33.9	32.2	28.6	26 7
Potassium	mg/Kg	2820	100%	2623	2	2430 J	1630 J	2210 J	2590 J	2260 J	2700 J
Selenium	mg/Kg	1.7	63%	2	0	0.73 J	0.91 J	0.83	0.96	1 7	0.34 U
Sodium	mg/Kg	92.1	75%	0.77	0	42.8 J	21.9 J	16.4 U	27.5 U	31.8 U	92 1 J
Thallium	mg/Kg	0.42	8%	187.8	0	0.35 U	0 37 U	0.31 U	0.42 J	0.32 U	0.32 U
Vanadium	mg/Kg	33.5	100%	150	0	33.5	25 6	25	27.6	32.2	22 8
Zinc	mg/Kg	167	100%	115.3	1	92.7	77 4	82.8	104	87.1	64 9
OTHER ANALYSES											
Total Solids	%W/W					83.5	87 7	88	74 3	84 5	90 4

NOTES:

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

The PAHs were detected in and directly below the landfill material from the two borings located on the landfill. The concentrations were generally less than 6,000 μg/kg. The highest concentration was 15,000 μg/kg of phenanthrene in the 2- to 4-foot sample from SB64A-2 which is directly below the fill material. No PAHs were detected in the background samples from MW64A-1. TAGM exceedances were noted for benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene. The concentrations of PAHs in soil are shown in Figure 3-15.

Four other SVOs were also detected: phenol, dibenzofuran, bis(2-ethylhexyl) phthalate, and di-n-butylphthalate. These compounds were detected at concentrations less than their criteria.

Pesticides and PCBs

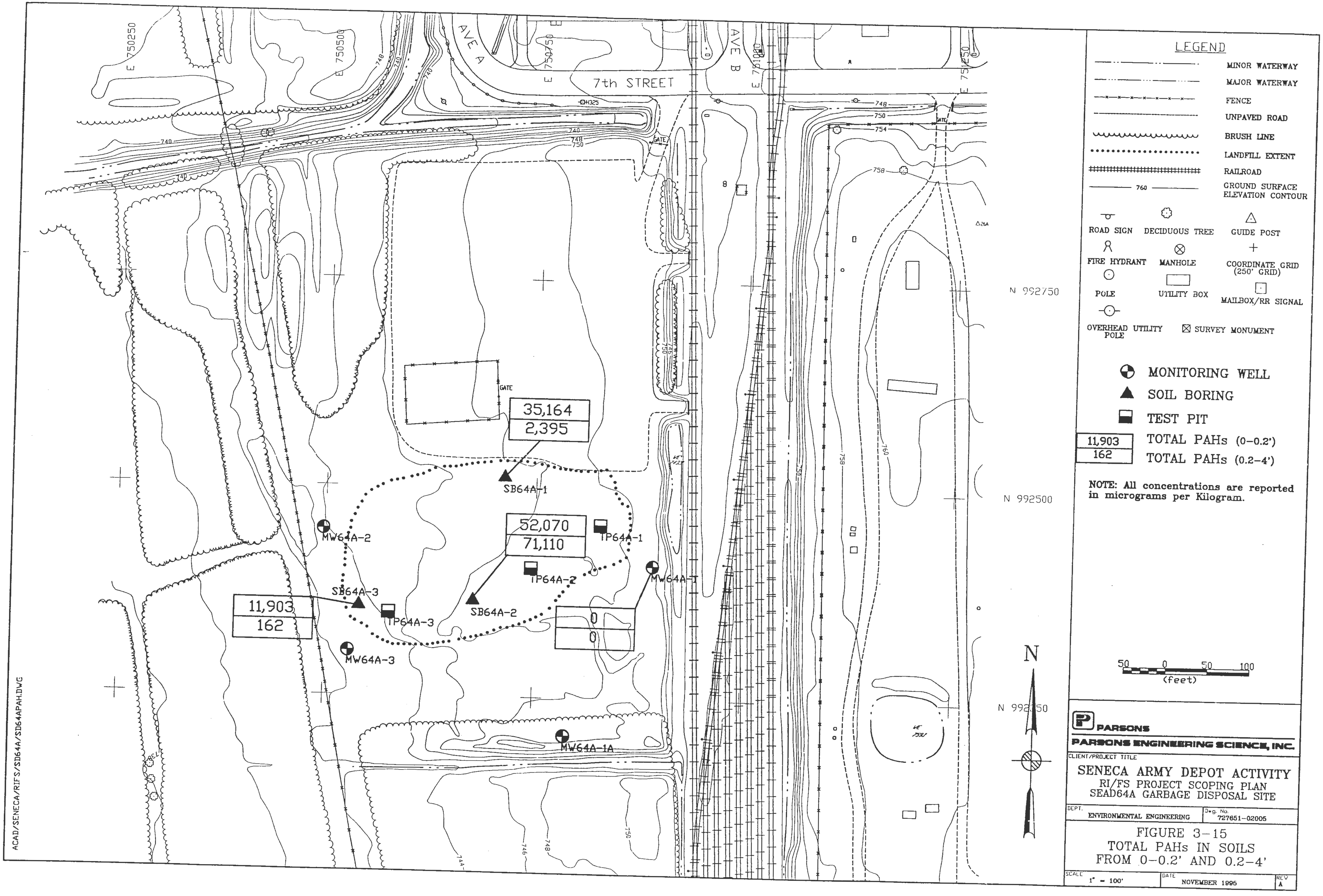
Eight pesticides were detected in the nine soil samples obtained from the three borings (SB64A-1, 2, and 3) at concentrations less than their criteria. Pesticides were detected primarily in the 0 to 0.2-foot soil samples. No pesticides were detected in the background soil samples from MW64A-1.

Metals

Five metals (chromium, copper, lead, potassium and zinc) were found at concentrations above their TAGM criteria. The exceedances occurred primarily at the location of soil boring SB64A-2 (samples -00 and -02).

Groundwater

Groundwater samples from three monitoring wells were collected as part of the ESI conducted at SEAD-64A. The summary of chemical analyses is presented in Table 3-9. The following sections describe the nature and extent of groundwater contamination identified at SEAD-64A.



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SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING	Dwg. No. 727651-02005

FIGURE 3-15
TOTAL PAHs IN SOILS
FROM 0-0.2' AND 0.2-4'

SCALE 1" = 100'	DATE NOVEMBER 1995	REV A

TABLE 3-9

SENECA ARMY DEPOT ACTIVITY
SEAD-64A PROJECT SCOPING PLAN
GROUNDWATER ANALYSIS RESULTS FROM ESI

COMPOUND	MATRIX	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	FEDERAL DRINKING WATER MCL (h)	NUMBER ABOVE LOWEST CRITERIA	WATER	WATER	WATER
	LOCATION						SEAD-64	SEAD-64	SEAD-64
	SAMPLE DATE						07/19/94	07/21 & 22/94	07/07/94
	ES ID						MW64A-1	MW64A-2	MW64A-3
	LAB ID						227451	227730, 227732	226306
	SDG NUMBER						45448	45448	45257
	UNITS								
METALS									
Aluminum	ug/L	1710	100%	NA	50-200 *	3	398	1710	379
Barium	ug/L	74.5	100%	1000	2000	0	42 J	74.5 J	53.4 J
Calcium	ug/L	148000	100%	NA	NA	NA	109000	148000	143000
Chromium	ug/L	3.8	100%	50	100	0	0.49 J	3.8 J	0.46 J
Cobalt	ug/L	4.7	33%	NA	NA	NA	0.5 U	4.7 J	0.5 U
Copper	ug/L	1.4	100%	200	1000 *	0	0.61 J	1.4 J	0.97 J
Iron	ug/L	3340	100%	300	300 *	3	773 J	3340 J	539
Magnesium	ug/L	23400	100%	NA	NA	NA	16800	23400	20700
Manganese	ug/L	2040	100%	300	50 *	1	28.3	2040	40.6
Mercury	ug/L	0.06	100%	2	2	0	0.04 J	0.06 J	0.04 J
Nickel	ug/L	9.6	100%	NA	100	0	1 J	9.6 J	1.9 J
Potassium	ug/L	15000	100%	NA	NA	NA	1790 J	15000 J	2010 J
Sodium	ug/L	13000	100%	20000	NA	0	2180 J	13000	10000
Thallium	ug/L	3.3	33%	NA	2	1	1.9 U	3.3 J	1.9 U
Vanadium	ug/L	3	100%	NA	NA	NA	1.3 J	3 J	0.65 J
Zinc	ug/L	16	100%	300	5000 *	0	3.9 J	16 J	5.8 J
OTHER ANALYSES									
pH	Standard Units						7.4	7.4	7
Conductivity	umhos/cm						500	950	620
Temperature	°C						15	21.6	13.6
Turbidity	NTU						15	80	120

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 Maximum Contaminant Levels
(40 CFR 141.61-62 and 40 CFR 143.3)

Volatile Organic Compounds

No volatile organic compounds were detected in the three groundwater samples collected at SEAD-64A.

Semivolatile Organic Compounds

No semivolatile organic compounds were detected in the three groundwater samples collected at SEAD-64A.

Pesticides and PCBs

No pesticides or PCBs were detected in the three groundwater samples collected at SEAD-64A.

Metals

Groundwater from MW64A-2, located hydraulically downgradient of the landfill, had metals concentrations 1.5 to 9 times higher than concentrations found in the background well. The second downgradient groundwater sample from MW64A-3 had metals concentrations similar to the background well, MW64A-1.

Four metals, aluminum, iron, manganese, and thallium were found in the groundwater samples at concentrations above either the NYSDEC Class GA or the Federal Primary and Secondary Drinking Water Standards. Aluminum exceeded the maximum Federal Secondary Drinking Water Maximum Contaminant Level (MCL) (50 μg/L) in all three samples with results ranging from 379 μg/L to 1710 μg/L. Iron was found in all three wells at concentrations above the criteria values of 300 μg/L. The iron concentrations were between 539 μg/L and 3,340 μg/L. One manganese sample exceeded both state and federal criteria values with a concentration of 2040 μg/L at MW64A-2. Thallium had an estimated concentration of 3.3 μg/L at MW64A-2, exceeding the federal standard of 2 μg/L.

3.1.2.3 Data Summary and Conclusions

The results of the ESI conducted at SEAD-64A indicate that a small landfill on site has impacted the soil and groundwater quality.

It is important to note that in some instances the detection limit for individual analyses may be raised (sometimes above the criteria value) due to dilution or matrix effects in the sample. Also, note that the total number of samples found to exceed the criteria in analytical results tables may include estimated concentrations (i.e., J-qualified data). This should be noted when considering further investigation or remedial action activities.

The soils have been impacted by the waste material that was landfilled on site. The fill material (typically 2 to 3 feet thick) and underlying soil contain polynuclear aromatic hydrocarbons which are present at concentrations above their criteria. Concentrations of heavy metals above their criteria were present in all of the soil samples, though no consistent pattern in their occurrences was evident. This is attributed to natural soil variations. One exception was a landfill surface soil sample that contained concentrations of copper, lead, and zinc at least two times their criteria.

The landfill is affecting the groundwater based on the increased metals concentrations in the downgradient groundwater samples. These metals include aluminum, iron, manganese, and thallium. No organic compounds analyzed for were detected in the groundwater samples.

3.1.3 SEAD-64D

3.1.3.1 Site History

The area occupied by SEAD-64D was a vineyard before SEDA was constructed in 1941. Since then, the land was allowed to reforest. At some time, SEDA cut fire lanes through the vegetation for firefighting.

SEAD-64D was reportedly used for waste disposal during the period from 1974 to 1979 when the on-site incinerator was inoperable. The SWMU Classification Report states that metal drums and other industrial waste were also reportedly disposed on site.

3.1.3.2 Physical Site Characterization

3.1.3.2.1 Physical Site Setting

SEAD-64D covers approximately 90 acres between West Patrol Road and the SEDA railroad tracks along the North-South Baseline Road (Figure 1-1). The site is approximately 2,800 feet long in a north-south direction and is approximately 1,600 feet wide in an east-west direction at the north end and 1,200 feet at the south end. Firebreaks are cut into the vegetation in the area and trend east-west and north-south.

The site is heavily vegetated with low brush, small deciduous trees, and grass. Areas in the southern portion of the site are heavily vegetated with large deciduous trees. Stressed vegetation was observed adjacent to West Patrol Road.

The land on site slopes generally downward to the west. An intermittent stream flows west through the south-central portion of the site, then off SEDA property. There are several wetlands along the east side of the site. There are low areas along the east side of West Patrol Road.

Two disposal areas were observed on site as evidenced by metal or other debris on the ground surface. These two areas are shown on Figure 1-4. At the south end of the site, an elongate east-west trending mound approximately 75 feet long contains trash and debris. Immediately to the north and east of this elongated mound are three 25-foot to 30-foot diameter depressions that are 2 to 4 feet deep. There are two other mounds nearby. In the east-central portion of the site, metal disposed on the ground surface was also observed.

Shallow north-south trending furrows in the ground surface are present over most of the site. These furrows are probably related to the former use of the site as a vineyard prior to the establishment of SEDA.

The site is bordered by the non-combustible fill area, the Ash Landfill, and an inactive incinerator (SEADs-8, 6, and 15, respectively) to the north, a railroad line and undeveloped land to the east, forested land to the south, and the West Patrol Road and the SEDA property boundary to the west.

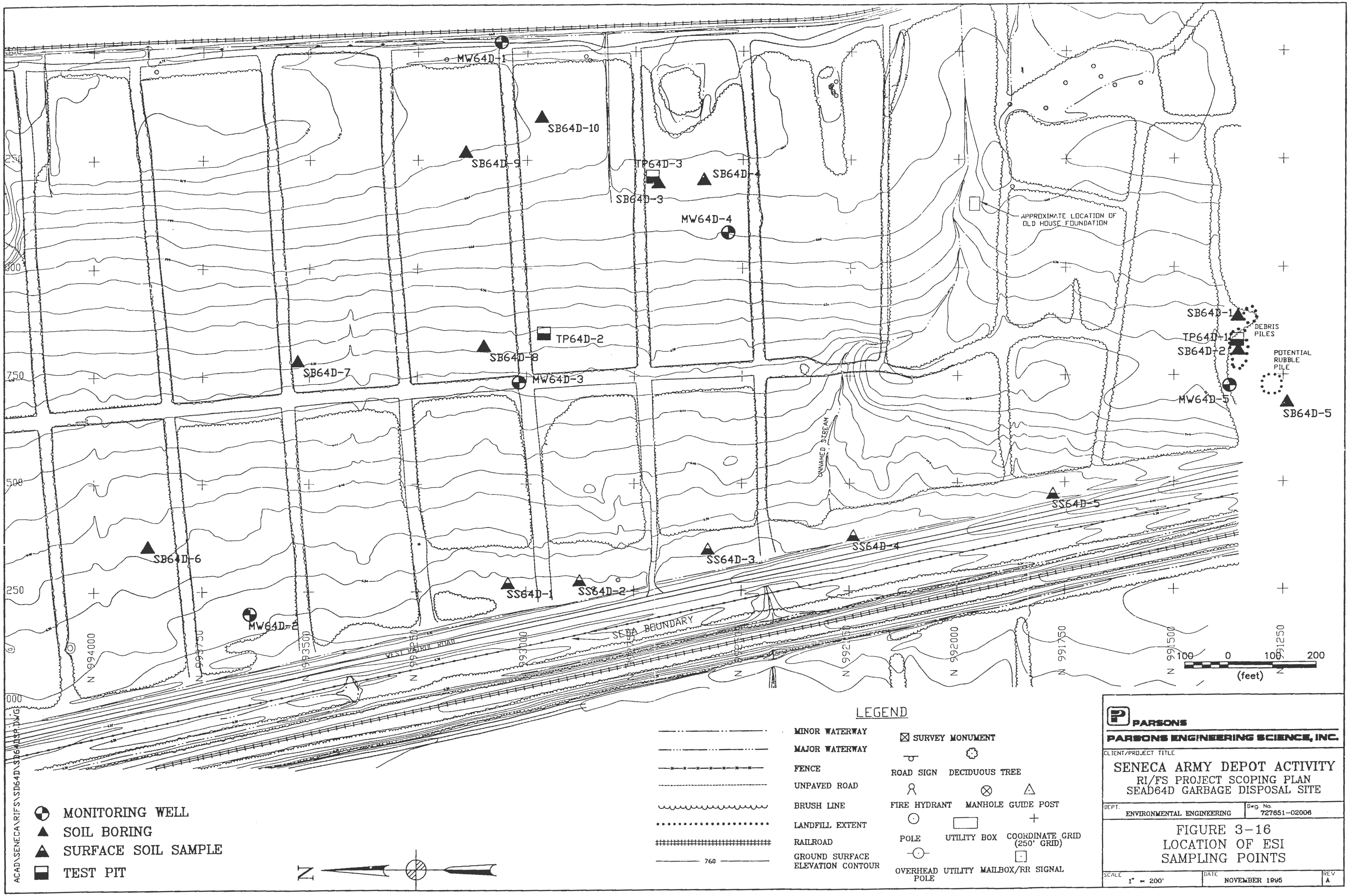
3.1.3.2.2 Site Geology

Subsurface soil samples were obtained from ten borings (SB64D-1 to -10) and five borings in which monitoring wells were installed (MW64D-1 to -5) as located on Figure 3-16. The boring logs, presented in Appendix G, were used to define the site geology.

The following strata were observed in the borings with increasing depth: topsoil, glacial till, weathered shale, and shale. All the strata and the bedrock surface parallel the slope of the ground surface.

Topsoil was encountered at all the borings drilled at undisturbed locations. This strata was observed to be 0.1 to 1.2 feet thick.

The till was observed to be 1.8 to 6.3 feet thick in the borings across the site. The till generally consisted of light brown silt and very fine sand with shale fragments, up to one inch in size, and trace amounts of clay. Layers of clay and of oxidized till were observed in some of the borings in the upper portion of the till. Larger shale fragments, thought to be rip-up clasts, were encountered in some of the borings near the base of the till layer.



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RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 727651-02006

FIGURE 3-16
LOCATION OF ESI
SAMPLING POINTS

SCALE 1" = 200'
DATE NOVEMBER 1995
REV A

A layer of weathered shale, 0.2 to 3.6 feet thick, was observed in all of the borings.

Bedrock on site consists of calcareous grey shale. The bedrock surface, as defined by auger or split spoon refusal, was encountered from 4.9 to 10.2 feet below ground surface.

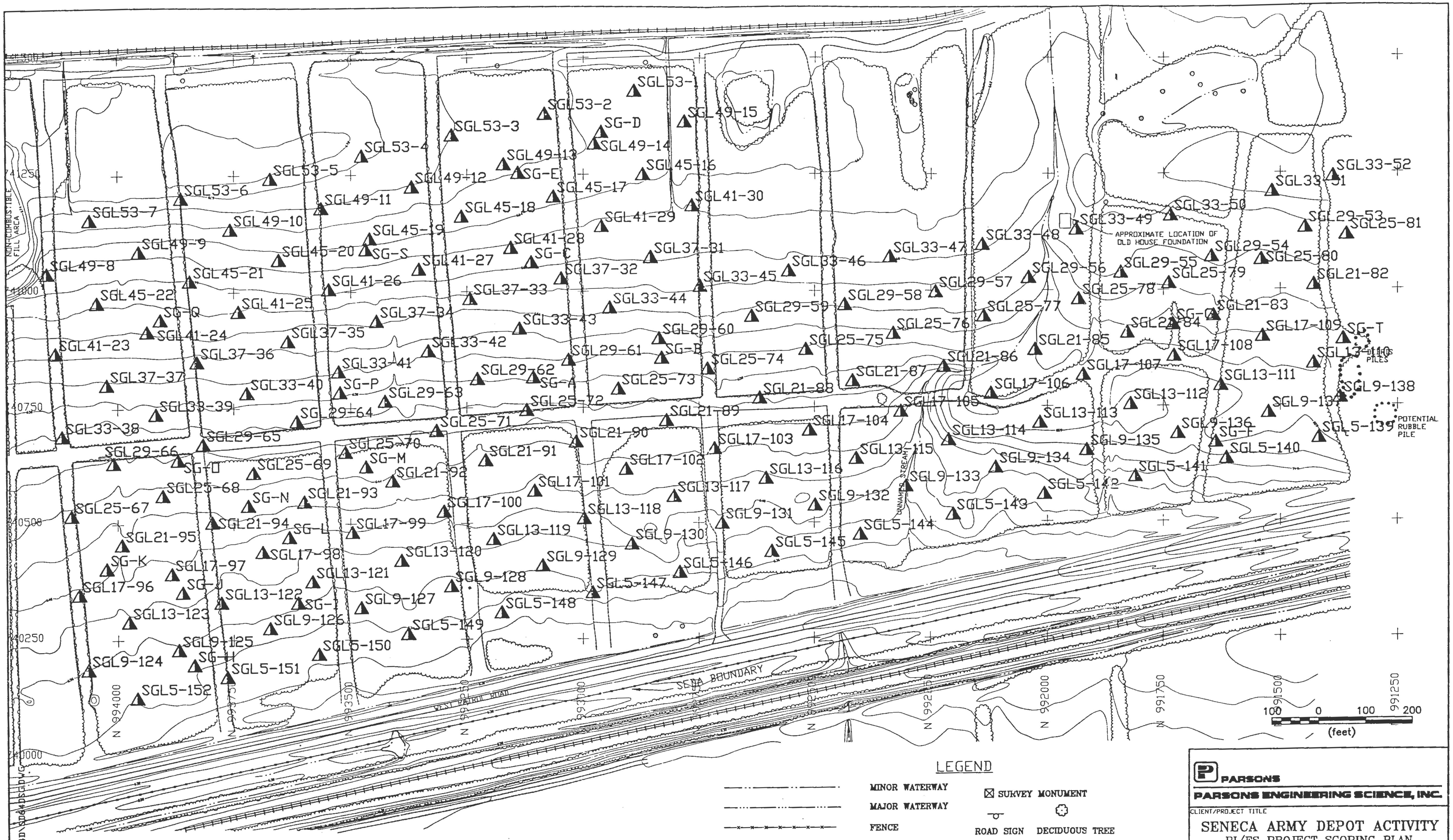
The only fill material was observed at the south end of SEAD-64D in the form of three piles or berms. The contents of the 75-foot long middle pile were investigated with a test pit and a boring. The fill primarily consisted of the same glacial till as present on the site. Four feet of household debris were observed in test pit TP64D-1 which was excavated into the side of the berm. Soil boring SB64D-2, drilled from the top of the same berm, encountered 2.3 feet of fill, but no layer of trash or debris. Refer to Section 3.1.2.4 for more detailed information regarding the waste material.

The surfaces of the other two piles were examined. No debris was observed on the eastern pile. Debris was observed on the surface of the western pile.

3.1.3.2.3 Soil Gas Survey

A soil gas survey was used to locate areas on the site that have been impacted by volatile organic compounds at points on a grid pattern with a spacing of approximately 150 feet. Soil gas samples were collected at 162 of 171 locations shown in Figure 3-17. At five of the locations, soil gas could not be obtained because groundwater filled the soil gas sampling tube after it was driven into the ground. At four other locations, the sampling tube hit refusal within 2.5 feet of the ground surface.

The soil gas survey results are presented in Table 3-10. The soil gas survey did not detect volatile organic compounds at any of the sampling points. Detector responses were used in conjunction with calibration curve data to calculate concentrations expressed as TCE in parts per million by volume (ppmv). Table 3-9 shows the concentrations of volatiles calculated at each sampling point as well as the maximum OVM readings of the soil gas immediately prior to sampling.



LEGEND

―·―·―	MINOR WATERWAY
―··―··―	MAJOR WATERWAY
―x―x―x―	FENCE
-------	UNPAVED ROAD
︵︵︵	BRUSH LINE
•••••••	LANDFILL EXTENT
┼┼┼┼┼┼┼	RAILROAD
―― 760 ――	GROUND SURFACE ELEVATION CONTOUR

☒ SURVEY MONUMENT

ROAD SIGN	DECIDUOUS TREE	
FIRE HYDRANT	⊗ MANHOLE	△ GUIDE POST
⊙ POLE	▭ UTILITY BOX	+ COORDINATE GRID (250' GRID)
-⊙- OVERHEAD UTILITY POLE	⊡ MAILBOX/RR SIGNAL	

▲ SGL41-29 SOIL GAS LOCATION

N

ACAD\SENECA\RIFS\SD64D\SD64DSG.DWG

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SEAD64D GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 727651-02006

FIGURE 3-17
LOCATION OF ESI
SOIL GAS SAMPLING POINTS

SCALE 1" = 200'
DATE NOVEMBER 1995
REV A

TABLE 3-10

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SUMMARY OF ESI SOIL GAS SURVEY RESULTS

Sample Name	Location		OVM Screen (ppm)	Concentration (ppmV as TCE)
	Line	Station		
Soil Gas Points Based on a Grid System:				
SGL53-1	53	8700	<0.1	<0.01
SGL53-2	53	8900	<0.1	<0.01
SGL53-3	53	9100	<0.1	<0.01
SGL53-4	53	9300	<0.1	<0.01
SGL53-5	53	9500	<0.1	<0.01
SGL53-6	53	9700	<0.1	<0.01
SGL53-7	53	9900	<0.1	<0.01
SGL49-8	49	10,000	<0.1	<0.01
SGL49-9	49	9800	<0.1	<0.01
SGL49-10	49	9600	<0.1	<0.01
SGL49-11	49	9400	<0.1	<0.01
SGL49-12	49	9200	<0.1	<0.01
SGL49-13	49	9000	<0.1	<0.01
SGL49-14	49	8800	<0.1	<0.01
SGL49-15	49	8600	<0.1	<0.01
SGL45-16	45	8700	<0.1	<0.01
SGL45-17	45	8900	<0.1	<0.01
SGL45-18	45	9100	<0.1	<0.01
SGL45-19	45	9300	<0.1	<0.01
SGL45-20	45	9500	<0.1	<0.01
SGL45-21	45	9700	<0.1	<0.01
SGL45-22	45	9900	<0.1	<0.01
SGL41-23	41	10,000	<0.1	<0.01
SGL41-24	41	9800	<0.1	<0.01
SGL41-25	41	9600	<0.1	<0.01
SGL41-26	41	9400	<0.1	<0.01
SGL41-27	41	9200	<0.1	<0.01
SGL41-28	41	9000	<0.1	<0.01
SGL41-29	41	8800	<0.1	<0.01
SGL41-30	41	8600	<0.1	<0.01
SGL37-31	37	8700	<0.1	<0.01
SGL37-32	37	8900	<0.1	<0.01
SGL37-33	37	9100	No Sample (R)	No Sample (R)
SGL37-34	37	9300	<0.1	<0.01
SGL37-35	37	9500	<0.1	<0.01
SGL37-36	37	9700	<0.1	<0.01
SGL37-37	37	9900	<0.1	<0.01

TABLE 3-10

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SUMMARY OF ESI SOIL GAS SURVEY RESULTS

Sample Name	Location		OVM Screen (ppm)	Concentration (ppmV as TCE)
	Line	Station		
SGL33-38	33	10,000	<0.1	<0.01
SGL33-39	33	9800	<0.1	<0.01
SGL33-40	33	9600	<0.1	<0.01
SGL33-41	33	9400	<0.1	<0.01
SGL33-42	33	9200	<0.1	<0.01
SGL33-43	33	9000	<0.1	<0.01
SGL33-44	33	8800	<0.1	<0.01
SGL33-45	33	8600	<0.1	<0.01
SGL33-46	33	8400	<0.1	<0.01
SGL33-47	33	8200	<0.1	<0.01
SGL33-48	33	8000	<0.1	<0.01
SGL33-49	33	7800	<0.1	<0.01
SGL33-50	33	7600	<0.1	<0.01
SGL33-51	33	7400	<0.1	<0.01
SGL33-52	33	7200	<0.1	<0.01
SGL29-53	29	7300	<0.1	<0.01
SGL29-54	29	7500	<0.1	<0.01
SGL29-55	29	7700	<0.1	<0.01
SGL29-56	29	7900	<0.1	<0.01
SGL29-57	29	8100	No Sample (R)	No Sample (R)
SGL29-58	29	8300	<0.1	<0.01
SGL29-59	29	8500	<0.1	<0.01
SGL29-60	29	8700	<0.1	<0.01
SGL29-61	29	8900	<0.1	<0.01
SGL29-62	29	9100	<0.1	<0.01
SGL29-63	29	9300	<0.1	<0.01
SGL29-64	29	9500	<0.1	<0.01
SGL29-65	29	9700	<0.1	<0.01
SGL29-66	29	9900	<0.1	<0.01
SGL25-67	25	10,000	<0.1	<0.01
SGL25-68	25	9800	<0.1	<0.01
SGL25-69	25	9600	<0.1	<0.01
SGL25-70	25	9400	<0.1	<0.01
SGL25-71	25	9200	<0.1	<0.01
SGL25-72	25	9000	<0.1	<0.01
SGL25-73	25	8800	<0.1	<0.01
SGL25-74	25	8600	<0.1	<0.01
SGL25-75	25	8400	<0.1	<0.01
SGL25-76	25	8200	<0.1	<0.01
SGL25-77	25	8000	<0.1	<0.01
SGL25-78	25	7800	<0.1	<0.01
SGL25-79	25	7600	<0.1	<0.01
SGL25-80	25	7400	No Sample (W)	No Sample (W)
SGL25-81	25	7200	<0.1	<0.01

TABLE 3-10

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SUMMARY OF ESI SOIL GAS SURVEY RESULTS

Sample Name	Location		OVM Screen (ppm)	Concentration (ppmV as TCE)
	Line	Station		
SGL21-82	21	7300	<0.1	<0.01
SGL21-83	21	7500	<0.1	<0.01
SGL21-84	21	7700	<0.1	<0.01
SGL21-85	21	7900	No Sample (W)	No Sample (W)
SGL21-86	21	8100	<0.1	<0.01
SGL21-87	21	8300	<0.1	<0.01
SGL21-88	21	8500	<0.1	<0.01
SGL21-89	21	8700	<0.1	<0.01
SGL21-90	21	8900	<0.1	<0.01
SGL21-91	21	9100	<0.1	<0.01
SGL21-92	21	9300	<0.1	<0.01
SGL21-93	21	9500	<0.1	<0.01
SGL21-94	21	9700	<0.1	<0.01
SGL21-95	21	9900	<0.1	<0.01
SGL17-96	17	10,000	<0.1	<0.01
SGL17-97	17	9800	<0.1	<0.01
SGL17-98	17	9600	<0.1	<0.01
SGL17-99	17	9400	<0.1	<0.01
SGL17-100	17	9200	<0.1	<0.01
SGL17-101	17	9000	<0.1	<0.01
SGL17-102	17	8800	<0.1	<0.01
SGL17-103	17	8600	<0.1	<0.01
SGL17-104	17	8400	<0.1	<0.01
SGL17-105	17	8200	<0.1	<0.01
SGL17-106	17	8000	<0.1	<0.01
SGL17-107	17	7800	<0.1	<0.01
SGL17-108	17	7600	<0.1	<0.01
SGL17-109	17	7400	<0.1	<0.01
SGL13-110	13	7300	<0.1	<0.01
SGL13-111	13	7500	<0.1	<0.01
SGL13-112	13	7700	<0.1	<0.01
SGL13-113	13	7900	<0.1	<0.01
SGL13-114	13	8100	<0.1	<0.01
SGL13-115	13	8300	<0.1	<0.01
SGL13-116	13	8500	<0.1	<0.01
SGL13-117	13	8700	<0.1	<0.01
SGL13-118	13	8900	<0.1	<0.01
SGL13-119	13	9100	<0.1	<0.01
SGL13-120	13	9300	<0.1	<0.01
SGL13-121	13	9500	<0.1	<0.01
SGL13-122	13	9700	<0.1	<0.01
SGL13-123	13	9900	<0.1	<0.01

TABLE 3-10

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SUMMARY OF ESI SOIL GAS SURVEY RESULTS

Sample Name	Location		OVM Screen (ppm)	Concentration (ppmV as TCE)
	Line	Station		
SGL9-124	9	10,000	<0.1	<0.01
SGL9-125	9	9800	<0.1	<0.01
SGL9-126	9	9600	<0.1	<0.01
SGL9-127	9	9400	<0.1	<0.01
SGL9-128	9	9200	<0.1	<0.01
SGL9-129	9	9000	<0.1	<0.01
SGL9-130	9	8800	<0.1	<0.01
SGL9-131	9	8600	<0.1	<0.01
SGL9-132	9	8400	<0.1	<0.01
SGL9-133	9	8200	<0.1	<0.01
SGL9-134	9	8000	<0.1	<0.01
SGL9-135	9	7800	<0.1	<0.01
SGL9-136	9	7600	<0.1	<0.01
SGL9-137	9	7400	<0.1	<0.01
SGL9-138	9	7250	<0.1	<0.01
SGL5-139	5	7300	<0.1	<0.01
SGL5-140	5	7500	No Sample (R)	No Sample (R)
SGL5-141	5	7700	<0.1	<0.01
SGL5-142	5	7900	<0.1	<0.01
SGL5-143	5	8100	<0.1	<0.01
SGL5-144	5	8300	<0.1	<0.01
SGL5-145	5	8500	<0.1	<0.01
SGL5-146	5	8700	<0.1	<0.01
SGL5-147	5	8900	<0.1	<0.01
SGL5-148	5	9100	No Sample (W)	No Sample (W)
SGL5-149	5	9300	No Sample (W)	No Sample (W)
SGL5-150	5	9500	<0.1	<0.01
SGL5-151	5	9700	No Sample (W)	No Sample (W)
SGL5-152	5	9900	<0.1	<0.01
Soil Gas Points Based on Geophysical Anomalies:				
SG-A	28	8980	<0.1	<0.01
SG-B	27	8795	<0.1	<0.01
SG-C	39	8960	<0.1	<0.01
SG-D	50	8780	<0.1	<0.01
SG-E	48	8970	<0.1	<0.01
SG-F	7	7520	No Sample (R)	No Sample (R)
SG-G	21	7600	<0.1	<0.01
SG-H	7	9770	<0.1	<0.01
SG-I	11	9530	<0.1	<0.01
SG-J	15	9780	<0.1	<0.01
SG-K	19	9940	<0.1	<0.01

TABLE 3-10

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SUMMARY OF ESI SOIL GAS SURVEY RESULTS

Sample Name	Location		OVM Screen (ppm)	Concentration (ppmV as TCE)
	Line	Station		
SG-L	18	9540	<0.1	<0.01
SG-M	23	9360	<0.1	<0.01
SG-N	22	9620	<0.1	<0.01
SG-O	28	9760	<0.1	<0.01
SG-P	31	9400	<0.1	<0.01
SG-Q	42	9770	<0.1	<0.01
SG-S	44	9310	<0.1	<0.01
SG-T	15	7230	<0.1	<0.01

Notes:
1) Rod Blanks and field duplicates were collected daily for Quality Control.
2) "No Sample" indicates that high groundwater was present (W) or refusal was encountered within 2.5 feet (R); therefore no soil gas sample was collected.

3.1.3.2.4 Geophysics

Several geophysical survey techniques were used on site. A seismic survey was used to determine the approximate groundwater flow direction on site. An electromagnetic survey was used to locate possible disposal areas. A ground penetrating radar survey was used to detect anomalies in the subsurface conditions, such as filled pits.

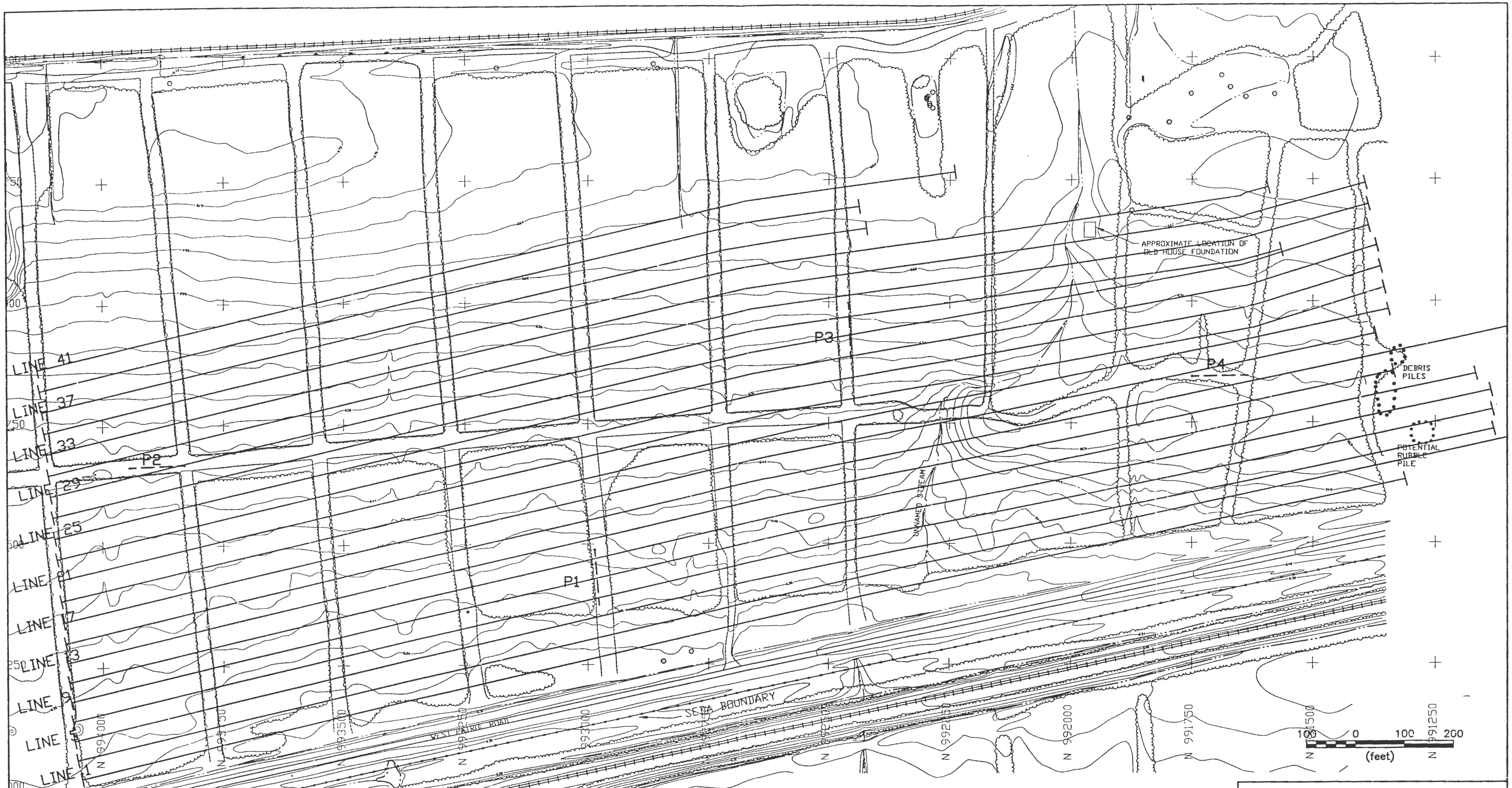
Seismic Survey

Four seismic refraction profiles, each 120 feet long, were performed at the locations shown in Figure 3-18 to obtain approximate groundwater depth information. The results of the seismic refraction survey conducted at SEAD-64D are shown in Table 3-11. Saturated overburden was detected only on profiles P1 and P2 at depths of 5.4 and 6.2 feet at P1 and 4.1 feet at P2.

The seismic refraction profiles detected 4 to 15 feet of unconsolidated overburden (1,050 to 4,900 ft./sec.) overlying bedrock (8,200 to 13,000 ft./sec.). In particular, the unconsolidated material included unsaturated overburden (1,050 to 1,370 ft./sec.) and saturated overburden (4,580 to 4,900 ft./sec.).

Seismic velocities typical of weathered shale (8,200 to 8,400 ft./sec.) were detected on profiles P1 and P3. However, on both profiles, the low velocity bedrock layer was detected only over a portion of the seismic transect. At distance 120 feet on profile P1, weathered rock was detected at a depth of 5.7 feet (refer to Table 3-11). On profile P3, weathered rock was detected at a depth of approximately 5.8 feet at distances -5 feet and 57.5 feet. At distance 120 feet of this profile, competent rock (13,000 ft/sec) was detected at a depth of 14.8 feet.

A review of Table 3-11 indicates that the bedrock slopes to the west, generally following the surface topography. Groundwater flow is also expected to be to the west, following the slope of the bedrock.



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING

Dwg No. 727651-02006

FIGURE 3-18
LOCATION OF ESI
SEISMIC AND GPR SURVEYS

SCALE 1" = 200'

DATE NOVEMBER 1995

REV ▲

TABLE 3-11

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
RESULTS OF ESI SEISMIC REFRACTION SURVEY

Profile	Distance[1]	Ground Elevation[2]	Water Table		Bedrock	
			Depth	Elev[2].	Depth	Elev[2].
P1	-5 (West end)	634.5	6.2	628.5	14.9	619.5
	57.5	635.5	5.4	630	15.2	620.5
	120 (East end)	637.5			5.7	632
P2	-5 (South end)	647			5.4	641.5
	57.5	647			5.5	641.5
	120 (North end)	647	4.1	643	6.2	641
P3	-5 (West end)	650			5.7	644.5
	57.5	652.5			5.9	646.5
	120 (East end)	655			14.8	640
P4	-5 (South end)	650.5			4.9	645.5
	57.5	650.5			4.6	646
	120 (North end)	650			4.0	646

1. All distances are in feet along the axis of each seismic profile.

2. All elevations are accurate to ± 1 foot and are rounded to the nearest half foot.

Electromagnetic Survey

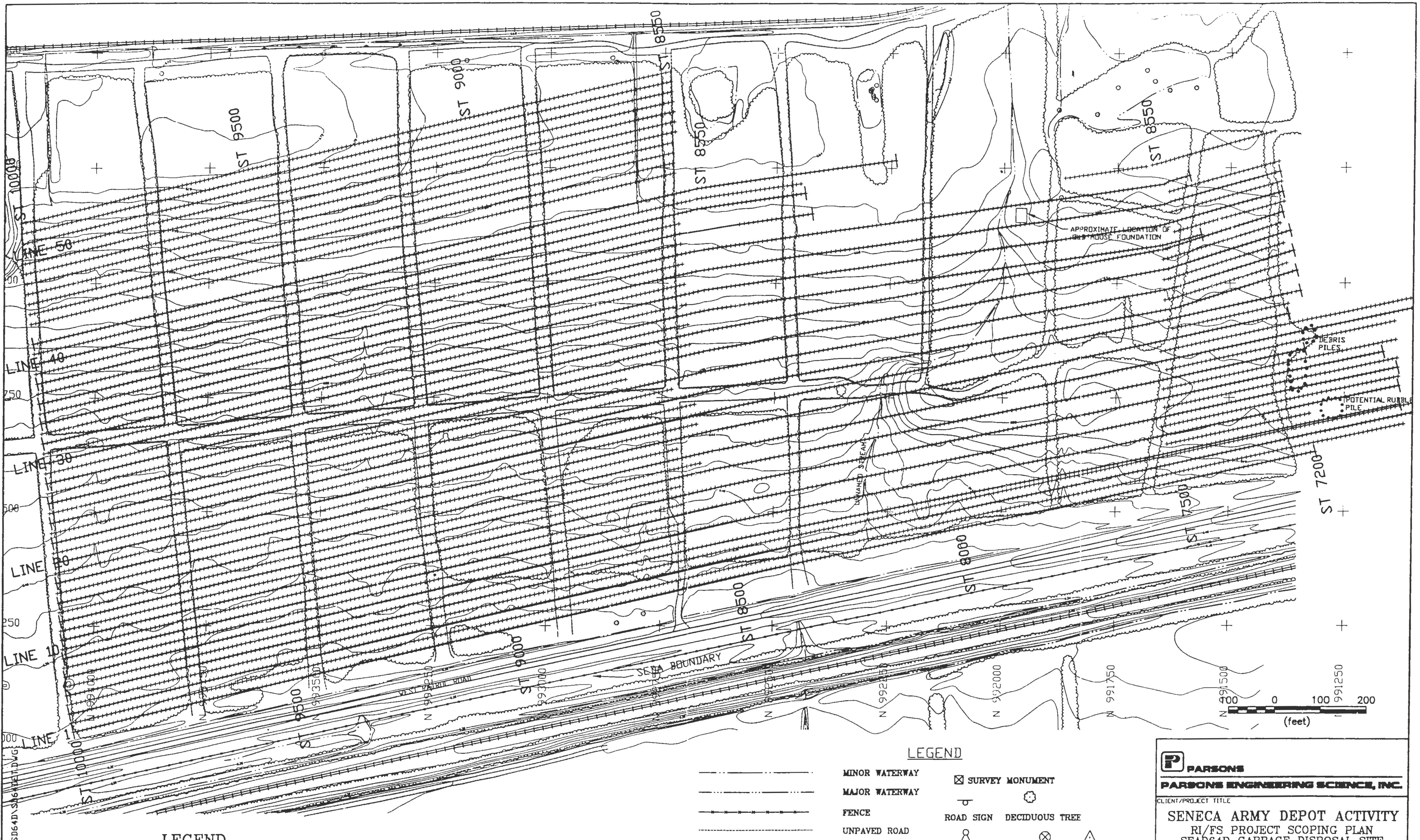
An electromagnetic survey, using the Geonics EM-31 Terrain Conductivity Meter, was performed across the site as shown in Figure 3-19. The survey was performed along lines parallel to the West Patrol Road. The lines were spaced 20 feet apart in the northern half of the site and at the southern end of the site. In much of the southern half, the lines were spaced 40 feet apart because this area has large deciduous trees.

Figure 3-20 shows the quadrature response which is proportional of the apparent ground conductivity. Three large areas of anomalous conductivity measurements were identified in the northern half of the grid. They are labelled A,B, and C in Figure 3-20. These three areas were characterized by groups of smaller anomalies with typically high conductivity values. A follow-up inspection at SEAD-64D suggested that these anomalies were caused by the posts and wires used to hold up the grape vines in the former vineyard. Small gauge wire was found running parallel to the furrows in the ground surface. These wires were often attached to tubular, four-foot long, metal posts which were found throughout the northern half of the site. The wires and posts were typically covered by 0.5 to 2 inches of decaying vegetation and/or topsoil.

A conductivity anomaly, labelled D on Figure 3-20, was detected in the east-central section of the site. Metal debris was observed on the ground surface in this area during a follow-up inspection.

The background conductivity values gradually decrease in the southern and the northeastern portions of the grid. This may be due to a decreased clay content in the overburden soils or to a decrease in the depth to bedrock.

Figure 3-21 shows the in-phase response which reflects the presence of buried ferrous objects. Most of the site has a similar response. Anomalies were detected at six locations labelled A to F on Figure 3-21. Anomaly A is at the location where disposed metal was present on the ground surface in the east-central section of the site. Anomalies B, C, and D are small and are located in the western half of the site. Anomalies E and F are located at the south end of the site where berms, piles, and depressions in the ground surface were observed.



LEGEND

LINE 1 ┼┼┼┼┼┼┼┼┼┼┼┼ EM TRANSECT AND STATION NUMBERS

ST10000

LEGEND

—··—··—	MINOR WATERWAY
—·—·—	MAJOR WATERWAY
—x—x—	FENCE
- - - - -	UNPAVED ROAD
︶︶︶︶	BRUSH LINE
··········	LANDFILL EXTENT
┼┼┼┼┼┼┼	RAILROAD
—— 760 ——	GROUND SURFACE ELEVATION CONTOUR

⊠ SURVEY MONUMENT

ROAD SIGN

DECIDUOUS TREE

FIRE HYDRANT

⊗ MANHOLE

△ GUIDE POST

○ POLE

▭ UTILITY BOX

+ COORDINATE GRID (250' GRID)

OVERHEAD UTILITY POLE

MAILBOX/RR SIGNAL

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RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT ENVIRONMENTAL ENGINEERING

Prog No. 727651-02006

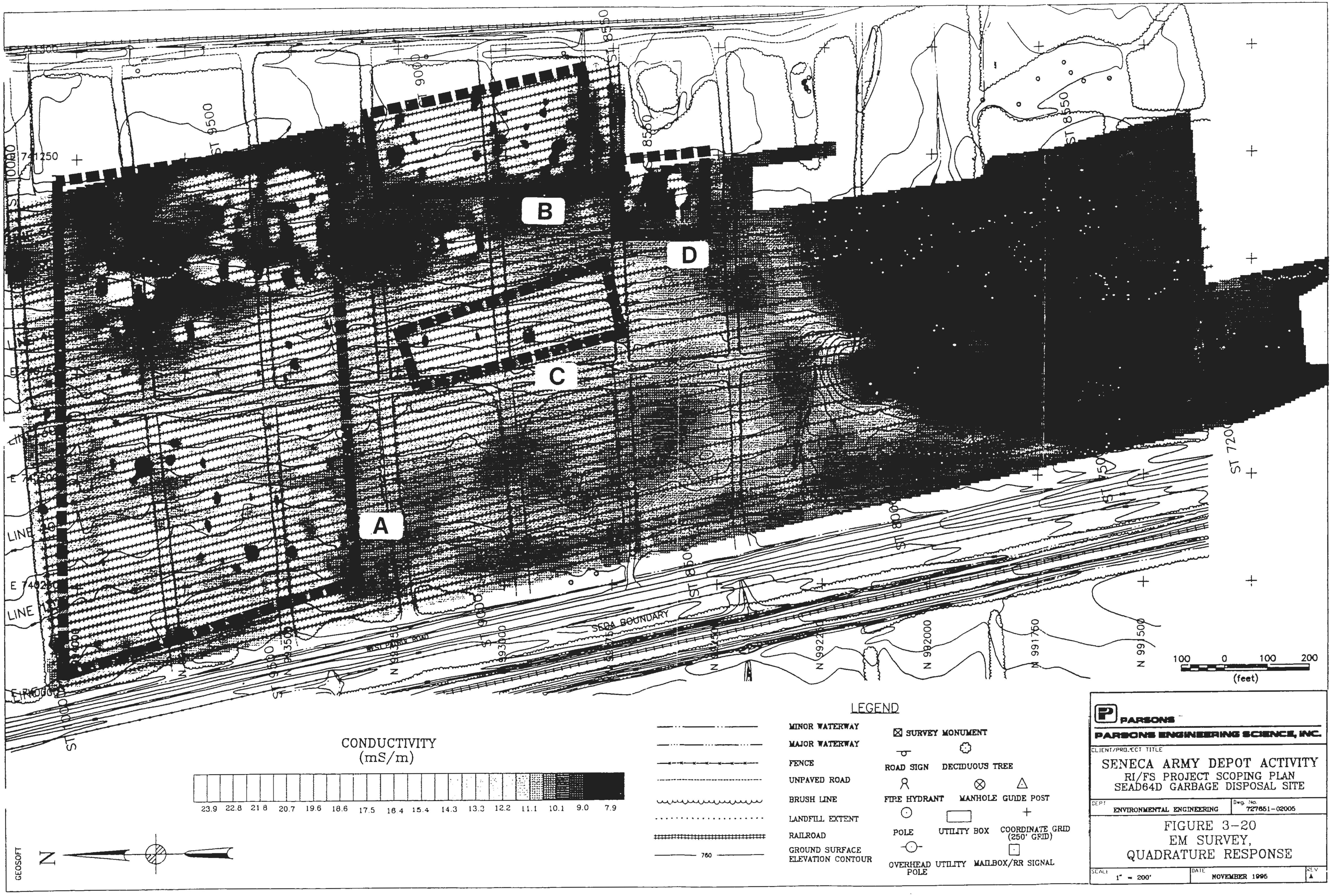
FIGURE 3-19
LOCATION OF ESI
ELECTROMAGNETIC TRANSECTS

SCALE 1" = 200'

DATE NOVEMBER 1995

REV A

ACAD\SENECA\RIFS\SD64D\SD64DEL.DWG



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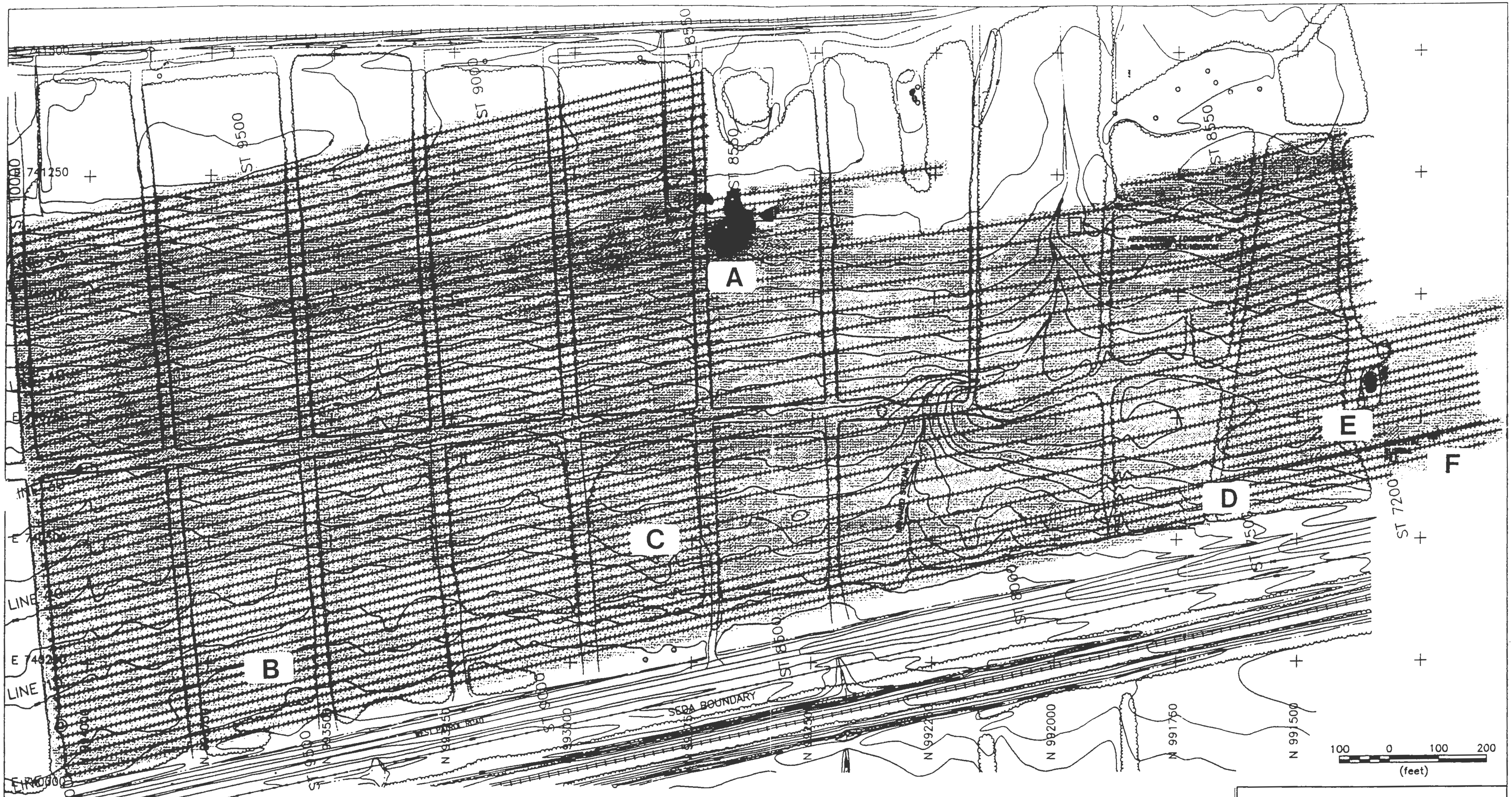
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT	Dwg. No.
ENVIRONMENTAL ENGINEERING	727651-02005

FIGURE 3-20
EM SURVEY,
QUADRATURE RESPONSE

SCALE	DATE	REV
1" = 200'	NOVEMBER 1995	▲



IN-PHASE
(ppt)

1.74	1.49	1.24	0.99	0.74	0.49	0.24	0.00	-0.24	-0.49	-0.74	-0.99	-1.24	-1.49	-1.74	-1.99

GEOSOFT

N

LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
- BRUSH LINE
- LANDFILL EXTENT
- RAILROAD
- GROUND SURFACE ELEVATION CONTOUR (760)
- ☒ SURVEY MONUMENT
- ROAD SIGN
- DECIDUOUS TREE
- FIRE HYDRANT
- ⊗ MANHOLE
- △ GUIDE POST
- ⊙ POLE
- UTILITY BOX
- \+ COORDINATE GRID (250' GRID)
- OVERHEAD UTILITY POLE
- ☐ MAILBOX/RR SIGNAL

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	727851-02005

FIGURE 3-21
EM SURVEY,
IN-PHASE RESPONSE

SCALE	DATE	REV
1" = 200'	NOVEMBER 1996	A

Ground Penetrating Radar (GPR) Survey

A ground penetrating radar survey was performed along transects 40 feet apart and parallel to the electromagnetic transects. The transects are shown in Figure 3-18.

Several anomalies were detected by the GPR survey, all occurring in the 1 to 3.5-foot depth range. These anomalies were characterized by hyperbolic reflections (possibly from large boulders or drainage pipes) and reflections from irregular surfaces measuring .5 to 3 feet in length. None of these anomalies exhibited characteristics of buried metallic objects. GPR records acquired from SEAD-64D showed relatively homogeneous layered soils with no evidence of burial pits or areas of abrupt cuts in the soil layering.

Test Pitting Program

Three test pits were excavated in SEAD-64D in two waste disposal areas and a geophysical anomaly (Figure 3-16). The test pit logs are presented in Appendix G.

Test pit TP64D-1 was excavated into the side of a 6- to 8-foot tall berm at the south end of the site. Two layers of household waste were exposed. The first layer of waste, located from one inch to two feet below the surface, was comprised of light brown silt with small amounts of waste. The second layer of waste, located 2 to 4 feet below the surface, was comprised of household waste with very little light brown silt. An OVM reading of 3 ppm organic vapors was measured from the debris in the waste. A boring, SB64D-2, was drilled on top of the berm. No layer of trash was encountered in this boring.

Test pit TP64D-2 was excavated at an electromagnetic quadrature response anomaly located in the central area of the site (Figure 3-20, Anomaly C). The test pit was excavated to the top of the weathered shale at a depth of 4 feet 2 inches. Approximately 1 foot of topsoil over silt was observed in the test pit. No buried metallic objects were found, though an east-west trending, 4-inch outside diameter, red clay pipe was intersected at a depth of 2 feet 3 inches. The interior of the pipe was dry and free of deposits. The EM anomaly may have been caused by a metal wire found on the ground surface near the test pit.

TP64D-3 was excavated in the east-central area of the site where metal debris was observed on the ground surface (Figure 3-20, Anomaly D). The test pit was excavated to the top of the weathered shale at depth of 4 feet. A 1 foot 3 inch layer of topsoil over silt was observed in the test pit. Drums, cans, and fencing were present on the ground surface. No buried objects were observed.

Soils excavated from the three test pits were continuously screened for volatile organic compounds and radioactivity with an OVM-580B and a Victoreen-190, respectively. Excluding the 3 ppm OVM reading from the waste material in TP64D-1, no readings above background levels (0 ppm of organic vapors and 10-15 micro Rhems per hour of radiation) were observed during the excavations.

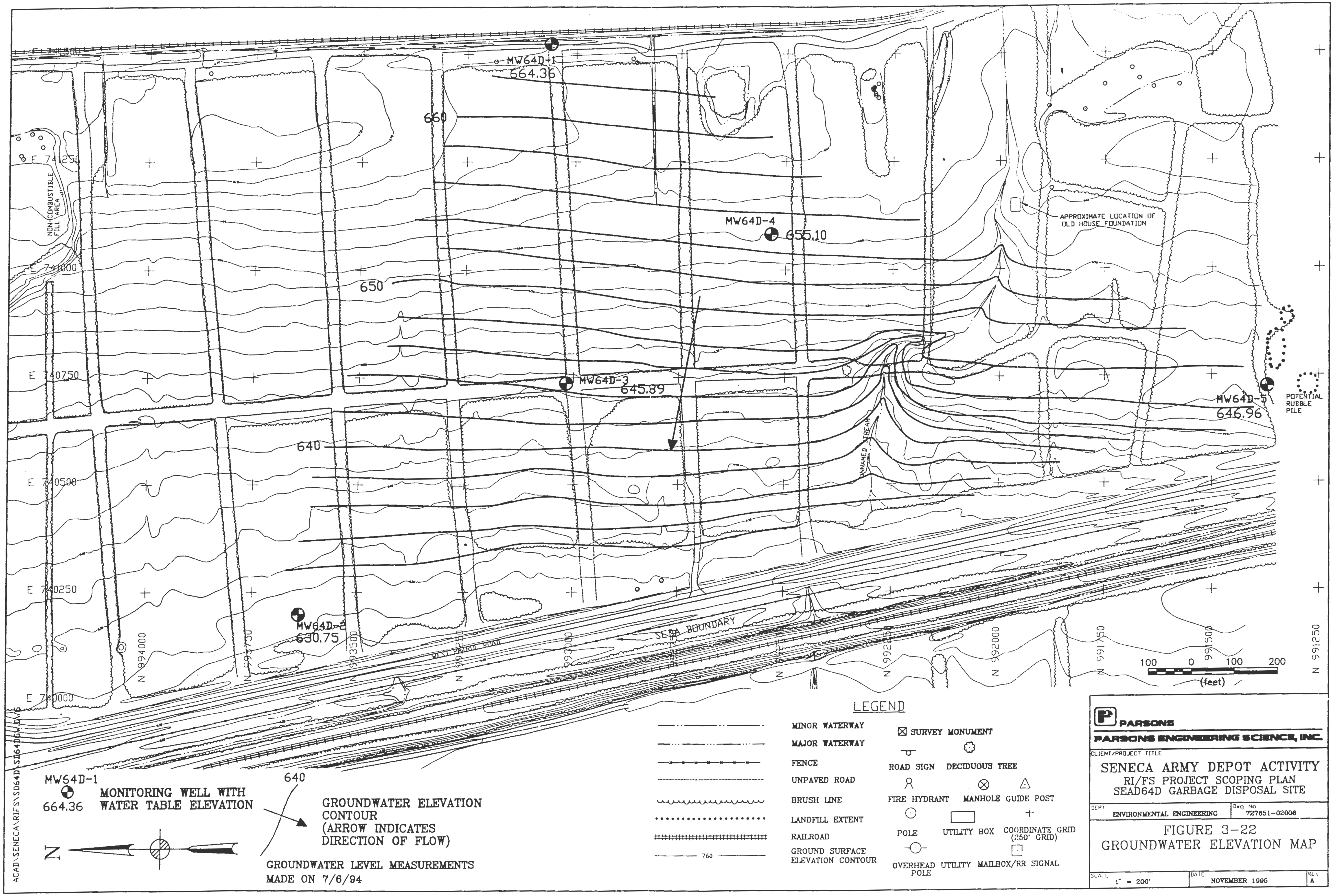
3.1.3.2.5 Site Hydrology and Hydrogeology

The main hydrologic features on SEAD-64D include an intermittent stream, drainage channels on the east and west sides of the site, and wetlands on the east side as shown in Figure 3-22.

Runoff on the site is controlled by the topography. Over most of the site, surface runoff flows west toward a drainage channel on the east side of the West Patrol Road. Along the eastern side of the site north of the stream, runoff flows primarily south toward wetlands and east into a drainage channel. South of the stream, runoff flows radially toward a low area located on site.

An intermittent unnamed stream flows west across the south central section of the site. Aerial photographs indicate the stream may start in the wetlands located in the southeastern corner of the site. The stream appears to flow west under the West Patrol Road and off SEDA property.

Drainage channels are shown on the topographic map along the eastern and western sides of the site. The eastern drainage channel flows south along the west side of the railroad tracks. This channel does not appear to collect or discharge water to the wetlands on the east side of the site. The drainage channel on the west side of the site appears to flow from the north end and south end of the site parallel to the West Patrol Road into a low area on the east side of the road.



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RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT ENVIRONMENTAL ENGINEERING

Dwg No 727651-02006

FIGURE 3-22
GROUNDWATER ELEVATION MAP

SCALE 1" = 200'

DATE NOVEMBER 1995

REV A

Five monitoring wells, screened in the till/weathered shale aquifer were installed during the ESI. The monitoring well installation diagrams and development reports are presented in Appendices B and C, respectively. Groundwater in the till/weathered shale aquifer on site flows west based on groundwater elevations measured in the five monitoring wells on July 6, 1994 and July 25, 1994 (Table 3-12 and Figure 3-22). Recharge of water to the monitoring wells during sampling was good.

3.1.3.2.6 Chemical Analysis Results

Soil and groundwater were sampled as part of the ESI conducted at SEAD-64D in 1994. The results of the 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 35 surface and subsurface soil samples were collected at SEAD-64D. Groundwater from five monitoring wells was also sampled as part of this investigation. The following sections describe the nature and extent of contamination identified at SEAD-64D in soil and groundwater.

It is important to note that in some instances the detection limit for individual analyses may be raised (sometimes above the criteria value) due to dilution or matrix effects in the sample. Also, note that the total number of samples found to exceed the criteria in analytical results tables may include estimated concentrations (i.e., J-qualified data). This should be noted when considering further investigation or remedial action activities.

Soil

The analytical results for the 35 soil samples collected as part of the investigation of SEAD-64D are presented in Table 3-13. The following sections describe the nature and extent of contamination in SEAD-64D soils. These data are compared to the criteria in the Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels (NYSDEC, 1992).

Volatile Organic Compounds

Methylene chloride, 2-butanone, and toluene, which are common laboratory contaminants, were detected in several samples at concentrations well below their criteria. Methylene chloride was detected in approximately 20 percent of the samples at concentrations up to 3 μg/kg. 2-Butanone and toluene were each detected in one sample at concentrations of 8 and 1 μg/kg, respectively. These compounds can be potentially attributed to the laboratory and not site conditions.

Semivolatile Organic Compounds

A total of 17 semivolatile organic compounds (SVOs) were found at varying concentrations in the soil samples obtained at SEAD-64D. Thirteen of the compounds are polynuclear

TABLE 3-12

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT 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)
MW64D-1	667.79	6/23/94	4.71	663.08	7/8/94	3.82	663.97	7/6/94	3.43	664.36
								7/25/94	4.26	663.53
MW64D-2	635.20	6/28/94	4.05	631.15	7/9/94	4.87	630.33	7/6/94	4.45	630.75
								7/25/94	7.66	627.54
MW64D-3	648.88	6/27/94	3.72	645.16	7/8/94	3.42	645.46	7/6/94	2.99	645.89
								7/25/94	4.48	644.40
MW64D-4	661.33	6/27/94	7.94	653.39	7/8/94	6.54	654.79	7/6/94	6.23	655.10
								7/25/94	9.22	652.11
MW64D-5	652.49	6/27/94	7.34	645.15	7/18/94	7.24	645.25	7/6/94	5.53	646.96
								7/25/94	7.37	645.12

TABLE 3-13

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM ESI

COMPOUND	MATRIX	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64
	DEPTH (FEET)					0-0.2	0-0.2	0-0 2	0-0.2	0-0.2	0-0 2
	SAMPLE DATE					04/14/94	04/14/94	04/14/94	04/14/94	04/14/94	06/23/94
	ES ID					SS64D-1	SS64D-2	SS64D-3	SS64D-4	SS64D-5	SB64D-1-00
	LAB ID					217694	217695	217696	217697	217698	225467
	SDG NUMBER					43535	43535	43535	43535	43535	44799
	UNITS										
VOLATILE ORGANICS											
Methylene Chloride	ug/Kg	3	23%	100	0	2 J	3 J	14 U	12 U	2 J	11 U
2-Butanone	ug/Kg	8	3%	300	0	14 U	14 U	14 U	12 U	14 U	11 U
Toluene	ug/Kg	1	3%	1500	0	14 U	14 U	14 U	12 U	14 U	11 U
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	42	6%	NA	NA	460 U	470 U	440 U	400 U	420 U	370 U
Naphthalene	ug/Kg	31	6%	13000	0	460 U	470 U	29 J	400 U	420 U	370 U
2-Methylnaphthalene	ug/Kg	49	14%	36400	0	30 J	27 J	49 J	400 U	420 U	370 U
Phenanthrene	ug/Kg	100	31%	50000*	0	35 J	36 J	57 J	400 U	24 J	370 U
Di-n-butylphthalate	ug/Kg	77	49%	8100	0	460 U	470 U	440 U	400 U	420 U	370 U
Fluoranthene	ug/Kg	240	43%	50000*	0	47 J	62 J	99 J	21 J	33 J	370 U
Pyrene	ug/Kg	160	40%	50000*	0	38 J	47 J	81 J	20 J	25 J	370 U
Benzo(a)anthracene	ug/Kg	86	20%	220	0	22 J	23 J	41 J	400 U	420 U	370 U
Chrysene	ug/Kg	110	26%	400	0	34 J	36 J	53 J	400 U	22 J	370 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1100	43%	50000*	0	120 J	470 U	440 U	19 J	420 U	370 U
Di-n-octylphthalate	ug/Kg	75	3%	50000*	0	460 U	470 U	440 U	400 U	420 U	370 U
Benzo(b)fluoranthene	ug/Kg	160	23%	1100	0	26 J	28 J	39 J	400 U	420 U	370 U
Benzo(k)fluoranthene	ug/Kg	110	17%	1100	0	27 J	470 U	53 J	400 U	420 U	370 U
Benzo(a)pyrene	ug/Kg	77	23%	61	3	25 J	27 J	43 J	400 U	420 U	370 U
Indeno(1,2,3-cd)pyrene	ug/Kg	61	14%	3200	0	460 U	470 U	26 J	400 U	420 U	370 U
Dibenz(a,h)anthracene	ug/Kg	40	11%	14	4	460 U	470 U	440 U	400 U	420 U	370 U
Benzo(g,h,i)perylene	ug/Kg	68	17%	50000*	0	460 U	470 U	23 J	400 U	420 U	370 U
METALS											
Aluminum	mg/Kg	20800	100%	20650	1	11300	8930	12900	12000	10300	16700
Antimony	mg/Kg	0 49	26%	6.27	0	0.24 UJ	0.16 UJ	0 18 UJ	0.19 J	0.19 UJ	0.23 UJ
Arsenic	mg/Kg	7.8	100%	9.6	0	4.3	3.9	6.4	4.5	3.6	6.1
Barium	mg/Kg	152	100%	300	0	76.4	74.6	89.3	61.8	77.3	87.7
Beryllium	mg/Kg	0.99	100%	1 13	0	0.53 J	0.43 J	0.65 J	0.56 J	0 45 J	0.76 J
Cadmium	mg/Kg	0 97	100%	2.46	0	0.38 J	0 35 J	0 42 J	0.42 J	0 27 J	0 76 J
Calcium	mg/Kg	162000	100%	125300	3	88900	129000	34900	84800	84100	10600
Chromium	mg/Kg	29.6	100%	30.95	0	18.3	13.5	20 4	18.8	15.3	25.2
Cobalt	mg/Kg	18.6	100%	30	0	9.3 J	7.8 J	12.7	8.8	7.3 J	12 8
Copper	mg/Kg	32.7	100%	32 94	0	18 8	14.5	20.6	19.7	15.5	28.1
Iron	mg/Kg	36600	100%	38110	0	23200	17800	28400	22900	17000	33800
Lead	mg/Kg	60.7	100%	23.49	3	13.2	11.4	18.7	10	12.2	14.2
Magnesium	mg/Kg	16300	100%	21890	0	7720	9080	7460	13400	11600	6610
Manganese	mg/Kg	1240	100%	1095	1	475 J	424 J	750 J	457 J	323 J	606
Mercury	mg/Kg	0 08	69%	0.1	0	0.02 J	0.01 J	0.02 J	0.01 J	0.01 J	0.02 J
Nickel	mg/Kg	41.2	100%	52 58	0	25.7	20.3	32.4	28.5	20 3	40 3
Potassium	mg/Kg	3240	100%	2623	2	1610	1480	1590	2200	2330	1870 J
Selenium	mg/Kg	2	80%	2	0	0.53 J	0.27 U	0.49 J	0.21 U	0 33 U	1.7
Sodium	mg/Kg	266	89%	0.77	1	100 J	95.7 J	59.6 J	151 J	30.3 J	43.6 J
Thallium	mg/Kg	0 76	46%	187.8	0	0.39 U	0.25 U	0.28 U	0.2 U	0.31 U	0 33 U
Vanadium	mg/Kg	35 3	100%	150	0	18.2	14.1	21.1	18.5	18 4	24.7
Zinc	mg/Kg	111	100%	115.3	0	72.6	63.1	87 9	80.4	54 8	102
OTHER ANALYSES											
Total Solids	%W/W					71 4	70 1	74 1	82.2	78 6	90 5

TABLE 3-13

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM ESI

	MATRIX					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64
	DEPTH (FEET)					0.2-1.2	2-3	0-0 2	2-3.5	4-6	0-0 2
	SAMPLE DATE					06/23/94	06/23/94	06/23/94	06/23/94	06/23/94	06/24/94
	ES ID		FREQUENCY		NUMBER	SB64D-1-01	SB64D-1-02	SB64D-2-00	SB64D-2-02	SB64D-2-03	SB64D-3-00
	LAB ID		OF		ABOVE	225468	225469	225470	225471	225472	225473
	SDG NUMBER	MAXIMUM	DETECTION	TAGM	TAGM	44799	44799	44799	44799	44799	44799
COMPOUND	UNITS										
VOLATILE ORGANICS											
Methylene Chlonde	ug/Kg	3	23%	100	0	1 J	1 J	12 U	12 U	11 U	13 U
2-Butanone	ug/Kg	8	3%	300	0	12 U	11 U	12 U	12 U	11 U	13 U
Toluene	ug/Kg	1	3%	1500	0	12 U	11 U	12 U	12 U	11 U	13 U
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	42	6%	NA	NA	380 U	360 U	380 U	410 U	350 U	42 J
Naphthalene	ug/Kg	31	6%	13000	0	380 U	360 U	380 U	410 U	350 U	440 U
2-Methylnaphthalene	ug/Kg	49	14%	36400	0	380 U	360 U	380 U	410 U	350 U	440 U
Phenanthrene	ug/Kg	100	31%	50000*	0	380 U	360 U	380 U	410 U	350 U	98 J
Di-n-butylphthalate	ug/Kg	77	49%	8100	0	380 U	360 U	380 U	410 U	350 U	37 J
Fluoranthene	ug/Kg	240	43%	50000*	0	380 U	360 U	380 U	410 U	350 U	240 J
Pyrene	ug/Kg	160	40%	50000*	0	380 U	360 U	380 U	410 U	350 U	160 J
Benzo(a)anthracene	ug/Kg	86	20%	220	0	380 U	360 U	380 U	410 U	350 U	86 J
Chrysene	ug/Kg	110	26%	400	0	380 U	360 U	380 U	410 U	350 U	110 J
bis(2-Ethylhexyl)phthalate	ug/Kg	1100	43%	50000*	0	32 J	29 J	25 J	410 U	33 J	96 J
Di-n-octylphthalate	ug/Kg	75	3%	50000*	0	380 U	360 U	380 U	410 U	350 U	440 U
Benzo(b)fluoranthene	ug/Kg	160	23%	1100	0	380 U	360 U	380 U	410 U	350 U	86 J
Benzo(k)fluoranthene	ug/Kg	110	17%	1100	0	380 U	360 U	380 U	410 U	350 U	110 J
Benzo(a)pyrene	ug/Kg	77	23%	61	3	380 U	380 U	380 U	410 U	350 U	77 J
Indeno(1,2,3-cd)pyrene	ug/Kg	61	14%	3200	0	380 U	380 U	380 U	410 U	350 U	61 J
Dibenz(a,h)anthracene	ug/Kg	40	11%	14	4	380 U	360 U	380 U	410 U	350 U	34 J
Benzo(g,h,i)perylene	ug/Kg	68	17%	50000*	0	380 U	360 U	380 U	410 U	350 U	54 J
METALS											
Aluminum	mg/Kg	20800	100%	20650	1	14100	7480	14800	17600	11100	14200
Antimony	mg/Kg	0.49	26%	6.27	0	0.17 UJ	0.17 UJ	0.22 UJ	0.28 UJ	0 21 UJ	0 26 UJ
Arsenic	mg/Kg	7.8	100%	9.6	0	6.9	3.8	6.2	6.3	5	5.9
Banum	mg/Kg	152	100%	300	0	81.5	38.5	93.2	115	45.3	103
Beryllium	mg/Kg	0.99	100%	1.13	0	0.7	0.32 J	0.73 J	0.93 J	0.5 J	0.71 J
Cadmium	mg/Kg	0.97	100%	2.46	0	0.66 J	0.54 J	0.78 J	0 97 J	0.65 J	0 64 J
Calcium	mg/Kg	162000	100%	125300	3	3830	36900	13800	4250	45600	4900
Chromium	mg/Kg	29 6	100%	30 95	0	22 1	11 8	21.7	25.3	16.9	18 6
Cobalt	mg/Kg	18.6	100%	30	0	11.5	7.7	11.8	18 6	11 1	8 1 J
Copper	mg/Kg	32.7	100%	32.94	0	27.5	18.7	24.9	22 1	20 6	21 6
Iron	mg/Kg	36600	100%	38110	0	32000	16800	29800	36600	24200	23200
Lead	mg/Kg	60 7	100%	23.49	3	15.1	8.8	60.7	15 5	8.2	19.1
Magnesium	mg/Kg	16300	100%	21890	0	5240	11800	5700	5850	9520	3800
Manganese	mg/Kg	1240	100%	1095	1	640	415	688	1240	476	549
Mercury	mg/Kg	0 08	69%	0.1	0	0.04 J	0.02 J	0.05 J	0 06 J	0.02 J	0 08 J
Nickel	mg/Kg	41 2	100%	52 58	0	37.8	20 6	31 4	41 2	28	22 5
Potassium	mg/Kg	3240	100%	2623	2	1380 J	1080 J	1800 J	1470 J	1190 J	1820 J
Selenium	mg/Kg	2	80%	2	0	1.4	0.44 J	1.6	1.6	0.62 J	2
Sodium	mg/Kg	266	89%	0.77	1	35.7 J	26.4 J	50.4 J	35.9 J	78.9 J	19 7 U
Thallium	mg/Kg	0 76	46%	187.8	0	0.45 J	0.3 J	0.32 U	0.41 U	0 3 U	0 58 J
Vanadium	mg/Kg	35 3	100%	150	0	23.3	13.5	22.1	23.9	15 8	22.4
Zinc	mg/Kg	111	100%	115.3	0	95.3	63.1	93	98 4	86 1	82.9
OTHER ANALYSES											
Total Solids	%W/W					86 5	91.2	85 9	81.3	93 2	74 7

TABLE 3-13

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM ESI

COMPOUND	MATRIX	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64
	DEPTH (FEET)					0.2-2	2-3.2	0-0.2	0.2-2.0	2-4
	SAMPLE DATE					06/24/94	06/24/94	06/24/94	06/24/94	06/24/94
	ES ID					SB64D-3-01	SB64D-3-02	SB64D-4-00	SB64D-4-01	SB64D-4-02
	LAB ID					225497	225498	225522	225523	225524
	SDG NUMBER					45048	45048	45048	45048	45048
	UNITS									
VOLATILE ORGANICS										
Methylene Chlonde	ug/Kg	3	23%	100	0	11 U	12 U	14 U	12 U	11 U
2-Butanone	ug/Kg	8	3%	300	0	11 U	12 U	14 U	12 U	11 U
Toluene	ug/Kg	1	3%	1500	0	11 U	12 U	14 U	12 U	11 U
SEMIVOLATILE ORGANICS										
Phenol	ug/Kg	42	6%	NA	NA	390 U	42 J	460 U	420 U	370 U
Naphthalene	ug/Kg	31	6%	13000	0	390 U	390 U	460 U	420 U	370 U
2-Methylnaphthalene	ug/Kg	49	14%	36400	0	390 U	390 U	460 U	420 U	370 U
Phenanthrene	ug/Kg	100	31%	50000*	0	22 J	390 U	36 J	420 U	370 U
Di-n-butylphthalate	ug/Kg	77	49%	8100	0	390 U	37 J	71 J	420 U	370 U
Fluoranthene	ug/Kg	240	43%	50000*	0	31 J	390 U	61 J	420 U	370 U
Pyrene	ug/Kg	160	40%	50000*	0	20 J	390 U	54 J	420 U	370 U
Benzo(a)anthracene	ug/Kg	86	20%	220	0	390 U	390 U	38 J	420 U	370 U
Chrysene	ug/Kg	110	26%	400	0	390 U	390 U	41 J	420 U	370 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1100	43%	50000*	0	390 U	390 U	39 J	1100	34 J
Di-n-octylphthalate	ug/Kg	75	3%	50000*	0	390 U	390 U	460 U	420 U	370 U
Benzo(b)fluoranthene	ug/Kg	160	23%	1100	0	390 U	390 U	61 J	420 U	370 U
Benzo(k)fluoranthene	ug/Kg	110	17%	1100	0	390 U	390 U	47 J	420 U	370 U
Benzo(a)pyrene	ug/Kg	77	23%	61	3	390 U	390 U	68 J	420 U	370 U
Indeno(1,2,3-cd)pyrene	ug/Kg	61	14%	3200	0	390 U	390 U	53 J	420 U	370 U
Dibenz(a,h)anthracene	ug/Kg	40	11%	14	4	390 U	390 U	40 J	420 U	370 U
Benzo(g,h,i)perylene	ug/Kg	68	17%	50000*	0	390 U	390 U	68 J	420 U	370 U
METALS										
Aluminum	mg/Kg	20800	100%	20650	1	14900	16100	17400	20100	9770
Antimony	mg/Kg	0.49	26%	6.27	0	0.22 J	0.47 J	0.4 J	0.3 UJ	0.21 UJ
Arsenic	mg/Kg	7.8	100%	9.6	0	5.9	6	6.6	6.9	4.3
Barium	mg/Kg	152	100%	300	0	92.1	111	116	114	62.7
Beryllium	mg/Kg	0.99	100%	1.13	0	0.74	0.73 J	0.78 J	0.81 J	0.46 J
Cadmium	mg/Kg	0.97	100%	2.46	0	0.36 J	0.51 J	0.43 J	0.4 J	0.41 J
Calcium	mg/Kg	162000	100%	125300	3	3060 J	4940 J	5120 J	11800 J	130000 J
Chromium	mg/Kg	29.6	100%	30.95	0	20.7	20.5	22.9	27.7	14.3
Cobalt	mg/Kg	18.6	100%	30	0	10.4	8.5 J	11.5 J	13.6	9.7
Copper	mg/Kg	32.7	100%	32.94	0	20.7	24	20.6	25.2	17.5
Iron	mg/Kg	36600	100%	38110	0	26900	24400	28300	34800	20500
Lead	mg/Kg	60.7	100%	23.49	3	17 J	19.3 J	21.5 J	15.6 J	7.4 J
Magnesium	mg/Kg	16300	100%	21890	0	3890	4110	3990	5330	9290
Manganese	mg/Kg	1240	100%	1095	1	690	564	884	859	751
Mercury	mg/Kg	0.08	69%	0.1	0	0.07 J	0.06 J	0.08	0.06 J	0.02 J
Nickel	mg/Kg	41.2	100%	52.58	0	25.8	23.6	27.2	35.6	24.8
Potassium	mg/Kg	3240	100%	2623	2	1440 J	2130 J	2280 J	2020 J	1520 J
Selenium	mg/Kg	2	80%	2	0	1.3	1.2	1.7	1.1 J	0.51 J
Sodium	mg/Kg	266	89%	0.77	1	14.5 U	25.4 J	27.1 U	28.6 J	90.4 J
Thallium	mg/Kg	0.76	46%	187.8	0	0.41 J	0.48 J	0.52 U	0.44 U	0.31 U
Vanadium	mg/Kg	35.3	100%	150	0	23.7	25.4	26.9	30.8	14.4
Zinc	mg/Kg	111	100%	115.3	0	85.8	89	91	88.3	63.9
OTHER ANALYSES										
Total Solids	%W/W					85.4	84.4	71.2	78.5	89.9

TABLE 3-13

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM 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-64 0-0.2 06/25/94 SB64D-5.00 225570 45058	SOIL SEAD-64 2-4 06/25/94 SB64D-5 02 225571 45058	SOIL SEAD-64 4-6 06/25/94 SB64D-5.03 225572 45058	SOIL SEAD-64 0-0.2 06/25/94 SB64D-6.00 225573 45058	SOIL SEAD-64 0.2-2 06/25/94 SB64D-6.01 225574 45058	SOIL SEAD-64 2-4 06/25/94 SB64D-6 02 225575 45058
VOLATILE ORGANICS											
Methylene Chloride	ug/Kg	3	23%	100	0	13 U	1 J	12 U	13 U	12 U	1 J
2-Butanone	ug/Kg	8	3%	300	0	13 U	12 U	12 U	13 U	12 U	11 U
Toluene	ug/Kg	1	3%	1500	0	13 U	1 J	12 U	13 U	12 U	11 U
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	42	6%	NA	NA	450 U	380 U	370 U	440 U	380 U	370 U
Naphthalene	ug/Kg	31	6%	13000	0	31 J	380 U	370 U	440 U	380 U	370 U
2-Methylnaphthalene	ug/Kg	49	14%	36400	0	46 J	22 J	370 U	440 U	380 U	370 U
Phenanthrene	ug/Kg	100	31%	50000*	0	100 J	29 J	370 U	34 J	380 U	370 U
Di-n butylphthalate	ug/Kg	77	49%	8100	0	77 J	46 J	75 J	76 J	32 J	74 J
Fluoranthene	ug/Kg	240	43%	50000*	0	140 J	25 J	370 U	52 J	380 U	370 U
Pyrene	ug/Kg	160	40%	50000*	0	100 J	380 U	370 U	41 J	380 U	370 U
Benzo(a)anthracene	ug/Kg	86	20%	220	0	66 J	380 U	370 U	43 J	380 U	370 U
Chrysene	ug/Kg	110	26%	400	0	97 J	28 J	370 U	47 J	380 U	370 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1100	43%	50000*	0	450 U	380 U	370 U	440 U	380 U	370 U
Di n-octylphthalate	ug/Kg	75	3%	50000*	0	450 U	380 U	370 U	75 J	380 U	370 U
Benzo(b)fluoranthene	ug/Kg	160	23%	1100	0	160 J	22 J	370 U	48 J	380 U	370 U
Benzo(k)fluoranthene	ug/Kg	110	17%	1100	0	450 UJ	21 J	370 U	47 J	380 U	370 U
Benzo(a)pyrene	ug/Kg	77	23%	61	3	64 J	23 J	370 U	47 J	380 U	370 U
Indeno(1,2,3-cd)pyrene	ug/Kg	61	14%	3200	0	53 J	380 U	370 U	43 J	380 U	370 U
Dibenz(a,h)anthracene	ug/Kg	40	11%	14	4	34 J	380 U	370 U	33 J	380 U	370 U
Benzo(g,h,i)perylene	ug/Kg	68	17%	50000*	0	41 J	22 J	370 U	46 J	380 U	370 U
METALS											
Aluminum	mg/Kg	20800	100%	20650	1	16400	16900	20800	14500	18900	12200
Antimony	mg/Kg	0.49	26%	6.27	0	0.49 J	0.24 UJ	0.28 UJ	0.22 J	0.23 UJ	0.22 UJ
Arsenic	mg/Kg	7.8	100%	9.6	0	5.8 J	6 J	6 J	5.6 J	5.5 J	3.4 J
Barium	mg/Kg	152	100%	300	0	116	123	110	113	152	59.1
Beryllium	mg/Kg	0.99	100%	1 13	0	0.88 J	0.8 J	0.87 J	0.72 J	0.88 J	0 56 J
Cadmium	mg/Kg	0 97	100%	2 46	0	0 75 J	0.43 J	0.4 J	0 48 J	0 45 J	0 35 J
Calcium	mg/Kg	162000	100%	125300	3	4770	3260	2760	3700	3630	30500
Chromium	mg/Kg	29 6	100%	30 95	0	22.4	23.3	29.8	20	24	19 5
Cobalt	mg/Kg	18 6	100%	30	0	10.5 J	11.4	12 9	10.1	10 7	11 1
Copper	mg/Kg	32 7	100%	32.94	0	22.7	21.6	23 7	27 2	24 9	17
Iron	mg/Kg	36600	100%	38110	0	25600	29000	34600	24300	28200	25300
Lead	mg/Kg	60.7	100%	23.49	3	29.9	13.5	13.4	16.4	13.1	6.1
Magnesium	mg/Kg	16300	100%	21890	0	3970	4540	6030	3980	4650	7390
Manganese	mg/Kg	1240	100%	1095	1	698	851	638	627	851	645
Mercury	mg/Kg	0.08	69%	0.1	0	0 14 R	0.07 J R	0.04 J R	0.06 J R	0.06 J R	0.01 U
Nickel	mg/Kg	41.2	100%	52.58	0	25.7	28 2	39.5	24.7	26 1	30 8
Potassium	mg/Kg	3240	100%	2623	2	3240 J	2470 J	3090 J	2170 J	2340 J	1220 J
Selenium	mg/Kg	2	80%	2	0	1.6	1.1	1 2	0.94	1 2	0.46 U
Sodium	mg/Kg	266	89%	0.77	1	71.2 J	90 J	99.7 J	75 J	94.9 J	170 J
Thallium	mg/Kg	0.76	46%	187.8	0	0.65 J	0.5 J	0.53 J	0.74 J	0 34 U	0.33 U
Vanadium	mg/Kg	35.3	100%	150	0	26.6	26.4	32	24.9	31.9	16 6
Zinc	mg/Kg	111	100%	115.3	0	111 J	83.3 J	101 J	70.3 J	77 J	60.7 J
OTHER ANALYSES											
Total Solids	%W/W					73 6	85.9	88 2	75 2	85 8	88

TABLE 3-13

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM ESI

	MATRIX					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64
	DEPTH (FEET)					0-0.2	0.2-2.0	2-4	0-0.2	0 2-2 0	2-4
	SAMPLE DATE					06/24/94	06/24/94	06/24/94	06/24/94	06/24/94	06/24/94
	ES ID					SB64D-7-00	SB64D-7-01	SB64D-7-02	SB64D-8-00	SB64D-8-01	SB64D-8-02
	LAB ID					225525	225526	225527	225528	225529	225530
	SDG NUMBER	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	45048	45048	45048	45048	45048	45048
COMPOUND	UNITS										
VOLATILE ORGANICS											
Methylene Chloride	ug/Kg	3	23%	100	0	14 U	12 U	11 U	13 UJ	12 U	11 U
2-Butanone	ug/Kg	8	3%	300	0	14 U	12 U	11 U	13 UJ	8 J	11 U
Toluene	ug/Kg	1	3%	1500	0	14 U	12 U	11 U	13 UJ	12 U	11 U
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	42	6%	NA	NA	460 U	390 U	360 U	450 U	380 U	370 U
Naphthalene	ug/Kg	31	6%	13000	0	460 U	390 U	360 U	450 U	380 U	370 U
2-Methylnaphthalene	ug/Kg	49	14%	36400	0	460 U	390 U	360 U	450 U	380 U	370 U
Phenanthrene	ug/Kg	100	31%	50000*	0	460 U	390 U	360 U	24 J	380 U	370 U
Di-n-butylphthalate	ug/Kg	77	49%	8100	0	54 J	390 U	360 U	56 J	44 J	370 U
Fluoranthene	ug/Kg	240	43%	50000*	0	39 J	390 U	360 U	48 J	380 U	370 U
Pyrene	ug/Kg	160	40%	50000*	0	41 J	390 U	360 U	54 J	380 U	370 U
Benzo(a)anthracene	ug/Kg	86	20%	220	0	460 U	390 U	360 U	450 U	380 U	370 U
Chrysene	ug/Kg	110	26%	400	0	460 U	390 U	360 U	450 U	380 U	370 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1100	43%	50000*	0	66 J	58 J	46 J	48 J	380 U	32 J
Di-n-octylphthalate	ug/Kg	75	3%	50000*	0	460 U	390 U	360 U	450 U	380 U	370 U
Benzo(b)fluoranthene	ug/Kg	160	23%	1100	0	460 U	390 U	360 U	450 U	380 U	370 U
Benzo(k)fluoranthene	ug/Kg	110	17%	1100	0	460 U	390 U	360 U	450 U	380 U	370 U
Benzo(a)pyrene	ug/Kg	77	23%	61	3	460 U	390 U	360 U	450 U	380 U	370 U
Indeno(1,2,3-cd)pyrene	ug/Kg	61	14%	3200	0	460 U	390 U	360 U	450 U	380 U	370 U
Dibenz(a,h)anthracene	ug/Kg	40	11%	14	4	460 U	390 U	360 U	450 U	380 U	370 U
Benzo(g,h,i)perylene	ug/Kg	68	17%	50000*	0	460 U	390 U	360 U	450 U	380 U	370 U
METALS											
Aluminum	mg/Kg	20800	100%	20650	1	17700	17500	13000	16100	15500	12400
Antimony	mg/Kg	0.49	26%	6.27	0	0.25 UJ	0.25 UJ	0.24 UJ	0.28 UJ	0.22 UJ	0.27 UJ
Arsenic	mg/Kg	7.8	100%	9.6	0	5.7	5.7	3.7	5.8	4.5	5.3
Barium	mg/Kg	152	100%	300	0	127	124	59.3	116	85	65.6
Beryllium	mg/Kg	0.99	100%	1.13	0	0.82 J	0.85 J	0.6 J	0.81 J	0.68 J	0.58 J
Cadmium	mg/Kg	0.97	100%	2.46	0	0.49 J	0.42 J	0.46 J	0.61 J	0.49 J	0.44 J
Calcium	mg/Kg	162000	100%	125300	3	5980 J	3690 J	80900 J	10900 J	29700 J	64000 J
Chromium	mg/Kg	29.6	100%	30.95	0	23.9	24.1	19	23.3	21.3	19.3
Cobalt	mg/Kg	18.6	100%	30	0	11.5	12.2	11.7	13.9	10.8	12.7
Copper	mg/Kg	32.7	100%	32.94	0	32.7	28.5	17.2	28	21.2	22.4
Iron	mg/Kg	36600	100%	38110	0	30100	34400	26600	32500	28200	28600
Lead	mg/Kg	60.7	100%	23.49	3	18.9 J	15.8 J	13.8 J	32.5 J	9.9 J	9 J
Magnesium	mg/Kg	16300	100%	21890	0	4350	4980	5810	5740	6010	8170
Manganese	mg/Kg	1240	100%	1095	1	776	830	642	1040	659	748
Mercury	mg/Kg	0.08	69%	0.1	0	0.07 J	0.05	0.04 J	0.06 J	0.04 J	0.02 J
Nickel	mg/Kg	41.2	100%	52.58	0	28	30.5	29.5	34.4	29.4	34.7
Potassium	mg/Kg	3240	100%	2623	2	2550 J	1670 J	1790 J	2030 J	1840 J	1390 J
Selenium	mg/Kg	2	80%	2	0	1.2	1.7	0.62 J	1.9	1.3	0.55 U
Sodium	mg/Kg	266	89%	0.77	1	27.5 J	22.6 J	90.6 J	21.3 U	37.3 J	94.7 J
Thallium	mg/Kg	0.76	46%	187.8	0	0.47 J	0.37 U	0.57 J	0.57 J	0.32 U	0.39 U
Vanadium	mg/Kg	35.3	100%	150	0	28.3	27.2	16.7	23.9	22.3	16.7
Zinc	mg/Kg	111	100%	115.3	0	90.8	86	69.8	106	85.2	85.9
OTHER ANALYSES											
Total Solids	%W/W					71.2	83.8	92.3	73.6	86	89.5

TABLE 3-13

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SOIL ANALYSIS RESULTS FROM ESI

	MATRIX					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION					SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64
	DEPTH (FEET)					0-0.2	0 2-2	2-4	0-0.2	0 2-2	4-5 1
	SAMPLE DATE					06/25/94	06/25/94	06/25/94	06/25/94	06/25/94	06/25/94
	ES ID		FREQUENCY		NUMBER	SB64D-9.00	SB64D-9.01	SB64D-9 02	SB64D-10.00	SB64D-10 01	SB64D-10 03
	LAB ID		OF		ABOVE	225576	225577	225578	225579	225580	225581
	SDG NUMBER	MAXIMUM	DETECTION	TAGM	TAGM	45058	45058	45058	45058	45058	45058
COMPOUND	UNITS										
VOLATILE ORGANICS											
Methylene Chlonde	ug/Kg	3	23%	100	0	13 U	12 U	1 J	14 U	12 U	12 U
2-Butanone	ug/Kg	8	3%	300	0	13 U	12 U	11 U	14 U	12 U	12 U
Toluene	ug/Kg	1	3%	1500	0	13 U	12 U	11 U	14 U	12 U	12 U
SEMIVOLATILE ORGANICS											
Phenol	ug/Kg	42	6%	NA	NA	450 U	400 U	360 U	460 U	400 U	370 U
Naphthalene	ug/Kg	31	6%	13000	0	450 U	400 U	360 U	460 U	400 U	370 U
2-Methylnaphthalene	ug/Kg	49	14%	36400	0	450 U	400 U	360 U	460 U	400 U	370 U
Phenanthrene	ug/Kg	100	31%	50000*	0	450 U	400 U	360 U	460 U	400 U	370 U
Di-n-butylphthalate	ug/Kg	77	49%	8100	0	53 J	34 J	360 U	70 J	45 J	24 J
Fluoranthene	ug/Kg	240	43%	50000*	0	33 J	400 U	360 U	38 J	400 U	370 U
Pyrene	ug/Kg	160	40%	50000*	0	24 J	400 U	360 U	33 J	400 U	370 U
Benzo(a)anthracene	ug/Kg	86	20%	220	0	450 U	400 U	360 U	460 U	400 U	370 U
Chrysene	ug/Kg	110	26%	400	0	450 U	400 U	360 U	460 U	400 U	370 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1100	43%	50000*	0	450 U	400 U	360 U	460 U	400 U	370 U
Di-n-octylphthalate	ug/Kg	75	3%	50000*	0	450 U	400 U	360 U	460 U	400 U	370 U
Benzo(b)fluoranthene	ug/Kg	160	23%	1100	0	450 U	400 U	360 U	460 U	400 U	370 U
Benzo(k)fluoranthene	ug/Kg	110	17%	1100	0	450 U	400 U	360 U	460 U	400 U	370 U
Benzo(a)pyrene	ug/Kg	77	23%	61	3	450 U	400 U	360 U	460 U	400 U	370 U
Indeno(1,2,3-cd)pyrene	ug/Kg	61	14%	3200	0	450 U	400 U	360 U	460 U	400 U	370 U
Dibenz(a,h)anthracene	ug/Kg	40	11%	14	4	450 U	400 U	360 U	460 U	400 U	370 U
Benzo(g,h,i)perylene	ug/Kg	68	17%	50000*	0	450 U	400 U	360 U	460 U	400 U	370 U
METALS											
Aluminum	mg/Kg	20800	100%	20650	1	13800	15800	12600	12100	19900	9180
Antimony	mg/Kg	0.49	26%	6.27	0	0.31 UJ	0.25 J	0.33 J	0.28 UJ	0.26 UJ	0 35 J
Arsenic	mg/Kg	7.8	100%	9.6	0	6 J	6.7 J	5.2 J	4.6 J	7.8 J	4.4 J
Barium	mg/Kg	152	100%	300	0	110	107	62.5	100	147	97 7
Beryllium	mg/Kg	0.99	100%	1.13	0	0.82 J	0.84 J	0 61 J	0.66 J	0.99 J	0 47 J
Cadmium	mg/Kg	0 97	100%	2 46	0	0.53 J	0.51 J	0 38 J	0.43 J	0 56 J	0 4 J
Calcium	mg/Kg	162000	100%	125300	3	3090	16300	47700	4750	5810	162000
Chromium	mg/Kg	29.6	100%	30.95	0	20.2	23.7	19.9	16.7	27.5	14 5
Cobalt	mg/Kg	18 6	100%	30	0	11.2 J	12.8	9.8 J	8.5 J	11 9	6 7 J
Copper	mg/Kg	32 7	100%	32 94	0	30 4	28.3	23.5	25	26 8	15 7
Iron	mg/Kg	36600	100%	38110	0	25500	32500	26000	21000	36200	17000
Lead	mg/Kg	60 7	100%	23 49	3	19.1	12.6	9.7	17.5	13.6	8
Magnesium	mg/Kg	16300	100%	21890	0	3620	4850	5700	3140	5180	16300
Manganese	mg/Kg	1240	100%	1095	1	973	971	539	684	776	352
Mercury	mg/Kg	0.08	69%	0.1	0	0.06 J R	0.47 R	0.09 J R	0.11 J R	0.06 J R	0.03 J
Nickel	mg/Kg	41 2	100%	52.58	0	25.1	34	31.5	18.1	35.3	19
Potassium	mg/Kg	3240	100%	2623	2	1970 J	1530 J	1540 J	1670 J	2300 J	2040 J
Selenium	mg/Kg	2	80%	2	0	1 J	1.2	0.54 U	1.3	1.3	0.5 U
Sodium	mg/Kg	266	89%	0.77	1	103 J	101 J	148 J	97.3 J	108 J	266 J
Thallium	mg/Kg	0 76	46%	187.8	0	0.66 J	0.76 J	0.38 U	0.49 J	0 62 J	0 35 U
Vanadium	mg/Kg	35.3	100%	150	0	23 7	23.9	19 1	21 4	35.3	17 3
Zinc	mg/Kg	111	100%	115.3	0	72.9 J	81 8 J	75.7 J	61.8 J	89 4 J	40 6 J
OTHER ANALYSES											
Total Solids	%W/W					73 9	82 4	91	71 1	82 2	87 7

NOTES.
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

aromatic hydrocarbons (PAHs). These PAHs were detected primarily in the soil samples from the 0- to 0.2-foot range. Other compounds included three phthalates and phenol.

Only two SVOs, benzo(a)pyrene and dibenz(a,h)anthracene, were detected at concentrations above their criteria. These exceedances occurred in the surface soil samples obtained from four borings: SB64D-3, 4, 5, and 6.

Pesticides and PCBs

No pesticides or PCBs were found in the soil samples collected at SEAD-64D.

Metals

Six metals (aluminum, calcuim, lead, manganese, potassium and sodium) were found at concentrations above their TAGM criteria. Among these, lead exceeded its standard in three samples and had a maximum concentration of 60.7 mg/kg, which is approximately three times the TAGM value. Most of the other metals are generally less toxic and their concentrations did not exceed their respective TAGMs by more than one time.

Groundwater

Five monitoring wells were installed on site. One well, MW64D-1, was installed as a background well. The other four, MW64D-2, 3, 4, and 5, were installed downgradient of electromagnetic anomalies. The summary of chemical analysis results is presented in Table 3-14. The following sections describe the nature and extent of groundwater contamination identified at SEAD-64D.

Volatile Organic Compounds

No volatile organic compounds were detected in the groundwater samples collected at SEAD-64D.

Semivolatile Organic Compounds

No semivolatile organic compounds were detected in the groundwater samples collected at SEAD-64D.

TABLE 3-14

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
GROUNDWATER ANALYSIS RESULTS FROM ESI

COMPOUND	MATRIX	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	FEDERAL DRINKING WATER MCL (h)	NUMBER ABOVE LOWEST CRITERIA	WATER	WATER	WATER	WATER	WATER
	LOCATION						SEAD-64	SEAD-64	SEAD-64	SEAD-64	SEAD-64
	SAMPLE DATE						07/08/94	07/09/94	07/08/94	07/08/94	07/18/94
	ES ID						MW64D-1	MW64D-2	MW64D-3	MW64D-4	MW64D-5
	LAB ID						226385	226386	226387	226388	227269
	SDG NUMBER						45257	45257	45257	45257	45332
	UNITS										
METALS											
Aluminum	ug/L	30100	100%	NA	50-200 *	5	177 J	1390	453	494	30100 J
Antimony	ug/L	1.5	20%	3	6	0	1.3 U	1.3 U	1.5 J	1.3 U	1.3 U
Arsenic	ug/L	10	20%	25	NA	NA	2 U	2 U	2 U	2 U	10
Barium	ug/L	693	100%	1000	2000	0	88.6 J	62.8 J	75.9 J	63 J	693
Beryllium	ug/L	3.1	20%	NA	4	0	0.1 U	0.1 U	0.1 U	0.1 U	3.1 J
Cadmium	ug/L	1.3	40%	10	5	0	0.2 U	0.2 U	1.3 J	0.2 U	1 J
Calcium	ug/L	902000	100%	NA	NA	NA	142000	122000	120000	140000	902000
Chromium	ug/L	47.1	80%	50	100	0	0.4 U	1.5 J	0.63 J	0.42 J	47.1
Cobalt	ug/L	82.3	100%	NA	NA	NA	0.69 J	2.8 J	1.5 J	1.4 J	82.3
Copper	ug/L	41.3	80%	200	1000 *	0	0.5 U	3.9 J	2 J	0.68 J	41.3
Iron	ug/L	65800	100%	300	300 *	5	440	1730	538	552	65800
Lead	ug/L	71.6	40%	25	15 **	1	0.9 U	1.2 J	0.89 U	0.89 U	71.6
Magnesium	ug/L	35900	100%	NA	NA	NA	14800	13000	14800	13200	35900
Manganese	ug/L	8250	100%	300	50 *	5	223	456	86.6	106	8250
Mercury	ug/L	0.05	40%	2	2	0	0.04 U	0.04 U	0.04 U	0.04 J	0.05 J
Nickel	ug/L	108	100%	NA	100	1	1.4 J	4.1 J	1.1 J	1.5 J	108
Potassium	ug/L	7080	100%	NA	NA	NA	3340 J	3240 J	1770 J	1280 J	7080 J
Sodium	ug/L	12300	100%	20000	NA	NA	12300	4490 J	6520	3350 J	4390 J
Thallium	ug/L	3.2	60%	NA	2	3	2.2 J	1.9 U	3.2 J	1.9 U	2.1 J
Vanadium	ug/L	42.9	100%	NA	NA	NA	0.69 J	2.1 J	0.9 J	0.69 J	42.9 J
Zinc	ug/L	305	100%	300	5000 *	1	3.8 J	12.4 J	14.4 J	6.5 J	305
OTHER ANALYSES											
pH	Standard Units						7.2	7.9	7.5	7.3	7.8
Conductivity	umhos/cm						725	490	550	595	550
Temperature	°C						22	15.6	16.9	15.2	15.3
Turbidity	NTU						1.5	181	127	141	>200

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 Maximum 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 Advisories, USEPA, May 1994

Pesticides and PCBs

No pesticides or PCBs were detected in the groundwater samples collected at SEAD-64D.

Metals

All of the inorganics on the Target Analyte List (TAL), except selenium, silver, and cyanide, were detected in one or more of the five groundwater samples. Seven metals were detected in the groundwater samples at concentrations above the lowest criteria for NY AWQS Class GA criteria or the Federal primary and secondary drinking water MCLs: aluminum, iron, lead, manganese, nickel, thallium, and zinc. Aluminum, iron, and manganese concentrations exceeded the criteria in the background and all the downgradient locations. Lead, nickel, thallium, and zinc concentrations exceeded the criteria in one or two of the downgradient samples.

When the data for each downgradient groundwater sample are compared to the background groundwater data, many of the metals concentrations are higher than the background concentrations, especially at MW64D-5. All the downgradient samples also had higher turbidities (127 to >200 NTUs) than the background sample (1.5 NTU). Groundwater from MW64D-5 had a turbidity greater than 200 NTU and looked silty. The higher turbidity in the downgradient wells may influence the reported metals concentrations..

3.1.3.3 Data Summary and Conclusions

The results of the ESI conducted at SEAD-64D identified a large debris pile at the south end of SEAD-64D that may be impacting the soils and groundwater locally due to municipal waste. Two other debris piles were observed in this area; the contents of which were not investigated. An area of disposed metallic debris was identified on the ground surface in the east-central section of SEAD-64D. Criteria for PAHs were exceeded in several surface soil samples across the site which may have been caused by the formerly active incinerator located approximately 500 feet north of the site. Most soil samples also had at least one exceedance of the criteria for a heavy metal. The groundwater sample collected from MW64D-5 had a high concentration of heavy metals, several of which were orders of magnitude above their respective criteria, though the sample's high turbidity may have affected these results.

It is important to note that in some instances the detection limit for individual analyses may be raised (sometimes above the criteria value) due to dilution or matrix effects in the sample. Also, note that the total number of samples found to exceed the criteria in analytical results tables may include estimated concentrations (i.e., J-qualified data). This should be noted when considering further investigation or remedial action activities.

This information suggests that there have been localized impacts to the soil and possibly to the groundwater at SEAD-64D which may pose a risk to receptors. In addition, emissions from the former incinerator may have impacted the surface soils across much of SEAD-64D.

3.1.4 Environmental Fate of Constituents

The potential contaminants of concern at SEAD-64A and SEAD-64D are semivolatile organic compounds, primarily PAHs, and metals. The potential contaminants of concern at SEAD-11 include semivolatile organic compounds, metals, and volatile organic compounds.

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 these potential contaminants of concern, and all contaminants of concern at SEDA, is provided in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

3.1.4.1 Semivolatile 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 semivolatile organics is presented in Table 3-15.

PAH compounds have a high affinity for organic matter and low water solubility. Water solubility tends to decrease and affinity for organic matter 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 slowly into the groundwater or the water between the soil particles in the vadose zone. 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 air represent important media for the transport of PAHs.

Because of their high affinity for organic matter, PAH compounds are readily taken up (bioaccumulated) by living organisms. However, organisms have the ability to metabolize the chemicals and to excrete the polar metabolites. This ability varies among organisms. Fish appear to have well-developed systems for metabolizing PAHs and excreting them. Shellfish (bi-valves) appear to be less able to metabolize the compounds. As a result, PAH concentrations are usually low in fish tissue and higher in shellfish tissue.

TABLE 3 - 15

SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR SELECTED ORGANIC 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
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
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	

TABLE 3 - 15

SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR SELECTED ORGANIC COMPOUNDS

SENECA ARMY DEPOT ACTIVITY

COMPOUND	SOLUBILITY (mg/l)	VAPOR PRESSURE (mmHg)	HENRY'S LAW CONSTANT (atm-m³/mol)	Koc (ml/g)	Kow	HALF - LIFE (days)	BCF
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)

Natural processes can alter PAH concentrations in the environment. Biodegradation due to microorganisms, is an important process affecting the concentrations of PAHs in soil, sediment, and water. Volatilization is another important process. It occurs more readily for the lighter molecular weight PAHs that the higher molecular weight PAHs.

3.1.4.2 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.

A RI was performed at the Open Burning (OB) Grounds at SEDA in 1992 for which over 50 surface soil samples and over 300 subsurface soil samples were collected (Parsons ES, September 1994). The pH values of the surface soil samples ranged from 5 to 8.4, and the subsurface soil samples had values ranging from 7 to 9. The soil at the OB Grounds is lithologically similar to the soil at the Construction Debris Landfill, therefore, metals in the soil at the Construction Debris Landfill are expected to be primarily present in insoluble forms. A detailed evaluation of select metals (barium, copper, lead and mercury) is given below.

Fate and Transport of Selected Metals

More information regarding the fate and transport of copper, lead, and zinc, which were detected in the soil at concentrations 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.

Lead is extremely persistent in both water and soil. Environmental fate processes may transform one lead compound to another; however, lead is generally present in the +2 oxidation state, and will form lead oxides. It is largely associated with suspended solids and sediment in aquatic systems, and it occurs in relatively immobile forms in soil. Lead, which has been released to soil may become airborne as a result of fugitive dust generation.

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 fuzes. 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.

3.1.4.3 Volatile Organic Compounds

Volatile organic compounds (VOCs) 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 VOCs may degrade rapidly in the vadose zone aboveground water 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 VOCs, only selected volatile organic compounds that are commonly found or are suspected to have been released to the environment at SEAD-11 are discussed below.

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 3-15 summarizes the chemical specific properties of TCE and its breakdown products, and BTEX compounds. Media specific properties include organic carbon content, porosity, moisture content, bulk density, groundwater velocity, and dispersivity.

Aromatic Volatile Organic Compounds

The following information was obtained from the document, "Installation Restoration Program Toxicology Guide", Volume 1, October 1985, AD-A171095.

Benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds may move through the soil/groundwater system when present at low concentrations (dissolved in water and sorbed on soil) or as a separate organic phase (resulting from a spill of significant quantities of the chemical).

In general, transport pathways of low soil concentrations can be assessed by equilibrium partitioning. These calculations predict the partitioning of BTEX compounds among soil particles, soil water and soil air. The portions of BTEX compounds associated with the water and air phases of the soil are more mobile than the adsorbed portions.

Benzene

The estimate for the unsaturated topsoil model indicate that most of the benzene (88%) is expected to be sorbed to the soil. A much smaller (yet significant) amount (7%) will be present in the soil water phase and can thus migrate by bulk transport (e.g., the downward movement of infiltrating water), dispersion and diffusion. For the portion of benzene in the gaseous phase of the soil (5%), diffusion through the soil-air pores up to the ground surface, and subsequent removal by wind, will be a significant loss pathway. There is no significant difference in the partitioning calculated for 25°C and 10°C.

In saturated, deep soil (containing no soil air and negligible soil organic carbon), a much higher fraction of the benzene (79%) is likely to be present in the soil water phase and transported with flowing groundwater.

Toluene

The estimates for the unsaturated topsoil model indicate that nearly all of the toluene (97%) is sorbed to the soil. A much smaller amount (2%) will be present in the soil water phase and can thus migrate by bulk transport (e.g., the downward movement of infiltrating water, dispersion and diffusion. For the portion of toluene in the gaseous phase of the soil (1.6%), diffusion through the soil pore spaces up to the ground surface, and subsequent removal by wind, will be a significant loss pathway. There is no significant difference in the partitioning calculated for 25°C and 10°C.

In saturated, deep soil (containing no soil air and negligible soil organic carbon), a much higher fraction of the toluene (48%) is likely to be present in the soil water phase and transported with flowing groundwater.

Investigators have studied the transport and fate of toluene in solutions applied to any soil. In a soil column receiving solutions with less than 1 mg/L toluene, approximately 40-70% was volatilized and 2-13% percolated through the soil column with minimal retardation. Between 20-60% was either degraded or not accounted for.

Ethyl benzene

The estimates for the unsaturated topsoil model indicate that nearly all of the ethyl benzene (98%) is sorbed to the soil. A much smaller amount (0.75%) is expected to be present in the soil water movement of infiltrating water), dispersion and diffusion. For the portion of ethyl benzene in the gaseous phase of the soil (0.7%), diffusion through the soil air pores up to the ground surface, and subsequent removal by wind, will be a significant loss pathway. There is no significant difference in the partitioning calculated for 25°C and 10°C.

In saturated, deep soil (containing no soil air and negligible soil organic carbon, a much higher fraction of the ethyl benzene (26%) is likely to be present in the soil water phase and transported with flowing groundwater.

Xylene

The estimates for the unsaturated topsoil model indicate that nearly all of the xylene (98.8%) is expected to be sorbed to the soil. A much smaller amount (0.7%) is expected to be present in the soil water phase and thus available to migrate by bulk transport (e.g., the downward movement of infiltrating water), dispersion and diffusion. For the portion of xylene in the gaseous phase of the soil (0.5%), diffusion through the soil-air pores up to the ground surface, and subsequent removal by wind, will be a significant loss pathway.

In saturated, deep soil (containing no soil air and negligible soil organic carbon), a much higher fraction of the xylene (26%) is likely to be present in the soil water phase and transported with flowing groundwater.

Sorption on Soil

The mobility of BTEX compounds in the soil/groundwater system (and their eventual migration into aquifers) is strongly affected by the extent of their sorption on soil particles. In general, sorption on soil is expected to:

- increase with increasing soil organic matter content;
- increase slightly with decreasing temperature;
- increase moderately with increasing salinity of the soil water; and
- decrease moderately with increasing dissolved organic matter content of the soil water.

Based upon octanol-water partition coefficients, for the BTEX compounds (135, 537, 1410, and 1450, respectively) the soil sorption coefficients (K_{oc})s are estimated to be 65, 259, 681, and 691, respectively.

Volatilization from Soil

Transport of BTEX vapors through the air-filled pores of unsaturated soil is an important transport mechanism for near-surface soil. In general, important soil and environmental properties influencing the rate of volatilization include soil porosity, temperature, convection currents and barometric pressure changes; important physiochemical properties include the Henry's law constant, the vapor-soil diffusion coefficient, and, to a lesser extent, the vapor phase diffusion coefficient.

There are no data from laboratory or field test, showing actual soil volatilization rates. Sorption of the benzene vapors on the soil may slow the vapor phase transport.

The Henry's law constant (H), which provides an indication of a chemical's tendency to volatilize from solution increases significantly with increasing temperature. Moderate increases in H are also observed with increasing salinity due to a decrease in solubility of benzene, toluene and ethyl benzene.

Transformation Processes in Soil/Groundwater Systems

The persistence of BTEX compounds in soil/groundwater systems is not well documented. In most cases, it should be assumed that the chemical will persist for months to years (or more). Benzene, toluene and ethyl benzene that has been released into the air will eventually undergo photochemical oxidation; tropospheric lifetime on the order of a few hours to a few days have been estimated for benzene and 15 hours for toluene and ethyl benzene.

Benzene

BTEX compounds under normal environmental conditions are not expected to undergo hydrolysis. Further, benzene and toluene are not expected to be susceptible to oxidation or reduction reactions in the soil/groundwater environment.

Available data on the biodegradability of benzene are somewhat contradictory. Certain pure and mixed cultures can apparently degrade benzene under environmental conditions, but the chemical must be considered fairly resistant to biodegradation. Available data indicate that toluene and ethyl benzene are biodegradable in the soil/groundwater environment. No information on the biodegradability of xylene in the soil/groundwater environment is available. However, based upon data for other structurally similar chemicals (e.g., toluene, ethyl benzene), it is expected that xylene would be biodegradable. In most soil/groundwater systems aerobic degradation would be of minimal importance because of the low concentration of microorganisms (at depth) and the low dissolved oxygen (anaerobic) conditions. No data are available on the possibility of anaerobic biodegradation.

Primary Routes of Exposure From Soil/Groundwater Systems

The above discussion of fate pathways suggest that benzene is highly volatile, weakly adsorbed by soil, and has a limited potential for bioaccumulation. Toluene is highly volatile from aqueous solutions, moderately sorbed to soil, and has a low potential for bioaccumulation. Ethyl benzene and xylene are highly volatile from aqueous solutions, may be moderately adsorbed by soil, and have a moderate potential for bioaccumulation. BTEX compounds may volatilize from soil surfaces, but that portion not subject to volatilization is likely to be mobile in groundwater. These fate characteristics suggest several potential exposure pathways.

Volatilization of BTEX compounds from a disposal site, particularly during drilling or restoration activities, could result in inhalation exposures. The potential for groundwater contamination is high, particularly in sand soil.

These results of a USEPA Groundwater Supply Survey indicate that BTEX compounds have the potential for movement in soil/groundwater systems. The compounds may eventually reach surface waters by this mechanism, suggesting several other exposure pathways:

- Groundwater and surface water may be used as drinking water supplies, resulting in exposures from direct ingestion and inhalation during showers;
- Aquatic organisms residing in these waters may be consumed, also resulting in ingestion exposure through bioaccumulation;
- Recreational use of these waters may result in dermal exposure;
- Domestic animals may consume or be dermally exposed to contaminated ground or surface waters; the consumption of meats and poultry could then result in ingestion exposures.

In general, exposures associated with surface water contamination can be expected to be lower than exposures from drinking contaminated groundwater for two reasons. First, the Henry's law constants for BTEX compounds indicate that they will volatilize upon reaching surface waters. Secondly, the bioconcentration factors for benzene and toluene are expected to below, suggesting limited bioaccumulation in aquatic organisms or domestic animals. For ethyl benzene, the bioconcentration factor suggest moderate bioaccumulation in aquatic organism and domestic animals. The bioaccumulation factor for xylene is not high enough to suggest consumption of aquatic organisms or domestic animals as a significant source of exposure compared to drinking water.

Although BTEX compounds are readily photo-oxidized in the atmosphere, its volatility suggests that it may be found in air as well.

Chlorinated Volatile Organic Compounds

Table 3-15 presents the information which will serve as a basis for predicting the likely environmental fate of chlorinated organic compounds. The most volatile of the chlorinated compounds being examined is vinyl chloride, with 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 the selected organic compounds are presented in Table 3-15. 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 3-15 for TCE and its breakdown products. The relationship between K_{oc} and mobility is presented in Table 3-16. 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 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 soil present is useful for estimating the mobility of compounds. The site soil, clay loam, generally has low permeabilities and high water retention capacities. Therefore dissolved materials tend to move much slower through clay soil than sandy soil. Since adsorption of solutes on soil is controlled by the amount of organic carbon in the soil, soil with a higher organic content will adsorb more organic compounds than soil which are low in carbon but rich in clay. Generally, surface soil, i.e. soil in the agricultural A horizon, have a higher organic content than deeper soil, i.e. soil 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

TABLE 3-16

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.

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 has been 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 are shown in Table 3-15. 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.

Fate of Chlorinated Compounds

Following a release, source materials partition into the three environmental media, i.e. soil, water and air. Estimations of phase partitioning at the source can be used to understand the expected fate of the released materials. The fate of the chlorinated chemicals can be determined by Level I equilibrium partitioning calculations following procedures developed by MacKay and Paterson, (1981). The details of the fugacity calculations are included in the Generic Installation RI/FS Workplan in Section 3.1.3.1.2 on page 3-11. The results of these partitioning analyses indicate that the chlorinated solvents will be partitioned into the soil-water and the soil-airspace.

A summary of the identified breakdown products resulting from the environmental biodegradation of TCE is provided in the Generic Installation RI/FS Workplan. Dechlorination and methane production are carried out by anaerobic microbes. Anaerobic conditions are likely to exist in the soil and therefore anaerobic degradation is a likely degradation pathway. Research indicates that under methanogenic conditions TCE is sequentially reduced by dechlorination to DCE isomers, then to vinyl chloride, and eventually to ethene. At each step a chlorine is replaced by hydrogen, and hydrogen chloride is produced. Of the three possible DCE isomers, the cis- and trans- 1,2-dichloroethene isomers are much more prevalent than 1,1-dichloroethene. Both an energy source and an electron, or an electron donor source appear to be necessary for this transformation to take place.

Compounds with a greater degree of halogenation are more likely to undergo dehalogenation, suggesting that vinyl chloride, with one remaining chlorine is not as likely to degrade to ethene as TCE is to degrade to DCE.

TCE is relatively mobile and will partition in the water of the soil-groundwater system especially in soil with a low organic content. Volatilization may also be a significant pathway for TCE near the surface or in the soil-air phase. Hydrolysis is not expected to be significant in natural soil due to slow reaction mechanisms.

DCE and vinyl chloride are also considered to be mobile in soil/groundwater systems and volatilization is also considered to be significant near the surface. However, unlike TCE and DCE, partitioning of vinyl chloride in the soil-air phase dominates the expected partitioning pathways and most of the vinyl chloride will likely be volatilized from the surface of the soil.

3.2 PRELIMINARY IDENTIFICATION OF POTENTIAL RECEPTORS AND EXPOSURE SCENARIOS

This section identifies the source areas, release mechanisms, potential exposure pathways and the likely human and environmental receptors at SEAD-11, SEAD-64A, and SEAD-64D, based upon the results of the conceptual site model described in the previous section. The complete potential exposure pathways from sources to receptors are shown schematically in the Exposure Pathway Models.

The following sections discuss the current understanding of risks for each site based upon the data gathered from the ESI. 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 that risks to human health and the environment can be determined and to develop appropriate remedial actions.

The future use of the land at Seneca Army Depot Activity is defined in the Reuse Plan and Implementation Strategy for the Seneca Army Depot (December 1996). Chapter 21 of this report describes the preferred land use for the entire Depot and identifies nine land uses. The portion of the Depot that is occupied by SEAD-11 and SEAD-64D is proposed as "Conservation/Recreation Land" (Figure 3-26). The description for land use in the Reuse Plan is described below:

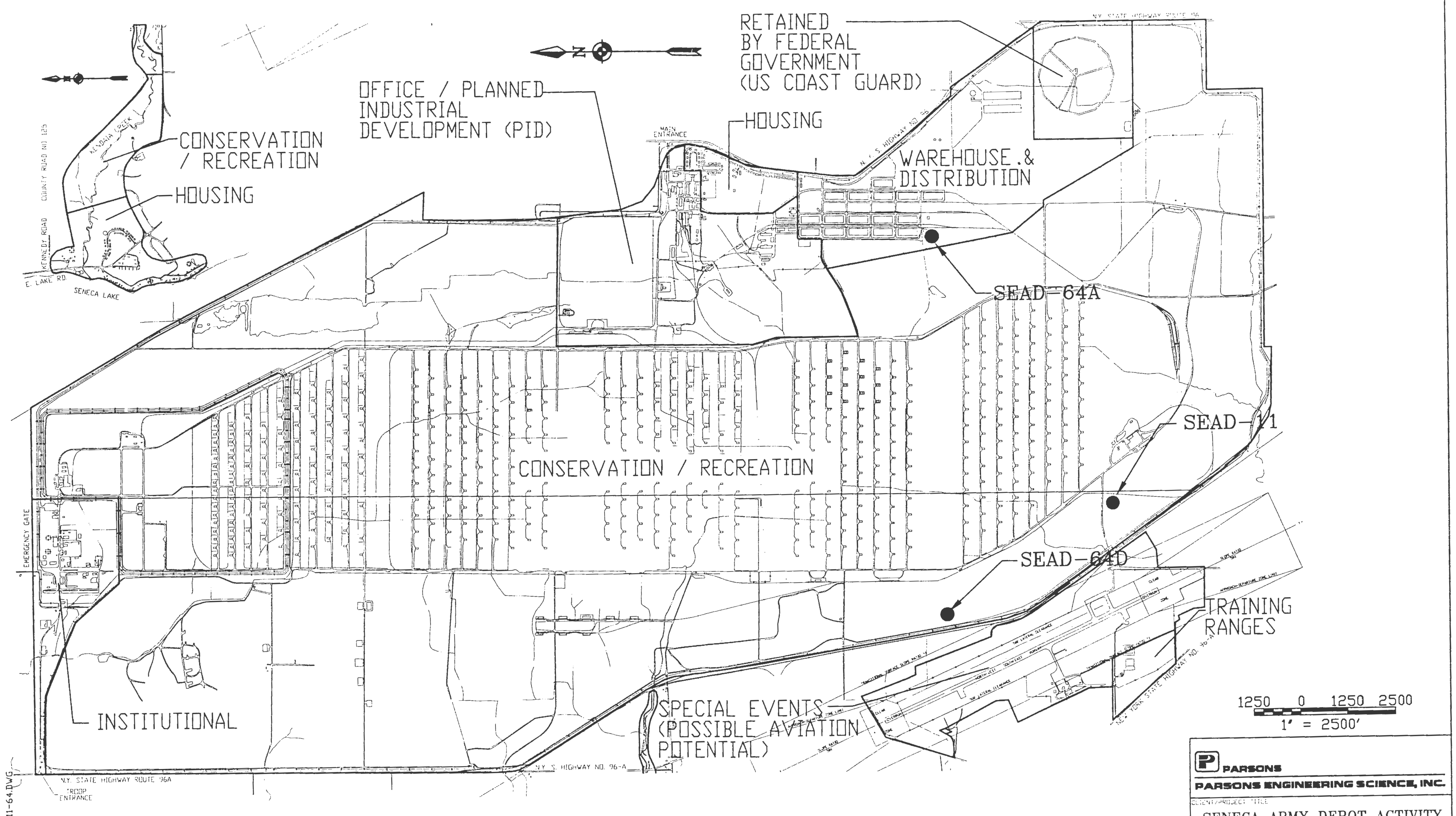
A major asset at the Seneca Army Depot is the abundance of wildlife, especially the unique white deer herd, that are located within the existing fence line at the Depot. The preservation of a large conservation area, designed to protect wildlife, could provide opportunities for a variety of public uses such as self-guided tours, nature trails, and controlled hunting and fishing.

"The parcel", which contains approximately 8,300 acres, would represent the largest use of land at the Depot. It would include all of the ammunition storage igloos, various office and support buildings in the North End "Q" area and other structures at various scattered locations. This site also contains a significant amount of internal roadway and a portion of the existing rail line. Other utilities (e.g., water, electric, telephone) also traverse this land parcel.

At the conclusion of the LRA outreach effort, the Division of Fish and Wildlife of New York State Department of Conservation (DEC) indicated an interest in acquiring ownership of this portion of the property and managing it for conservation purposes. Another private organization also indicated an interest in the land area for similar types of activities.

It is recommended that this site be designated for the purpose of wildlife conservation. However, in developing a specific site plan for the reuses of the site, opportunities for other forms of active recreation, that would be compatible with conservation, should also be examined. In addition, the LRA should ensure that site planning efforts examine the need for buffers, especially near adjacent parcels that involve different types of land uses, as well as the need to provide easements for utilities, roadways, and rail lines.

It is anticipated that the organization that eventually acquires the property, under a Public Benefit Conveyance, would be responsible for preparing a site plan for the land. However, the LRA should work closely with this organization in the development of plans for the site,



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-11, SEAD-64A, SEAD-64D

DEPT ENVIRONMENTAL ENGINEERING	Dwg No 726510-02007

FIGURE 3-26
FINAL LAND USE PLAN

SCALE 1" = 2500'	DATE JANUARY 1997	REV A

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as well as provide assistance in negotiations regarding the transfer of property from the Department of the Army to another user.

The portion of the Depot occupied by SEAD-64A is designated as Warehouse and Distribution in the Reuse Plan. The Reuse Plan describes the proposed use of this land as follows:

"This 550 acre portion of the Depot contains approximately 2.3 million square feet of warehouse space. There are 21 warehouses of 90,000 square feet and two additional warehouses that each contain over 200,000 square feet. In total, this portion of the site contains almost 90 percent of the warehouse inventory at the Depot. The parcel is also serviced by rail and many of the warehouses have rail siding.

Due to the type of facilities on this portion of the Depot, it is recommended that this area be designated for warehouse and distribution related activities. However, because of the age of the facilities it is recommended that this site be transferred directly by the Department of the Army to private and public organizations through negotiated sales and/or public auctions. The LRA, or its successor organization should not be directly involved in owning or managing this site. However, the LRA or its successor organization, should be involved in marketing facilities within this area. In addition, zoning and other land use regulations should be prepared to manage the redevelopment of this site.

The public outreach effort conducted by the LRA indicated that the New York State Army National Guard had an interest in acquiring three warehouses and that a private corporation was interested in acquiring warehouse space and the use of rail facilities at the site."

Using the Reuse Plan and Implementation Strategy for the Depot, the future use scenario and the required degree of cleanup will be addressed on a site-by-site basis as part of each feasiblity study.

3.2.1 SEAD-11

3.2.1.1 Potential Source Areas and Release Mechanisms

The Construction Debris Landfill was active from 1946 to 1949 although operating practices are unknown. The landfill, which covers approximately four acres, is currently abandoned and the surface is vegetated with grasses and weeds. The constituents of concern identified during the ESI are primarily SVOCs and metals. The primary source area for SEAD-11 includes the buried waste and contaminated soil within the landfill.

The primary release mechanisms from the buried waste and soil are surface water runoff and infiltration. Wind erosion is also a release mechanism from impacted soil, although this is not expected to be significant since the site is vegetated. Groundwater, surface water and sediment are secondary sources. Surface water interception of groundwater is a secondary release mechanism.

3.2.1.2 Potential Exposure Pathways and Receptors - Current Uses

The complete potential exposure pathways from sources to receptors are shown schematically in Figure 3-23. The potential for human exposure is directly affected by the accessibility to the site. Within SEDA, human and vehicular access to the site is restricted since the facility is located within the confines of the ammunition storage area.

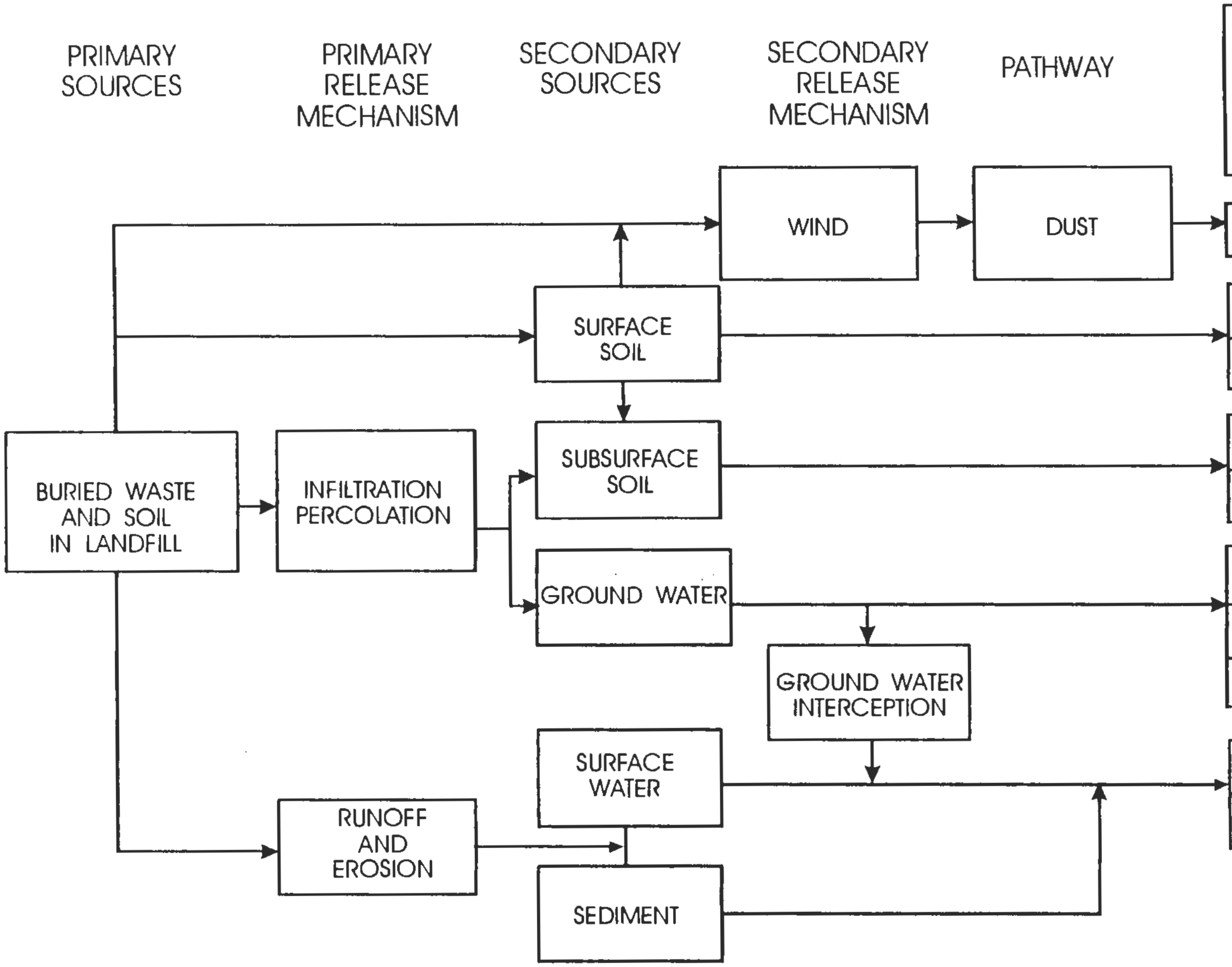
There are three primary receptor populations for potential releases of chemicals from the Construction Debris Landfill:

1. Current site workers and visitors (i.e., hunters) who may visit the site
2. Terrestrial biota on or near the site
3. Aquatic biota on or near the site (i.e., at Indian Creek)

The exposure pathways and media of exposure are described below as they may effect the various receptors. The numerical assumptions that will be used in the risk assessment for the current uses exposure scenario are listed in Table 3-17.

Ingestion and Dermal Exposure Due to Surface Water Runoff and Erosion

Current site workers and visitors (i.e., hunters) could be exposed by way of ingestion or dermal contact to surface water or sediment in the drainage ditches or in Indian Creek. Terrestrial biota that drink or come in contact with surface water or sediment in the drainage ditches or Indian



EXPOSURE ROUTE	RECEPTOR				
	HUMAN			BIOTA	
	HUNTER	RECREATER/ CAMPER	CURRENT SITE WORKERS	TERRESTRIAL	AQUATIC
INHALATION	●	●	●	●	NA
INGESTION	●	●	●	●	NA
DERMAL CONTACT	●	●	●	●	NA
INGESTION	●	NA	NA	●	NA
DERMAL CONTACT	●	NA	NA	●	NA
INHALATION	NA	●	NA	NA	NA
INGESTION	NA	●	NA	NA	NA
DERMAL CONTACT	NA	●	NA	NA	NA
INGESTION	●	●	●	●	●
DERMAL CONTACT	●	●	●	●	●

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE RECEPTOR

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CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-11 Old Construction Debris Landfill

DEPT ENVIRONMENTAL ENGINEERING
DWG NO 726510-02005

FIGURE 3-23
EXPOSURE PATHWAY SUMMARY

SCALE NA
DATE July 1997

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Table 3-17
Standard Assumptions For Calculation of Chemical Intake

Seneca Army Depot Activity

PATHWAY	RISK EVALUATION	INTAKE ASSUMPTIONS
DERMAL WATER	CARCINOGENIC	SA = Skin surface area for contact adult = 1940 sq. cm SA = Skin surface area for contact child = 866 sq. cm EF = Exposure Frequency = 350 days/year ED = Exposure Duration = 30 years BW = Body weight = 70 Kg (adult average) AT = Averaging Time = 70 years x 365 days/year
	NONCARCINOGENIC	SA = Skin surface area for contact adult = 1940 sq. cm SA = Skin surface area for contact child = 866 sq. cm EF = Exposure Frequency = 350 days/year ED = Exposure Duration = 30 years BW = Body weight = 70 Kg (adult average), 15 Kg (children 1-6 years) AT = Averaging Time = 70 years x 365 days/year
DERMAL SOIL	CARCINOGENIC	SA = Skin surface area for contact adult = 1940 sq. cm SA = Skin surface area for contact child = 866 sq. cm EF = Exposure Frequency = 350 days/year ED = Exposure Duration = 30 years BW = Body weight = 70 Kg (adult average) AT = Averaging Time = 70 years x 365 days/year AF = Soil to Skin Adherence = 2.77 mg/cm^2(Soil Std.)
	NONCARCINOGENIC	SA = Skin surface area for contact adult = 1940 sq. cm SA = Skin surface area for contact child = 866 sq. cm EF = Exposure Frequency = 350 days/year ED = Exposure Duration = 30 years BW = Body weight = 70 Kg (adult average), 15 Kg (children 1-6 years) AT = Averaging Time = ED x 365 days/year AF = Soil to Skin Adherence = 2.77 mg/cm^2(Soil Std.)
INHALATION	CARCINOGENIC	EF = Exposure Frequency = 350 days/year IR = Inhalation Rate = 20 m^3/day (adult average); (no child) ED = Exposure Duration = 30 years BW = Body weight = 70 Kg (adult average), 15 Kg (child average) AT = Averaging Time = 70 years x 365 days/year
	NONCARCINOGENIC	EF = Exposure Frequency = 350 days/year IR = Inhalation Rate = 20 m^3/day (adult average) BW = Body weight = 70 Kg (adult average), 15 Kg (child average)
INGESTION WATER	CARCINOGENIC	EF = Exposure Frequency = 350 days/year IR = Ingestion Rate = 2 liters/day (adult 90%); 1 liter/day (child) ED = Exposure Duration = 30 years BW = Body weight = 70 Kg (adult average), 15 Kg (child average) AT = Averaging Time = 70 years x 365 days/year
	NONCARCINOGENIC	EF = Exposure Frequency = 350 days/year IR = Ingestion Rate = 2 liters/day (adult 90 %) BW = Body weight = 70 Kg (adult average), 15 Kg (child average)
INGESTION SOIL	CARCINOGENIC	EF = Exposure Frequency = 350 days/year IR = Ingestion Rate = 100mg/day (adult average) ED = Exposure Duration adult = 30 years ED = Exposure Duration child = 6 years (child), 24 years (adult) BW = Body weight = 70 Kg (adult average), 15 Kg (child average) AT = Averaging Time = 70 years x 365 days/year
	NONCARCINOGENIC	EF = Exposure Frequency = 350 days/year IR = Ingestion Rate = 200 mg/day (child)/100 mg/day (adult) BW = Body weight = 15 Kg (child average)

Notes:

1) The values shown in this table were obtained from:

a) EPA Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure

b) EPA Exposure Factors Handbook, EPA/600/8-89/043

Creek may be exposed. Aquatic biota in the drainage ditches or Indian Creek may also be exposed.

Incidental Soil Ingestion and Dermal Contact

Incidental ingestion of surface soil is a potential exposure pathway for current site workers, visitors and terrestrial biota. Dermal contact with soil is a potential pathway for current site workers, visitors and terrestrial biota.

Ingestion of and Dermal Contact with Groundwater

The groundwater at the Construction Debris Landfill is not used as a drinking water source. It is not anticipated that there will be direct exposure to the groundwater from the site under current uses to current site workers, visitors, terrestrial biota or aquatic biota.

Dust Inhalation and Dermal Contact

Inhalation and dermal contact with impacted dust is a potential exposure pathway for current site workers, visitors and terrestrial biota.

3.2.1.3 Potential Exposure Pathways and Receptors - Future Uses

The proposed future use of the area that encompasses SEAD-11 is as "Conservation/Recreation Land." The potential for human exposure is directly affected by the accessibility to the site and related facilities, which would be controlled by the administrator of the areas designated as "Conservation/Recreation Land."

There are four primary receptor populations for potential releases of contaminants from the Construction Debris Landfill disposal site:

1. Reactor/Camper who may visit the Construction Debris Landfill;
2. Hunter who may visit the Construction Debris Landfill;
3. Terrestrial biota on or near the former Construction Debris Landfill; and
4. Aquatic biota in the Indian Creek area.

The exposure pathways and media of exposure are described below as they may effect the various receptors.

For future use of SEAD-11, the receptor population would include, in addition to the above-mentioned receptors, a recreator/camper. This receptor may be exposed to inhalation of dust, ingestion and dermal contact with surface soil. In addition, the recreator may be exposed to groundwater (inhalation, dermal contact, and ingestion). This assumes that the receptor is exposed to groundwater supplied from a shallow well with a hand pump at a campsite or rest area in the Conservation/Recreation area. Lastly, camper/recreator may be exposed to surface water and sediment through wading in Indian Creek.

The hunter would be exposed in much the same manner as described in the current site scenario noted in Section 3.2.1.2.

Aquatic and Terrestrial biota would also be exposed in much the same manner as described in the current site use scenario noted in Section 3.2.1.2.

3.2.2 SEAD-64A

3.2.2.1 Potential Source Areas and Release Mechanisms

The primary source area identified during the ESI at SEAD-64A was the waste material in the landfill. The constituents of concern for this source are PAHs and heavy metals.

The primary release mechanisms from the waste material are surface water runoff, infiltration of precipitation, and wind erosion. Wind erosion is expected to be a minor mechanism since the site is vegetated. Groundwater, surface water, and sediment are secondary sources. Groundwater discharge to surface water is a secondary release mechanism.

3.2.2.2 Potential Exposure Pathways and Receptors - Current Uses

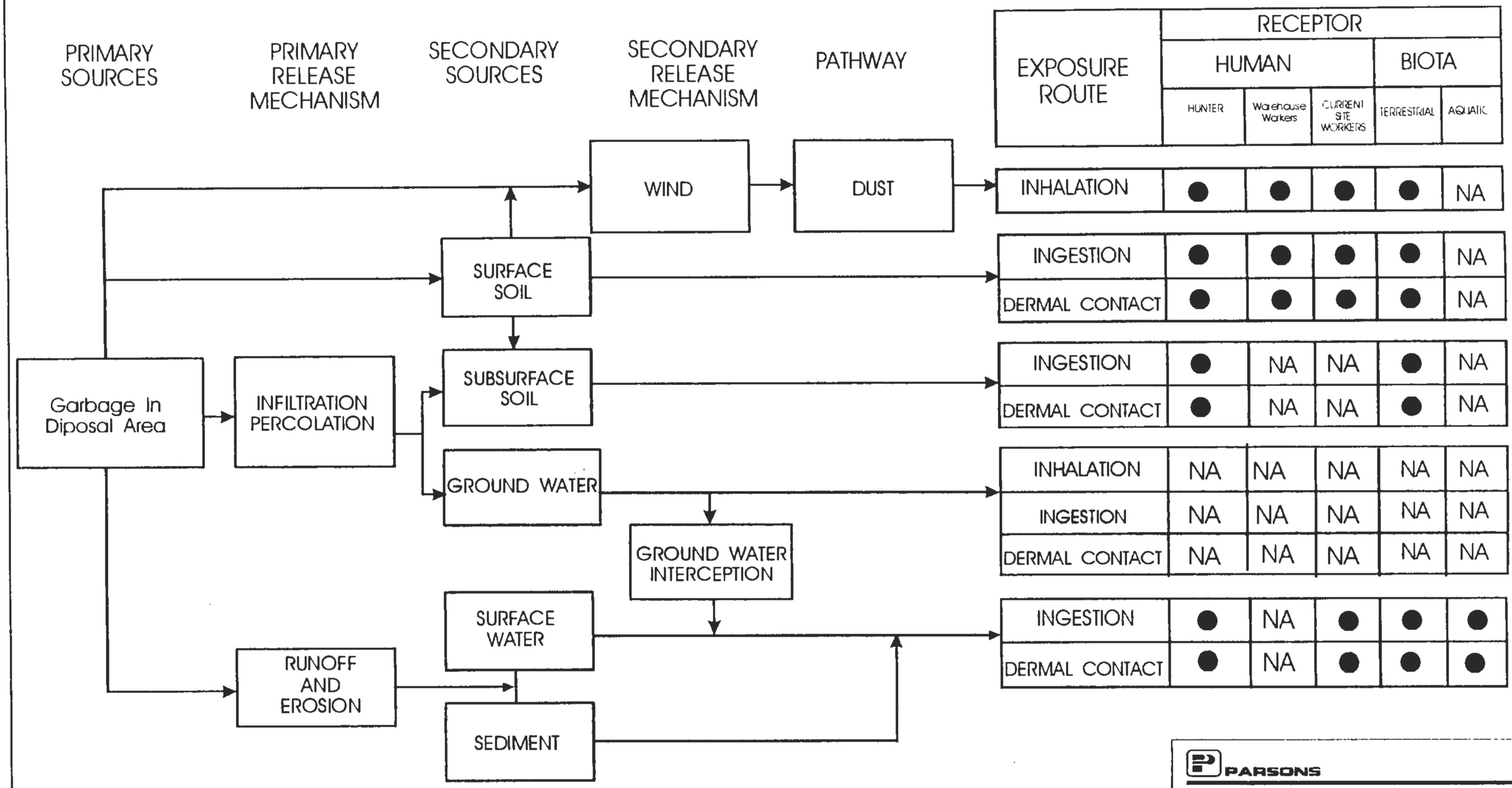
The potential exposure pathways from sources to receptors are shown schematically in Figure 3-24. The landfill at SEAD-64A is not enclosed by a fence; therefore, human and vehicular access to the site is restricted to SEDA on-site workers who enter the SEDA facility at the main gates.

There are two primary current receptor populations for potential releases of contaminants from SEAD-64A:

1. SEDA workers who may visit the site (This is not an active site; therefore, these receptors are periodic); or hunters and
2. Terrestrial and aquatic biota on or near the site.

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 current uses exposure scenario are listed in Table 3-17.



EXPOSURE ROUTE	RECEPTOR				
	HUMAN			BIOTA	
	HUNTER	Warehouse Workers	CURRENT SITE WORKERS	TERRESTRIAL	AQUATIC
INHALATION	●	●	●	●	NA
INGESTION	●	●	●	●	NA
DERMAL CONTACT	●	●	●	●	NA
INGESTION	●	NA	NA	●	NA
DERMAL CONTACT	●	NA	NA	●	NA
INHALATION	NA	NA	NA	NA	NA
INGESTION	NA	NA	NA	NA	NA
DERMAL CONTACT	NA	NA	NA	NA	NA
INGESTION	●	NA	●	●	●
DERMAL CONTACT	●	NA	●	●	●

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE RECEPTOR

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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-64A Garbage Disposal Site

DEPT ENVIRONMENTAL ENGINEERING

DWG NO 726510-02007

FIGURE 3-24
EXPOSURE PATHWAY SUMMARY

SCALE NA

DATE July 1997

Ingestion and Dermal Exposure Due to Surface Water Runoff and Sediment

Human receptors of impacted surface water and sediment include on-site workers who may incidentally ingest or come in contact with the surface water and sediment in the drainage channels. Terrestrial biota that drink from and come in contact with impacted surface waters may be affected. Aquatic biota in the surface water and sediment may also be affected.

Soil Ingestion and Dermal Contact

Incidental ingestion of the waste material and soil is a potential exposure pathway for on-site workers and terrestrial biota. Dermal contact with the waste material and soil is potential pathway for on-site workers and terrestrial biota.

Groundwater Ingestion, Inhalation, and Dermal Contact

Ingestion of, inhalation of, and dermal contact with groundwater are not potential exposure pathways for on-site workers or terrestrial biota. The groundwater beneath the site is not used currently as a drinking water source and connection to other potable groundwater aquifers has not been demonstrated.

Dust Inhalation and Dermal Contact

Inhalation and dermal contact with impacted dust is a potential exposure pathway for on-site workers and terrestrial biota.

3.2.2.3 Potential Exposure Pathways and Receptors - Future Use

The proposed future use of the area that encompasses SEAD-64A is as "Warehouse and Distribution Land". The potential for human exposure is directly affected by the accessibility to the site and related facilities, which would be controlled by the administrator of the areas designated as "Warehouse and Distribution Land."

There are four primary receptor populations for potential releases of contaminants from the IRFNA disposal site:

1. Warehouse Worker at the Garbage Disposal Site;
2. Hunter who may visit the Garbage Disposal Site, which is on the edge of the Conservation/Recreation Land area;
3. Terrestrial biota on or near the former Garbage Disposal Site; and
4. Aquatic biota in the nearby drainage swales.

The exposure pathways and media of exposure are described below as they may effect the various receptors.

For future use of SEAD-64A, the receptor population would include, in addition to the above-mentioned receptors, a warehouse/worker. This receptor may be exposed to inhalation of dust, ingestion and dermal contact with surface soil.

The hunter would be exposed in much the same manner as described in the current site scenario noted in Section 3.2.2.2.

Aquatic and Terrestrial biota would also be exposed in much the same manner as described in the current site use scenario noted in Section 3.2.2.2.

The numerical assumptions that will be used in the risk assessment for the future uses exposure scenario are listed in Table 3-17.

3.2.3 SEAD-64D

This section will identify the source areas, release mechanisms, potential exposure pathways, and likely human and environmental receptors at SEAD-64D using the conceptual site model. The potential exposure pathways are presented in Figure 3-25.

This section also discusses the current understanding of site risk for SEAD-64D based upon the data gathered for the ESI. This information is used to assess whether sources of contamination, release mechanisms, exposure routes, and receptor pathways developed based on the conceptual site model are valid, or if they may be eliminated from further consideration prior to conducting the risk assessment.

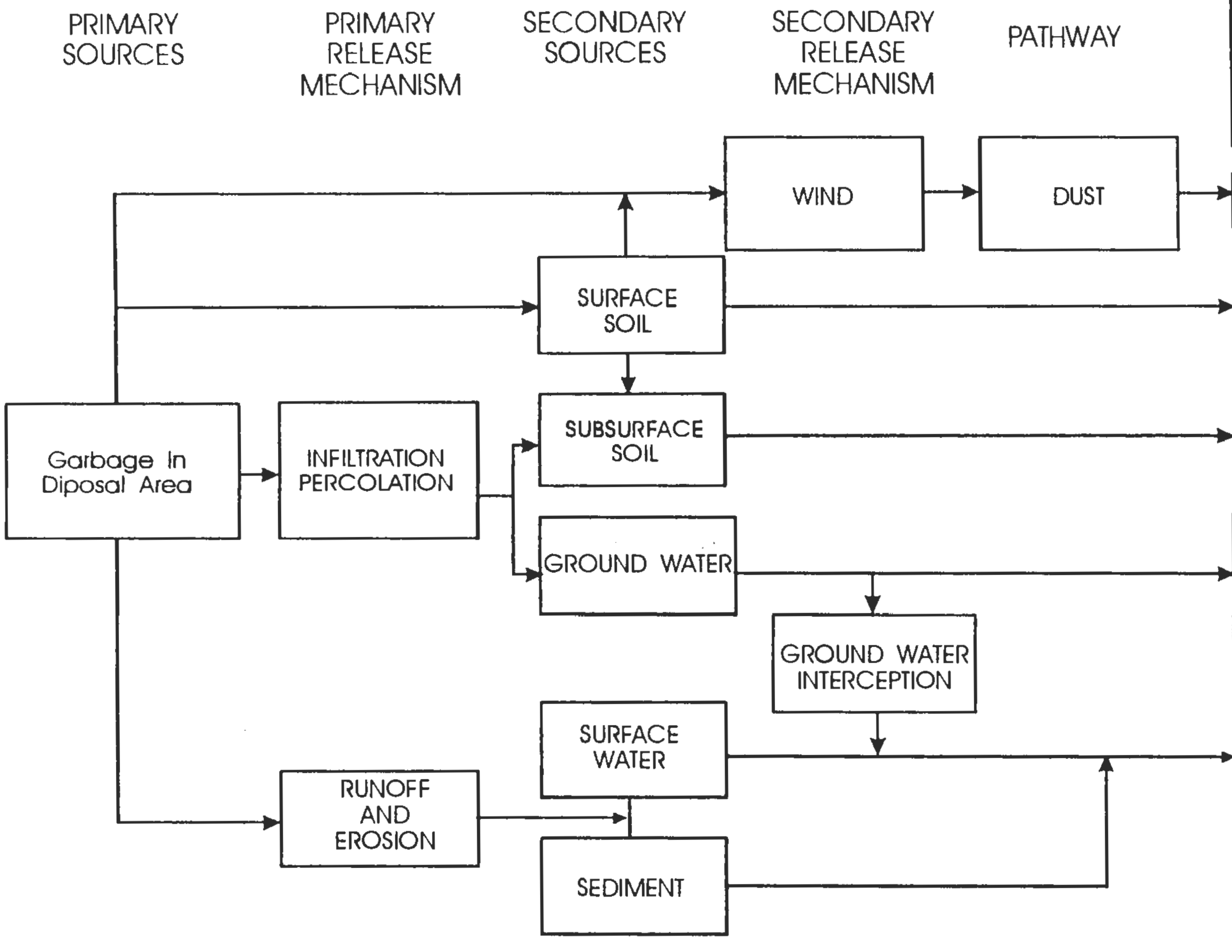
3.2.3.1 Potential Source Areas and Release Mechanisms

The primary source areas identified during the ESI are the waste material located in the east-central area and at the south end of SEAD-64D and the surface soils across the site. The constituents of concern for these sources are SVOs and heavy metals.

The primary release mechanisms from the waste material and the surface soils are surface water runoff, infiltration of precipitation, and wind erosion. Wind erosion is expected to be a minor mechanism since the site is vegetated. Groundwater, surface water, and sediment are secondary sources. Groundwater discharge to surface water is a secondary release mechanism.

3.2.3.2 Potential Exposure Pathways and Receptors - Current Uses

The potential exposure pathways from sources to receptors are shown schematically in Figure 3-21. At SEDA, human and vehicular access to the site is restricted to SEDA on-site workers by a chain-link fence around the SEDA facility.



EXPOSURE ROUTE	RECEPTOR				
	HUMAN			BIOTA	
	HUNTER	RECREATER/ CAMPER	CURRENT SITE WORKERS	TERRESTRIAL	AQUATIC
INHALATION	●	●	●	●	NA
INGESTION	●	●	●	●	NA
DERMAL CONTACT	●	●	●	●	NA
INGESTION	●	NA	NA	●	NA
DERMAL CONTACT	●	NA	NA	●	NA
INHALATION	NA	●	NA	NA	NA
INGESTION	NA	●	NA	NA	NA
DERMAL CONTACT	NA	●	NA	NA	NA
INGESTION	●	●	●	●	●
DERMAL CONTACT	●	●	●	●	●

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE RECEPTOR

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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-64D Garbage Disposal Area

DEPT ENVIRONMENTAL ENGINEERING
DWG NO 726510-02007

FIGURE 3-25
EXPOSURE PATHWAY SUMMARY

SCALE NA
DATE July 1997

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There are two primary receptor populations for potential releases of contaminants from SEAD-64D:

1. SEDA personnel and other people (i.e., hunters) who may visit the site. This is not an active site; therefore, these receptors would be exposed only on an intermittent or occasional basis.
2. Terrestrial and aquatic biota near the site.

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 baseline risk assessment for the current usage exposure scenario are listed in Table 3-17.

Ingestion and Dermal Exposure Due to Surface Water and Sediment

Human receptors of impacted surface water and sediment include on-site workers who may incidentally ingest or come in contact with the surface water and sediment. Terrestrial biota that drink from and come in contact with impacted surface waters may be affected. Aquatic biota in the surface water and sediment may also be affected.

Soil Ingestion and Dermal Contact

Incidental ingestion of the waste material and soil is a potential exposure pathway for on-site workers and terrestrial biota. Dermal contact with the waste material and soil is a potential pathway for on-site workers and terrestrial biota.

Groundwater Ingestion, Inhalation, and Dermal Contact

Ingestion of, inhalation of, and dermal contact with groundwater are not potential exposure pathways for on-site workers or terrestrial biota. The groundwater beneath the site is not used currently as a drinking water source and connection to other potable groundwater aquifers has not been demonstrated. It is not anticipated that there would be direct exposure of on-site workers or terrestrial biota to the groundwater from the site.

Dust Inhalation and Dermal Contact

Inhalation and dermal contact with impacted dust is a potential exposure pathway for on-site workers and terrestrial biota.

3.2.3.3 Potential Exposure Pathways and Receptors - Future Use

The proposed future use of the area that encompasses SEAD-64D is as "Conservation/Recreation Land". The potential for human exposure is directly affected by the accessibility to the site and related facilities, which would be controlled by the administrator of the areas designated as "Conservation/Recreation Land".

There are four primary receptor populations for potential releases of contaminants from the IRFNA disposal site:

1. Warehouse Worker at the Garbage Disposal Area;
2. Hunter who may visit the Garbage Disposal Area;
3. Terrestrial biota on or near the Garbage Disposal Area; and
4. Aquatic biota in the nearby drainage swales at the Garbage Disposal Area.

The exposure pathways and media of exposure are described below as they may effect the various receptors.

For future use of SEAD-64D, the receptor population would include, in addition to the above-mentioned receptors, a reactor/camper. This receptor may be exposed to inhalation of dust, ingestion and dermal contact with surface soil. In addition, the recreator may be exposed to groundwater (inhalation, dermal contact, and ingestion). This assumes that the receptor is exposed to groundwater supplied from a shallow well with a hand pump at a campsite or rest area in the Conservation/Recreation area. Lastly, the camper/recreator may be exposed to surface water and sediment through wading in ditches at the Garbage Disposal Area.

The hunter would be exposed in much the same manner as described in the current site scenario noted in Section 3.2.3.2.

Aquatic and Terrestrial biota would also be exposed in much the same manner as described in the current site use scenario noted in Section 3.2.3.2.

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 semivolatile organics and metals-impacted soils at the three 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
- low temperature thermal desorption

Remedial action alternatives, which are available for treatment of the metals-impacted groundwater at the three sites, will be evaluated as remedial action alternatives. They include the following technologies:

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

Section 3.3.2 of the Generic RI/FS Workplan provides a description of each type of technology.

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-64D RI/FS Report.

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-11, SEAD-64A, and SEAD-64D.

SOURCES OF CHEMICAL SPECIFIC ARARS

Federal:

- Resource Conservation and Recovery Act (RCRA), Groundwater Protection Standards and Maximum Concentration Limits (40 CFR 264, Subpart F)

- Clean Water Act, Water Quality Criteria (Section 304) (May 1, 1987 - Gold Book)
- Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) (40 CFR 141.11-.16)
- Clean Air Act (40 CFR Part 50)

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))
- 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 Air Guide - 1

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).
- 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)

<u>**New York State:**</u>

- 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.

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 for metals in soils/sediments and surface water/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. The data package submittal from the laboratory contains all the raw data generated in the analyses, including mass spectral identification charts, mass spectral tuning data, spike recoveries laboratory duplicate results, method blank results, instrument calibration, and holding times documentation.

Level 1 data, defined as field screening data, will be collected during soil boring operations. 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 and to assist in the optimization of sampling locations. Data can be generated regarding the presence or absence of certain contaminants (especially volatile organic compounds, VOCs), at sampling locations. For these sites, the soils obtained from the split-spoon sampler will be screened for the presence of volatile organics using a hand-held instrument equipped with a Photoionization Detector (PID). The occurrence of high readings, above normal background levels, from a sampling location will provide a qualitative indication that volatiles are present and, therefore, samples collected from this location should be subjected to more rigorous analytical techniques.

Level 2 data will be collected during the soil gas surveys at SEAD-11 and SEAD-64A. Level 2 data will include field analyses 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 QC requirements for the soil gas survey will include the following: sample duplicates, rod blanks, syringe blanks, vessel blanks, use of certified gas standards, and daily calibration runs of gas standards to establish compound specific response factors and retention times. The detection limit for volatiles in soil gas will be approximately 0.5 ppb. All sample collection data and gas chromatogram charts will be kept in a soil gas binder for the project.

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.

3.6 DATA GAPS AND DATA NEEDS

The investigations conducted at SEAD-11, SEAD-64A, and SEAD-64D 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 area release mechanisms and receptor pathways. The results of the investigation at the three sites were used to refine the conceptual site model 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 three sites are a direct result of the need to meet the DQOs identified in the Generic Installation RI/FS Workplan. The data needs will be reviewed and revised throughout the RI as additional data is collected.

3.6.1 SEAD-11

The data needs for SEAD-11 are listed below by media:

Soil Data:

- Determine the nature and extent of contamination across SEAD-11. Collect samples for risk evaluation.

- Compare SEAD-11 data to site-wide metals soil background data that has been compiled from 57 background samples obtained from the ESIs performed at 25 SEADs and RIs completed at the OB Grounds and the Ash Landfill. Compare other soil analytes to established TAGM values.

- Collect information about the landfill such as its thickness. Collect data that may be used to assess the response actions that may be implemented at the site (i.e., capping, excavation, and in-situ treatments (permeability, grains size, moisture content, TOC, etc.). Provide an estimate of the volume of waste in the landfill.

- Conduct a soil gas survey over a portion of the landfill where VOCs were previously detected to establish extent of VOC impacts.

- Determine more completely the nature of the materials buried in the landfill.
- Monitor the flux of VOCs from surface soil at the landfill.
- Establish database to determine compliance with ARARs, to perform baseline risk assessment and to develop remedial action alternatives.

Groundwater Data:

- Verify the analytical results from the monitoring wells already established at SEAD-11. This will entail sampling of the four existing monitoring wells and the proposed monitoring wells. Groundwater flow has been determined to be to the west. Install additional monitoring wells screened in both the shale and overburden glacial till.
- Determine hydrologic properties of the aquifer to assess the potential for migration of constituents and evaluate potential remedial actions.
- Define the nature and extent of current and potential release or migration of constituents from the site.
- Review prior sampling data from each sampling point for baseline parameters.
- Conduct surface leachate inspection to identify the presence of uncontrolled leachate from the landfill.
- Establish database to determine compliance with ARARs to perform baseline risk assessment and to develop remedial action alternatives.

- Determine the background groundwater quality at SEAD-11 to allow comparison with other SEAD-11 groundwater data.

Surface Water/Sediment Data:

- Determine the nature and extent of impacts to surface water and sediment. Sample collection will concentrate on drainages leaving the SEAD-11 Landfill and Indian Creek.

- Compare SEAD-11 sediment data to site-wide sediment background data that has been compiled from the ESIs performed at 25 SEADs and RIs performed at the OB Grounds and the Ash Landfill.

- Establish pollutant concentration levels adjacent to the SEDA railroad tracks and drainage collection areas south of Indian Creek Road and southwest of SEAD-11 Landfill.

- Establish database to determine compliance with ARARs, to perform 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.

- Establish database to determine compliance with ARARs, to perform baseline risk assessment and to develop remedial action alternatives.

3.6.2 SEAD-64A

The ESI data indicate that the landfill at SEAD-64A could affect soil, groundwater, surface water, and sediment. Borings will be performed on the landfill to evaluate the type and thickness of waste material, evaluate whether the soil below the waste material has been affected and observe the subsurface conditions. A soil gas survey will be used to evaluate whether volatile organic compounds are present in the landfilled material. Surface soil samples downgradient from the landfill will be obtained to determine whether runoff from the landfill has impacted site soils. Groundwater from monitoring wells further downgradient will be collected to determine the extent of contaminants. Surface water and sediment samples will be obtained from the drainage channels east and south of the landfill to determine whether the landfill has affected these media.

The data needs for SEAD-64A are listed below by media:

Soil Data

- Determine the thickness and extent of the waste material in the SEAD-64A area using soil borings. Collect samples and analyze them for the baseline risk assessment and the feasibility study.
- Determine the depth of affected soil below the waste material using soil borings.
- Evaluate the effect of runoff and erosion from the landfill on the surface soil downgradient of the landfill. Chemically analyze samples of surface soil west and south of the landfill.
- Chemically analyze surface soil samples from the landfill to evaluate the quality of potential dust.
- Perform a soil gas survey over the extent of the landfill to evaluate the potential for VOCs in the waste material.
- Compare SEAD-64A metals data to site-wide metals soil background data that has been compiled from 57 samples obtained from the ESIs performed at 25 SEADs and Remedial Investigations at the OB Grounds and Ash Landfill. Compare all otehr soil analytes to established TAGM values.
- Collect soil samples for a number of physical parameters, including permeability, grain size, moisture content, and Total Organic Carbon to establish potential remedial alternatives.
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Groundwater Data

- Assess the type and extent of contaminants in the groundwater downgradient from the landfill.
- Determine the hydraulic conductivity of the aquifer to assess contaminant migration and potential remedial actions.
- Obtain another background groundwater sample at SEAD-64A for chemical analysis to allow comparison with other SEAD-64A groundwater data.
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Surface Water/Sediment Data

- Obtain samples of surface water and sediment from the drainage channels south and east of the landfill to evaluate whether material in the landfill affects these media.
- Analyze surface water and sediment samples for general chemical parameters to evaluate potential remedial alternatives and compare the surface water quality to state standards.
- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Ecological Data

- Perform an ecological investigation to systematically document visual observations between obvious and potentially impacted and non-impacted areas.
- Establish a database for environmental compliance with ARARs or clean-up goals to perform a baseline risk assessment and to develop remedial action alternatives.

3.6.3 SEAD-64D

The ESI data indicate there are two waste disposal sites at SEAD-64D that could affect soil, groundwater, surface water, and sediment. One is located in the east central section of the site. The other is located at, and south of, the south end of SEAD-64D. These two sites will require further investigation. Test pits will be excavated at geophysical anomalies, mounds, and topographically unusual features identified on the site plan to evaluate whether there are any other disposal sites at SEAD-64D. PAHs and heavy metals were present in some of the surface soil samples across the site at concentrations greater than the TAGMs. They may be due to prior emissions from the incinerator located north of the site. Surface soil samples will be collected in a systematic pattern over the site and analyzed to evaluate whether the PAHs and heavy metals are due to the incinerator. Surface water and sediment samples will be obtained to evaluate whether the PAHs and metals in surface soils affect these media through surface water runoff.

The data needs for SEAD-64A are listed below by media:

Soil Data

- Extend the topographic map of SEAD-64D 400 feet south to obtain information on the site conditions in the area of disposed material.
- Obtain additional geophysical data to locate the eastern extent of the waste material in the east central area of the site.
- Obtain soil samples from the disposal area in the east central area of the site to evaluate whether the waste has impacted the soil quality.
- Determine if waste material is present at potential clear areas south of SB64D-1, at a potential rubble pile, at a geophysical anomaly, and any other berms located 100 to 300 feet south and west of the waste material at the south end of SEAD-64D.
- Obtain samples of the waste material and the soils below the potential rubble pile at the south end of SEAD-64D.
- Obtain surface soil samples systematically over the site to evaluate whether the incinerator north of the site is the source of the PAHs and heavy metals detected in the surface soil.

- Collect and analyze soil samples for a baseline risk assessment and to develop remedial action alternatives.

- Compare SEAD-64D data to sitewide soil background data that has been compiled from 57 samples obtained from the ESIs performed at 25 SEADs and Remedial Investigations at the OB Grounds and Ash Landfill.

- Analyze soil samples for general chemical and physical parameters. This information would be used during the selection of remedial action alternatives.

- Establish database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Groundwater Data

- Determine whether contaminants are present in the groundwater downgradient of the two identified waste disposal areas.

- Determine the hydraulic conductivity of the aquifer to assess the potential for contaminant migration and to select potential remedial action alternatives.

- Analyze groundwater samples for general chemical parameters. This information would be used during the selection of remedial action alternatives.

- Analyze an additional sample of the background groundwater at SEAD-64D to allow comparison with other SEAD-64D groundwater data.

- Establish 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 flow rates, if possible, and flow directions in the drainage channels and streams.

- Evaluate whether surface water runoff transports PAHs and heavy metals present in the surface soil to the drainage channel, stream, and wetland sediments.

- Analyze surface water and sediment samples for general chemical parameters. This information will be used during the selection of potential remedial action alternatives and determine whether the surface water quality meets the state criteria.

- Determine the background surface water/sediment quality by obtaining samples of surface water and sediment from the head of the stream and where the drainage channels enter the site.

- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Ecological Data

- Perform an ecological investigation to systematically document visual observations between obvious and potentially impacted and non-impacted areas.

- Analyze flora, fauna, and endangered species on, and in the vicinity of, the site.

- Establish a database to determine compliance with ARARs, to perform a baseline risk assessment, and to develop remedial action alternatives.

Archaeologic Data

- Perform an archaeologic investigation of the house foundation located on the south side of the stream.

4.0 TASK PLAN FOR RI

This section describes the tasks to be performed during the Remedial Investigation (RI) at SEAD-11, SEAD-64A, and SEAD-64D. The following tasks are included in this workplan:

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

4.1 PRE-FIELD ACTIVITIES

The pre-field activities include the following:

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

4.2 FIELD INVESTIGATIONS - SEAD-11

The following field investigations will be performed to complete the RI characterization of SEAD-11:

- Geophysical Investigation
- Soil Gas Investigation
- Soil Investigation
- Surface Water/Sediment Investigation
- Groundwater Investigation
- Air Monitoring with a Flux Chamber
- Ecological Investigation.

4.2.1 Geophysical Investigation

Seismic refraction surveys will be performed around the perimeter of the SEAD-11 Landfill to determine the depth to bedrock. The lowest bedrock elevation near the landfill is significant because it may be the migration pathway for any dense nonaqueous phase liquid on-site, although none has been found to date. The seismic survey will be used to locate monitoring wells in any bedrock lows that may exist around the perimeter of the landfill. Four 115-foot seismic refraction transects will be established at the landfill as shown in Figure 4-1. Geophone spacing will be held at 5-foot intervals throughout the survey. The shot point locations will be located along each profile and used to define each individual seismic spread. The data will be collected using an industry standard 24 channel seismograph. Seismic refraction procedures are provided in Appendix A, Field Sampling and Analysis Plan, of the Generic RI/FS Workplan.

4.2.2 Soil Gas Survey

For this investigation, a tighter soil gas survey grid will be established on a portion of the landfill that was previously investigated and where volatile organic compounds were detected during the previous soil gas survey.

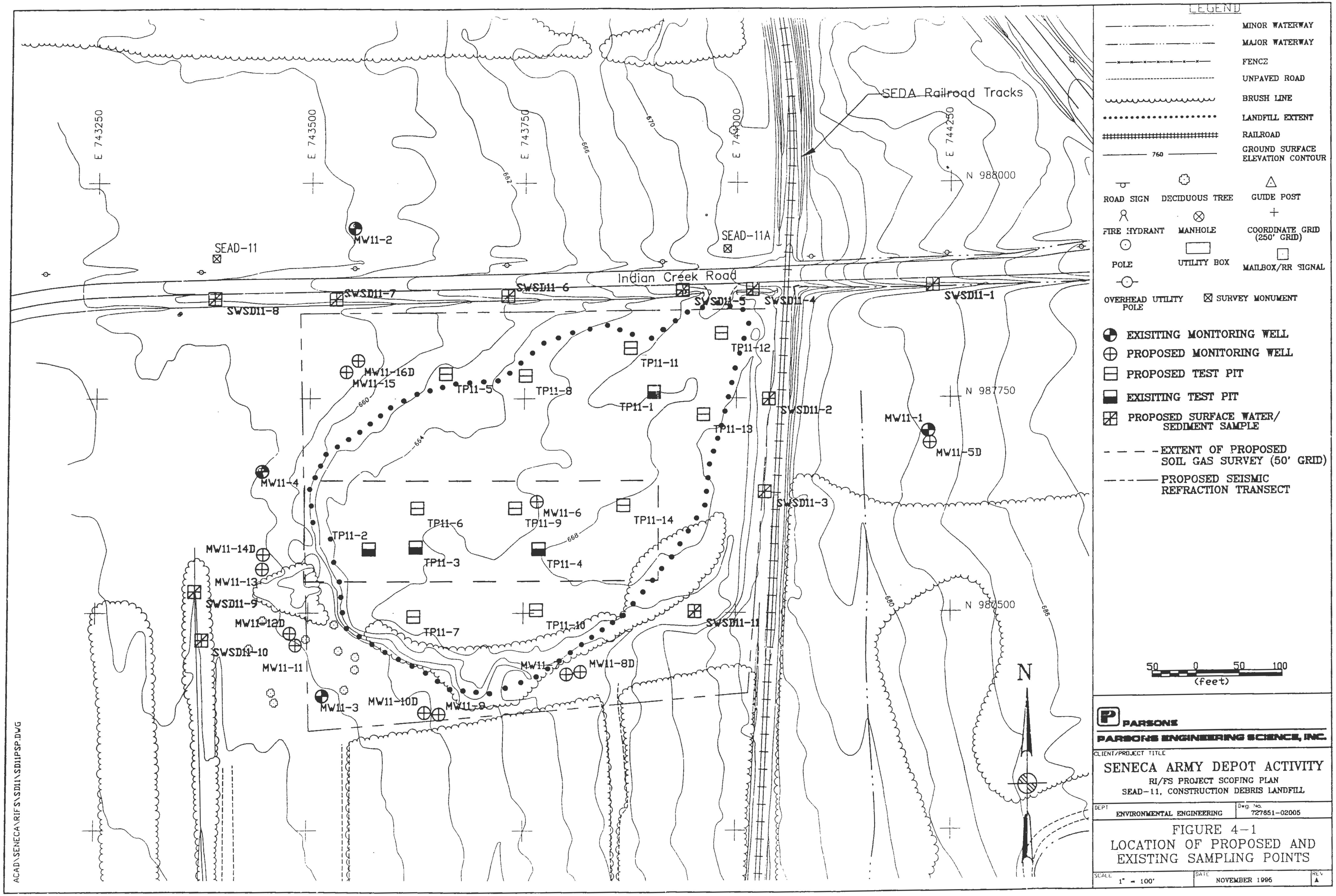
The tighter (50-foot) grid spacing for the soil gas samples at SEAD-11 is deemed appropriate since the prior investigation revealed gaps between the soil gas "hits"that may be important to determine the extent of the impacts. The tighter spacings provide a degree of conservatism to ensure adequate sample coverage. With the new grid, 27 soil gas points will be investigated at the landfill as shown in Figure 4-1. Procedures for conducting the soil gas survey are contained in Appendix A, Field Sampling and Analysis Plan, of the Generic RI/FS Workplan.

4.2.3 Soil Investigation

The soil investigation program consists of the collection of both surface and subsurface soil samples from soil borings and test pit excavations in the fill material. Six (6) soil borings and 10 test pit excavations will be performed. All six boring are to be completed as monitoring wells as specified in Section 4.2.4.

4.2.3.1 Soil Boring Program

Six (6) soil borings will be performed on-site for the purpose of stratigraphic definition and to collect soil samples for analysis. The analytical program discussed in Section 4.2.8.



PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-11, CONSTRUCTION DEBRIS LANDFILL

DEPT ENVIRONMENTAL ENGINEERING
Dwg. No. 727851-02005

FIGURE 4-1
LOCATION OF PROPOSED AND EXISTING SAMPLING POINTS

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

The locations of the soil borings, which will be completed as monitoring wells (shown on Figure 4-1 as MW11-6, MW11-7, MW11-9, MW11-11, MW11-13 and MW11-15), will be partly dependent on the results of the seismic survey. A discussion of the determination of the soil boring locations based on the seismic survey is provided in Section 4.2.1. The 6 borings will generally be performed in two locations; 1 near the center of the landfill, and 5 at locations around the perimeter of the landfill.

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. Two subsurface soil samples will be selected from each soil boring to be submitted for chemical testing. At each boring location a 0-2" surface soil sample will be collected and submitted for chemical testing. The criteria for the selection of the subsurface soil samples submitted to the lab for chemical testing is provided in Appendix A, Field Sampling and Analysis Plan, of the Generic RI/FS Workplan.

In addition, soil samples will be collected for physical and limited chemical testing at 2 boring locations. At each of the two locations, 3 subsurface soil samples (one near the surface, one immediately below the water table and an intermediate sample) will be collected. The analytical program is shown in Table 4-1.

The soil sampling will be performed until split-spoon refusal is encountered. The soil boring (i.e., augering) will continue until auger refusal is reached. Auger refusal for this project is defined in Appendix A, Field Sampling and Analysis Plan. The borings are expected to extend to different depths as the depth to bedrock is know to vary on the site; east of the landfill and the SEDA railroad tracks it is suspected to be particularly deep. Soil boring procedures are described in Appendix A, Field Sampling and Analysis Plan, of the Generic RI/FS Workplan.

4.2.3.2 Test Pitting Program

Ten (10) test pits will be excavated as shown in Figure 4-1. The test pits will be excavated within the landfill so that a visual evaluation of the fill materials can be made and also for the purpose of collecting soil samples for chemical testing. Test pits will be dug to the bottom of the fill. The bedrock surface (if encountered) and bottom of the fill material will be documented at each test pit location. Three (3) soil samples will be collected from each pit. One 0-2" surface soil sample will be collected and submitted for chemical testing. Two

Table 4-1

Summmary of Sampling and Analyses
Seneca Army Depot
SEAD-11

		VOCs		SVOCs	Explosives	Metals	Pesticides/PCBs	Nitrate Nitrogen	Grain Size*	Moisture Content	pH	Hardness	TOC
MEDIA		TCL NYSDEC CLP	Method 524.2	TCL NYSDEC CLP	Method 8330	TAL NYSDEC CLP	TCL NYSDEC CLP	Method 352.1	ASTM D422	ASTM D2216	Method 150.1	Method 130.2	Method 415.1
Soil	Surface	16	0	16	16	16	16	16	0	0	0	0	0
	Subsurface	32	0	32	32	32	32	32	6	6	0	0	6
Groundwater #		16	16	32	32	32	32	32	0	0	0	0	0
Surface water		15	0	15	15	15	15	15	0	0	15	15	15
Sediment		15	0	15	15	15	15	15	15	0	0	0	15
Air		3+	0	0	0	0	0	0	0	0	0	0	0
Leachate		5	0	5	5	5	5	5	0	0	0	0	0

Notes.
1) * Grain size analysis includes determination of the grains size distribution within the silt and clay size fraction.
2) + Air samples will be analyzed by the appropriate method.
3) # CLP: round 1; 524.2: round 2
4) QA/QC sampling requirements are described in Section 5.3 of Appendix C of the Generic Installation RI/FS Workplan.

samples will be collected at depths where there is evidence of impacts based upon visual observations and field screening procedures. 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.

Test pits TP11-6, TP11-9, and TP11-14 will be located according to soil gas anomalies identified in the soil gas survey to be performed for this RI/FS investigation. All other test pits to be performed have been located based upon soil gas and geophysical anomalies identified during the ESI performed at SEAD-11. Because of the biased nature of the location of the test pit soil samples, these samples will be excluded from the risk assessment.

All personnel performing the test pit operation will be wearing Level B equipment to avoid possible exposure. Unexploded ordnance (UXO) personnel will perform the excavations and obtain soil samples. The excavated soils will be monitored for VOCs and radiation during test pitting. Test pitting procedures are provided in Appendix A, Field Sampling and Analysis Plan, of the Generic RI/FS Workplan.

4.2.3.3 Soil Sampling Summary

The sampling program will consist of 18 soil samples collected from the soil borings and 30 soil samples from test pits. In total, 48 soil samples will be collected for chemical testing. One (1) surface soil sample and 2 subsurface soil samples will be collected from the 6 soil borings. Three (3) soil samples will be collected from each of the 10 test pits excavated in the landfill.

In addition, six (6) subsurface soil samples will be collected from the soil borings and submitted for analysis of TOC and grain size distribution.

Soil samples will be analyzed for the parameters listed in Section 4.2.8.

4.2.4 Groundwater Investigation

4.2.4.1 Monitoring Well Installation and Sampling

Four (4) monitoring wells were installed on the perimeter of SEAD-11 and sampled as part of the ESI conducted at the site. The vertical and lateral extents of contaminant migration from the landfill were not fully characterized in that investigation. The goals of this groundwater investigation are to determine if groundwater in the landfill has been impacted by contaminants, investigate potential pathways of migration around the perimeter of the landfill using overburden and bedrock well pairs, and verify the data collected from the previous monitoring well analyses.

The groundwater investigation program will involve the installation of 12 additional monitoring wells comprised of 6 overburden wells and 6 shallow bedrock wells. Final locations of the monitoring wells will be based on the results of the seismic study, which will be performed to locate bedrock lows that may exist around the perimeter of the landfill. Ten (10) of the wells will be located in five well pairs at the toe of the landfill. Each of the monitoring well pairs will consist of an overburden and competent shale well. The shallow bedrock wells are proposed because the soil gas samples and the test pit soil samples collected during the ESI indicated the presence of VOCs. The shallow bedrock wells will monitor the potential for vertical migration of constituents from the landfill into the bedrock. The additional overburden wells are proposed to characterize and monitor the potential for radial flow away from the landfill. Additionally, 1 overburden well will be located in the center of the landfill and 1 bedrock well will be located upgradient of the landfill; the latter well will be a pair to the existing overburden well at this location. Each of the proposed well locations is shown in Figure 4-1. The monitoring wells will be installed and developed according to procedures outlined in Section 3.5.3 and 3.6 of the Field Sampling and Analysis Plan, of the Generic RI/FS Workplan.

While drilling the boreholes in which the six overburden wells will be installed, split spoon samples of the soil will be collected until split-spoon refusal is encountered. The soil borings will be advanced to auger refusal, which will represent the depth of the competent bedrock. Determination of auger refusal is defined in Section 3.4.2 of the Field Sampling and Analysis Plan of the Generic Workplan as the depth (after penetrating the weathered shale) when augering becomes significantly more difficult and auger advancement is slow. A monitoring well will then be installed in the boring and screened over the entire depth of the overburden aquifer to a maximum screen length of 10 feet.

Double-cased bedrock wells will also be installed adjacent to five of the overburden well locations creating five pairs of wells. During the well installation, the boring will be drilled to auger refusal. Then the hole will be advanced using coring or air hammer methods until 2 to 3 feet of competent shale has been penetrated. An appropriate length of six-inch casing will be installed 2 to 3 feet into the competent shale and grouted in place. Then a 10-foot long section of competent bedrock will be cored, logged and archived. A bedrock well with a screen 10 feet long will be installed in the boring.

Groundwater from the 16 existing and new monitoring wells will be sampled twice and analyzed for the parameters listed in Section 4.2.8. The second round of sampling will occur approximately three months after the first round of sampling. The wells will be sampled using the latest version of the EPA groundwater sampling procedure, which is a low flow pump purging and sampling methods.

4.2.4.2 Aquifer Testing

Because the groundwater has not been fully characterized on the site, aquifer testing will be performed at the 16 monitoring wells (4 existing and 12 proposed) on site. Slug testing will be performed on all of the monitoring wells and used to estimate hydraulic conductivity and transmissivity of the overburden and bedrock aquifers. Vertical connection testing will be performed at the 6 overburden/bedrock monitoring well pairs. The procedures for slug testing, vertical connection testing and water level measurements are provided in Appendix A, Field Sampling and Analysis Plan, of the Generic RI/FS Workplan.

Three rounds of water level measurements will be performed. One measurement will take place before well development and the measurement will be used for well development calculations. The remaining two rounds of measurements will be performed before both rounds of groundwater sampling and will be used to construct a groundwater elevation contour map and evaluate seasonal changes in the groundwater flow direction.

A surface leachate inspection will be conducted to identify the presence of uncontrolled leachate from the landfill. If leachate is present, samples will be collected and analyzed for the parameters listed in Section 4.2.8. A maximum of 5 leachate samples will be collected, if necessary.

4.2.5 Surface Water and Sediment Investigation

The intent of the surface water and sediment investigation is to determine the nature and extent of impacts to any on-site surface waters and to Indian Creek, and to evaluate the relationship between groundwater and surface water. Sample collection will concentrate on surface water bodies adjacent to the Construction Debris Landfill and in Indian Creek. Sediment samples will be collected from the same locations that the surface water samples are collected. The surface water and sediment sampling plan identifies three potential on-site surface water areas, which includes two drainage channels and a low-lying area southwest of the "toe" of the landfill. Eleven (11) locations within these areas will be sampled as shown in Figure 4-1. The analytical summary is presented in Table 4-1.

Four (4) additional surface water and sediment samples will be collected along Indian Creek located west of the landfill near the SEAD-11 boundary line. These four sample locations are shown in Figure 4-2.

Field stream geometry of Indian Creek will also be measured at each sample location. This will include stream bed cross-sections, reach lengths, stream slopes, and roughness factors. Water discharges in the Indian Creeks will be determined using data collected from stream flow measurements.

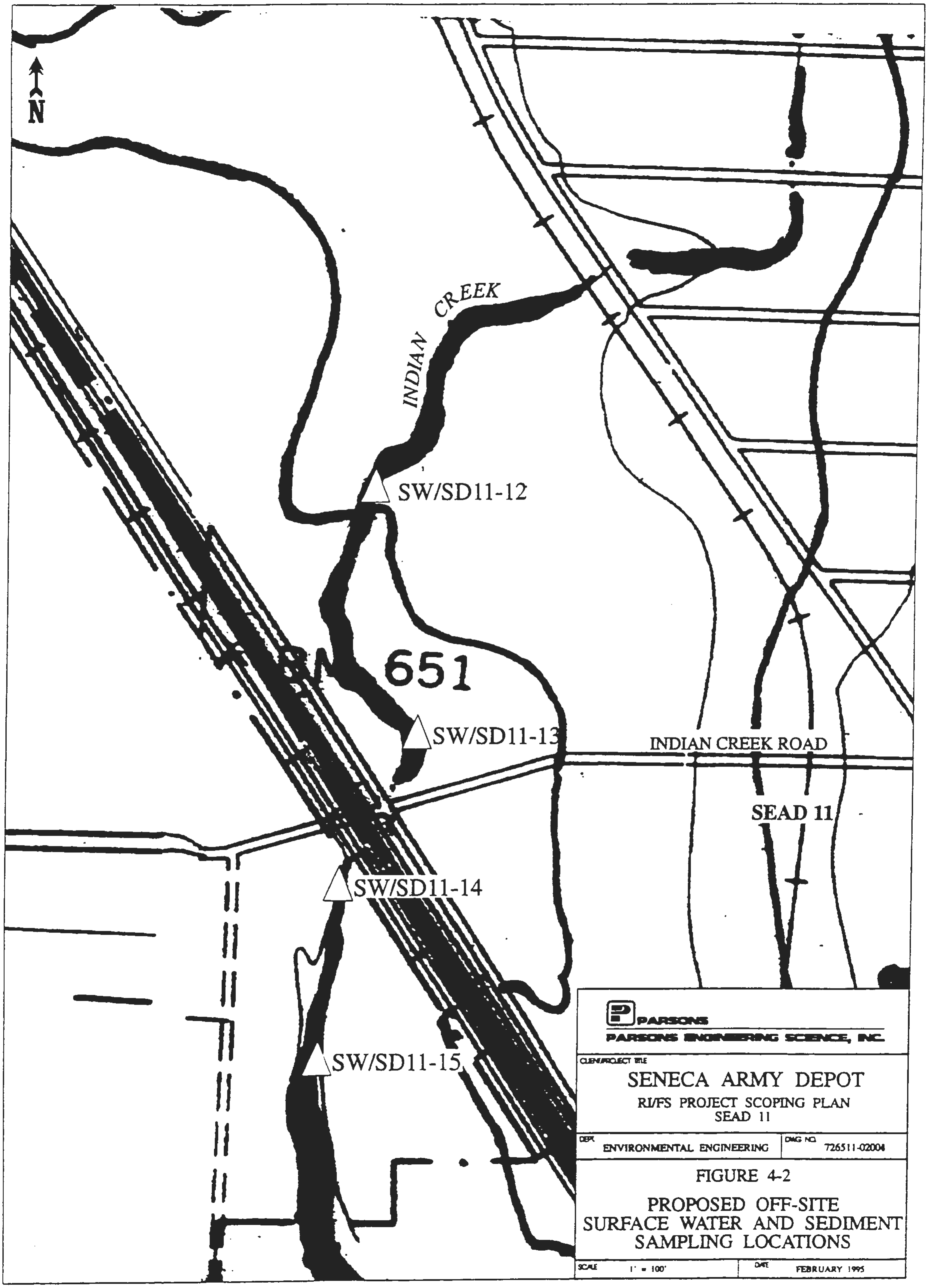
Surface water and sediment sampling procedures are provided in Appendix A, Field Sampling and Analysis Plan, of the Generic RI/FS Workplan. Procedures for conducting stream flow measurements are also provided in Appendix A, of the Generic RI/FS Workplan.

4.2.6 Air Monitoring with a Flux Chamber

Air monitoring with a flux chamber at the landfill will document ambient levels and emission rates of specified substances for use in dispersion modeling of emissions from the landfill to ultimately be used as part of the risk assessment.

The approach to documenting the ambient levels and emissions rate consists of first identifying the substances of concern and then specifying sufficient numbers, locations,and durations of monitoring. At the landfill, volatile organic compounds (VOCs) emitted from the landfill surface will be sampled by the emission isolation flux chamber technique. Three (3) areas of the landfill with the highest concentrations of soil gases will be monitored.

The flux chamber technique employs an enclosed device (flux chamber) to sample the gaseous emissions from a known surface area defined by the cross sectional area of the flux chamber. The flux chamber is essentially a stainless steel tube. A flat plexiglass lid is attached to one end of the tube and an airtight seal is achieved with a neoprene gasket. A



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT
RI/FS PROJECT SCOPING PLAN
SEAD 11

DEPT. ENVIRONMENTAL ENGINEERING

DWG NO. 726511-02004

FIGURE 4-2

PROPOSED OFF-SITE
SURFACE WATER AND SEDIMENT
SAMPLING LOCATIONS

SCALE 1' = 100'

DATE FEBRUARY 1995

sheet of teflon is placed on the underside of the lid between the lid and the inside of the flux chamber to prevent any out-gassing from the Plexi-glass and contaminating the samples. The remainder of the inside of the flux chamber is stainless steel which is inert and poses no contamination threat to the samples. The bottom edge of the flux chamber has a saw-tooth edge to facilitate the "digging in" of the flux chamber into the surface of the landfill. The chamber is buried into the ground approximately one to two inches so that surface emissions inside the chamber do not leak out from underneath the chamber. The chamber sides are equipped with numerous stainless steel ports which allow access for sampling instrumentation and input of calibration gases, and can easily be capped off to prevent contamination.

A small metal fan in the center of the lid is used to enhance the mixing of the surface emissions and the sweep air inside the chamber.

Clean, dry, sweep air is added to the chamber at a fixed, controlled rate. The volumetric flow rate of sweep air through the chamber is recorded and after the chamber has equilibrated a known sample volume is extracted from the chamber through volatile organic sampling train (VOST) tubes. The VOST tubes contain a Tenax resin and activated charcoal which strip the sample air of the target VOC species. The tubes are then analyzed for the target species by gas chromatograph/mass spectrometry (GC/MS).

Sampling procedures for the flux chamber air sampling are provided in Appendix A, Field Sampling and Analysis Plan, of the Generic RI/FS Workplan. The Quality Assurance/Quality Control (QA/QC) procedures are a integral part of the program. The QA/AC data will be used to assess the validity of the results.

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 analyses of the samples collected for the RI. USEPA guidance for Ecological Risk Assessment (USEPA, Ecological Assessment of Hazardous Waste sites, 1989. EPA/600/3-89/013.) will also be considered.

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; and if they were present prior to contaminant introduction, to provide the appropriate information 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.

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 use of the aquatic and terrestrial resources of the site by humans will be assessed. Included with the assessment of the site, the area within a half mile of the site, documented resources within two miles of the site, and documented resources 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.

Performing a contaminant-specific impact analysis may require specific toxicological or ecological information. A number of methods that are useful in the development of appropriate information are listed:

1. Sampling and analysis of tissues obtained from biota collected from contaminated and uncontaminated areas.

2. Bioaccumulation calculations supported by the analysis of contaminated media and biota.

3. The modelling of environmental fate and contaminants.

4. In situ and laboratory toxicity tests of contaminated and uncontaminated media.

5. Histopathological studies of populations exposed to contaminants.

6. Collection and comparison of population density, diversity, or species richness data from contaminated and uncontaminated areas.

7. Contaminant-specific toxicological data obtained from literature sources for biota known to inhabit the site and surrounding area.

8. Evaluation of potential use of fish and wildlife resources by humans from information available in surveys and records.

4.2.8 Analytical Program

A total of 48 soil samples will be collected (from soil boring and test pits), 15 surface water and sediment samples, 32 groundwater samples and 3 flux chamber air samples will be collected for definitive chemical testing. If required, a maximum of 5 leachate samples will be collected. All of these (except the air samples) will be analyzed for the following: TCL volatile organic compounds (method 524.2 for groundwater in round 2), TCL semivolatile organic compounds, TCL pesticides/PCBs, TAL metals according to the NYSDEC CLP SOW, explosive compounds by EPA Method 8330 and nitrate nitrogen by EPA Method 352.1. Additional analyses are discussed below.

Six (6) subsurface soil samples from two soil borings will also be analyzed for TOC by EPA Method 415.1 grain size distribution (including the distribution within the silt and clay fractions) by ASTM Method D422, and moisture content by ASTM Method D2216. The 16 groundwater samples will be analyzed for volatile organic compounds using EPA Method 524.2. The 15 surface water samples will also be analyzed for hardness by EPA Method 130.2, pH by EPA Method 150.2 and TOC by EPA Method 415.1. The 15 sediment samples will also be analyzed for TOC by EPA Method 415.1 and grain size distribution (including the distribution within the silt and clay fractions). A summary of sampling and analyses is presented in Table 4-1.

A detailed description of the analytical methods, as well as lists of each compound included in each of the categories is presented in Appendix C, Chemical Data Acquisition Plan.

4.2.9 Surveying

Surveying will be performed at the Construction Debris Landfill to provide accurate base maps that will be used for the following purposes:

1. Map the direction and compute the velocity of groundwater movement,
2. Locate all of the environmental sampling points,
3. Estimate the volume of impacted soils and sediments which may require a remedial action, and
4. Mapping 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 sampling points will be surveyed and plotted on the site base map to show their location with respect to surface features within the project area. Site surveys will conform to all pertinent state laws and regulations governing land surveying. The surveyor shall be licensed and registered in New York.

A detailed discussion of the site field survey requirements is presented in Appendix A, Field Sampling and Analysis Plan.

4.3 FIELD INVESTIGATIONS - SEAD-64A

The following field investigations will be performed to complete the RI characterization of SEAD-64A:

- Surface Soil Sampling
- Soil investigation (soil gas survey and soil borings),
- Groundwater investigation (overburden wells and a bedrock well),
- Surface water/sediment investigation
- Ecological investigation, and
- Surveying.

4.3.1 Soil Investigation

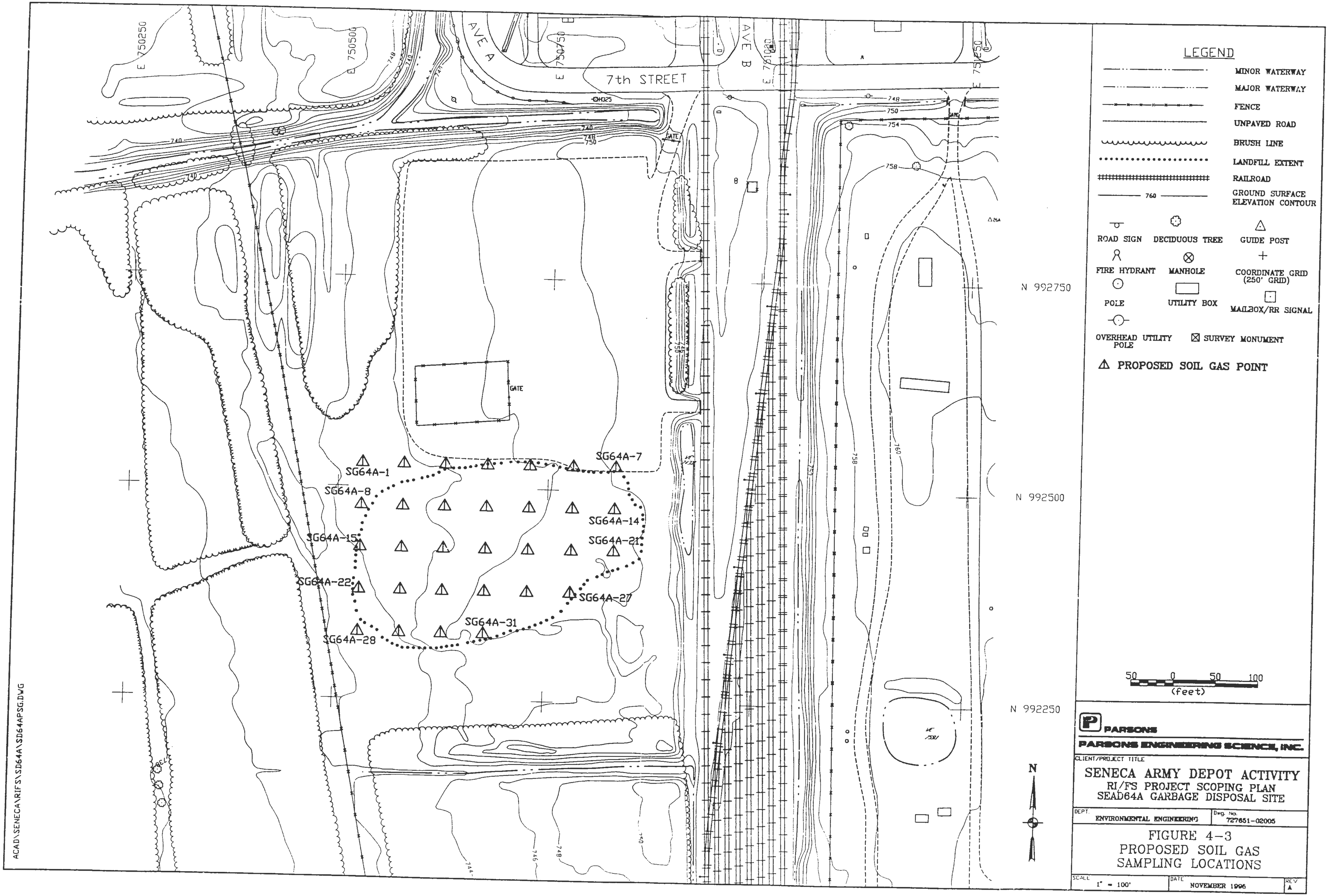
4.3.1.1 Soil Gas Survey

A soil gas survey will be performed at SEAD-64A to provide a quick determination of potential sources of VOCs in soils and groundwater. The soil gas data will be used to locate soil and groundwater samples in areas where elevated levels of VOCs are present in soil gas. Soil gas samples will be collected on a 50 foot grid within the extent of the landfill (Figure 4-3). Sample probes will be driven into the waste material. The 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. A map will be developed showing the concentrations of VOCs in the soil gas.

Soil gas survey procedures are described in Appendix A, Field Sampling and Analysis Plan.

4.3.1.2 Soil Boring Program

Twelve soil borings will be drilled at the locations shown in Figure 4-4. Nine borings will be located within the known extent of the landfill. The fill thickness data from the borings will



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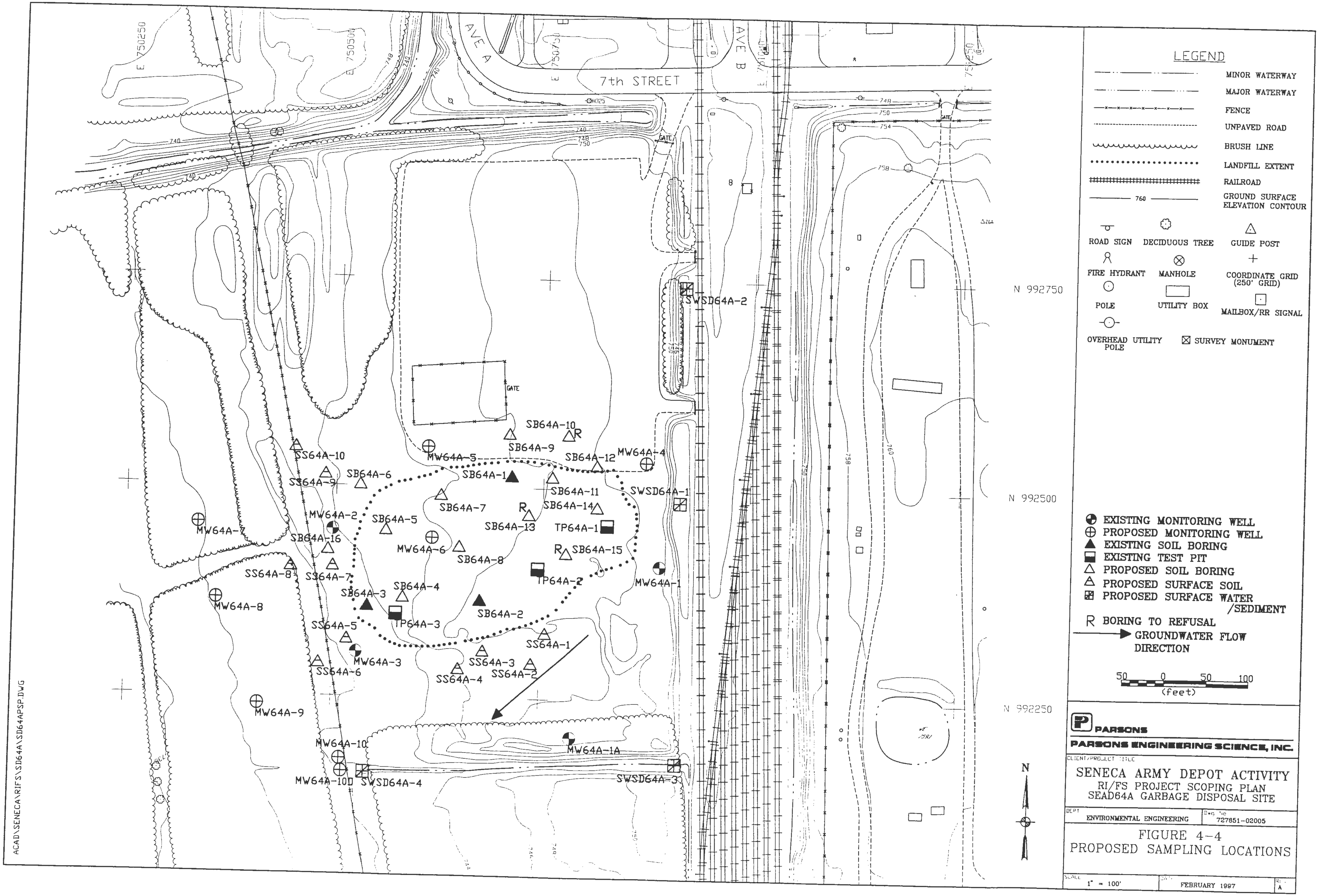
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 727651-02005

FIGURE 4-3
PROPOSED SOIL GAS SAMPLING LOCATIONS

SCALE 1" = 100'
DATE NOVEMBER 1996
REV A



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SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64A GARBAGE DISPOSAL SITE

DEPT ENVIRONMENTAL ENGINEERING
DWG NO 727851-02005

FIGURE 4-4
PROPOSED SAMPLING LOCATIONS

SCALE 1" = 100'
DATE FEBRUARY 1997
REV A

be used to refine the fill thickness plan shown in Figure 3-13. Four soil borings will be drilled north and west of the landfill to determine whether buried waste material extends under the surveyed area.

The purpose of the 12 soil borings is to determine the thickness of the waste material, observe the subsurface soils, measure the depth to bedrock, and obtain samples of the waste and underlying soil for chemical analysis. Subsurface samples will be collected continuously to the groundwater table. Three soil samples will be collected for chemical analysis from each soil boring. The samples will be collected from a depth of 0-0.2', from just above the water table, and from an intermediate depth.

At three of the soil boring locations, the soil below the water table will be sampled continuously with split spoons to auger refusal to determine depth to bedrock. These locations are marked with an "R" on Figure 4-4. Auger refusal for this project is defined in Appendix A, Field Sampling and Analysis Plan.

At two soil boring locations within the landfill, three subsurface soil samples will be collected and submitted for both chemical and physical analysis. The soil samples will be collected as follows: one near the surface, one intermediate sample, and one immediately below the water table.

The soil boring procedures and the sampling criteria used for the selection of soil samples are described in Appendix A, Field Sampling and Analysis Plan.

4.3.1.3 Surface Soil Sampling

Ten surface soil samples will be obtained at five paired locations downslope of the landfill as shown in Figure 4-4. These samples will be used to determine if runoff from the landfill transported contaminants downgradient of the landfill. The five pairs will be located ideally in drainage swales or other low linear features leading from the landfill where surface runoff may collect. If there are no low areas, then the five pairs will be located around the landfill as shown on Figure 4-4. In each pair, the sample closest to the landfill will be approximately 25 feet downslope from the edge of the landfill. The second sample will be located approximately 50 feet further downslope from the first sample.

The procedure for sampling surface soil is described in Appendix A, Field Sampling and Analysis Plan.

4.3.1.4 Soil Sampling Summary

Ten surface soil samples will be obtained downslope of the landfill. One surface, and two subsurface soil samples will be collected from each of the 12 borings resulting in 36 soil samples. In total, 46 soil samples will be collected for chemical testing. In addition, six subsurface soil samples from two of the soil borings on the landfill will be analyzed for general chemical and physical parameters.

Soil samples will be analyzed for the parameters listed in Section 4.3.5.

4.3.2 Groundwater Investigation

4.3.2.1 Monitoring Well Installation and Sampling

The purpose of the monitoring well installation program is to define the horizontal and vertical extent of groundwater impacts in the overburden and shallow bedrock aquifer and to determine background groundwater quality.

A total of seven new overburden monitoring wells and one bedrock well will be installed at SEAD-64A at the locations shown in Figure 4-4. The well borings will be continuously sampled to competent rock. A monitoring well will then be installed in the boring and screened through the overburden aquifer to a maximum screen length of 10 feet. The wells will be developed prior to sampling. Two separate rounds of groundwater sampling will be collected. The one bedrock well will be installed as described in Section 4.2.4.1.

All newly installed and existing monitoring wells will be sampled twice and analyzed for the parameters listed in Section 4.3.5. The second round of groundwater sampling will be performed approximately three months after the first round. The wells will be sampled using the latest version of the EPA low-flow groundwater sampling procedure.

Installation, development, and sampling procedures for overburden and bedrock wells are provided in Appendix A, Field Sampling and Analysis Plan.

4.3.2.2 Aquifer Testing

Slug tests will be performed at all existing and newly installed monitoring wells on site to determine the hydraulic conductivity of the aquifer.

Three rounds of water level measurements will be performed. One measurement will take place before well development and the measurement will be used for well development calculations. The remaining two rounds of measurements will be performed before both rounds of groundwater sampling and will be used to construct a groundwater elevation contour map and evaluate seasonal changes in the groundwater flow direction.

The procedures for slug testing (hydraulic conductivity determination) and water level measurement are provided in Appendix A, Field Sampling and Analysis Plan.

4.3.3 Surface Water/Sediment Investigation

Four of surface water and sediment samples will be obtained from the two nearby drainage channels. Two samples will be obtained from the drainage channel located south of the landfill and two samples will be collected from the drainage channel located east of the landfill. The sampling locations are shown on Figure 4-4.

Surface water and sediment sampling procedures are described in Appendix A, Field Sampling and Analysis Plan.

4.3.4 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 analyses of the samples collected for the RI.

4.3.4.1 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; and if they were present prior to contaminant introduction, to provide the appropriate information 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.

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 use of the aquatic and terrestrial resources of the site by humans will be assessed. Included with the assessment of the site, the area within a half mile of the site, documented resources within two miles of the site, and documented resources 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.

4.3.4.2 **Contaminant-Specific Impact Analysis**

Information from the site description developed in Section 4.3.4.1 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.

Performing a contaminant-specific impact analysis may require specific toxicological or ecological information. A number of methods that are useful in the development of appropriate information are listed:

1. Sampling and analysis of tissues obtained from biota collected from contaminated and uncontaminated areas.

2. Bioaccumulation calculations supported by the analysis of contaminated media and biota.

3. The modelling of environmental fate and contaminants.

4. In situ and laboratory toxicity tests of contaminated and uncontaminated media.

5. Histopathological studies of populations exposed to contaminants.

6. Collection and comparison of population density, diversity, or species richness data from contaminated and uncontaminated areas.

7. Contaminant-specific toxicological data obtained from literature sources for biota known to inhabit the site and surrounding area.

8. Evaluation of potential use of fish and wildlife resources by humans from information available in surveys and records.

4.3.5 Analytical Program

A total of 46 soil samples, 24 groundwater samples and 4 surface water/sediment samples will be collected for chemical and physical testing.

All the samples from the 12 borings (36 samples), the 24 groundwater samples, 4 surface water samples, and 4 sediment samples will be analyzed for the following: TCL volatile organic compounds (EPA Method 524.2 for groundwater in round 2), TCL semivolatile organic compounds, TCL pesticides/PCBs, TAL metals and cyanide according to the NYSDEC Contract Laboratory Program (CLP) Statement of Work (SOW), and total recoverable petroleum hydrocarbons (TRPH) by EPA Method 418.1.

The 10 surface soil samples obtained at locations off the landfill will be analyzed for the TCL semivolatile organic compounds and the TAL metals and cyanide according to the NYSDEC CLP SOW.

Six subsurface soil samples from two soil borings on the landfill will be analyzed for grain size (including the distribution in the silt and clay fractions) by ASTM Method D422. Total Organic Carbon (TOC) by EPA Method 415.1, Cationic Exchange Capacity (CEC), pH, and density.

The 24 groundwater samples will be analyzed in the field for pH, temperature, specific conductivity, dissolved oxygen, and oxidation-reduction potential. The following analyses will be performed by the laboratory: alkalinity, ferrous iron, sulfate, sulfide, nitrate, TOC, biological oxygen demand (BOD), hardness, total dissolved solids (TDS), and chemical oxygen demand (COD).

The four surface water samples will be analyzed in the field for pH, temperature, specific conductivity, and dissolved oxygen. The following analyses will be performed by the laboratory: total suspended solids (TSS), TDS, alkalinity, hardness, ammonia, nitrate/nitrite, phosphate, TOC, and turbidity.

The four sediment samples will be analyzed by the laboratory for grain size, TOC, CEC, pH, and density.

A summary of the analyses to be performed at SEAD-64A is provided in Table 4-2.

4.3.6 Surveying

Surveying will be performed at SEAD-64A for the following purposes:

1. Mapping the direction and computing the velocity of groundwater movements;

TABLE 4-2

SENECA ARMY DEPOT ACTIVITY
SEAD-64A PROJECT SCOPING PLAN
SUMMARY OF SAMPLING AND ANALYSES

	VOCs		SVOs	Pesticides/PCBs	Metals	TPH	Grain Size	Moisture Content	pH	Cationic	Hardness	TOC	Density
MEDIA	TCL NYSDEC CLP	Method 524.2	TCL NYSDEC CLP	TCL NYSDEC CLP	TAL NYSDEC CLP	Method 418.1	ASTM D422	ASTM D2216	Method 150.1	Exchange Capacity	Method 130.2	Method 415.1	
Surface Soil	0	0	10	0	10	0	0	0	0	0	0	0	0
Soil from Borings	36	0	36	36	36	36	6	6	6	6	0	6	6
Groundwater (3)	12	12	24	24	24	24	0	0	0	0	24	24	0
Surface Water (4)	4	0	4	4	4	4	0	0	0	0	4	4	0
Sediment	4	0	4	4	4	4	4	0	4	4	0	4	4

Notes.
1) The general chemistry and physical parameters that will be analyzed for each medium are listed in Section 4.3.5.
2) QA/QC sampling requirements are described in Appendix C, Section 5.3 of the Generic Installation RI/FS Workplan.
3) CLP: round 1; 524.2: round 2; Groundwater samples will also be analyzed for alkalinity, ferrous ions, sulfate, sulfide, nitrate, BOD, TDS, and COD.
4) Surface water samples will also be analyzed for TSS, TDS, alkalinity, ammonia, nitrate/nitrite, phosphate, and turbidity.

2. Locating the environmental sampling points;
3. Estimating the volume of impacted soils and sediments which may require a remedial action;
4. Mapping the extent of any impacted groundwater above established ARAR limits; and
5. Mapping the extent of the landfill.

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

Site surveys will conform to all pertinent state laws and regulations governing land surveying. The surveyor will be licensed and registered in New York.

The site field survey requirements are presented in Appendix A, Field Sampling and Analysis Plan.

4.4 FIELD INVESTIGATIONS - SEAD-64D

The following field investigations will be performed for the RI characterization of SEAD-64D:

1. Geophysical investigation,
2. Soil investigation (surface soil samples, test pits, and soil borings),
3. Groundwater investigation (overburden wells),
4. Surface Water and Sediment Investigation,
5. Ecological investigation,
6. Archeological investigation, and
7. Surveying.

4.4.1 Geophysical Survey

An electromagnetic survey will be performed in a 150- by 250-foot area that was not surveyed during the ESI. This area is located in the east central portion of the site immediately east of the geophysical anomaly as shown in Figure 4-5. The survey will be used to locate the eastern extent of the geophysical anomaly identified in the ESI of this site. Geophysical survey procedures are discussed in Appendix A, Field Sampling and Analysis Plan.

4.4.2 Soil Investigation

4.4.2.1 Soil Boring Program

A total of ten soil borings will be performed where waste material was found at the south end of the site and at the east-central area of the site. The borings will be located as shown in Figures 4-5 and 4-6.

Nine soil borings will be performed within the area of the geophysical anomaly in the east-central area of the site. The ESI data indicate that the depth to bedrock is approximately 4 feet; therefore, soil samples from each boring location will be obtained for chemical analysis from the following depths: 0 to 0.2 feet, 0.2 to 2 feet, and 2 to 4 feet. If depth to bedrock is found to be greater than 4 feet, then the sampling depths for the intermediate and deep soil samples will be adjusted in accordance with the SAP in Appendix A.

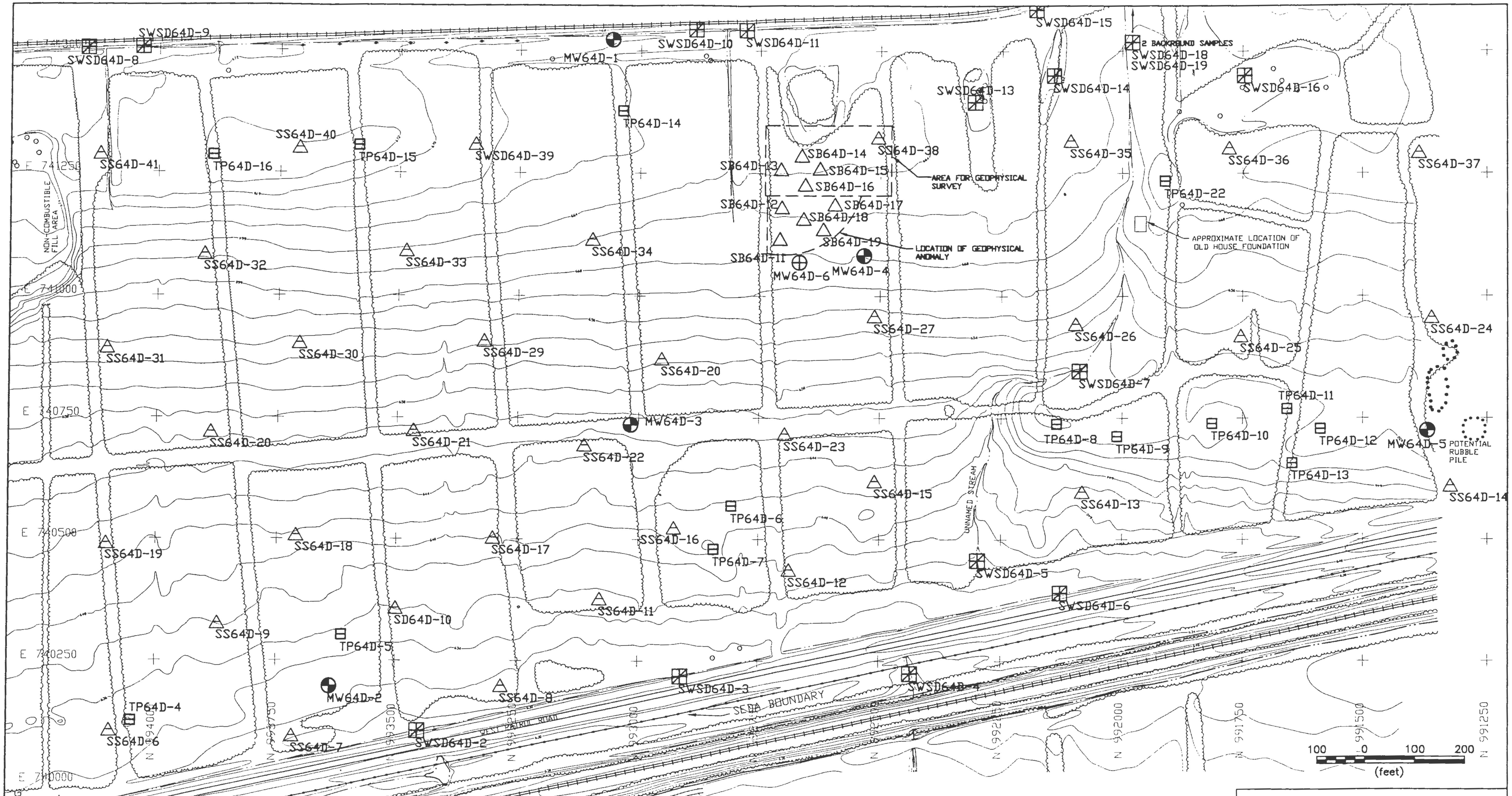
One boring will be performed on a potential rubble pile at the south end of the site as shown in Figure 4-6. The depth of the boring will be to the saturated overburden. Samples for chemical analysis will be obtained as follows: a composite sample of the waste material, soil immediately below the waste material, soil at the water table, and an intermediate soil sample.

Soil boring procedures and subsurface soil sampling criteria from borings are discussed in Appendix A, Field Sampling and Analysis Plan. These samples will be analyzed for the parameters listed in Section 4.4.7.

4.4.2.2 Test Pit Program

Test pits will be excavated at 19 locations across the site as shown in Figures 4-5 and 4-6 to evaluate whether there are other disposal sites on SEAD-64D. The test pits will be excavated at geophysical anomalies, mounds, and topographically unusual features identified on the site plan and in aerial photographs. Additional test pits will be excavated at the south end of the site if other berms, piles, or depressions are observed in this area. If visual staining,odors, or elevated PID readings are obtained, then a sampled will be collected for analysis.

The test pit excavation procedure is discussed in Appendix A, Field Sampling and Analysis Plan.



LEGEND

●	EXISITNG MONITORING WELL
⊕	PROPOSED MONITORING WELL
△	PROPOSED SURFACE SOIL SAMPLE
△	PROPOSED SOIL BORING
⊞	PROPOSED SURFACE WATER/SEDIMENT SAMPLE
⊟	PROPOSED TEST PIT

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

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

A:\SENECA\RIFS\SD64D\SD64DPSP.DWG

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT: ENVIRONMENTAL ENGINEERING
Dwg No: 727651-02006

FIGURE 4-5
PROPOSED SAMPLING LOCATIONS

SCALE: 1" = 200'
DATE: FEBRUARY 1997
REV: A

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

⊕ PROPOSED MONITORING WELL

△ PROPOSED SURFACE SOIL SAMPLE

△ PROPOSED SOIL BORING

⊞ PROPOSED SURFACE WATER/SEDIMENT SAMPLE

⊟ PROPOSED TEST PIT

▄ EXISTING TEST PIT

◐ EXISITING MONITORING WELL

▲ EXISTING SOIL BORING

▲ EXISTING SURFACE SOIL SAMPLE

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD64D GARBAGE DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING

Dwg. No 727651-02006

FIGURE 4-6
PROPOSED SAMPLING LOCATIONS
SOUTH END

SCALE 1" = 200'

DATE NOVEMBER 1995

ACAD\SENECA\RIFS\SD64D\SD64DSE.DWG

4.4.2.3 Surface Soil Sampling Program

An abandoned solid waste incinerator, formerly used to burn municipal waste from depot activities and family housing, and on occasion, small munitions and asbestos, is located approximately 500 feet north of the site. Meteorological studies at SEDA have shown that the prevailing wind direction varies from northwest in the winter to southwest in the summer. PAHs and heavy metals present in the surface soils on site include particulate deposition from this incinerator and from waste buried in pits at the site. Therefore, 36 surface soil samples will be obtained in a systematic pattern across the site as shown in Figure 4-5.

The surface soil sampling procedure is discussed in Appendix A, Field Sampling and Analysis Plan. These samples will be analyzed for the parameters listed in Section 4.4.7.

4.4.2.4 Soil Sampling Summary

Surface soil samples will be obtained at 36 locations across the site and at nine boring locations. One waste sample will be obtained from a boring. Thirty subsurface soil samples will be obtained for chemical analysis from ten borings. Samples will also be obtained from the test pitting program if field screening results indicate potential soil or waste contaminants. These soil samples will be analyzed for the parameters listed in Section 4.4.7.

4.4.3 Groundwater Investigation

4.4.3.1 Monitoring Well Installation and Sampling

The purpose of the groundwater investigation is to determine whether the groundwater quality is being impacted at the two locations where waste material is located on site.

Prior to installation of new monitoring wells, existing monitoring wells MW64D-2,3,4 and 5 will be sampled with a low flow pump and the samples analyzed for metals only; the results will be obtained from the lab as soon as possible. If metals criteria are exceeded in any of the wells a total of five new overburden monitoring wells and one bedrock well will be installed at SEAD-64D at the locations shown in Figures 4-5 and 4-6. The well borings will be continuously sampled to competent rock. A monitoring well will then be installed in the boring and screened through the overburden aquifer to a maximum screen length of 10 feet. These wells will be developed before sampling.

As part of the first round of groundwater sampling, all existing and newly installed monitoring wells will be sampled and analyzed for the parameters listed in Section 4.4.7. The second round of sampling will occur approximately three months after the first round. The wells will be sampled using the latest version of the EPA low-flow groundwater sampling procedures.

Four rounds of water level measurements will be performed. One measurement will take place prior to the initial metals sampling. The next one before well development and used for well development calculations. The remaining two rounds of measurements will be performed before both rounds of groundwater sampling and used to develop a groundwater elevation contour map and evaluate seasonal changes in the groundwater flow direction (during each round all wells at the site will be measured). Three rounds of water level measurements will be collected if no new wells are installed.

Installation, development, sampling, and groundwater level measurement procedures for overburden wells are provided in Appendix A, Field Sampling and Analysis Plan.

4.4.3.2 Aquifer Testing

Slug tests will be performed at the five monitoring wells installed during the ESI (MW64D-1 to -5) to determine hydraulic conductivities at various locations on site. The procedures for slug testing (hydraulic conductivity determination) are provided in Appendix A, Field Sampling and Analysis Plan.

4.4.4 Surface Water/Sediment Sampling Program

Surface water and sediment samples will be obtained from 19 locations on site to evaluate the transport of PAHs and heavy metals in, and the general quality of, the surface water and sediment. The surface water flow rate and direction will also be measured at each location. The 19 locations are shown on Figures 4-5 and 4-6.

Surface water/sediment sampling and surface water flow rate measurement procedures are provided in Appendix A, Field Sampling and Analysis Plan. These samples will be analyzed for the parameters listed in Section 4.4.7.

4.4.5 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.

4.4.5.1 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.

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.

4.4.5.2 Contaminant-Specific Impact Analysis

Information from the site description developed in Section 4.4.5.1 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.

Performing a contaminant-specific impact analysis may require specific toxicological or ecological information. A number of methods that are useful in the development of appropriate information are listed:

1. Sampling and analysis of tissues obtained from biota collected from contaminated and uncontaminated areas.

2. Bioaccumulation calculations supported by the analysis of contaminated media and biota.

3. The modelling of environmental fate and contaminants.

4. In situ and laboratory toxicity tests of contaminated and uncontaminated media.

5. Histopathological studies of populations exposed to contaminants.

6. Collection and comparison of population density, diversity, or species richness data from contaminated and uncontaminated areas.

7. Contaminant-specific toxicological data obtained from literature sources for biota known to inhabit the site and surrounding area.

8. Evaluation of potential use of fish and wildlife resources by humans from information available in surveys and records.

4.4.6 Archeological Investigation

The results of the archeological survey performed on SEDA, titled "An Archeological Overview and Management Plan for Seneca Army Depot" (Final Report No. 16, September 1986), were reviewed to determine whether any known or potential archeological resources were present at SEAD-64D. The only archeological resources identified at or near SEAD-64D were three potential resources numbered 105, 108, and 109 in the survey. All three are identified as former farmsteads.

The remains of only one foundation were observed on SEAD-64D located on the south side of the stream that flows west through the site. A preliminary archeological assessment of the foundation and nearby land will be performed. The foundation and any nearby areas that contain remains will be located, described, photographed, surveyed, and shown on a topographic map. One or two shallow (less than one foot deep) pits will be dug with a shovel in each area containing remains to obtain preliminary information on the depth of the remains. Any remains in the pits will be documented. The pit locations will be surveyed and shown on a topographic map. Each pit will be backfilled with the material that was removed from it.

4.4.7 Analytical Program

A total of one waste sample, 66 soil samples, 26 groundwater samples (includes the initial round for metals and 2 subsequent rounds), 19 surface water samples, and 19 sediment samples will be collected for chemical testing.

All the samples, except for the 36 surface soil samples obtained from across the site, will be analyzed for the following: TCL volatile organic compounds (EPA Method 524.2 for groundwater in round 2), TCL semivolatile organic compounds, TCL pesticides/PCBs, and TAL metals and cyanide according to the NYSDEC Contract Laboratory Program (CLP) Statement of Work (SOW).

Prior to installation of new monitoring wells, groundwater samples will be collected from MW64D-2,3,4 and 5 and analyzed for metals. A low flow pump procedure will be used for sampling. If the metals concentration exceed their respective NYSDEC Class GA Standards the five new overburden wells will be installed and sampled.

Then two rounds of groundwater samples will be obtained from all of the wells on-site. One round will occur soon after the initial metals sampling. The second round will occur approximately three months after the first round. These samples will be chemically analyzed for the same parameters as listed in the previous paragraph plus volatile organic compounds, SVOCs, pesticides/PCBs and TPH.

The 36 surface soil samples obtained from across the site will be analyzed for the TCL semivolatile organic compounds and the TAL metals and cyanide according to the NYSDEC CLP SOW.

All the surface soil, waste, and subsurface soil samples from the 10 borings (31 samples) will be analyzed for total recoverable petroleum hydrocarbons (TRPH) by EPA Method 418.1.

The four samples from the boring at the south end of the site and both subsurface samples from three of the nine borings in the east central section of the site will be analyzed for grain size (including the distribution in the silt and clay fractions by ASTM Method D422), Moisture Content by ASTM Method D2216, Total Organic Carbon (TOC), Cationic Exchange Capacity (CEC), pH, and density.

The 22 groundwater samples from the two latter rounds will be analyzed in the field for pH, temperature, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. The following analyses will be performed by the laboratory: TRPH, alkalinity, ferrous iron, sulfate, sulfide, nitrate, TOC, biological oxygen demand (BOD), hardness, total dissolved solids (TDS), and chemical oxygen demand (COD).

The 19 surface water samples will be analyzed in the field for pH, temperature, specific conductivity, and dissolved oxygen. The following analyses will be performed by the laboratory: total suspended solids (TSS), TDS, alkalinity, hardness, ammonia, nitrate/nitrite, phosphate, TOC, and turbidity.

The 19 sediment samples will be analyzed for grain size, TOC, CEC, and pH. The western-most sample from the unnamed stream and the sample furthest downstream in the drainage channel along the eastern border of SEAD-64D will also be analyzed for density.

A summary of the analyses to be performed at SEAD-64D is provided in Table 4-3.

4.4.8 Surveying

Surveying will be performed at SEAD-64D for the following purposes:

TABLE 4-3

SENECA ARMY DEPOT ACTIVITY
SEAD-64D PROJECT SCOPING PLAN
SUMMARY OF SAMPLING AND ANALYSES

	VOCs		SVOs	Pesticides/PCBs	Metals	TPH	Grain Size	Moisture Content	pH	Cationic	Hardness	TOC	Density
MEDIA	TCL NYSDEC CLP	Method 524.2	TCL NYSDEC CLP	TCL NYSDEC CLP	TAL NYSDEC CLP	Method 418.1	ASTM D422	ASTM D2216	Method 150.1	Exchange Capacity	Method 130.2	Method 415.1	
Soil Surface	0	0	36	0	36	0	0		0	0	0	0	0
Subsurface	30	0	30	30	30	30	10	10	10	10	0	10	10
Groundwater Re-Sample	0	0	0	0	4	0	0	0	4	0	4	4	0
Groundwater (3)	11	11	22	22	22	22	0	0	22	0	22	22	0
Surface Water (4)	19	0	19	19	19	0	0	0	0	0	19	19	0
Sediment	19	0	19	19	19	0	19	0	19	19	0	19	2

Notes:
1) The general chemistry and physical parameters that will be analyzed for each medium are listed in Section 4.4.7.
2) QA/QC sampling requirements are described in Appendix C, Section 5.3 of the Generic Installation RI/FS Workplan.
3) CLP: round 1; 524.2 round 2; groundwater samples will also be analyzed for alkalinity, ferrous ions, sulfate, sulfide, nitrate, BOD, TDS, and COD.
4) Surface water samples will also be analyzed for TSS, TDS, alkalinity, ammonia, nitrate/nitrite, phosphate, and turbidity.

1. Extend the topographic map approximately 400 feet south of the mapped area.
2. Mapping the direction and computing the velocity of groundwater movements;
3. Locating the environmental sampling points;
4. Estimating the volume of impacted soils and sediments which may require a remedial action; and
5. Mapping 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 lines, soil borings, monitoring wells (new and existing), surface soil sampling points, and surface water/sediment sampling points will be surveyed and plotted on the topographic map to show their location with respect to surface features within the project area. The extent of the waste materials will also be surveyed and plotted on the topographic map. The extent of the waste materials will be determined through a combination of visual observations, soil sampling and geophysical testing.

Site surveys will conform to all pertinent state laws and regulations governing land surveying. The surveyor will be licensed and registered in New York.

The site field survey requirements are presented in Appendix A, Field Sampling and Analysis Plan.

4.5 DATA REDUCTION, ASSESSMENT, AND INTERPRETATION

Data reduction, assessment, and interpretation are discussed in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

4.6 BASELINE RISK ASSESSMENT

The baseline risk assessment is discussed in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

4.7 DATA REPORTING

Data reporting is discussed in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

4.8 TASK PLAN SUMMARY

Detailed task plan summaries that indicate the number and type of samples to be collected at each site are provided in Tables 4-1, 4-2, and 4-3.

General information about the Task Plan Summary is presented in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

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 discussion of the detailed analysis 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). Any Remedial Action and/or operation and maintenance cost estimates will be structured using the HTRW Remedial Action and O&M Work Breakdown structures. The latest HTRWRA-WBS and O&M WBS was distributed to USACE offices in February 1996 and should be used to structure HTRW cost estimates. Remedial Action estimates should reflect all the necessary project costs including direct construction costs, contractor indirect costs (overheads), necessary contingencies (both design and construction), prime and subcontractor mark-ups, cost growth to mid-point of construction, construction management, E&D during construction and government quality assurance costs.

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.

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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.

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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 Study at SEAD-11, SEAD-64a, and SEAD-64D. The Field Sampling and Analyses Plan (Appendix A of the Generic RI/RS Workplan), details procedures which 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 B of the Generic RI/FS Workplan) details procedures to be followed during field activities to protect personnel involved in the field program.

The Chemical Data Acquisition Plan (Appendix C of the Generic RI/FS Workplan) 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-11, SEAD-64A, and SEAD-64D are presented in Figures 6-1 through 6-4.

6.2 STAFFING

The project team organization for performing the RI/FS is presented in Figure 6-5.

Table 6-1
SEAD-11 RI Field Investigation Schedule
Seneca Army Depot Activity

Page 1 of 1

1.31.1997

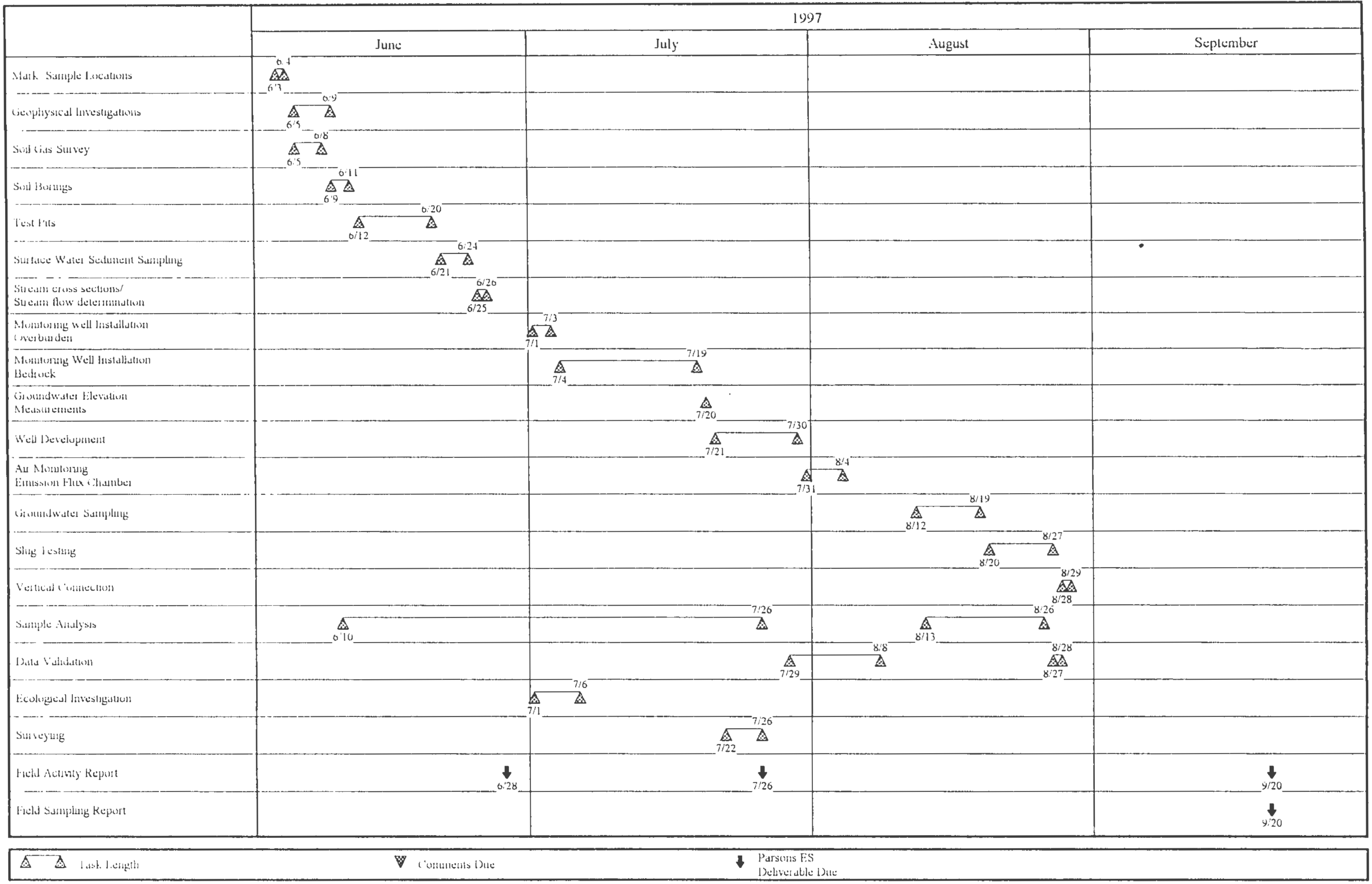


Table 6-2
SEAD-64A RI Field Investigation Schedule
Seneca Army Depot Activity

Page 1 of 1

2/11/1997

	1997						
	June	July	August	September	October	November	December
Mark Sample Locations	△ 6/3						
Surface Water / Sediment Sampling and Runoff Delineation	△ 6/4						
Ecological Investigation	△ 6/5 — △ 6/10	△ 7/15 — △ 7/17					
Surface Soil and Soil Gas Sampling	△ 6/11 — △ 6/17						
Soil Borings	△ 6/18						
Monitoring Well Installation and Development	△ 6/24 —	— △ 7/5					
Groundwater Sampling		△ 7/15 — △ 7/20			△ 10/14 — △ 10/19		
Water Level Measurements		△ 7/8 △ 7/15			△ 10/14		
Aquifer Testing		△ 7/21 — △ 7/23					
Sample Analysis	△ 6/5 —	— △ 7/12 △ 7/16 — △ 7/26			△ 10/15 — △ 10/25		
Data Validation		△ 7/15 — △ 7/23 △ 7/29 — △ 7/30			△ 10/26 — △ 10/27		
Surveying		△ 7/15 — △ 7/19					
Field Activity Reports	⬇ 6/28	⬇ 7/26			⬇ 10/18	⬇ 11/5	
Field Sampling Letter Report						⬇ 11/27	

△—△ Task Length ▼ Comments Due ⬇ Parsons ES Deliverable Due

Table 6-3
SEAD-64D RI Field Investigation Schedule
Seneca Army Depot Activity

Page 1 of 1

2/3/1997

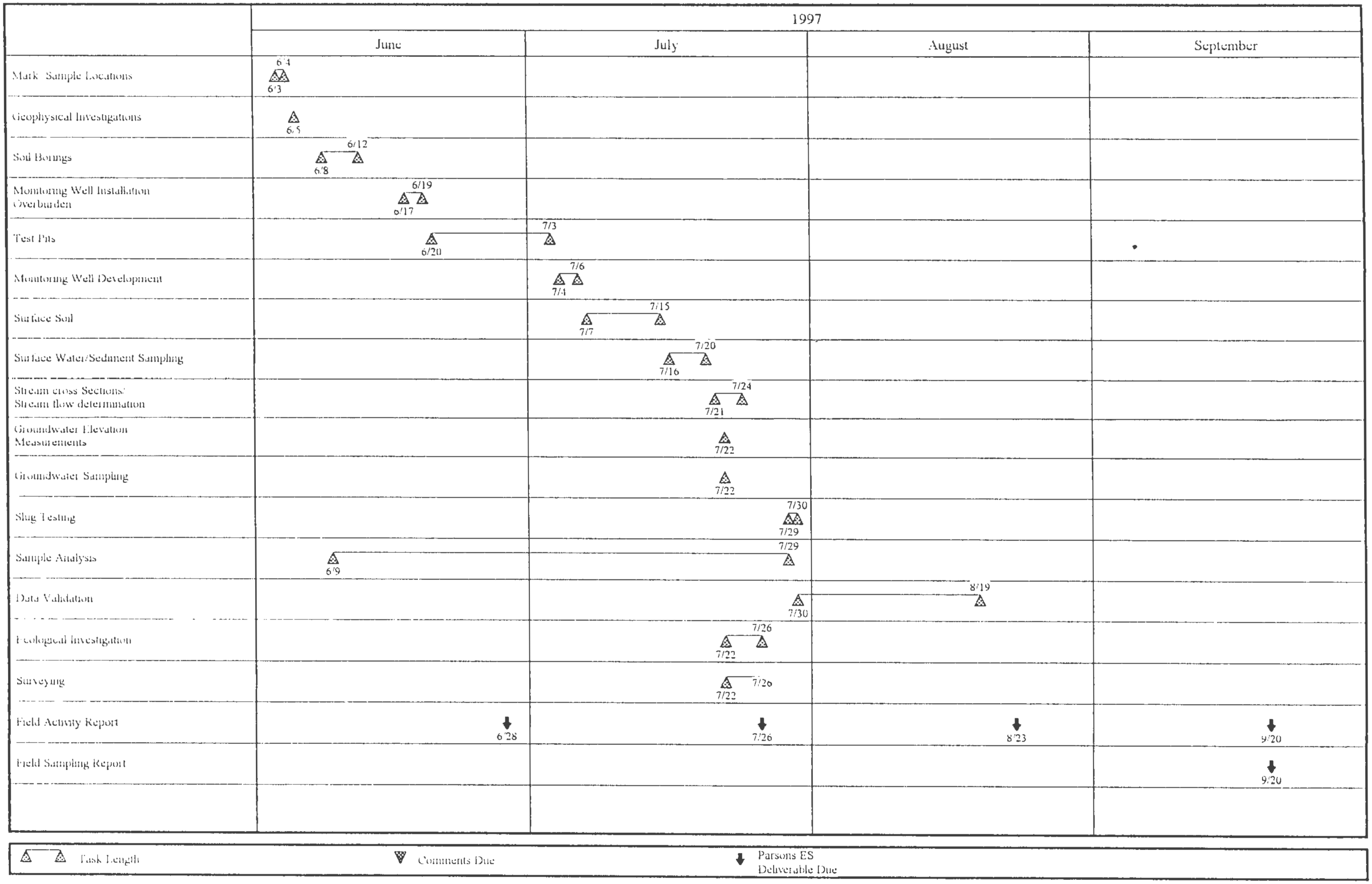
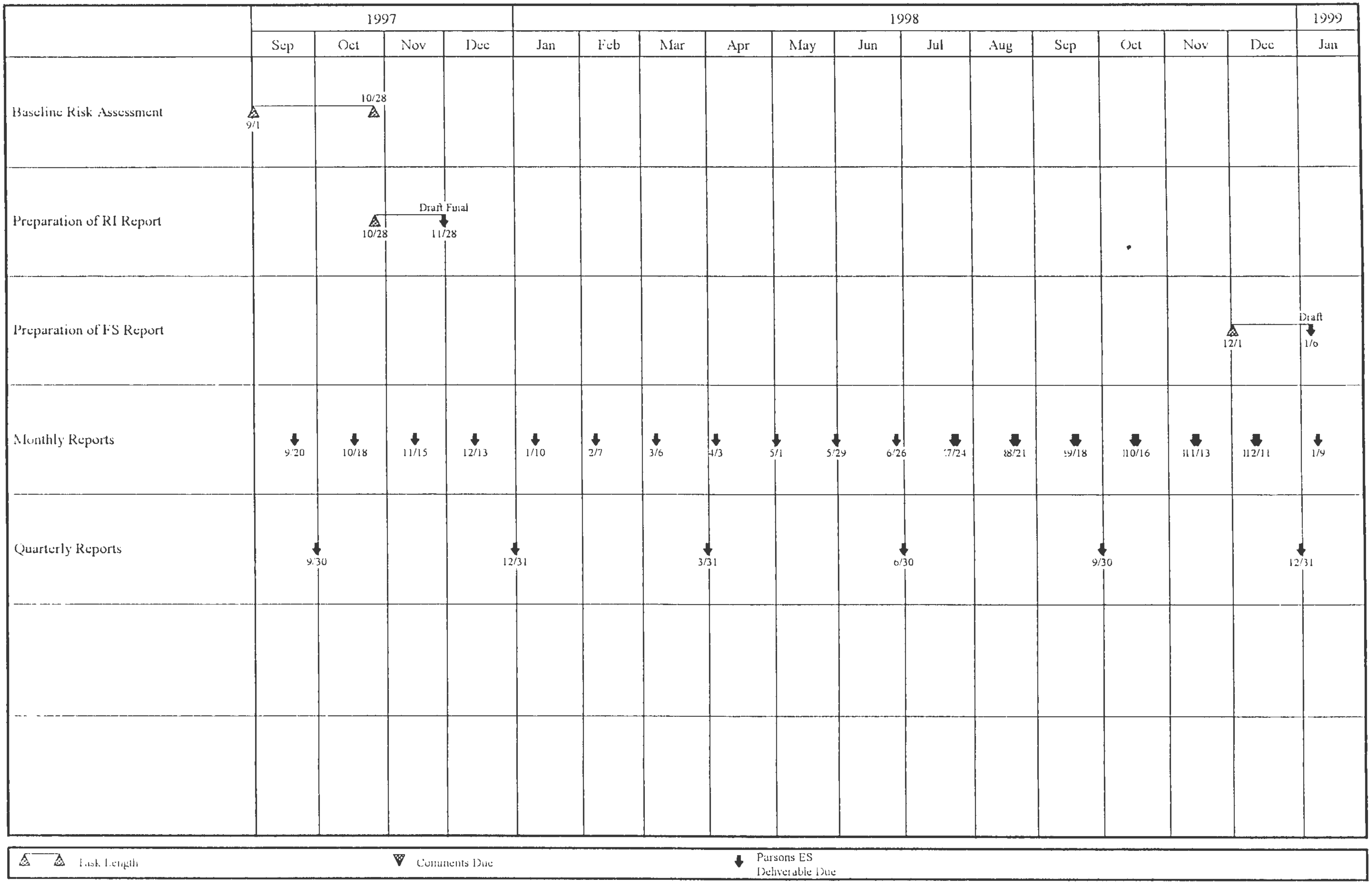


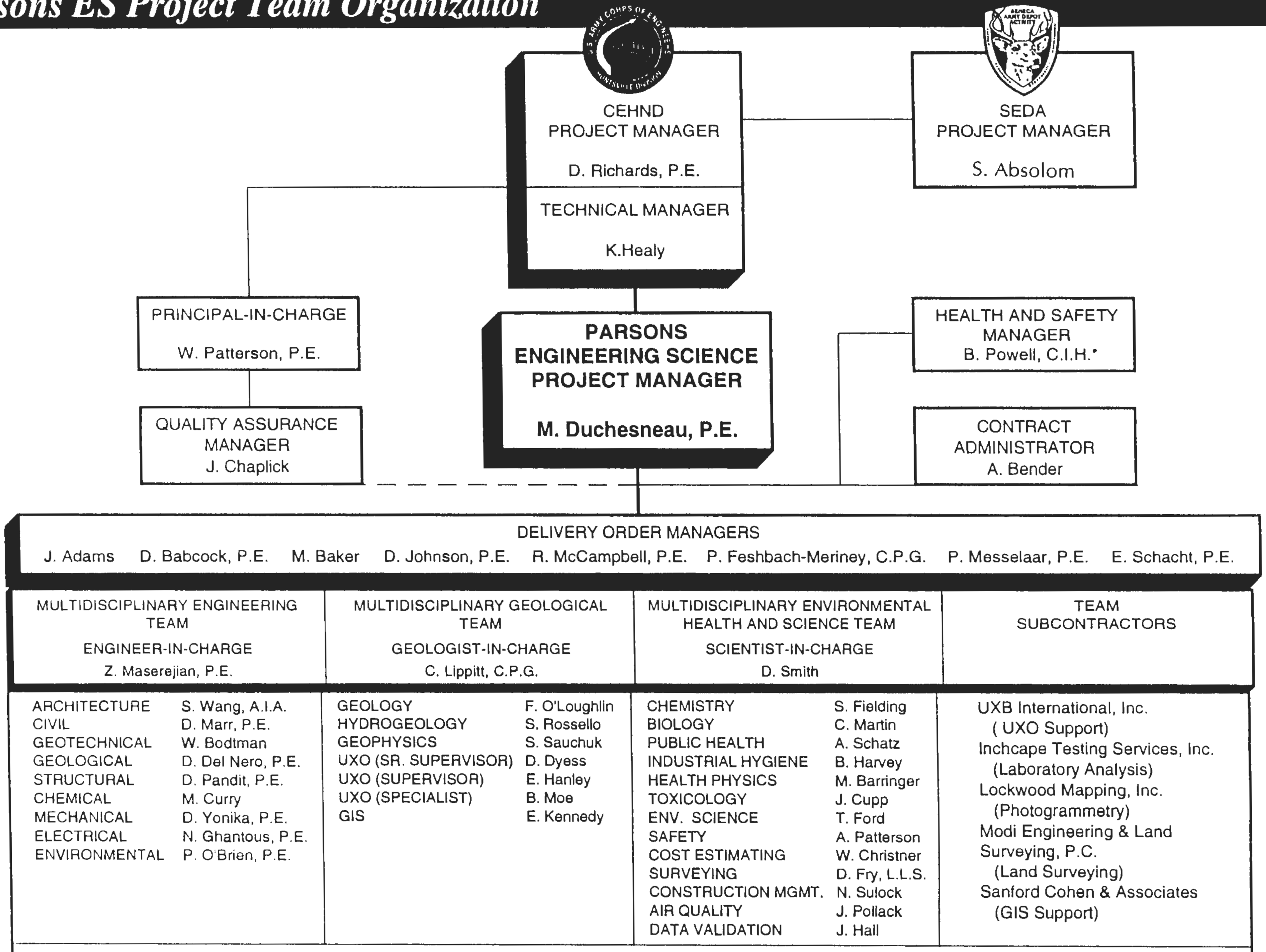
Table 6-4
SEADs-11., 64A, and 64D RI/FS Schedule: Risk Assessment and Reports
Seneca Army Depot Activity

Page 1 of 1

2/6/1997



Parsons ES Project Team Organization



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- Inchcape Testing Services, Inc. (Laboratory Analysis)
- Lockwood Mapping, Inc. (Photogrammetry)
- Modi Engineering & Land Surveying, P.C. (Land Surveying)
- Sanford Cohen & Associates (GIS Support)

Figure 6-5

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APPENDIX A

FIELD SAMPLING AND ANALYSIS PLAN

Appendix A information is contained in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan

APPENDIX B

HEALTH AND SAFETY PLAN

The Health and Safety Plan for the RI/FS to be conducted at SEAD-11, SEAD-64A, and SEAD-64D is contained in the Generic Installation Workplan that serves as a supplement to this RI/FS Project Scoping Plan. Site-specific information about the investigations to be performed at SEAD-11 and the hazards associated with them are presented here.

B-1 PHYSICAL DESCRIPTION OF SEAD-11: OLD CONSTRUCTION DEBRIS LANDFILL

The Old Construction Debris Landfill covers approximately 4 acres (590 feet by 300 feet) is currently abandoned and the surface is vegetated with grasses and weeds. Operating practices of the landfill are unknown.

B-2 POTENTIAL CHEMICAL CONTAMINANTS

Contents of landfill are mostly unknown. During the sampling program conducted for the ESI performed at SEAD-11, the following constituents were detected:

- VOCs
- SVOCs
- pesticides and herbicides
- explosive compounds
- heavy metals

B-3 PHYSICAL HAZARDS

- unexploded ordnance
- metal debris
- rough terrain
- protruding debris
- landfill cave-ins
- test pit cave-ins

B-4 FIELD WORK TO BE PERFORMED

- Geophysical Survey
- Soil Gas Survey
- Test Pits
- Soil Borings
- Install, Develop and Sample Groundwater Monitoring Wells
- Surface Water and Sediment Sampling

B-5 TASK SPECIFIC SAFE OPERATING GUIDELINES

The geophysical survey, soil gas survey, drilling, monitoring well installation and surface water and sediment sampling will be performed in Level D personnel protection equipment.

The excavation and sampling to be performed during the test pitting operation at SEAD-11 will be performed by UXO personnel because explosive compounds were detected in soil and ground water samples collected for the ESI performed at SEAD-11.

All personnel involved in the test pit operation will wear Level B personnel protection equipment (PPE) because soil gas and soil samples collected during the ESI at SEAD-11 indicated the presence of VOCs in the landfill.

Level B PPE consists on full-facepiece self-contained breathing apparatus or air-line respirator, poly-coated Tyvek or Saranex coverall, neoprene boat covers, nitrile outer gloves, latex inner gloves, hard hat, and safety shoes.

Prior to any test pitting operations, an exclusion zone will be set up around the excavation location. The exclusion boundary will be approximately 50 feet from the edges of the area to be excavated. There will be one point of entry and exit for the excavation equipment. Metallic objects will be separated for classification purposes. When the excavation and sampling is complete, all materials will be replaced into the pit and the ground surface will be returned to its original position.

Plastic sheeting with run-off controls will be set up where excavated materials will be placed. Excavated materials will be placed a minimum of 2 feet away from the edge of the excavation to avoid cave-ins.

A minimum of four people will be involved in each test pit excavation: one person operating the backhoe, one person in the exclusion zone, one person operating the air regulators and one person available for emergency response.

On the southern and western edge of the landfill, the ground surface slopes sharply, but the ground surface over the main body of the landfill (where the test pitting will be performed), the ground surface is level and relatively smooth. Because the surface is smooth, hazards associated with maneuvering the heavy excavating equipment on the landfill surface should be minimal. Prior to moving the backhoe around the landfill, however, the pathway that the operator intends to take will be inspected for protruding debris and possible voids within the landfill that could cave in.

All personnel involved with the test pitting will limit their movement around the landfill surface to necessary movement to avoid trips or falls that may result from protruding debris or voids within the landfill.

B-6 MONITORING TO BE PERFORMED

A PID will be used to screen soil for volatiles. Particulate and radiation monitoring will also be performed during excavation of test pits.

Ambient air will be monitored continuously throughout driling and test pitting activities. Downwind monitoring will also be conducted continuously throughout drilling and also test pitting activities. Drilling spoils and excavated materials will be monitored periodically and with any change in appearance. Split spoons should be monitored when opened.

B-7 DECONTAMINATION

Equipment Decontamination

Gross contamination (caked mud, dirt and debris) should be removed from bucket, backhoe, and other equipment before leaving excavation area. Equipment should be steamed cleaned between test pits and before leaving site.

Personal Decontamination

Step 1 Segregated equipment drop.
Step 2 Remove and discard overboots.
Step 3 Remove and discard outergloves.
Step 4 Remove SCBA backpack.
Step 5 Remove coveralls.
Step 6 Remove respirator face-piece.
Step 7 Remove inner gloves.
Step 8 Wash hands and face.

Change of SCBA air tank can be performed after removal of outer gloves if coveralls are not grossly contaminated.

APPENDIX C

CHEMICAL DATA ACQUISITION PLAN

Appendix C information is contained in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan

APPENDIX D

UNITED STATES DEPARTMENT OF INTERIOR FISH AND WILDLIFE SERVICES ENDANGERED AND THREATENED SPECIES LETTER

Appendix D information is contained in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan

RESPONSE TO COMMENTS
BY
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (REGION II)
FOR DRAFT FINAL SCOPING PLAN
FOR THE CONSTRUCTION DEBRIS LANDFILL (SEAD-11), GARBAGE DISPOSAL AREAS (SEADs-64A & 64D)
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
COMMENT DATE: MARCH 1997

SEAD-64

Comment #2 Based on a review of the text and the response to comment, Parsons ES has not stated why it is unclear why the debris pile is described as "rubble."

Response #2 Agreed. It is apparent that this minor issue needs clarification, as it has unnecessarily consumed two rounds of comments. The draft text stated that "Debris, possibly rubble, was observed on the surface of the western pile." The use of the term "possibly rubble" was meant to convey information to indicate that this pile was composed of slightly different material than the other piles, that of rubble, but that the observer was not certain of all of the materials contained in the pile, and chose to use the word rubble to describe it. In the context of the description of the western pile, the word rubble means, an accumulation of rough angular fragments. No change was made to the text of the Scoping Plan, since the term "possibly rubble" was previously removed in the draft final version of the plan.

Specific BTAG Comment

Comment #7 Based on a review of the text and figures, it is unclear if additional soil borings will be conducted in the areas of previous PAH and SVOC exceedences. Additional borings will be required in these areas to define the vertical extent of contamination.

Response #7 Agreed. This response will clarify the issue of whether soil borings will be conducted in the areas of previous PAH and SVOC exceedences. The highest concentrations of PAHs and SVOCs, and the exceedences for individual compounds, were found in the 0.0 to 0.2 foot soil samples at the three previous ESI soil boring locations (SB64A-1, SB64A-2, and SB64A-3). The proposed boring locations are generally located around the previous borings to help define the horizontal and vertical extent of impacts from PAHs and SVOCs, however, some horizontal coverage in the southern portion of the filled area is provided by surface soil samples. Also, the vertical extent of the these impacts at the three previous soil boring locations was defined by the previous ESI data, which showed significant decreases in the concentrations of the PAHs and SVOCs with depth. In these three borings, theses concentrations were below the method detection limits and/or TAGM values in samples collected between approximately

4 and 8 feet below the ground surface (Table 3-8 in the Scoping Plan). No additional borings or changes were made to the text of the Scoping Plan.

Other Specific Comments

Comment #20 It remains unclear from the response to comment and the revised text, if two or three rounds of sampling will be conducted at the existing monitoring well locations if new monitoring wells are installed.

Response #20 Agreed. The following text will clarify this point. Initially, the existing wells will be sampled using the low-flow method and analyzed for metals only, and the results of these analyses will be obtained as soon as possible. If any of the metals concentrations exceed their respective TAGM values then the five additional wells will be installed. Then, two additional rounds of samples will be collected from all of the wells and analyzed for the list of constituents listed in Section 4.4.7 of the Scoping Plan. The first round will occur soon after the initial metals sampling, and the second round will occur approximately three months after the first round. The text in Section 4.4.3.1 of the Scoping Plan has been clarified accordingly.

Comment #22 The revised text associated with this response states that the new wells will be installed and sampled if the groundwater samples from the existing monitoring wells exceed TAGM values for metals. Groundwater results should be compared to NYSDEC Class GA standards and not TAGM values, which are for soils.

Response #22 Agreed. The reference to TAGM values was an error in the response, and as a result the text on page 4-39 of the Scoping Plan has been modified appropriately.

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RESPONSE TO COMMENTS
BY
U.S. ARMY
FOR DRAFT FINAL SCOPING PLAN
FOR THE CONSTRUCTION DEBRIS LANDFILL (SEAD-11),
GARBAGE DISPOSAL AREAS (SEADs-64A & 64D)
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
COMMENT DATE: MARCH 1997

Comments by Forget

Comment #1 Section 3.1.1.2.6
Although the PAHs may be from fuel products, in a landfill it is more likely they are from asphalt or burning activities.

Response #1 Agreed. In light of this comment, the text on page 3-22 has been modified to indicate that PAHs may be from petroleum products, asphalt or burning activities.

Comment #2 General
Clarify why soil samples were taken through and under the landfills. This practice is generally not recommended due to safety. Additionally, the data gathered is generally not used for risk assessment because there is no exposure to the subsurface areas of a landfill.

Response #2 Agreed. Clarification of the reason for this is as follows. Soil samples were collected from within and under the landfilled areas to determine if these areas were impacted by chemicals of concern. By not sampling these areas there would have been gaps left in the data such that potential source areas, which could present the significant risk on the site, would have been uninvestigated. By sampling within and beneath the fill, data is available to fully characterize any future impacts (possibly through leaching to groundwater) that may not be realized in downgradient locations at this time. We did not feel that it was an appropriate approach to leave suspected source areas unsampled, and then, at a later date, have to defend the lack of data from these areas. Also, the risk assessment does propose to use exposure to subsurface soil (incidental ingestion and dermal contact) over the entire site for the hunter and terrestrial biota receptors (Section 3.2). We also realize that that there can be additional safety issues when drilling in fill material, and the necessary precautions were taken during the ESI and will be taken during the RI so that the drilling is performed in a safe manner. No change was made to the text of the Scoping Plan.

Comment #3 Section 3.1.2.3
The sentence, "For future uses of SEAD-11, on-site residents will be considered even though the Re-use plan has designated this area as a conservation and recreation area." does not comply with the intent of BRAC.

BRAC guidance states, "Identify anticipated land reuses for the disposal and reuse parcels identified in Chapter 2, an ENSURE that these uses are considered during the development of risk assessment protocols and cleanup objectives during the RI." Additionally, "In all cases, the cost in time and money should be balanced against the need to protect human health and the environment." (DOD BRAC Cleanup Plan Guidebook).

Defaulting to unrealistic future land use results in unnecessary expenditure of funds.

Same comment on 3.2.2.3 and 3.2.3.3.

Response #3

Agreed. The on-site resident scenario was removed from Sections 3.2.1.3, 3.2.2.3 and 3.2.3.3 as recommended. The residential scenario was carried through into the discussion of exposure pathways and receptors after the Reuse Plan was finalized, it should not have been included in the Scoping Plan. The Reuse Plan indicates the future use for the land as "Conservation/Recreation" for SEADs 11 and 64D, and "Warehouse and Distribution" for SEAD-64A. The above-referenced sections were updated so that they no longer include future on-site residents as a potential receptor. The text in the three sections noted above (pages 103, 104, 106, 109, and 110) was further clarified with regard to the receptors and, the exposure pathway summary figures (Figures 3-23, 3-24, and 3-25) were updated according the scenarios defined by the Reuse Plan under BRAC.

Comment #4

Section 3.6
The data needs specified for the sites are not needed. There is adequate analytical data at these sites to determine their risk to human health and the environment.

Furthermore, cleanups at other SEADs have not even been based on risk, but rather state guidance criteria being applied as ARARs. Therefore, clarify why an identified data need is data required for a risk assessment when it will not be used for risk management decisions.

Further justification is required for the proposed sampling.

Response #4

Disagree. There is not enough analytical data to determine the risk to human health and the environment considering that the extent of impacts have not been fully defined, and further justification is provided below. The data gathered during the ESIs provided a preliminary understanding of the physical nature of these sites and the chemical impacts. Importantly, the ESI data did not define the vertical and lateral extent of chemical impacts in the various site media, and it was not intended to do so. The ESI data was intended to provide information to the Army, EPA and NYSDEC so that the best course of action could be implemented at the site. On the basis of the ESI data, these three sites were recommended for RI/FS investigations. And, one of the main goals of the RI is to define the extent of the chemical impacts. Also, the additional data requirements listed in the data needs section of the Scoping Plan are necessary for the risk assessment because they will help determine if the total site risk is acceptable, which, along with state guidance criteria, is something that factors into the cleanup and risk management decisions at the SEADs.

Comments by Peterson

Comment #1

General

If further investigation reveals that a Feasibility Study, or similar decision document that includes cost estimates is required, please insure that the remedial action and/or operation and maintenance cost estimates are structured using the HTRW Remedial Action and O&M Work Breakdown structures. ER1110-3-1301, dated 15 April 94, requires in paragraph 8.b(1), "Cost estimates for HTRW remedial action shall use the latest HTRW remedial action work breakdown structure (RA-WBS)..." The latest HTRWRA-WBS and O&M WBS was distributed to USACE offices in February 96, and should be used to structure HTRW cost estimates. Structuring cost estimates using these documents helps to insure that remedial action and operation and maintenance cost estimates are standardized, complete, and that cost engineering offices are involved in either the preparation or review of the cost estimates.

Response #1

Agreed. If further investigation reveals that a feasibility study or similar decision document that includes cost estimates is required, the remedial action and/or operation and maintenance cost estimates will be structured using the HTRW Remedial Action and O&M Work Breakdown structures, as described in ER1110-3-1301. In response to this comment, appropriate text was added to page 5-1 in Section 5.5 that explains this.

Comment #2

General

Remedial Action cost estimates should reflect all the necessary project costs including direct construction costs, contractor indirect costs (overheads), necessary contingencies (both design and construction), prime and sub-contractor markups, cost growth to the mid-point of construction, construction management, E&D during construction, and Government quality assurance costs. The HTRW CS has prepared an example HTRW cost estimate in the RA WBS format, including all the above mentioned costs. Even though all project costs may be difficult to identify or develop at early project stages, they should be accounted for, so that cost estimates are as complete as possible, particularly since they will likely be used for budgeting/programming purposes. For more information, please contact Jim Peterson in the HTRW CX at (402) 697-2612.

Response #2

Agreed. As stated in the comment, Remedial Action cost estimates will reflect all the necessary project costs including direct construction costs, contractor indirect costs (overheads), necessary contingencies (both design and construction), prime and sub-contractor markups, cost growth to the mid-point of construction, construction management, E&D during construction, and Government quality assurance costs. Appropriate text was added to page 5-1 in Section 5.5 to explain this.

Comments by Frye

Comment #1

General
Evidence from previous investigations at these sites does not seem to indicate that the sites pose a high enough risk to warrant the extensive investigation proposed in this scoping plan. However, I defer to the HTRW CX risk assessment specialist review comments on this issue.

Response #1

Acknowledged. See Response #4 (Forget), above.

Comment #2

Section 3.4, page 3-111.
Per 40 CFR 300.400(g), the lead agency (DOD) shall identify its ARARs and the support agency (EPA and State) shall identify their respective ARARs in a timely manner. It appears from this section that DOD is identifying State requirements. It is not prudent to do this. Recommend State requirements be removed from the document and submit a request to the State to identify their own list of ARARs (per EPA Guidance), which can then be negotiated. Listing the entire laundry list of State requirements may result in having to meet standards not appropriate for the project.

Also in this section, the New York Guidance series for Ambient Water Quality Standards is listed as a potential ARAR. This should be a TBC criteria and not an ARAR.

Response #2

Agreed. The responses to the comments provided above are provided as follows. First, the list of ARARs was originally developed for the Generic Work Plan and this list was developed with considerable comment, and approval by the New York Department of Environmental Protection. The Army specifically asked NYSDEC to provide a list of ARARs per EPA Guidance, and they cited the list that is included in the Generic Work Plan/Scoping Plan. Potentially applicable ARARs from the list in the Generic Work Plan were used in this Scoping Plan, because it was requested in earlier agency comments on other plans that this list be included in the individual scoping plans. No change was made to the text of the Scoping Plan.

Agreed. The New York State Department of Environmental Conservation, Division of Water, Technical and Operations Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values, can be listed as a TBC. Although the guidance series does list the surface water and groundwater standards, which have been promulgated and placed into regulation, these standards are extracted from Part 703 to Title 6, which is already listed as an ARAR for New York State in the Scoping Plan. In response to this comment the Guidance Series 1.1.1 has been removed from the ARAR list on page 3-112 of this Scoping Plan.

Comments by Georgian

Comment #1

General
Sections 1 and 2 were not included in the report and could not be reviewed.

Response #1 Acknowledged. The reports were shipped with all sections included; it is possible that these were removed internally by the Army, before you received it.

Comment #2 General

It is generally inappropriate to report nondetections as “0”. For example, in Table 3-1, concentrations of zero ppm VTCE are reported. Nondetections should be reported as “<x,” where x denotes the “reporting limit.”

The reporting limit, RL, is a threshold or censoring limit below which results are reported as “ND” or “<“. The RL must be no lower than the “limit of identification” (LOI) and no higher than the action level (risk-based limit, regulatory limit, some level that triggers a decision, etc). The LOI is the smallest concentration that is guaranteed to be detected with 99% certainty (the false negative probability is 1%). The LOI is approximate twice the method detection limits (40 CFR, Part 136, Appendix B).

Response #2 Agreed. Nondetects should reflect the detection limit of the instrument, and we also agree with the information presented to support the comment presented above. Therefore, for the field screening results presented in Tables 3-1 and 3-10, the nondetects have been modified according to the instrument’s capabilities during the field testing. The OVM screening detection limit was approximately 0.1 ppm and the soil gas results detection limit was approximately 10 ppb. This method for recording nondetects (i.e., “<X“) will be used for the RI (where X denotes the reporting limit).

Comment #3 General

The action level for the OVM and TCE screening should be specified. The report should specify what VOC concentration are considered to be a significant detection. For example, Section 3.1.1.2.3 states “the data indicate that the west-central portion of the landfill has been impacted by low concentrations of volatile organic compounds...” The report should defined “low concentration.” The concentrations were “low” relative to what actions/screening level?

Response #3 Disagree. Action levels are not needed for the soil gas survey, however, we agree that further explanation of the goals of the survey is necessary. No OVM or TCE action levels were developed for the soil gas screening, because the screening was meant to provide a relative indication of where VOC impacts were likely to be found at the sites. This is not to say that the actual concentrations measured are not important, but the purpose of performing the soil gas screening was to provide guidance for subsequent subsurface investigation methods; i.e., to identify areas that could be further investigated by soil borings and/or monitoring wells to obtain more accurate data on the concentration of VOCs in soil and/or groundwater, and the extent of impacts. Also, NYSDEC does not have a soil gas standard for comparison. It has been our experience at other sites (e.g., Ash Landfill) that concentrations between 1 ppm and 10 ppm a generally indicate areas that need further investigation, however, the significance of the impacts to the subsurface soil is not certain.

However, we agree that the term "low concentration" should not be left undefined in the report. Therefore, because no action levels were necessary to meet the goals of the soil gas survey, we have deleted the term "low concentration" from the Scoping Plan and instead, the let the actual measured values stand in the report.

Comment #4

General

Background concentrations are not being quantitatively compared to site concentrations (e.g., using statistical methods). For example, p. 3-23 states that 17 metals exceeded the TAGM action levels but does not state whether the background concentrations of these metals also exceed the TAGM action levels. It is recommended that upper confidence limits for background soil samples be calculated and compared to site metal concentrations.

Response #4

Agreed. While it is not clear from the results table, currently, the site concentrations are compared to the site background concentrations as allowed under the use of NYSDEC TAGM values. The TAGM values were derived with consideration of concentrations specified by NYSDEC and SEDA site-wide background concentrations, as define by the TAGM. Based on the most recent publication of NYSDEC TAGMs, all but one of the TAGM values for metals (mercury) allow site background concentrations to be incorporated into the TAGM value. They are as follows: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc (the higher of the two, site background vs TAGM, was used as the TAGM at Seneca). For these metals, the site background values used for the TAGM represent the 95th percentile of the background data for the individual metals (as calculated using the statistical software package SPSS). Note that mercury is the only metal that has a specified TAGM (0.1 mg/Kg), however, the 95th percentile of the site background data is 0.11 mg/Kg. The sections of text in the Scoping Plan that discuss metals in soil (pages 3-23, 3-46, and 3-78) have been revised to reflect the use of the 95th percentile of the background data and not the 95th upper confidence limit of the mean.

Comment #5

General

The report does not adequately address the quality of the analytical data. For example, the TAGM for antimony (Sb) in soil is 5 ppm. However, many nondections of Sb are reported at levels that are higher than the 5 action level. For example, Sb for soil sample SEAD-11-5 (205267) is reported as 12.3 UJ and Sb for soil sample SEAD-11 (206882) is reported as 11.3 J. Neither of these results indicates that the action level for Sb has been met or exceeded. The reporting limit for the first sample is higher than the action level. Since the result for the second sample is qualified as estimated, the actual concentration for Sb in the soil could be lower or higher than 5 ppb. With respect to a 5 ppm action level, both these Sb results are not usable. As a second example, the Se action level in soil 2 ppm but detections of 0.66 J and 0.74 J are reported. Since this data is estimated, it does not reliably demonstrate that the action level has been met or exceeded.

Response #5

Disagree. We believe that J-qualified data can be used in determining the exceedence of a criteria value, however, we agree that the report does not discuss the quality of the data with regard to instances where the detection limit for the analysis was above the criteria value or where an exceedence of a criteria is based on an estimated concentration. To address this, text as shown near the end of this response has been added to the Scoping Plan.

Specifically with regard to the use of NYSDEC CLP analyses for metals there will be instances where the detection limit is raised above the criteria value, however, for the metals in soil the IDL is typically below the TAGM action levels (get latest data from ITS). According to the laboratory (Intertek Testing Services), the raised detection limits are mainly caused by dilution or variations in the % solids of the sample matrix (for soils). These occurrences are inherent limitations of the NYSDEC Level IV metals analysis. The laboratory does its best to obtain the contract required detection limits (CRDL) for the NYSDEC CLP Level IV analyses, and to obtain the lowest possible instrument detection limit (IDL). It is important to note that the reporting limits for all of the metals are, baring unusual circumstances, below the TAGM action level. Also, the detection limit may be raised during the data validation process if metals were found in the laboratory blanks. Two metals where the reporting limit shown in the table is close to the TAGM action level are antimony and selenium, but under normal circumstances, the reporting limits for these metals are below the TAGM [Sb is generally between 0.18UJ and 0.31 UJ; Se is generally between 0.13U and 0.55U]. Only at SEAD-11 were there instances where the selenium reporting limit was raised above the TAGM, as noted in the comment above).

Also, we believe that J-qualified results are results that should be used according to NYSDEC Level IV reporting requirement for metals, the major concentration qualifiers assigned by the laboratory are "U" and "B"; no "J" qualifiers are assigned by the laboratory for metals, as they are for organics. The laboratory assigns a "U" when the concentration is below the IDL. A "B" is assigned when the concentration is between the CRDL and the IDL. During the data validation process, if no data validation criteria fail, the "B" is dropped and a "null" qualifier is assigned. If any one of the NYSDEC data validation criteria fails (e.g., the presence of the metal above the IDL in a lab blank, poor surrogate recoveries, etc.), then the data is qualified with a "J", even if the value is above the IDL. However, the estimated value remains the best representation of the true concentration in the soil.

Further support for the validity of estimated concentrations comes from USEPA's Risk Assessment Guidance for Superfund (RAGS). According the RAGS risk assessment procedures, data that has been assigned "J" qualifiers through the validation process are given equal weight to those concentrations that have no qualifier (i.e., "null"), both of which are used in the risk assessment evaluation. Or as noted in RAGS, "use J-qualified concentrations the same way as positive data that do not contain this qualifier"). Importantly, RAGS notes that such qualified data should have the appropriate caveats attached (see below).

On this basis of the information presented above, we believe the "J" values are of sufficient quality to indicate an exceedence of a TAGM for metals. However, to address the concern over the lack of a discussion of the quality of the data in the context of estimated concentrations, appropriate text has been added to the Scoping Plan that discusses this. The text addresses the quality of the data with respect to the fact that some of the exceedences are based on estimated concentrations so that the reader is aware that this may occur. However, these estimated concentrations remain the best representation of the true concentration in the sample and are considered valid data to make comparisons to criteria and for use in risk assessments. The additional text to be added to the Scoping Plan is as follows:

"It is important to note that in some instances the detection limit for individual analyses may be raised (sometimes above the criteria value) due to dilution or matrix effects in the sample. Also, note that the total number of samples found to exceed the criteria in the analytical results tables may include estimated concentrations (J-qualified data). This should be noted when considering further investigation or remedial action activities."

The additional text has been added to the Sections 3.1.1.2.6 and 3.1.1.3 for SEAD-11, 3.1.2.2.5 and 3.1.2.3 for SEAD-64A, and 3.1.3.2.3.6 and 3.1.3.3 for SEAD-64D.

Comment #6 General
Data quality objectives for sensitivity are not adequately addressed.

The report should list the detection limit (DL) and quantitation limit (QL) for each analyte of interest and should compare these limits to the TAGM action levels. The QL is set by the low calibration standard; should be at least five times the DL and less than the action level. Reporting limits must be less than the action level and greater than the LOI (about twice the DL). Nondetections do not demonstrate an action level is met when the RL is greater than the action level or is less than the LOI. Detections are not usable when the action level is less than the QL.

Detections below the QL are necessarily estimated and should be reported using one significant figure. (in general, J flag data should be reported using one significant figure).

Response #6 Agreed. The report does not list the detection limit (DL) and quantitation limit for each analyte of interest because these data are contained in the Generic Work Plan. Also, the Army has submitted a proposal to USEPA and NYSDEC for approval to use modified NYSDEC CLP methods for groundwater that will meet all the chemical ARARs for the RI/FS programs at Seneca. This comparison is also being done to ensure that all soil TAGM action levels are met, however, this information has not been finalized.

Disagree. Nowhere in the NYSDEC Level IV data validation process are there instructions or provisions to round off values reported by the laboratory. We do not agree that, "in general, J flag data should be reported using one significant figure." A "J" qualifier assigned through the validation process does not mean that the reported concentration is invalid, but only estimated.

Comment #7

Page 3-24. Metals:
The discussion of the lead result of "33.7 ug/L" further illustrates that DQOs for sensitivity are not being adequately addressed. Since the result is estimated, (i) it should be reported as "30 J ppb" (not as 33.7 ppb) and (ii) does not reliably demonstrate that the 25 ppb action level has been exceeded. The two result differ by only 15% in the context of analytical error, 25 is not significantly different from 30. Since the mean lead concentration is significantly below the 25 ppb action level and 30 ppb detection is estimated, if anything, the data implies that the action level for lead was not exceeded. Unfortunately, this type of treatment of the analytical data is prevalent throughout the report. As a second example, consider the Tl data listed in Table 3-14. The action level for Tl is 2. Detections of "2.2 J," "2.1 J," are reported. The report concludes Tl is a contaminant of concern because the Federal MCL for T1 has been exceeded. Since the detections are estimated, the data does NOT reliably demonstrate Tl is actually present above the 2 ppb in the groundwater. See previous comment, comment #6.

Response #7

Disagree. Laboratory results should not be rounded off (See the Responses #5 and # 6 above) and we believe that "J" values are valid to determine if a criteria/standard has been exceeded, provided the appropriate qualifying information is provided to the reader. To the best of our understanding, the NYSDEC Level IV data validation procedures do not provide instructions or provisions to round off concentrations reported by the laboratory. Therefore, we disagree with the example given that explains why the lead value of 33.7 J should be rounded off and reported as 30 J in the groundwater results. Also, we do not feel that one can arbitrarily determine that two concentrations are not significantly different using the argument presented above (i.e, that 30 is not significantly different than 25 because they differ by only approximately 15 %). We believe that a concentration qualified with a "J" is valid and can be used to determine if a criteria/standard has been exceeded. However, we do acknowledge a lack of information in the Scoping Plan to qualify the data with regard to the fact that some of the exceedences are based on estimated values. As noted in Response #5, text to address this has been added to appropriate sections of the Scoping Plan.

The data as reported in the ESI were determined using NYSDEC Level IV CLP methods and validated according to NYSDEC Level IV data validation procedures, and we have worked within the procedures available under these programs.

Comment #8

General
A more realistic discussion of fate and transport is recommended.

For a path to a receptor to exist, site contaminants must necessarily be present as significant concentrations. However, relative to the action levels being used, the report does not indicate that significant concentrations of VOC were detected in the soil or groundwater. There were some detections of VOCs in the air but no action levels were specified. Hence, the rationale for discussing the fate and transport of VOCs is not clear. For example, pages 3-87 to 3-92 discuss BTEX. However, significant concentrations of BTEX were not detected at the site.

Response #8

Disagreed. The fate and transport section in the Scoping Plan is meant to provide a discussion of the potential chemicals of concern at the site based on the ESI analytical data, and we believe that it should not focus on the "significance" of the impacts at this time because these impacts have not been fully characterized in the ESI; their significance is not fully defined at this time. We believe an even approach to the discussion of the fate and transport of chemicals is more appropriate for an RI/FS Scoping Plan. However, a focused approach is appropriate for the fate and transport section of RI, when the extent and magnitude of the chemical impacts have been fully characterized. The rationale for discussing the fate and transport of VOCs is based on the fact that VOCs were detected in the soil gas survey at SEAD-11, and thus the plan should present some basic fate and transport data on these volatile organic chemicals. We acknowledge that it is likely that VOCs may not be as significant at other chemicals found at the sites, as pointed out in the comment above.

Comment #9

Section 3.5
USEPA no longer uses "DQO Levels" (e.g., "Level 3 quality data"). Under the present guidance, there is "definitive" data and "screening" data. The reporting and QC requirements for each "Level" (e.g., for Level 2) should be defined.

USEPA CLP analyses are not recommended. Since CLP methods are not performance-based methods, the use of CLP methods is likely to adversely impact data quality. For example, CLP CRQLs and CRDLs are contractual quantities that are not generally equal to a laboratory's true quantitation and detection limits. To obtain usable data, the laboratory must demonstrate that its detection and quantitation levels are appropriate for the project-specific action levels; demonstration of performance relative to CLP CRQLs and CRDLs will not generally satisfy this objective. As a second example, CLP does not require laboratory's to maintain control charts to demonstrate routine analytical performance for accuracy and precision. Furthermore, CLP QC limits are generally wider than SW-846 limits (e.g., mass spectral tuning requirements, method blank acceptance criteria, and calibration acceptance criteria are less stringent). For SVOCs, CLP requires extraction at one pH value rather than two values (as in SW-846). CLP requires sonication rather than Soxhlet extraction (the former has a lower extraction efficiency than the later), etc. The use of CLP methods does not imply higher quality data-relative to the use of SW-846 performance-based methods, the opposite is generally true.

Response #9	Agreed (first part). We are aware that the USEPA no longer uses "DQO Levels" and that under the present guidance, there is "definitive" data and "screening" data (EPA 540-R-93-071). However, this Generic Work Plan, which outlines the DQO Levels for the Seneca Army Depot projects, was originally prepared, and finalized, using the earlier DQO methods. A general description of the reporting and QC requirements for each "Level" (e.g., for Level 2) is given in Section 3.5 of the Scoping Plan, however, a more complete description is provided in the Generic Work Plan (pages 3-130 through 3-135). Also, Level II QC and reporting requirements were added to page 3-117 of the Scoping Plan that addressed the soil gas program. Specifically, the QC requirements for the soil gas survey will include the following: sample duplicates, rod blanks, syringe blanks, use of certified gas standards, and daily calibration runs of gas standards to establish compound specific response factors and retention times. The soil gas results will be reported in a binder that will contain all of the sample collection data and the gas chromatogram charts from the analyses. Disagree (second part). While we recognize many of the points brought forth in the comment about the comparisons between CLP and SW-846 methods, the Army, USEPA, and NYSDEC agreed to use NYSDEC CLP methods, and selected non-CLP methods for the RI/FS programs at the Seneca Army Depot Activity. However, it is important to note that the Army has submitted a proposal to USEPA and NYSDEC for approval to use modified NYSDEC CLP methods for groundwater that will meet the chemical ARARs for the RI/FS programs at Seneca. The laboratory (Intertek Testing Services) has submitted the appropriate documentation to the agencies to demonstrate their ability to meet the Seneca RI/FS analytical reporting goals. Approval for the use of these modified NYSDEC CLP methods is pending. No change was made to the text of the Scoping Plan. The modified CLP methods will be incorporated into the Generic Work Plan.
Comment #10	General It is recommended that the Data Gaps section discuss recommended activities for future investigations with respect to a presumptive remedy. For example, the presumptive remedy for a landfill is typically some form of containment and land restriction. If this is a probably presumptive remedy for any of these sites, then future soil sampling inside the landfill would be of limited value, especially since the principal contaminants of concern (e.g., metals and PAHs) are relatively immobile. Under these circumstances, the focus of future sampling should be the groundwater. It is not clear that air monitoring is required, since the detections that resulted from the air monitoring analyses were not compared to any action levels.
Response #10	Disagree. We believe that soil samples from the landfill are appropriate because they would allow the RI to address future impacts from the source area that may not be manifested in downgradient locations at this time. If these soil data are not collected it would be difficult to adequately defend comments from the agencies

that the source area is uncharacterized, and that downgradient locations would be impacted in the future. As stated in Response # 2 (Comments by Forget), we do not believe that it is appropriate to leave potential source areas unsampled. Also, we agree that groundwater sampling is important to understanding/characterizing the source areas within the landfill. A discussion of some of the potential remedies is provided in Section 3.3 of the Scoping Plan. No change was made to the text of the Scoping Plan.

Disagree. The comment suggests that air monitoring analyses were performed as part of previous investigations, and other than health and safety monitoring at the drilling rigs, none was previously performed. However, soil gas surveys were performed. at SEAD-11 and SEAD-64D. With respect to the soil gas survey, the results were intended to be used to provide guidance for selected soil borings, test pits, and monitoring wells installed for the ESI, and not for comparison to standards. The results of the soil gas investigation at SEAD-11 indicated that VOCs in soil may be a concern at the site, so flux chamber monitoring was proposed. The flux chamber monitoring proposed at SEAD-11 will document ambient levels of emission rates of specified substances for use in dispersion modeling of emissions from the landfill, which will ultimately be used as part of the risk assessment. No changes was made to the text of the Scoping Plan.

Comment #11

Section 4.
If soil samples will be collected and analyzed for VOCs, methanol preservation or no-transfer VOC vials are recommended to minimize the loss of VOCs. It is well known that the conventional "stuff-the-soil-in-the-jar" method for taking VOC soil samples often results in the loss of 80% to 90% of the volatiles before analysis.

Rather than performing full TCL and TAL analyses, future analyses should be limited to the contaminants of concern at each site. For example, for the SVOCs at SEAD-11, only PAHs appear to be contaminants of certain in the soil. Of the pesticides, only DDT was detected above the TAGM. No VOCs were detected above the TAGM for the soils. Only select metals were detected above the TAGM for the SEAD-11 soils. Only a few metals were detected in the groundwater. However, the full CLP list of analytes are being recommended for SEAD-11 (e.g., full list of VOCs, SVOCs, and TAL). It does not appear that the historical data is being used to limit future analytical testing to only the contaminants of concern.

Response #11

Disagree. Responses to the above comments under #11 are as follows.

First, we recognize that methanol preservation for soil samples to be collected and analyzed for VOCs would help to minimize the loss of VOCs from the sample, however, the analytical protocols that are defined for this project do not allow the use of methanol preservation for VOC soil samples. The EPA Region II QA Manual (Appendix IV) defines CLP contractual and technical preservation and holding time requirements for the all pertinent analyses, and for volatile organics in solids (i.e., soil) the preservation method is "cool to 4 degrees C." In the past, we have found that the USEPA has been less than receptive to changes in analytical protocols defined in the Region II QA Manual; for example, the EPA would not allow the sampling order to be slightly changed to allow metals samples with lower NTUs to be collected. Thus, while we recognize the potential benefit from the recommendation given above, it has not been our experience that such changes are not easily approved, and therefore are difficult to implement into the field programs. No change was made to the text of the Scoping Plan.

Second, a reduced analytical program that focuses on the major chemical impacts has been proposed in the past at SEDA, and was not allowed by EPA. A significant consideration is that the outcome of the risk assessment is based on an assessment of total risk at the site, the calculation of which includes may of the chemicals that may not be the focus of the investigation, but are still present at the site.

APPENDIX E

RESPONSE TO REVIEW COMMENTS

RESPONSE TO COMMENTS
BY
U.S. ARMY
FOR DRAFT SEADS-11, 64A, & 64D PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT THE CONSTRUCTION DEBRIS LANDFILL
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
DECEMBER 1995

Comments By Nebelsick

Comment #1 The Expanded Site Investigation for each of these sites identified little to no contamination in the groundwater. The ESI identified only minor impact to the soils. This reviewer recommends that the landfills go through the proper closure that meet State of New York requirements. It is this reviewers understanding based on the State of New York Title 6, Chapter IV, Subchapter B, Part 360, Subpart 360-2, Section 360-2.15 Landfill Closure and Post-closure Criteria that only that ground water be characterized and monitored. If these sites are determined to have adequate downgradient coverage of monitoring wells then only monitoring is required. Provide justification for the soils investigation proposed. In general, the reasons for an RI should be clarified. A focused FS could be performed that takes into consideration previous data gathered and these landfill closure requirements.

Response #1 Acknowledged. The RI/FS is intended to satisfy the requirements of CERCLA. The investigations proposed are required to complete the human health and ecological risk assessments and to evaluate remedial action alternatives. Potential landfill closure requirements are listed under the action specific ARARs for New York State.

Comment #2 Metals contamination is greatly impacted by turbid samples. The reference listed in comment 1 requires sample turbidity to be less than 50 nephelometric turbidity units. Decisions for additional work bases on these samples should be re-examined. Use of the low flow pump identified on page 4-21 should eliminate this problem.

Response #2 Acknowledged. Parsons uses the EPA low-flow sampling methods to minimize turbidity in the groundwater samples.

Comments by Healy

Comment #1 Sec 3.2, page 3-95.

Please delete "Currently, the Army ... transfer the ownership." This is no longer accurate since SEDA was listed on BRAC prior to this submission.

Response #1 Agreed. The section has been revised to discuss the future uses of the site based upon the Reuse Plan and Implementation Strategy.

Comment #2 Sec 4.3, page 4-17.

Please add "Surface Soil Sampling" as the second bullet since this type of sampling is planned as part of the Field Investigations.

Response #2 Agreed. This has been added to the section.

Comment #3 Please delete "and Test Pit" in the section title since no test pits are discussed elsewhere.

Response #3 Agreed. This has been deleted from the section.

Comments by Bradley

Comment #1 Previous comments for SEAD-11, SEAD-64a, and SEAD-64d scoping plans have all been addressed in this combined document.

Response #1 Acknowledged.

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RESPONSE TO COMMENTS
BY
UNITED STATES ENVIRONMENTAL PROTECTION
AGENCY (REGION II)
FOR DRAFT SCOPING DOCUMENT FOR THE CONSTRUCT DEBRIS
LANDFILL (SEAD-11) AND
THE GARBAGE DISPOSAL AREAS (SEAD-64A AND 64D)
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
DECEMBER 1996

GENERAL COMMENTS

Comment #1

In light of the adoption of a Reuse Plan for SEDA in October 1996, the Generic Installation Remedial Investigation/Feasibility Study Work Plan (Generic Work Plan) should be revised to address how future use scenarios will be evaluated for individual SEADs. Because the Reuse Plan affects all future RI/FS activities, it is preferable to address this issue in the Generic Work Plan than in the SEAD-specific Work Plans. The SEAD-specific Work Plans should cross reference the Generic Plan.

Response #1

Acknowledged. The scoping document has been revised to include a description of the future use scenarios identified at SEDA in the Reuse Plan. [Future use at individual SEADs will be determined by the designations provided in the Reuse Plan]. Section 3.2 summarizes the future uses of the site as defined in the Reuse Plan.

Comment #2

The conceptual models for all of the SEADs discussed in both of the Project Scoping Plans, except SEAD-11, do not consider vertical hydraulic gradients or investigate competent bedrock at the sites. Omission of these two items means that the nature and extent of contamination in groundwater cannot be determined. The absence of vertical head data from well clusters (several wells at one location that are screened at different depths) means that the direction, magnitude, and significance of vertical groundwater-flow cannot be determined. Such information is required to determine the vertical extent of contamination in groundwater. The absence of bedrock wells means that the hydraulic relationship between the saturated overburden and the bedrock will be unknown. At present, there is no evidence that the shallow bedrock and the overburden are separated hydraulically, therefore, if contaminants are detected in any of the existing or proposed wells at the SEADs, the vertical extent of such contamination cannot be defined or reasonably assumed and it cannot be demonstrated that the bedrock is unaffected.

Response #2

Acknowledged. Bedrock wells were not proposed for SEAD 64A or SEAD 64D due to the results of the ESIs which showed no detectable levels of VOCs or SVOCs in groundwater in these two areas. However, in order to determine whether the shallow bedrock aquifer has been impacted. one shallow bedrock well will be installed during the well installation programs at SEAD-64A and SEAD-64D. The location of the bedrock wells will be established at a downgradient location with respect to overburden groundwater flow, and nested with one of the newly installed overburden wells. Vertical connection tests will be performed during the installation of the bedrock wells as a relative test of the hydraulic connection of the overburden aquifer and the bedrock aquifer.

Comment #3 Chemical specific ARARs that address air quality should also be included in Part 3.4 of the Scoping Plan. These include New York State's Air Guide 1 and the clean Air Act's air quality standards (40 CFR Part 50).

Response #3 Agreed. These chemical-specific ARARs have been added to Section 3.4.

Comment #4 Appendix C: Contrary to what is stated in the Generic Work Plan, the scoping plan does not contain the contract laboratory's Quality Assurance Project Plan (QAPP). This discrepancy should be corrected.

Response #4 Agreed. This discrepancy has been corrected. The Generic Work Plan now refers to Attachment C-1 of Appendix C of that document as the location of the QAPP.

Comment #5 The Field Sampling and Analysis Plan is referred to throughout the document as Appendix D, but is listed in the table of contents as Appendix A.

Response #5 Agreed. This discrepancy has been corrected.

Comment #6 Appendix F, Scope of Work, is not contained in our copy of this document.

Response #6 Acknowledged. The Final Draft has a copy of the Scope of Work inserted in Appendix F.

SPECIFIC COMMENTS

Biological Technical Assistance Group

Comment #1 Proposed surface soil samples will be collected from the top 2". Although this is appropriate for human health concerns, this may under- or over-estimate actual contaminant levels which ecological receptors are exposed to. For ecological purposes, the BTAG recommends that soil sampling be conducted in the top 12". To ensure that the appropriate information is collected for both the human health and ecological risk assessments, samples should be collected and analyzed from 0-2 inches and from 0-12 inches. Further, 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. Future surface soil samples at SEAD-64A and SEAD-64D should be analyzed for TCL pesticides and PCBs. These components have been dropped out of the sampling plan because previous data do not show TAGM exceedances for these compounds. However, these criteria are not for ecological purposes, and therefore pesticides and PCBs should be considered potential COCs, and carried through to the ecological risk assessment.

Response #1 Disagree. The soil sampling plan was approved in the ESI after review by both NYSDEC and the EPA. The Army does not plan to collect samples at both 0-2" and 0-12" at each of the surface soil sampling locations. The surface soil sampling plan for SEAD-64D includes the collection of both surface and subsurface soil samples. 36 surface soil samples will be collected at 0-2" to assess potential impacts from particulate deposition from the abandoned solid waste incinerator. These samples will be analyzed for TCL SVOCs and TAL Metals. A total of 31 subsurface soil samples will also be collected from ten soil borings and will be analyzed for the above parameters plus TCL VOCs and TCL pesticides and PCBs. The proposed sampling depths for the 10 soil borings are 0-0.2 feet, 0.2-2 feet, and 2 to 4 feet.

Comment #2 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). Proposed sediment sampling should indicate that the depth of the samples will be from 0-6". At SEAD-11, surface water and sediment samples in Indian Creek should be obtained in depositional areas away from the influence of the road (Indian Creek Road and the railroad (SWSD11-14). Figures 4-5 and 4-6 illustrate the location of proposed sediment and surface water sampling for SEAD-64D. It cannot be determined from Figure 4-5 whether surface water and sediment samples will be obtained from the wetlands area at the eastern side of the site. As wetlands represent depositional areas and are frequently found to be contaminant sinks, it is important that this area be sampled. As drainage channels are often intermittent, sampling should be conducted after rain storms. The potential for groundwater to discharge to surface water and wetland areas should be considered.

Response #2 Acknowledged. SEAD currently compares sediment quality data to the SELs and LELs from "Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario" (Persaud, et.al., 1993). In accordance with the SAP contained in the Generic RI/FS Workplan, sediment and surface water samples for intermittent streams will be scheduled during high flow conditions. Sediment samples will be collected at 0-6" in accordance with the Generic Work Plan SAP. Sample locations will be collected with a consideration of the local topography and localized effects to the extent practicable. Wetlands samples will not be collected unless the surface water and sediment samples collected indicate that these intermittent waterways are affected by the site. We do recognize that wetlands can act as contaminant sinks. However, the data collected to date does not suggest that contaminant levels in soils or groundwater at these sites is significant and that overland transport by surface water runoff or groundwater discharge to surface water represent a significant contaminant transport pathway.

Comment #3 All wetland areas associated with SEAD-64D (page 3-50) should be delineated and identified in site figures. Also note that a wetlands assessment and restoration plan will be needed for any wetlands impacted or disturbed by contamination or remedial activities.

Response #3 The wetlands to the west of SEAD-64D are not part of this investigation and therefore are not shown on site figures. The Wetlands Construction and Management Procedures (40 CFR 6, Appendix A) and Executive Orders on Floodplain management and Wetlands Protection (CERCLA Floodplain and Wetlands Assessments # 11988 and 11990) are identified in the scoping document as location specific ARARs.

Comment #4 Potential exposure pathways and receptors for SEAD-64D (page 3-103) should include terrestrial and aquatic biota on the site, in addition to terrestrial and aquatic biota near the site. Further, terrestrial biota may be affected by impacted sediments as well as surface water.

Response #4 Agreed. The exposure pathways identified on page 3-103 discuss potential human receptors for the human health risk assessment. Section 4.4.5 discusses the ecological investigation which evaluates the impacts to terrestrial and aquatic biota.

SEAD-64

Comment #1 Page 3-33, p4. The last sentence of this paragraph refers to "test pits" although it appears that the author is referring to the disposal pits identified by the GPR survey.

Response #1 Agreed. This sentence has been revised to state: "disposal pits."

Comment #2 Page 3-52, p4. Why is it unclear if the debris observed on the surface of the western pile is "rubble"? What is the significance of this distinction?

Response #2 The description of the western pile is provided to document visual observations of the piles during the investigations. This distinction is provided to distinguish these piles from other solid waste observed at the site such as trash or debris.

Comment #3 Page 3-115, sixth bullet. The comparison of SEAD-64A soil data, for inorganics only, to sitewide soil background data is appropriate. Organic analyte concentrations should be compared to NYSDEC TAGM values.

Response #3 Agreed. The statement on page 3-115 has been revised to specify that the comparison of soils data to site-wide background data is for metals and that all other analytes will be compared to established TAGMs.

Comment #4 Section 4.2.7, 4.3.4, and 4.4.5. Although the Ecological Investigation described in these sections is consistent with the NYSDEC Fish and Wildlife Impact Analysis for Inactive Waste Sites (1194), no mention is made of USEPA guidance regarding Ecological Risk Assessment. USEPA guidance should be considered in the investigation and risk assessment portions of the project.

Response #4 Agreed. A statement that USEPA guidance for Ecological Risk Assessment (USEPA, Ecological Assessment of Hazardous Waste Sites, 1989. EPA/600/3-89/013.) will also be considered has been added to Section 4.2.7.

Comment #5

Section 4.3.1.1. Soil Gas Survey. While the proposed soil gas survey may meet its stated goal ("...to evaluate whether VOCs are present in the soil vapor."), the ultimate use of the data is not discussed. Data collected from this type of survey should be used as a screening tool to refine future sampling locations. Determining whether VOCs are present in soil gas is not the objective of such a survey.

Assuming that the survey is intended as a screening tool, the investigation locations should not be confined only to the waste material. Additional samples should be collected outside of the suspended fill boundaries to aid in determining if soil gases are migrating off-site and to provide background samples for data comparison.

Response #5

Agreed. The soil gas survey is performed in the field to obtain a rapid and cost-effective identification of potential source areas in soils and also to help delineate groundwater VOC plumes that may be present. The results will be used to direct the location of soil and groundwater samples if elevated concentrations are detected. Samples will be collected outside the fill boundaries if the analyses indicate a potential for migration in these areas.

Comment #6

Page 4-17, Section 4.3.1.1. The soil gas survey discussed in this section is not contained in the RI Field Investigation Schedule (Table 6-2).

Response #6

Acknowledged. This discrepancy has been corrected.

Comment #7

Section 4.3.1.2., Soil Boring and Test Pit Program. There is no discussion of the test pits in this section.

The text does not relate this program to the findings of the ESI. For example, one finding of the ESI was that the fill, and soils immediately below the fill, contained elevated levels of PAHs; therefore, one purpose of this soil boring and test pit program should be to define the area and vertical extent of PAH-contamination in site soils.

Response #7

Agreed. The soil boring program is intended to delineate the extent of PAHs and SVOCs in soils that were detected from the ESI. Only three borings were performed during the ESI and the additional proposed borings are intended to fully characterize the soils across the SEAD-64A site. A test pitting program will not be performed in this area as part of the RI. This discrepancy has been corrected in the scoping document. The test pitting program conducted during the ESI was centered on geophysical anomalies and characterized the waste materials present in the landfill area as general construction debris. No detectable levels of VOCs or radioactivity were detected upon exposure of the waste materials during excavation.

Comment #8

Page 4-20, p1. It appears that the Figure referenced as Figure 3-9 should be Figure 3-13.

Response #8

Agreed. This discrepancy has been corrected.

Comment #9

Page 4-20, p1. The text on page 3-33 states that "... the landfill may extend west and north of the (electromagnetically) surveyed area;

however, there are no soil borings planned immediately west of the surveyed area. Additional borings should be proposed directly to the west of the fill area.

Response #9

Agreed. A soil boring (SB64A-16) has been added approximately 25-30 feet due west of the surveyed landfill line.

Comment #10

Page 4-20, p2. A discussion that presents the rationale for selecting soil samples for chemical analysis from the borings should be presented, particularly at those locations where waste (fill) is present. The rationale should discuss: (1) how samples of the waste will be selected (if practical) so that the waste is adequately characterized, and (2) how the underlying soil samples will be selected to provide the data necessary to characterize the nature and extent of contamination. For example, the highest levels of PAHs detected during the ESI occurred in the native soil immediately underlying the waste, so a sample collected at this location would be useful in determining the real extent of affected soil underlying the waste. Another sample collected at some depth below the native-soil surface would provide data on the vertical extent of affected soil.

Response #10

Acknowledged. As stated in the last paragraph in the referenced section, the procedures and criteria for the selection of soil samples are described in the Field Sampling and Analysis Plan in Appendix A (incorrectly referenced as Appendix D). Appendix A refers to the Generic Installation RI/FS Workplan which describes in detail the procedures used for all types of investigation activities. The purpose of the Generic Workplan is to standardize procedures to collect environmental data at all SEAD sites and to minimize the duplication of information in subsequent scoping plans.

Comment #11

Page 4-20, p4. The purpose of analyzing the three subsurface soil samples from these borings is not stated. Such information would be useful in evaluating the appropriateness of the interval and number of proposed samples.

Response #11

Acknowledged. Please see response # 10.

Comment #12

Page 4.3.2.1, p2. The discussion on well-screen placement does not describe where a well will be screened if the thickness of the overburden aquifer is greater than ten feet. There is also a typographical error in line four of this paragraph "...lenth..." should read "...length..."

Response #12

Acknowledged. In accordance with the SAP in the Generic RI/FS Workplan, the well-screen will be screened to a <u>maximum length</u> of 10 feet in the saturated overburden. If a saturated thickness of greater than 20 feet is encountered, multiple monitoring wells will be installed. Based upon previous investigations at SEAD, the average saturated overburden depth is four feet. As a result, the well screen depth of a maximum of 10 feet, should be sufficient to characterize the horizontal and vertical extent of potential groundwater contamination in the saturated overburden.

The noted typographical error has been corrected.

Comment #13

Section 4.4.1, Geophysical Survey. The Figure referenced in this section (Figure 4-1) does not present the area of the electromagnetic survey.

A map showing the location of proposed EM-survey lines should be presented to aid in the evaluation of the survey.

Response #13

Acknolwledged. Figure 4-5 shows the area for geophysical survey at SEAD -64D. The EM transect lines will be established using grid and profile-based surveys. The grid based surveys will use either a 10x10'or 20x20' grid spacing. The corners of the grids will be established using a registered NY State land surveyor. The individual EM-31 survey lines and station locations will be established using hip chains and hand held compasses.

The reference to Figure 4-1 has been corrected to Figure 4-5.

Comment #14

Page 4-30, p2. The sampling depths provided assume the depth to bedrock is uniform across the area to be investigated. The text should describe at what depth samples will be collected if the depth to bedrock is greater than anticipated.

Response #14

Agreed. The SAP in the Generic RI/FS Workplan describes the generalized procedures for the collection of soil samples from soil borings. The depths of the soil samples selected for chemical analysis are: 1) 0-2''below grade, 2) immediately above the water table, 3) midway between samples (1) and (2). The proposed sampling depths in the scoping document are based upon the assumption that bedrock will generally be encountered at a depth of four feet below grade. If the depth to bedrock is found to be less or greater than four feet, then the intermediate and deep soil sample depths will be adjusted accordingly. For a detailed discussion, please see the SAP in the Generic RI/FS Workplan.

The text has been modified to indicate that the sampling depths will be adjusted in accordance with the SAP.

Comment #15

Page 4-30, p3. The proposed depth of the boring at the "potential rubble pile" should be included.

Collecting and analyzing a composite sample of the waste material appears to be difficult, since the waste is described as "debris, possibly rubble". Alternate methods of sampling may be required based on the physical nature of the rubble.

Response #15

Agreed. A statement has been added indicating that the depth of the soil boring will be to the saturated overburden.

Comment #16

Section 4.4.2.2, Test Pit Program. If a potential contaminant source or "hot-spot" is observed in any test pit (e.g., visual staining, odors, or elevated PID readings) it should be sampled for characterization.

Response #16

Agreed. A statement has been added to indicate that a sample will be collected for analysis if elevated PID readings or visual staining is observed.

Comment #17 Page 4-33, p1. If the incinerator is located 500 feet north of the site and the prevailing wind directions are northwest and southwest, as indicated, then winds from these directions will either not cross the site (in the case of a southwest wind) or cross the northern most portion of the site (in the case of a northwest wind). Therefore, the locations of proposed soil samples should be re-evaluated and located downwind of the incinerator (southeast and northeast of the incinerator) to investigate the effects of particulate deposition from the incinerator.

Response #17 Disagree. Incidental ingestion and dermal contact of surface soils were identified as potential exposure pathways in the preliminary risk assessment as well as a potential exposure pathway for ecological receptors. The proposed surface soil samples will determine the likelihood for these exposure pathways to occur by determining if deposition of particulates from the nearby incinerator resulted in unacceptable levels of PAHs and metals in surface soils. A systematic approach was detemined to be the best approach since atmospheric depositional patterns tend to be random. Historical data indicates that one of the prevailing wind directions (northwest) could potentially result in unacceptable levels of PAHs and metals due to dispersion and depositon of incinerator emissions. Potential deposition of particulates from other prevailing wind directions (most notably southwest) are not the subject of this study.

Comment #18 Page 4-33, p6. The discussion on well-screen placement does not describe where a well will be screened if the thickness of the overburden aquifer is greater than ten feet. Also additional monitoring wells should be installed, both downgradient and upgradient of the geophysical anomaly to adequately define groundwater flow direction and the presence of contamination.

Response #18 Agree with first comment. See comment #12.

Disagree with second comment. One of the proposed wells (MW64D-6) is located immediately downgradient from the geophysical anomaly (see Figure 4-5) with respect to the groundwater flow direction established during the ESI (see Figure 3-22). An upgradient well has already been established (MW64D-1).

Comment #19 Section 4.4.3.1. The location of wells MW64D-2,3, and 4 are not shown on either Figure 4-5 or 4-6. These should be presented for each reference.

Response #19 Agreed. The locations of the wells have been added to these figures.

Comment #20 Section 4.4.3.1. Page 4-33, final paragraph. It is unclear whether the existing wells will be sampled twice or three times, if new monitoring wells are installed. For example, will the existing wells be sampled prior to installation of the new monitoring wells and only once after the new wells are installed or once before and twice after the new wells are installed? If new wells are installed, it would be more useful if two complete rounds of data were available from all of the wells. The text should state why well MW-64D-5 has been identified for redevelopment.

Response #20 Acknowledged. Four of the five existing monitoring wells will be sampled prior to the installation of new wells. If the metals criteria are exceeded, then, the five new wells will be installed in the locations shown in Figures 4-5 and 4-6. All newly installed and existing wells will be sampled twice. The text has been revised to reflect this.

MW-64D-5 is erroneously listed for redevelopment. This statement has been removed from the scoping document.

Comment #21 Page 4-34, p2. This paragraph does not address the possibility that no new wells are installed. How many rounds of water levels will be measured if no new wells are installed?

Response #21 Acknowledged. This paragraph has been changed to state that three rounds of water level measurments will be collected if the new wells are installed. Two rounds will be collected if the new wells are not installed.

Comment #22 Section 4.4.7, Analytical Program. The discussion does not address the possibility that no new wells will be installed. Furthermore, the discussion indicates that the existing monitoring wells will be sampled twice and new wells will be sampled only once. This does not agree with the discussion presented in Section 4.4.3.1. The total number of groundwater samples to be collected during the RI at this site will be greater than 10, as indicated in the text. The total number of samples to be collected should be corrected and presented in the text.

Response #22 Agreed. The text has been revised to show that the total number of groundwater samples collected from both rounds is 16. The first round of sampling would be for 4 existing wells plus a duplicate. The second round would be for the 4 existing wells plus 6 newly installed wells plus a duplicate. The second round is dependent upon if the metals concentrations exceed their respective criteria in the existing wells. For the second round of sampling, the analyses would be expanded to include VOCs, SVOCs, PCBs/pest. and TPH.

Comment #23 Page 4-42, p1. What will be used to determine the "extent of waste materials" that will be "...surveyed and plotted on the topographic map"? Does this mean the extent of visible waste materials?

Response #23 Acknowledged. The extent of the waste materials will be determined through a combination of visual observations, soil sampling and geophysical testing.

Response to EPA Comment s on the first Draft RI/FS Project Scoping Plan, The Construction Debris Landfill (SEAD 11)

Comment #1 The Army has responded to all comments satisfactorily with the exception listed below.

Comment #8 is Appendix E.

The statement "...if it is not available in the existing literature." should be removed from the text, since it could be confusing. The response to comment states clearly that stream geometry data will be collected from the sampling locations.

Response #1 Agreed. This statement has been removed from the text

H:\eng\seneca \scoping\ sead1164ad\comments\epa8-96.doc

RESPONSE TO COMMENTS
BY
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC)
FOR DRAFT SCOPING DOCUMENT FOR THE CONSTRUCT DEBRIS LANDFILL (SEAD-11) AND
THE GARBAGÊ DISPOSAL AREAS (SEAD-64A AND 64D)
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
APRIL 1996

Comment #1 The USEPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (EPA/540/G-89/004 Oswer Directive 9355.3-01 page 1-3 second paragraph) states:

"The objective of the RI/FS process is not the unobtainable goal of removing all uncertainty, but rather to gather information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site. The appropriate level of investigation to meet this objective can only be reached through constant strategic thinking and careful planning concerning the essential data needed to reach a remedy selection decision. As hypotheses are tested and either rejected or confirmed, adjustments or choices as to the appropriate course for further investigations and analyses are required. These choices, like the remedy selection itself, involve the balancing of a wide variety of factors and the exercise of best professional judgment."

The site investigation results and the historical information have at least given us enough information to narrow down the list of most appropriate remedies for each of these three sites. In our opinion these remedies could be an appropriate landfill cap or consolidation in an on-site landfill or off-site disposal. The remedial investigation should now only gather sufficient information to support an informed risk management decision regarding these remedies, instead of large amount of data as proposed.

Response #1 Acknowledged. The goal of the site investigations is to collect sufficient data to assess the human health and environmental risks posed by the site and to determine the remedial action objectives and selected remedies. A conceptual model of the site identifies all potential exposure pathways in accordance with CERCLA regulations. The site investigations must then collect sufficient data to calculate the risks associated with these pathways. The proposed site investigations for SEAD-11 and SEAD-64A and -64D are intended to evaluate all potential exposure pathways by collecting samples from all potentially affected environmental media including groundwater, soils, sediments, surface water and air so that the baseline risk assessment process can be completed. The remedial investigation approach follows the protocols developed in the Generic RI/FS Workplan for SEDA and uses any previous investigations to make an informed and prudent decision for the numbers and types of samples required, and take into account any site-specific features. The site investigation activities proposed for SEAD-11 and SEAD-64 are relevant and necessary to complete the baseline risk assessment process and to select the most appropriate remedial actions that will also comply with ARARs. As in all CERCLA remedial investigations, the goal is not to remove all uncertainty, but rather to gather enough data to complete the risk evaluation and ARARs compliance in accordance with CERCLA and, in this case, NYSDEC requirements and guidance.

SEAD-11

Comment #1 4.2.1, Geophysical Investigation: A seismic refraction survey has been proposed around the perimeter of SEAD-11 to determine depth of bedrock, which will be used to determine a migration pathway for any dense non-aqueous phase liquid (DNAPL). In the absence of any historical data or site investigation results that indicate that DNAPL may exist at the site, this investigation is unnecessary.

Response #1 Disagree. A seismic refraction survey is intended to confirm the bedrock profile around the perimeter of the landfill to determine potential migration pathways in groundwater, and to aid in the placement of monitoring wells. The limited seismic survey conducted during the ESI indicated that the bedrock sloped to the west. Additional seismic surveys are needed to complete the mapping of the bedrock surface in this, and other areas, to determine if any bedrock surface anomalies are present. The scope of the groundwater monitoring effort in the ESI is insufficient, for the size of the site, to determine if DNAPL may be present.

Comment #2 4.2.2. Soil Gas Survey: A soil gas survey has already been done in this area. By doing a second survey with a tighter grid, it is not clear what the Army would achieve in terms of risk management or remedy selection.

Response #2 The proposed soil gas survey is focused on the area of the landfill that exhibited the highest soil gas readings during the ESI. The survey is much smaller in extent than the ESI and uses a grid of 50X50'. The soil gas survey will be used to identify potential hot spots and to pinpoint soil and groundwater samples where elevated readings are detected.

Comment #3 4.2.3.1 Soil Boring Program: Please provide the rationale for collecting soil samples from areas outside the landfill (monitoring well locations).

Response #3 As outlined in the Generic RI/FS Workplan, the standard protocol for monitoring well construction includes continuous soil sampling using stainless steel split-spoons. Section 3.4.2 outlines the protocol for sample collection and screening.

Comment #4 4.2.4.1 Monitoring Well Installation and Sampling: The Army has proposed six shallow bedrock wells because the soil gas samples and test pit soil samples indicate the presence of VOCs.

The Ash Landfill site which has similar hydrogeological characteristics as SEAD-11, had high levels of VOC contamination in the soil and overburden aquifer but had no VOC contamination in the bedrock aquifer. We therefore believe that this site which shows VOC contamination in soil below NYSDEC TAGM levels and no contamination in the overburden aquifer, would be a most unlikely candidate to show contamination in the bedrock aquifer. NYSDEC therefore does not require bedrock wells.

Response #4 Acknowledged. Bedrock wells are proposed to determine the full vertical and horizontal extent of potential contaminant migration from the landfill. The scope of the groundwater sampling conducted during the ESI is not considered sufficient to confirm if DNAPL or elevated concentrations of VOCs are present at the site. Extrapolation of the conditions found at the Ash Landfill to SEAD-11 is not consistent with CERCLA guidance. It is SEDA's policy to maximize site mobilizations and field investigations to the extent practicable, so that all necessary environmental investigations are completed in the most expeditious and cost-effective manner possible.

Comment #5 4.2.6 Air Monitoring with a Flux Chamber: Based on VOC levels in soil (total less than 1 ppm) and soil gas (14.4 ppmv as TCE max.), we do not expect the air monitoring with a flux chamber would yield meaningful data.

Response #5 Disagree. The collection of flux chamber samples is proposed so that the inhalation exposure pathway identified in the site exposure pathway summary can be evaluated in the baseline risk assessment. In order to calculate human health risks, VOC emission rates will be measured from the surface of the landfill.

SEAD-64A

Comment #1 This is a small landfill (350 x 200 ft.) that includes two disposal pits (35 x 15 and 60 x 20 ft). The site investigation results indicate that soil has been impacted by PAHs and to lesser extent with metals. Groundwater appears to be minimally impacted by the landfill contamination, although the groundwater sampling yielded metals data above background levels.

In addition to characterizing the source area, the scoping document also proposes a soil gas survey and the installation of seven additional monitoring wells. Based on the site investigation results and possible remedy for this site, NYSDEC does not require the soil gas survey nor the installation of additional monitoring wells at this time.

Response #1 Acknowledged. The extent of sampling conducted during the ESI is insufficient to characterize the exposure pathways identified in the exposure pathway summary. The soil gas survey will be conducted to determine potential hot spots of VOCs and to pinpoint soil and groundwater samples in areas of elevated VOC concentrations. The additional wells are proposed to adequately characterize the vertical and horizontal extent of groundwater contamination for the entire site. One bedrock well has been added to the program in response to EPA comments. This well will be situated downgradient of the site with respect to overburden groundwater flow and nested with one of the newly installed wells.

Sead-64D:

Comment #1 4.4.2.2 Test Pit Program: Based on geophysical anomalies, mounds, or topographically unusual features nineteen test pits are proposed for this AOC, but only for visual inspections. We propose that at least one soil sample should be taken from each test pit, if some contamination is indicated by field screening and/or by visual inspection.

Response #1 Agreed. Soil samples will be collected from the test pits proposed for SEAD-64D if visual staining, elevated PID readings and/or odors are detected.

Comment #2 4.4.2.3 Surface Soil Sampling Program: Thirty-six surface soil samples are proposed to characterize the impacts of the solid waste incinerator (located at the Ash Landfill site). This site is heavily vegetated and the site investigation results indicate that the surface soils are contaminated with total PAH less than one ppm. Even if some low levels of semi-VOCs and/or metals were to be found in surface soils, we do not expect any other alternative than a no-action remedy for surface soil. NYSDEC therefore does not require these surface soil samples.

Response #2 Acknowledged. The surface soil sampling conducted under the ESI (5 surface soil samples were collected) is insufficient for characterizing the soils or meeting the data quality objectives at SEAD-64D in consideration of the size of the site and potential receptor pathways. The 36 soil samples proposed will be used to determine potential impacts from the former incinerator at the Ash Landfill so that potential pathways involving surface soils (see Figure 3-25) can be completed for the baseline risk assessment. This data is needed to complete a risk-based closure in order to evaluate the remedial action alternatives for this site, as well as to determine compliance with all ARARs.

Comment #3 4.4.3.1 Monitoring Well Installation and Sampling: Unless the source characterization reveals some additional source of contamination, the NYSDEC does not require placement of additional monitoring wells.

Response #3 Acknowledged. The existing wells will be sampled for metals to determine if the concentrations in groundwater exceed the TAGMs. If the metals concentrations are found to exceed TAGMs, five new monitoring wells will be installed and sampled in accordance with scoping document analytical program for SEAD-64D.

Comment #4 4.4.4 Surface Water/Sediment Sampling Program: Unless the source characterization reveals some additional source of contamination or high level of contamination, the NYSDEC does not require such a large number (19) of surface water/sediment sampling.

Response #4 Acknowledged. The number of surface water/sediments samples proposed is considered reasonable and appropriate to meet the DQOs for the site.

Comment #5 Section 3.2 - Preliminary Identification of Potential Receptors and Exposure Scenarios: Throughout this section it is stated that Table 4-1 of the Generic Installation RI/FS work plan contains the numerical assumptions that will be used in the risk assessment for these sites. However, Table 4-1 was removed from the work plan in response to the USEPA's comment letter of May 1995. Therefore, each individual project scoping plan must contain a table of the numerical assumptions made for the risk assessment for that area of concern. These exposure assumptions must be reviewed and accepted by the NYSDOH.

Response #5 Agreed. A table listing the standard exposure assumptions for the calculation of chemical intakes has been added to the scoping document for SEAD-11 and SEAD-64A and -64D (please refer to Table 3-17).

Comment #6 Section 4.2.3.2 - Test Pitting Program: It is not appropriate to exclude the results of the test pit soil samples from the risk assessment for this site. All data gathered regarding soil contamination will be relevant to the risk assessment, since it is reasonable to anticipate excavation of and exposure to subsurface soils under a future residential use scenario. Exclusion of the test pit soil sample results would only be appropriate if the Army agrees in advance of the investigation of remedy of any contamination found in the test pits.

As stated in the Generic Installation RI/FS work plan, "*the objective of the risk assessment is to characterize the current and potential public health and environmental risks that would exist under the no action alternative*". By definition, a no action alternative would leave all contamination on site untreated, and selectively eliminating some of the sampling data will likely result in an understanding of actual risks posed by site contaminants.

Response #6 Disagree. According to the USEPA Risk Assessment Guidance for Superfund, biased data should not be used in the risk assessment. Soil samples collected from the test pits are considered biased because the test pits will be located at geophysical anomalies and soil gas anomalies. Soil samples will be collected at depths where there is evidence of impacts based on visual observations and field screening. The test pit data will be used to assess compliance with ARARs and to assist in the development of remedial action alternatives for the site.

APPENDIX F

SCOPE OF WORK

APPENDIX G

EXPANDED SITE INSPECTION SOIL BORING LOGS, TEST PIT LOGS, AND MONITORING WELL INSTALLATION DIAGRAMS

SEAD-11

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC.

CLIENT: ACOE

BORING NO.: MW11-1
SB11-3

PROJECT: 10 SWMU ESI
LOCATION: SEAD 11

JOB NO.: —
EST. GROUND ELEV.:
START DATE: 11/2/93
FINISH DATE:
CONTRACTOR: Empire
DRILLER: Alan
INSPECTOR: PFM
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER		HAMMER	
			SIZE	TYPE	TYPE	WT/FALL
HSA	8½"		3"x2'	SS	HMR	140#/30'

DRILLING ACRONYMS:

HSA	HOLLOW–STEM AUGERS	HMR	HAMMER	SS	SPLIT SPOON
DW	DRIVE–AND–WASH	SHR	SAFETY HAMMER	CS	CONTINUOUS SAMPLING
MRSLC	MUD–ROTARY SOIL–CORING	HHR	HYDRAULIC HAMMER	5I	5 FT INTERVAL SAMPLING
CA	CASING ADVANCER	DHR	DOWN–HOLE HAMMER	NS	NO SAMPLING
SPC	SPIN CASING	WL	WIRE–LINE	ST	SHELBY TUBE
				3S	3 INCH SPLIT SPOON

MONITORING EQUIPMENT SUMMARY

INSTRUMENT TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND			CALIBRATION		WEATHER
			READING	TIME	DATE	TIME	DATE	
OVM	PID	0-2000	0	1336	11/2/93			sunny
Rad		0-100	14.5 μR/h	1336	11/2/93			
Dust		0-0.99	0.07	1336	11/2/93			
OVM			0	830	11/3/93			cloudy
Rad			11.2 μR/h	830	11/3/93			
Dust			.05	830	11/3/93			

MONITORING ACRONYMS

PID	PHOTO – IONIZATION DETECTOR	BGD	BACKGROUND	DGRT	DRAEGER TUBES
FID	FLAME – IONIZATION DETECTOR	CPM	COUNTS PER MINUTE	PPB	PARTS PER BILLION
GMD	GEIGER MUELLER DETECTOR	PPM	PARTS PER MILLION	MDL	METHOD DETECTION LIMIT
SCT	SCINTILLATION DETECTOR	RAD	RADIATION		

COMMENTS:

OTHER REPORTS	DATE/PENDING	N/A
WELL DEVELOPMENT		
SURVEYOR		
CORE LOG		
WELL INSTALLATION DETAILS		
HYDRAULIC TESTING		
GEOPHYSICAL LOGGING		

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** ACOE | **BORING NO.:** MW 11-2

PROJECT: 10 SMWU
LOCATION: SEAD 11

JOB NO.:
EST. GROUND ELEV.:
START DATE: 11/16/93
FINISH DATE:
CONTRACTOR: Empire
DRILLER: ~~Bob~~ John
INSPECTOR: LB/ES
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL
HSA	8¼"		3'x2'	SS	HMR	140#/30"

DRILLING ACRONYMS:

HSA	HOLLOW-STEM AUGERS	HMR	HAMMER	SS	SPLIT SPOON
DW	DRIVE-AND-WASH	SHR	SAFETY HAMMER	CS	CONTINUOUS SAMPLING
MRSLC	MUD-ROTARY SOIL-CORING	HHR	HYDRAULIC HAMMER	5I	5 FT INTERVAL SAMPLING
CA	CASING ADVANCER	DHR	DOWN-HOLE HAMMER	NS	NO SAMPLING
SPC	SPIN CASING	WL	WIRE-LINE	ST	SHELBY TUBE
				3S	3 INCH SPLIT SPOON

MONITORING EQUIPMENT SUMMARY

INSTRUMENT TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND			CALIBRATION		WEATHER
			READING	TIME	DATE	TIME	DATE	
OVM	PID	0-2000	0.0	1110	11/16/93			overcast
Minicam			0.06	1110	11/16/93			
Minram			0.04	1300	11/16/93			
OVM			0.0	1300	11/16/93			

MONITORING ACRONYMS

PID	PHOTO-IONIZATION DETECTOR	BGD	BACKGROUND	DGRT	DRAEGER TUBES
FID	FLAME-IONIZATION DETECTOR	CPM	COUNTS PER MINUTE	PPB	PARTS PER BILLION
GMD	GEIGER MUELLER DETECTOR	PPM	PARTS PER MILLION	MDL	METHOD DETECTION LIMIT
SCT	SCINTILLATION DETECTOR	RAD	RADIATION		

COMMENTS:

OTHER REPORTS	DATE/PENDING	N/A
WELL DEVELOPMENT		
SURVEYOR		
CORE LOG		
WELL INSTALLATION DETAILS		
HYDRAULIC TESTING		
GEOPHYSICAL LOGGING		

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC. | **CLIENT:** | **BORING NO.:** MW 11-3

PROJECT: 10 SWMU
LOCATION: SEAD 11

JOB NO.:
EST. GROUND ELEV.:
START DATE: 11/4/93
FINISH DATE: 11/5/93
CONTRACTOR: Empire
DRILLER: Al
INSPECTOR: ES/LB
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER		HAMMER	
			SIZE	TYPE	TYPE	WT/FALL
HSA	8½"	.	3" x 2'	SS	HMR	140/30"

DRILLING ACRONYMS:

HSA	HOLLOW–STEM AUGERS	HMR	HAMMER	SS	SPLIT SPOON
DW	DRIVE–AND–WASH	SHR	SAFETY HAMMER	CS	CONTINUOUS SAMPLING
MRSLC	MUD–ROTARY SOIL–CORING	HHR	HYDRAULIC HAMMER	5I	5 FT INTERVAL SAMPLING
CA	CASING ADVANCER	DHR	DOWN–HOLE HAMMER	NS	NO SAMPLING
SPC	SPIN CASING	WL	WIRE–LINE	ST	SHELBY TUBE
				3S	3 INCH SPLIT SPOON

MONITORING EQUIPMENT SUMMARY

INSTRUMENT TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND			CALIBRATION		WEATHER
			READING	TIME	DATE	TIME	DATE	
OVM	PID	0-2000	0	1450	11/4/93			cloudy
Rad		0–100	15.1	1450	11/4/93			sprinkling
Dust		0-0.99	0.	1450	11/4/93			
			Raining — no dust readings					

MONITORING ACRONYMS

PID	PHOTO – IONIZATION DETECTOR	BGD	BACKGROUND	DGRT	DRAEGER TUBES
FID	FLAME – IONIZATION DETECTOR	CPM	COUNTS PER MINUTE	PPB	PARTS PER BILLION
GMD	GEIGER MUELLER DETECTOR	PPM	PARTS PER MILLION	MDL	METHOD DETECTION LIMIT
SCT	SCINTILLATION DETECTOR	RAD	RADIATION		

COMMENTS:

OTHER REPORTS	DATE/PENDING	N/A
WELL DEVELOPMENT		
SURVEYOR		
CORE LOG		
WELL INSTALLATION DETAILS		
HYDRAULIC TESTING		
GEOPHYSICAL LOGGING		

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC. | **CLIENT:** ACOE | **BORING NO.:** MW11-4

PROJECT: 10 SWMU
LOCATION: SEAD 11

JOB NO.:
EST. GROUND ELEV.:
START DATE: 11/4/93
FINISH DATE: 11/4/93
CONTRACTOR: Empire
DRILLER: Alan
INSPECTOR: ES/LB
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL
HSA	8½"		3"x2'	SS	HMR	140/30"

DRILLING ACRONYMS:

HSA	HOLLOW–STEM AUGERS	HMR	HAMMER	SS	SPLIT SPOON
DW	DRIVE–AND–WASH	SHR	SAFETY HAMMER	CS	CONTINUOUS SAMPLING
MRSLC	MUD–ROTARY SOIL–CORING	HHR	HYDRAULIC HAMMER	5I	5 FT INTERVAL SAMPLING
CA	CASING ADVANCER	DHR	DOWN–HOLE HAMMER	NS	NO SAMPLING
SPC	SPIN CASING	WL	WIRE–LINE	ST	SHELBY TUBE
				3S	3 INCH SPLIT SPOON

MONITORING EQUIPMENT SUMMARY

INSTRUMENT TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND READING	BACKGROUND TIME	BACKGROUND DATE	CALIBRATION TIME	CALIBRATION DATE	WEATHER
OVM	PID	0-2000	0	1000	11/4/93			cloudy
RAD		0-100	16.6	1000	11/4/93			
DUST		0-0.99	0.	1000	11/4/93			

MONITORING ACRONYMS

PID	PHOTO – IONIZATION DETECTOR	BGD	BACKGROUND	DGRT	DRAEGER TUBES
FID	FLAME – IONIZATION DETECTOR	CPM	COUNTS PER MINUTE	PPB	PARTS PER BILLION
GMD	GEIGER MUELLER DETECTOR	PPM	PARTS PER MILLION	MDL	METHOD DETECTION LIMIT
SCT	SCINTILLATION DETECTOR	RAD	RADIATION		

COMMENTS:

OTHER REPORTS	DATE/PENDING	N/A
WELL DEVELOPMENT		
SURVEYOR		
CORE LOG		
WELL INSTALLATION DETAILS		
HYDRAULIC TESTING		
GEOPHYSICAL LOGGING		

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

BORING NO.:

PAGE 1 OF 1

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.
CLIENT: SEAD
TEST PIT #: TP11-1

PROJECT: SEAD 3 SWMU INVESTIGATION
LOCATION: SEAD 11

JOB NUMBER: 720478-01000
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES/WXB
START DATE: 11/20/93
COMPLETION DATE: 11/20/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
8'	4'	4'4"	BACKHOE

MONITORING DATA

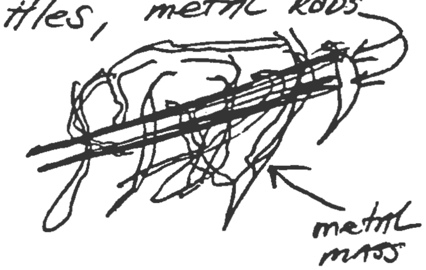
INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0	—	11/20/93 11:10
LEL/O2/H2S		NORMAL	11/20/93 "
RADIATION		—	11/20/93 11:15

QA/QC DUPLICATE SAMPLE: YES or NO
Duplicate Sample Number:
MRD Sample Number:

QA/QC Rinsate Sample Number:

COMMENTS: [15] 3 LOCATION DEPTHS'

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
		1	0-8"		TOPSOIL, FILL TOPSOIL w/Definite SCRAP METAL FILL LAYER Cobbweb metal, SCRAPS, Bottles, metal RODS*	* ANOMALY Determination metal RODS which were entangled in A BALL of webbed metal
1						
2						
3		2	3'4"			
4					FILL material w/SHALE FRAGMENTS interbedded	
		3	4'+		NATURAL MATERIAL clastic TILL (DARK GREY Bottom OF TEST PIT	
5						



SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP11-1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: SEAD

TEST PIT #: TP11-2

PROJECT: SENECA 10 SWMU INVESTIGATION
LOCATION:

JOB NUMBER: 720478-01000
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES/UXB
START DATE: 11/19/93
COMPLETION DATE: 11/20/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
15'	4'6"	8'6"	BACKHOE

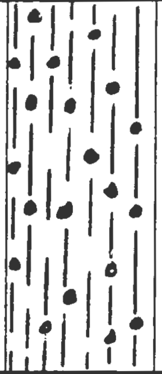
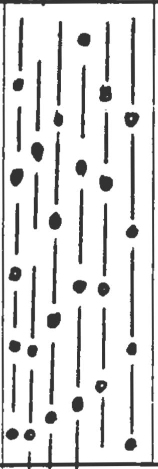
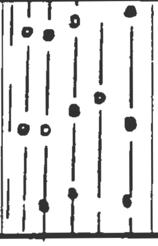
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0	11/19/93 1:30
LEL/O2/H2S			" "

COMMENTS:

SEAD-11 LANDFILL INVESTIGATION

TOTAL SAMPLES: 15 3 LOCATIONS (DEPTHS)

SCALE (FT)	VOC./RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0				TOPSOIL W/FORIEGN MATERIAL METAL PIECES	
1 2	0	Full SUITE	SAMPLE TAKEN 8"		FILL MATERIAL MED.-BROWN SILT ORGANIC W/ HUGE PIECES OF CONCRETE (5'x4') SECTIONS 1" DIAMETER STEEL CABLE >20' LONG	LARGE FORIEGN OBJECTS
3 4					Rubber Hoses LARGE METAL TRASH (1) << FILL MATERIAL >> 6" STEEL GURDERS Rebar CONCRETE PIECES	
5					FILL MATERIAL	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #:

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.

CLIENT: US ACOE

TEST PIT #: TP 11-3

PROJECT: Seneca Army Depot
LOCATION: SEAD 11

JOB NUMBER:
EST. GROUND ELEV.
INSPECTOR: BH
CONTRACTOR:
START DATE: 12/14/93
COMPLETION DATE:
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID		
Rad			

COMMENTS:

SG 2-1
Location

Depth 6.6
Width
Length

TOTAL SAMPLES:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0ppm		0-1		Building material, concrete block, Wire, pipe Glass, Sand, Dark brn (color)	Sample No 11-3-1 Time 1350
2			1-2		Rust, Plastic (melted) Ash (black)	
3	0ppm		2-4		(Soda bottle) Metal, Glass bottle w/liquid Dark brn, Nails Large boulders Wet soil, Sand, Rust Ash (black)	Sample No 11-3-2 Time 1400
4 5			4-6		Same Metal, Glass Gravel, small rock, nails Debris, Dark Brn Soil	Sample No 11-3-3 TIME 1420

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS   TEST PIT #:

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. CLIENT: US ACOE

TEST PIT #: TP11-4

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID	0ppm	

DATE START: 12/14/93

DATE FINISH:

INSPECTOR: BH

CONTRACTOR:

SCALE (FT)	VOC./ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm	0-2			Glass, Nails Clay, Sand, Dk Brn	SG 2-3 Time 1500 11-4-1
	0ppm	2-4			Clay, Shale Dk Brown (color) Rock	Time 1515 11-4-2
	0ppm Rock C		4-6		Sand, Clay, Glass Dark Brn	11-4-3 Time 1530

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #:

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING–SCIENCE, INC. CLIENT: ACOE WELL #: MW11-1

PROJECT: 10 SWMU -
LOCATION: SEAD -11
PROJECT NO:
INSPECTOR: ES / LB
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Alan
DRILLING COMPLETED: 11/3/93
BORING DEPTH: 14.2'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC:
POW DEPTH: 14.2'
INSTALLATION STARTED: 11/3/93
INSTALLATION COMPLETED: 11/3/93
SURFACE COMPLETION DATE: 11/3/93
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?)
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4" x 4" Steel LENGTH: 5'

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH:

SCREEN:
TSC: 6.1' TYPE: PVC-40 DIAMETER: 2" LENGTH: 7' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 13.5' POW: 14.2' 0.5' point

GROUT:
TG: 0.0 TYPE: Cem 3 Ben[illegible] LENGTH: 3.6

SEAL: TBS: 3.6' TYPE: Bentonite [illegible] LENGTH: 1.0

SAND PACK: TSP: 5.' #3 4.6' #1 TYPE: #3 Silica #1 Si[illegible] LENGTH: [illegible]

SURFACE COLLAR:
TYPE: Cem[illegible] RADIUS: 2.2' THICKNESS CENTER: ' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: – DEPTH 2: – DEPTH 3: DEPTH 4:

COMMENTS:

• ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

PAGE 1 OF 2

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
ROADWAY BOX – SURFACE COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT: ACOE WELL #: MW11-2

PROJECT: 10 SWMU
LOCATION: SEAD 11

PROJECT NO:
INSPECTOR: ES
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: John W.
DRILLING COMPLETED: 11/16/93
BORING DEPTH: 8.5'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: 11

POW DEPTH: 8.5'
INSTALLATION STARTED: 11/16/93
INSTALLATION COMPLETED: 11/16/93
SURFACE COMPLETION DATE: 11/16/93
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?):
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4"x4" Steel LENGTH:

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH:

SCREEN:
TSC: 34 TYPE: PVC-40 DIAMETER: 2" LENGTH: 4' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 7.4 POW: 8.5'

GROUT:
TG: Ground TYPE: Cement-bentonite LENGTH: 1.8'

SEAL: TBS: 1.8' TYPE: bentonite pellets LENGTH: 0.6'

SAND PACK: TSP: 2.4 TYPE: #3 + #1 LENGTH: 6.1'

SURFACE COLLAR:
TYPE: Cement RADIUS: 2'x2' THICKNESS CENTER: 1' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: DEPTH 2: DEPTH 3: DEPTH 4:

COMMENTS:

* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT: WELL #: MW-11-3

PROJECT: 10-SWMU
LOCATION: SEAD 11
PROJECT NO:
INSPECTOR: ES/LB
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Al
DRILLING COMPLETED: 11/4/93
BORING DEPTH: 9.0'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC: 11

POW DEPTH: 9.0'
INSTALLATION STARTED: 11/4/93
INSTALLATION COMPLETED: 11/5/93
SURFACE COMPLETION DATE: 11/5/93
COMPLETION CONTRACTOR/CREW:
BEDROCK CONFIRMED (Y/N?)
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4"x4" Steel LENGTH: 4'- total length

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH:

SCREEN:
TSC: 39' TYPE: PVC-40 DIAMETER: 2" LENGTH: 4.0' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 7.9' POW: 9.0' 11' betw. Pow and BSC.

GROUT:
TG: NA TYPE: LENGTH:

SEAL: TBS: near surface TYPE: bentonite pellets LENGTH: 2.4'

SAND PACK: TSP: 2.4' → #1 2.9 #3 TYPE: #3 and #1 LENGTH: 6.6'

SURFACE COLLAR:
TYPE: Cement RADIUS: 2'x2' THICKNESS CENTER: 1' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: DEPTH 2: DEPTH 3: DEPTH 4:

COMMENTS:
Well screen is 4.0'
Depth to PoW from BSC 1.1' } note change

* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC.
CLIENT:
WELL #: MW11-4

PROJECT: 10 SWMU
LOCATION: SEAD-11
PROJECT NO:
INSPECTOR: E/S / LB
CHECKED BY:

DRILLING CONTRACTOR: EMPIRE
DRILLER: AL
DRILLING COMPLETED: 11/4/93
BORING DEPTH: 10.5'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: 11

POW DEPTH: 10.5'
INSTALLATION STARTED: 11/4/93
INSTALLATION COMPLETED:
SURFACE COMPLETION DATE:
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?) y
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4"x4" Steel LENGTH: 2.9' Stickup

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH: 25'

SCREEN:
TSC: 4.8' TYPE: PVC-40 DIAMETER: 2" LENGTH: 5.0' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 9.8' POW: 10.5' 0.5' point

GROUT:
TG: 0.0 TYPE: Cem-bentonite LENGTH: 2.8'

SEAL: TBS: 28' TYPE: bentonite pellets LENGTH: 0.5'

SAND PACK: TSP: 3.3' TYPE: #3 and #1 LENGTH: 7.2

SURFACE COLLAR:
TYPE: cement RADIUS: 2', 2' THICKNESS CENTER: 1' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: — DEPTH 2: DEPTH 3: DEPTH 4:

COMMENTS:

* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

SEAD-64A

LOG OF BORING NO. SB64A-1

PROJECT:	SEVEN LOW PRIORITY AOCs
PROJECT LOCATION:	SENECA ARMY DEPOT, ROMULUS NY
ASSOCIATED UNIT/AREA:	SEAD-64A
PROJECT NO:	720518-01000
DATE STARTED:	05/27/94
DATE COMPLETED:	05/27/94
DRILLING CONTRACTOR:	EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD:	HOLLOW STEM AUGER
SAMPLING METHOD:	3" SPLIT SPOONS

DEPTH TO WATER (ft):	NA
BORING LOCATION (N/E):	992513.0 750711.2
REFERENCE COORDINATE SYSTEM:	New York State Plane
GROUND SURFACE ELEVATION (ft):	NA
DATUM:	NAD 1983
INSPECTOR:	FO
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 4 5 5	2.00	1.3	0	BGD	0.6		Gray-brown SILT, some(-) organic material, little Clay, trace very fine Sand, trace fine to medium Shale, loose, moist.	ML
						1.3		Light brown SILT, little very fine Sand, trace fine to medium Shale, trace(-) Cobbles, trace(-) brick, loose, dry.	ML
						2.0		No Recovery	-
.02	7 7 8 9	2.00	1.3	0	BGD	2.7		Brown very fine SAND + SILT, trace(-) fine Shale fragments, trace(-) organic material, loose, dry.	ML
						3.3		Light brown SILT, some very fine Sand, trace fine to medium Shale fragments, loose, dry.	ML
						4.0		No Recovery	-
.03	80 80 100/.2	1.20	1.1	0	BGD	4.8		Light brown SILT, little very fine Sand, trace(+) fine to medium Shale fragments, loose, moist.	ML
						5.1		Fractured SHALE, trace iron staining, dry, wetness at 4.8'.	-
						6.0		No Recovery	-
.04	42 18 38 100/.2	1.70	1.7	0	BGD	6.6		Gray fractured/weathered SHALE, moist.	-
						7.3		Gray-light brown CLAY + SILT, little(+) fine to medium Shale fragments, little(-) very fine Sand, stiff, moist to wet.	ML
								Gray, highly weathered, laminated SHALE, loose, dry.	-

BORING TERMINATED AT 7.7'

NOTES: Bottom of overburden at 4.8'. The following samples were collected for chemical analysis: SB64A-1.00(0-2"), SB64A-1.02(2'-4'), SB64A-.04(6'-8').

PARSONS

ENGINEERING-SCIENCE, INC.

UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB64A-1

Sheet 1 of 1

LOG OF BORING NO. SB64A-2

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64A**
PROJECT NO: **720518-01000**
DATE STARTED: **06/10/94**
DATE COMPLETED: **06/10/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" & 3" SPLIT SPOONS**

DEPTH TO WATER (ft): **6.9**
BORING LOCATION (N/E): **992364.6 750676.3**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK,LK**
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	7 16 7 8	2.00	1.7	0	BGD	0.6		Brown very fine to fine SAND, some fine gray Shale fragments and Gravel, trace organic, loose, dry. FILL	SW
						0.9		Highly weathered, highly fractured coarse gray SHALE fragments, trace(+) very fine to fine Sand, dry. FILL	GW
						1 1.5		Fine to medium SAND, some fine gray Shale fragments, little medium gray Shale fragments, trace very fine Sand, loose, slightly moist. FILL	SW
						1.7		AA, moist. BOTTOM OF FILL	SW
						2.0		No Recovery	-
.02	7 6 6 8	2.00	1.8	0	BGD	2 3 3.3		Light brown SILT + very fine SAND, little(+) fine to medium gray Shale fragments, trace organics, trace very fine mica chips, soft to medium stiff, moist to wet.	ML
						3.8		Brown SILT + very fine SAND, trace very fine mica chips, trace fine gray Shale fragments, soft to medium dense, moist to wet.	ML
						4.0		No Recovery	-
.03	7 8 22 16	2.00	1.7	0	BGD	4 5.0		AA, (3.3-3.8').	ML
						5 5.2		Fractured SHALE COBBLE.	-
						5.7		AA, (3.3-3.8) some fine to medium gray Shale fragments.	ML
						6.0		No Recovery	-
.04	20 24 80 100/.3	1.80	1.6	0	BGD	6 6.9		AA(5.2'-5.7') moist to wet.	ML
						7 7.2		AA, saturated.	ML
						7.3		Highly weathered, fractured gray SHALE, saturated.	
						7.6		AA, dry.	-
								No Recovery	-

BORING TERMINATED AT 7.8'
AUGER REFUSAL

NOTES: Bottom of fill at 1.7'. Bottom of overburden at 7.2'. The following samples were collected for chemical analysis: SB64A-2.00(0-2"), SB64A-2.02(2'-4'), SB64A-2.03(4'-6').

PARSONS
ENGINEERING-SCIENCE, INC.

UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB64A-2

Sheet 1 of 1

LOG OF BORING NO. SB64A-3

PROJECT: SEVEN LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
ASSOCIATED UNIT/AREA: SEAD-64A
PROJECT NO: 720518-01000
DATE STARTED: 06/10/94
DATE COMPLETED: 06/10/94
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 3" SPLIT SPOONS

DEPTH TO WATER (ft): 3.0
BORING LOCATION (N/E): 992356.5 750540.9
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): NA
DATUM: NAD 1983
INSPECTOR: KK,LR
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 7 7	2.00	1.8	0	BGD	0.4		Brown very fine SAND, little organics, little fine to medium gray Shale fragments and Gravel, loose, dry.	SW
						1 1.8		Light brown very fine SAND + SILT, trace fine gray Shale fragments, trace fine mica chips.	ML
						2.0		No Recovery	-
.02	6 5 7 14	2.00	1.9	0	BGD	2 2.6		AA, (.4'-1.8').	ML
						3.0		Olive gray to light brown SILT, some very fine Sand, some fine gray Shale fragments, trace medium gray Shale fragments, medium stiff, moist to wet.	ML
						3 3.9		Grading from AA, (2.6-3.0') to light brown Silt and very fine Sand, some fine gray Shale fragments, trace fine Sand, medium stiff, saturated.	ML
						4.0		No Recovery	
.03	12 100/.4	0.90	0.9	0	BGD	4 4.3		AA, (3.0-3.9').	ML
						4.9		Gray highly fractured, highly weathered SHALE.	-
						5		No Recovery	-

BORING TERMINATED AT 5.5'
AUGER REFUSAL

NOTES: Bottom of overburden at 4.3'. The following samples were collected for chemical analysis: SB64A-3.00(0-2"), SB64A-3.01(2"-2'), SB64A-3.02(2'-4').

PARSONS
ENGINEERING-SCIENCE, INC.

UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB64A-3

Sheet 1 of 1

LOG OF BORING NO. MW64A-1

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64A**
PROJECT NO: **720518-01000**
DATE STARTED: **04/02/94**
DATE COMPLETED: **04/02/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **6.0**
BORING LOCATION (N/E): **992409.1 750892.2**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **745.8**
DATUM: **NAD 1983**
INSPECTOR: **FO**
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 9 9 8	2.00	1.4	0	BGD	0.3		Brown SILT, little organic material, trace fine Shale fragments.	ML
						1.4		Light brown SILT, trace Clay, trace fine to coarse Shale fragments, loose, moist	ML
						2.0		No Recovery	-
.02	8 8 10 12	2.00	1.2	0	BGD	3.2		Light brown SILT, trace very fine to fine Shale fragments, trace coarse Shale fragments, trace very fine Sand (2.9-3.2'), loose, moist.	ML
						4.0		No Recovery	-
.03	8 19 21 16	2.00	1.6	0	BGD	4.2		Pink-brown SILT + CLAY, trace fine to medium Shale fragments, loose, moist to wet.	ML
						5.6		Gray-brown SILT, trace(+) fine to medium Shale fragments, trace weathered Shale, dry, dry to moist.	ML
						6.0		No Recovery	-
.04	82 100/.1	0.60	0.6	0	BGD	6.4	▼	Light brown very fine SAND, some(-) Silt, trace very fine Shale fragments, loose, saturated.	SM
						6.6		Gray fractured, slightly weathered SHALE, wet to saturated.	-
						8.0		No Recovery	-
.05	47 100/.25	0.75	0.6	0	BGD	8.6		Gray highly fractured, weathered SHALE, wet between fracture planes.	-
						10		No Recovery	-

NOTES: Bottom of overburden at 6.4'. The following samples were collected for chemical analysis: MW64A-1.00(0-2"), MW64A-1.02(2'-3.2'), MW64A-1.03(4'-5.6').

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LOG OF BORING MW64A-1

Sheet 1 of 2

LOG OF BORING NO. MW64A-1A

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64A**
PROJECT NO: **720518-01000**
DATE STARTED: **03/31/94**
DATE COMPLETED: **03/31/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **6.0**
BORING LOCATION (N/E): **992205.5 750789.3**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **744.5**
DATUM: **NAD 1983**
INSPECTOR: **FO**
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 6 10 9	2.00	1.4	0	BGD	0.7		Brown SILT, some organic material, trace medium Shale fragments, moist.	ML
						1.4		Brown SILT, little Clay, trace(+) Shale fragments, trace organic material, loose, moist.	ML
						2.0		No Recovery	-
.02	10 10 9 10	2.00	1.6	0	BGD	3.0		Light brown CLAY, some Silt, trace fine Shale fragments (bedded/horizontal fracture planes), moist.	CL
						3.6		Light brown SILT, trace very fine Shale, trace organic material, loose, dry to moist	ML
						4.0		No Recovery	-
.03	9 12 18 20	2.00	1	0	BGD	5.0		Light brown SILT, slightly weathered, fractured Shale at 5', dry to moist.	ML
						6.0		No Recovery	-
.04	24 12 8 10	2.00	0.3	0	BGD	6.3		Light brown SILT, some very fine Sand, trace weathered Shale, saturated at tip.	ML
						8.0		No Recovery	-
.05	54 72 72 81	2.00	1.8	0	BGD	9.1		Gray weathered SHALE, trace Silt + Clay, saturated.	-
						9.8		Weathered SHALE + SILT + CLAY, trace(+) banded iron staining, moist.	-

NOTES: Bottom of overburden at 6.3'. No samples were collected for chemical analysis.

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LOG OF BORING MW64A-1A

Sheet 1 of 2

LOG OF BORING NO. MW64A-2

PROJECT: SEVEN LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
ASSOCIATED UNIT/AREA: SEAD-64A
PROJECT NO: 720518-01000
DATE STARTED: 04/01/94
DATE COMPLETED: 04/01/94
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 3" SPLIT SPOONS

DEPTH TO WATER (ft): 5.3
BORING LOCATION (N/E): 992447.6 750496.9
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): 739.2
DATUM: NAD 1983
INSPECTOR: FO
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 6 8 10	2.00	0.4	0	BGD		0.4	Brown SILT, little organic material, trace fine Gravel, gray Shale at tip of spoon.	ML
						1	2.0	No Recovery	-
.02	9 9 15 10	2.00	1.3	0	BGD	2	2.9	Light brown SILT, some Clay, trace fine Shale fragments, medium stiff, moist	ML
						3	3.3	Light brown SILT + very fine SAND, trace(+) Clay, saturated. Fine Shale + coarse Gravel at tip, saturated, wet to saturated at: (2.2-2.8), (2.9-3.3).	ML
							4.0	No Recovery	-
.03	6 8 11 50	2.00	1.6	0	BGD	4	4.9	Light brown very fine SAND + SILT, trace Shale fragment, loose, wet with trace saturated lenses.	ML
						5	5.3	AA, (4-4.9') trace fine to medium Shale fragments, wet to saturated.	ML
							5.6	Dark gray, very fractured, slightly weathered SHALE, trace iron staining, saturated.	-
							6.0	No Recovery	-
.04	62 100/.4	0.90	0.9	0	BGD	6	6.9	AA(5.3'-5.6'), fracture planes filled with gray-brown Clay, saturated.	-
						7	8.0	No Recovery	-
.05	100/.2	0.20	.2	0	BGD	8		Dark gray fractured SHALE.	-

BORING TERMINATED AT 8.2'
AUGER REFUSAL

NOTES: Bottom of overburden at 5.3'. No samples were collected for chemical analysis.

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LOG OF BORING MW64A-2

Sheet 1 of 1

LOG OF BORING NO. MW64A-3

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64A**
PROJECT NO: **720518-01000**
DATE STARTED: **04/01/94**
DATE COMPLETED: **04/01/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **4.0**
BORING LOCATION (N/E): **992302.2 750529.2**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **737.8**
DATUM: **NAD 1983**
INSPECTOR: **FO**
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	1 2 5 6	2.00	1.1	0	BGD	0.6		Brown SILT, little organic material, trace fine Shale fragments, loose, wet.	ML
						1.1		AA, light brown with trace organic material.	ML
						2.0		No Recovery	-
.02	7 8 8 12	2.00	1.7	0	BGD	3.3		Gray-brown SILT, trace(+) Clay, very fine Shale fragments, trace fine to medium Shale, trace(-) organic material, loose, trace wet lenses.	ML
						3.7		Gray-brown SILT, little fine to medium Shale fragments, trace very fine Sand, trace weathered Siltstone (3.3-3.5'), loose, wet to saturated.	ML
						4.0		No Recovery	-
.03	53 100/.15	0.65	0.6	0	BGD	4.6		Dark gray, highly fractured, weathered SHALE, trace iron staining, trace fossils, trace Silt + Clay between fracture planes, saturated.	-
						6.0		No Recovery	-
.04	50 100/.15	0.65	0.5	0	BGD	6.3		Gray, very fractured + moderately weathered SHALE, little gray Silt + Clay, wet.	-
						6.5		Gray, highly fractured + very weathered SHALE + SILT + CLAY, trace(+) mottling, moist to wet.	-
						8.0		No Recovery	-
.05	50 100/.2	0.70	0.5	0	BGD	8.5		Gray, highly weathered SHALE, wet to saturated between fracture plane.	-
								No Recovery	-
								BORING TERMINATED AT 8.7'	

NOTES: Bottom of overburden at 4'. No samples were collected for chemical analysis.

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LOG OF BORING MW64A-3

Sheet 1 of 1

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** USACOE | **TEST PIT #:** TP64A1

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/8/94
COMPLETION DATE: 6/8/94
CHECKED BY:
DATE CHECKED:

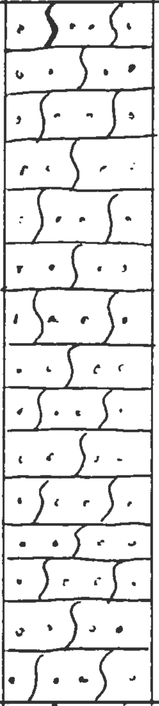
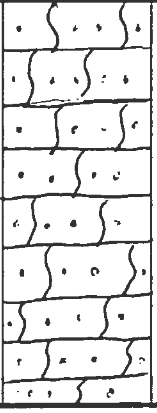
TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
20'5"	2'10"	5'6"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	1545pm 6/8/94
VICTOREEN-190	pancake	10-15 µR/Hr	1545pm 6/8/94

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				Top Soil	
1 2 3	0ppm BKGD				3" DARK GrAY SilT with Shale ClASTS and Fill Debris	Objects Found: AN canisters (~12" DiAm x 14" Long); Rail Ties; 6'L x 12" Diam culvert; metal Lattice
4 5	0ppm BKGD				3' 3" Olive Gray SilT with Few Shale ClasTs	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP64A-1

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. **CLIENT:** SEAD **TEST PIT #:** 64A-2

PROJECT: SEAD 64A 15 SWMU Investigations
LOCATION: TEST PIT #2

JOB NUMBER: 720518
EST. GROUND ELEV.:
INSPECTOR: JWC/AS
CONTRACTOR: ES/EMPIRE
START DATE: 6/9/94
COMPLETION DATE: 6/9/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
18' L	2.5' W	6'6" D	BACKHOE

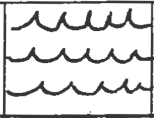
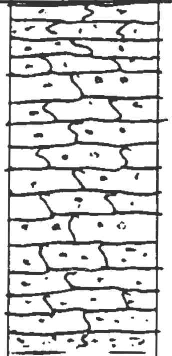
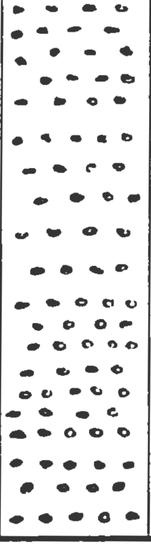
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0eV	0 ppm	
VICTOREEN-190		BGDD	

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
					Top Soil	
6" 1 2	0 ppm				LT. gray Silt ~~[illegible]~~ and Shale clasts (1"-3"); Large (3'x3') ~~Concrete~~ Reinforced Concrete slabs. Also present were lenses of dark Gray silt.	
					same as above with Asphalt pieces	
2'10" Base of Fill 3 4 5	0 ppm				Olive Gray Silt	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #:

PAGE 1 OF 2

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: SEAD

TEST PIT #: 64A - 3

PROJECT: SEAD 15 SWMU Investigations
LOCATION: Test Pit #3 TP64A-3

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JMC/AS
CONTRACTOR: ES/Empire
START DATE: 6/9/94
COMPLETION DATE: 6/9/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
25'	2.5'	6.0'	BACKHOE

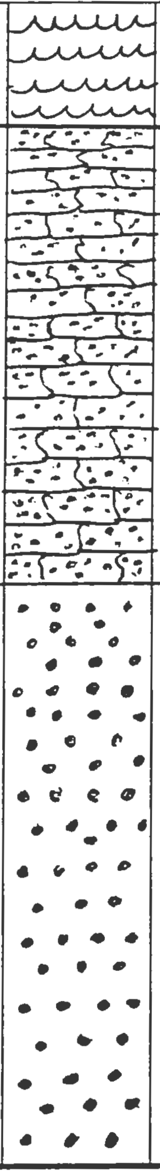
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

QA/QC DUPLICATE SAMPLE: YES or [✓ NO]
Duplicate Sample Number:
MRD Sample Number:

QA/QC Rinsate Sample Number:

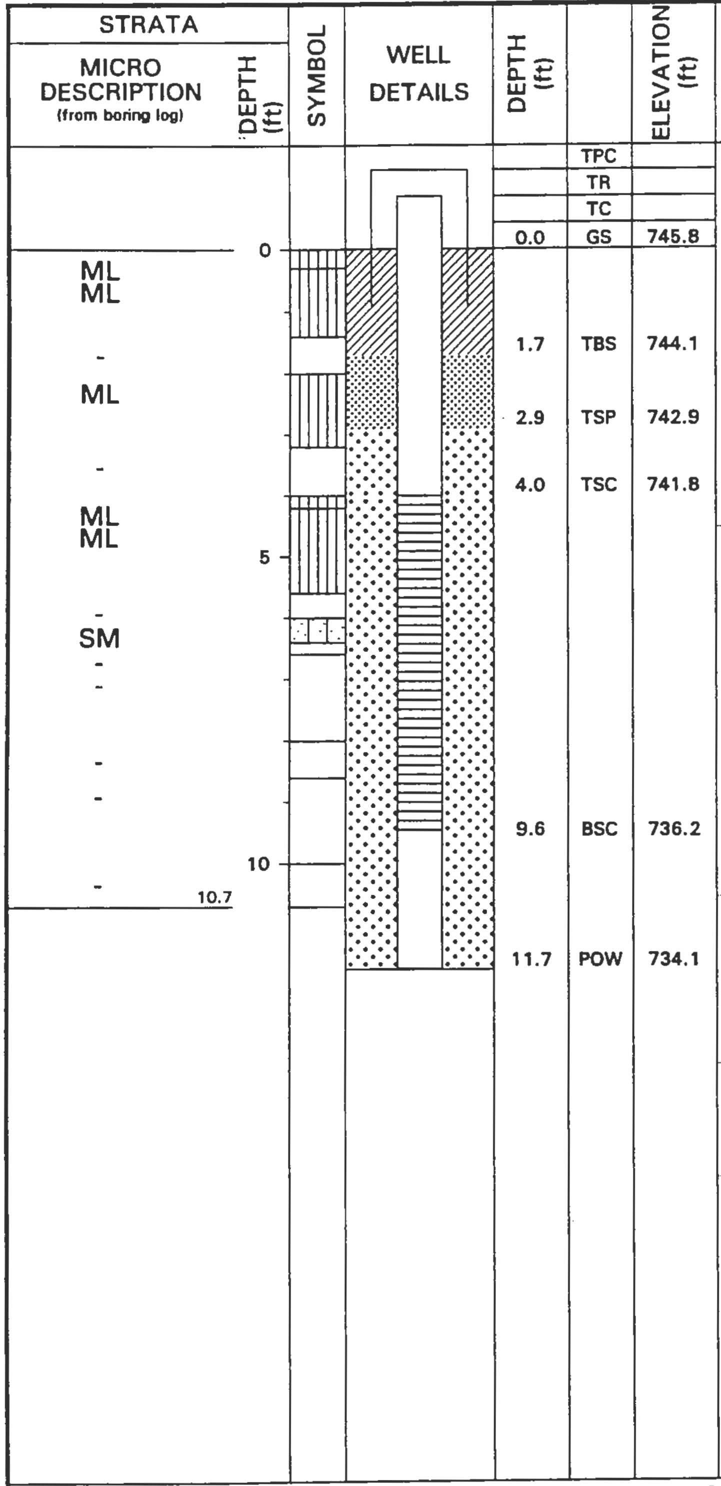
COMMENTS:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0ppm				Top Soil	
8"						
1	0ppm				Light Brown SilT, some shale clasts, with: culvert, Asphalt, ConstanTine wire, Panelling, car seat, HoT wheels car	
2						
2'8"					BASE OF Fill	
3	0ppm				Olive Gray SilT, some shale clasts	
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #:

COMPLETION REPORT OF WELL No. MW64A-1

PROJECT:	SEVEN LOW PRIORITY AOCs	WELL LOCATION (N/E):	992409.1 750892.2
PROJECT LOCATION:	SENECA ARMY DEPOT, ROMULUS NY	REFERENCE COORDINATE SYSTEM:	New York State Plane
DRILLING CONTRACTOR:	EMPIRE SOILS INVESTIGATIONS	GROUND SURFACE ELEVATION (ft):	745.8
DRILLING METHOD:	HOLLOW STEM AUGER	DATUM:	NAD 1983
WELL INSTALLATION STARTED:	04/02/94	GEOLOGIST:	F. O'LOUGHLIN
WELL INSTALLATION COMPLETED:	04/02/94	CHECKED BY:	FO



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	745.8
1.7	TBS	744.1
2.9	TSP	742.9
4.0	TSC	741.8
9.6	BSC	736.2
11.7	POW	734.1

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: 5, 1

SURFACE SEAL
Type: CEMENT
Interval: 1.7

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE PELLETS
Interval: 1.2

SANDPACK
Type: #1, #3
Interval: 7.8

WELL DEVELOPMENT DATA
Date: 7/10/94
Method: BAIL/PUMP
Duration: 48 DAYS
Rate:
Final Measurements:

WATER LEVELS

	Date	Time	Depth,TR
▽	5/23	1045	10.86
▼	5/24	0725	11.71
▽	7/9	1400	10.50
▽			
▽			
▼			

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.07	13.8	460	3.6

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

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COMPLETION REPORT OF
WELL No. MW64A-1

Sheet 1 of 1

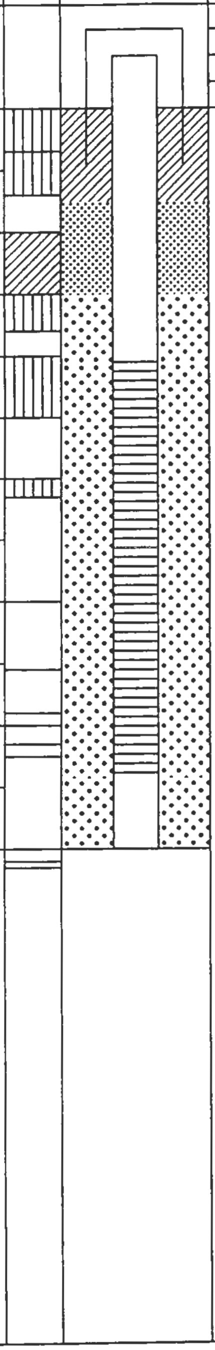
COMPLETION REPORT OF WELL No. MW64A-1A

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: **03/31/94**
WELL INSTALLATION COMPLETED: **03/31/94**

WELL LOCATION (N/E): **992205.5 750789.3**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **744.5**
DATUM: **NAD 1983**
GEOLOGIST: **F. O'LOUGHLIN**
CHECKED BY: **FO**

STRATA MICRO DESCRIPTION (from boring log)	DEPTH (ft)
ML	0
ML	
-	
CL	
ML	
-	
ML	
-	5
ML	
-	
-	
-	
-	10
-	
-	
	12.3
-	
-	

SYMBOL / WELL DETAILS



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	744.5
1.5	TBS	743.0
3.0	TSP	741.5
4.1	TSC	740.4
10.9	BSC	733.6
12.0	POW	732.5

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: **4, 2**

SURFACE SEAL
Type: **CEMENT**
Interval: **1.5**

GROUT
Type: **N/A**
Interval: **N/A**

SEAL
Type: **BENTONITE PELLETS**
Interval: **1.5**

SANDPACK
Type: **#1, #3**
Interval: **9**

WELL DEVELOPMENT DATA
Date:
Method:
Duration:
Rate:
Final Measurements:

WATER LEVELS

Date	Time	Depth,TR

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)

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

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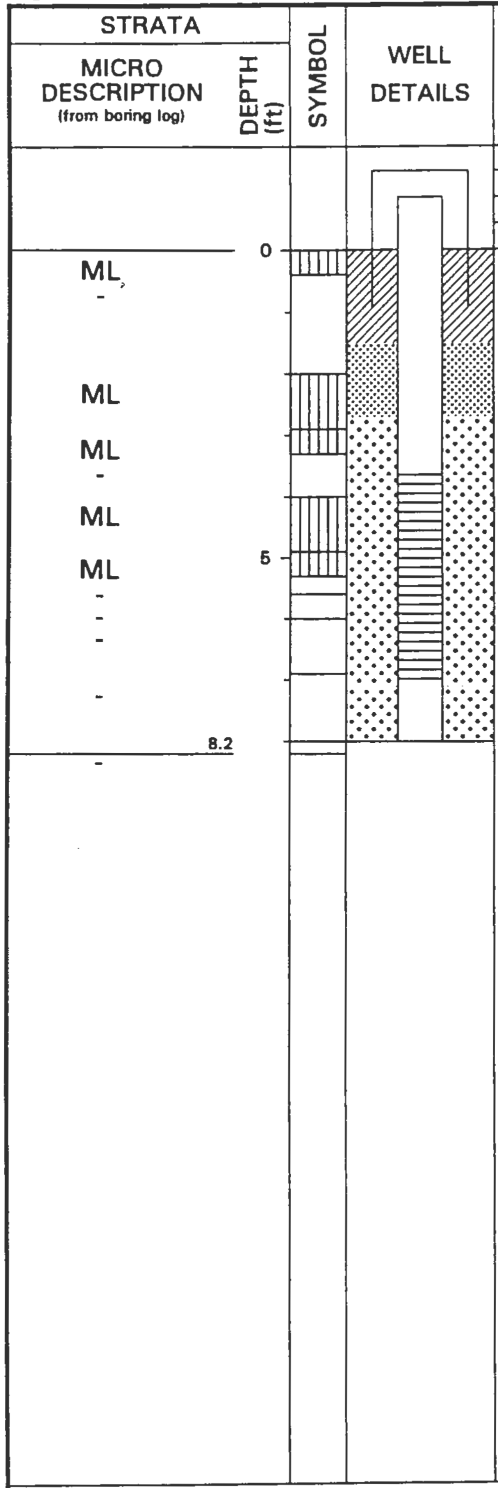
Romulus, New York

COMPLETION REPORT OF
WELL No. MW64A-1A

Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW64A-2

PROJECT:	SEVEN LOW PRIORITY AOCs	WELL LOCATION (N/E):	992447.6 750496.9
PROJECT LOCATION:	SENECA ARMY DEPOT, ROMULUS NY	REFERENCE COORDINATE SYSTEM:	New York State Plane
DRILLING CONTRACTOR:	EMPIRE SOILS INVESTIGATIONS	GROUND SURFACE ELEVATION (ft):	739.2
DRILLING METHOD:	HOLLOW STEM AUGER	DATUM:	NAD 1983
WELL INSTALLATION STARTED:	04/01/94	GEOLOGIST:	F. O'LOUGHLIN
WELL INSTALLATION COMPLETED:	04/01/94	CHECKED BY:	FO



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	739.2
1.5	TBS	737.7
2.7	TSP	736.5
3.7	TSC	735.6
7.1	BSC	732.1
8.0	POW	731.2

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: 1, 3

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE CHIPS
Interval: 1.2

SANDPACK
Type: #1, #3
Interval: 5.3

WELL DEVELOPMENT DATA
Date: 7/19/94
Method: BAIL/PUMP
Duration: 57 DAYS
Rate:
Final Measurements:

WATER LEVELS

	Date	Time	Depth,TR
∇	5/23	1330	7.42
▼	7/10	1630	7.22
∇	7/19	1520	9.40
∇			
∇			
▼			

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
6.78	18.9	1000	33

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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Romulus, New York

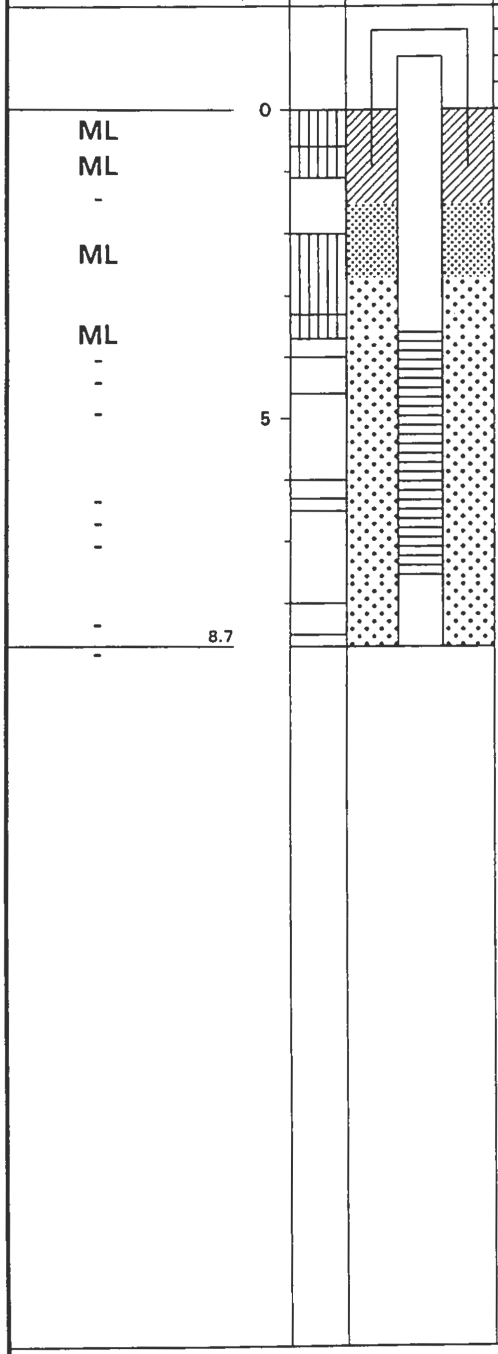
COMPLETION REPORT OF WELL No. MW64A-2

Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW64A-3

PROJECT:	SEVEN LOW PRIORITY AOCs	WELL LOCATION (N/E):	992302.2 750529.2
PROJECT LOCATION:	SENECA ARMY DEPOT, ROMULUS NY	REFERENCE COORDINATE SYSTEM:	New York State Plane
DRILLING CONTRACTOR:	EMPIRE SOILS INVESTIGATIONS	GROUND SURFACE ELEVATION (ft):	737.8
DRILLING METHOD:	HOLLOW STEM AUGER	DATUM:	NAD 1983
WELL INSTALLATION STARTED:	04/01/94	GEOLOGIST:	F. O'LOUGHLIN
WELL INSTALLATION COMPLETED:	04/01/94	CHECKED BY:	FO

STRATA — MICRO DESCRIPTION (from boring log), DEPTH (ft), SYMBOL, WELL DETAILS



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	737.8
1.5	TBS	736.3
2.7	TSP	735.1
3.6	TSC	734.2
7.6	BSC	730.2
8.7	POW	729.1

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: 4

SURFACE SEAL
Type: CEMENT
Interval: 1.5

GROUT
Type: N/A
Interval: N/A

SEAL
Type: BENTONITE CHIPS
Interval: 1.2

SANDPACK
Type: #1, #3
Interval: 6

WELL DEVELOPMENT DATA
Date: 5/23/94
Method: BAIL/PUMP
Duration: 120 MIN
Rate: .400 L/MIN

WATER LEVELS

	Date	Time	Depth,TR
∇	5/23	1350	6.59
▼	5/23	1610	7.03

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.09	10.9	460	3.24

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

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COMPLETION REPORT OF
WELL No. MW64A-3
Sheet 1 of 1

WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC. CLIENT: USACOE WELL #: MW64A-1

PROJECT : 15 SWMU ESI (SEAD- MW64A)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

DATE: 05-23-94
PROJECT NO. : 720518

DRILLING METHOD (s): Hollow Stem Auger
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Bailer, Teflon
INSTALLATION DATE: 4-2-94

INSPECTOR: Richard S. Moravec
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 05-23-94
END DEVELOPMENT DATE: 7/10/94

WATER DEPTH (TOC): 10.86 ft
WELL DIA. (ID CASING): 2.0" ~~ft~~
BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~BGS~~): 10.70' ft
MEASURED POW DEPTH(TOC): 10.96 ft
SILT THICKNESS: .00 ft
POW AFTER DEVELOPMENT: ~~11.96~~ E.V. ft → 12.09' Revised 8/17/94

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	[✓ 2]	3	4	5	6	7	8	9	10	11	12
GALLONS/ FT:	[✓ 0.163]	0.367	0.654	1.02	1.47	2.00	2.61	3.30	4.08	4.93	5.87
							2.955				

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 0.18 GAL. = A
1.12 0.163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = .94 GAL. = B
1.12 2.955 0.163

SINGLE STANDING WATER VOLUME = A + B = .18 + .94 1.12 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C 5 x 1.12 5.6 GALS.

DATE	ACTIVITY	STARTING H20 DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
5/23/94	Bail	10.86	1045	1050	5	0.3	7.47	500	14.9	light Brown	458	10.65 Dry
5/24	Bail	11.71	0725	0730	5	.05	7.64	470	10.0	Cloudy	89.9	11.80
7-9	Bail	9.89'	1015	1035	20	1.2	7.11	500	13.9	Grey cloudy	>100	11.62' Dry
7-9	Pump	10.50'	1400	14:20	20	0.5	7.08	530	16.4	clearing	18	11.63 Dry
7-10	Pump	10.56	16:00	16:20	20	0.5	7.07	460	13.8	clear	3.6	11.67 Dry
										Complete		
TOTALS/FINAL						2.55						

RECOVERY

GOOD FAIR [✓ POOR]

~~KEY # 2537~~ E.D.

INVESTIGATION DERIVED WASTE (IDW)

DATE	7-9-94	7-10-94			
VOLUME	1.7 gal	0.5 gal			
DRUM #	MW64A+W64A-1W				

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #:

H:\ENG\SENECA\15SWMU\FIELDFMS\WELLDEV.WK3

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WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: USACOE WELL #: MW 64A-2

PROJECT: 15 SWMU ESI (SEAD-64A)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY
DATE: 05-23-94
PROJECT NO.: 720518

DRILLING METHOD (s): Hollow Stem Auger
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Bailer - Teflon
INSTALLATION DATE: 4-1-94

INSPECTOR: Richard S. Moravec
CONTRACTOR: -
CREW: -
START DEVELOPMENT DATE: 05-23-94
END DEVELOPMENT DATE: 7/11

WATER DEPTH (TOC): 7.42 ft
WELL DIA. (ID CASING): 2.0" ~~ft~~
BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~TOC~~): 8.0 ft
MEASURED POW DEPTH(TOC): 9.48 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: ~~7.94~~ ~~10.54~~ ft
~~9.56~~ 9.63'
Revised 8/17/94

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	[✓ 2]	3	4	5	6	7	8	9	10	11	12
GALLONS/FT:	[✓ 0.163]	0.367	0.654	1.02	1.47	2.00	2.61 2.955	3.30	4.08	4.93	5.87

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = .34 GAL. = A
2.06 0.163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR - WELL DIAM. FACTOR) X 0.3 = 1.73 GAL. = B
2.06 2.955 0.163

SINGLE STANDING WATER VOLUME = A + B = 0.34 + 1.73 2.07 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C 5x 2.07 10.33 GALS.

DATE	ACTIVITY	STARTING H20 DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
5/23/94	Bail	7.42	1330	1335	5	0.3	7.45	500	17.0	Dark Green Brown	>1000	9.38
5/24	Bail	8.04	0740	0743	3	0.25	7.23	520	15.2	Dark Green Brown	>1000	9.24
7/7	Pump	6.98	0945	1000	15	1	went dry				>100	
7/9	Bail	6.99'	09:00	09:20	20	0.3	6.98	680	16.1	Dk Grey Brown	>1000	8.06'
7/9	Pump	8.06'	09:30	09:40	10	~~1.0~~ 0.2	7.03	650	15.8	A/A	>1000	Dry 9.26'
7/9	Bail	8.03'	10:55	11:00	5	.2	7.01	660	17.5	A/A	>100	Dry
7/9	Pump	7.18'	1440	1500	20	.3	6.93	690	18.1	A/A	>1000	Dry
7/10	Pump	7.22'	16:30	16:50	20	.4	6.86	700	16.8	Slightly Clear	>100	~17.5
7/11	Pump	7.39'	10:10	1030	20	.4	6.84	750	16.5	Cloudy Brown	>100 cloudy	Dry 9.26'
TOTALS/FINAL						3.35						

RECOVERY

GOOD FAIR [✓ POOR]

KEY # 2537

INVESTIGATION DERIVED WASTE (IDW)

DATE	7-7-94	7-9-94	7-10+11		
VOLUME	1gal	.5			
DRUM #	MW64A-2W				

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW64A-2

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10.73

WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: USACOE WELL #: MW64A-3

PROJECT : 15 SWMU ESI (SEAD-64A)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

DATE: 05-23-94
PROJECT NO. : 720518

DRILLING METHOD (s): Hollow Stem Auger
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Bail-Teflon
INSTALLATION DATE: 4-1-94

INSPECTOR: Richard S. Moravec
CONTRACTOR: –
CREW: –
START DEVELOPMENT DATE: 05-23-94
END DEVELOPMENT DATE: 5/23/94

WATER DEPTH (TOC): 6.59 ft
WELL DIA. (ID CASING): 2.0" ~~ft~~
BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~TOC~~): 8.7 ft
MEASURED POW DEPTH(TOC): 10.41 ft
SILT THICKNESS: .01 ft
POW AFTER DEVELOPMENT: ~~10.48~~ RV ft
10.61' Revised 8/17/9

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	9	10	11	12
GALLONS/FT:	[✓ 0.163]	0.367	0.654	1.02	1.47	2.00	2.61	3.30	4.08	4.93	5.87

2.955

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = .63 GAL. = A
3.85 0.163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 3.22 GAL. = B
3.85 2.955 0.163

SINGLE STANDING WATER VOLUME = A + B = .63 + 3.22 3.85 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C 5 x 3.85 19.27 GALS.

	DATE	ACTIVITY	STARTING H20 DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth	
1st Vol	5/23/94	Bail	6.59	1350	1410	20	4.0	7.10	450	10.5	Bn Brown	>1000	7.31	
	5/23	Bail	7.31	1415	1420	5	1.0	7.08	460	10.6	Dk Brown	>1000	7.75	
2nd Vol	5/23	Bail	6.64	1450	1455	5	3.0	7.16	480	10.8	Dark Brown	>1000	7.60	
3rd Vol	5/23	Pump	6.64	1510	1540	30	4.0	7.17	460	11.3	Cloudy	29.	7.02	400
4th Vol	5/23	Pump	7.02	1540	1610	30	4.0	7.09	460	10.8	Clear	4.94	7.03	400
5th Vol	5/23	Pump	7.03	1610	1640	30	4.0	7.09	460	10.9	Clear	3.24	7.04	400
	TOTALS/FINAL						20							

RECOVERY
GOOD [✓ FAIR] POOR

Key# 2537

INVESTIGATION DERIVED WASTE (IDW)

DATE					
VOLUME					
DRUM #					

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: ______

H:\ENG\SENECA\15SWMU\FIELDFMS\WELLDEV.WK3

SEAD-64D

Sheet 1 of 1

LOG OF BORING NO. SB64D-1

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/23/94**
DATE COMPLETED: **06/23/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **NA**
BORING LOCATION (N/E): **991352.4 740881.4**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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	4 7 6 6	2.00	1.7	0	BGD	0.5		Dark gray-brown SILT + CLAY, trace(+) very fine Sand, trace very fine to fine gray Shale fragments and Gravel, very stiff, iron staining.	ML
						1.2		Light brown CLAY + SILT, little very fine Sand, trace fine gray Shale fragments and Gravel, trace coarse gray Shale fragments, some iron staining, grading from medium stiff to soft, moist.	ML
						1.7		Grading from light brown SILT + very fine SAND to very fine to fine SAND, little Silt, trace fine gray Shale fragments soft to very soft, saturated.	SM
						2.0		No Recovery	-
.02	18 30 32 40	2.00	2.0	0	BGD	2.1		AA (1.2-1.7'), saturated.	SM
						2.7		Light brown very fine SAND + SILT, trace coarse Gravel, trace iron-stained Clay, trace gray very fine gray Shale fragments, medium stiff, wet.	ML
						4.0		Light brown very fine to fine SAND, trace Silt, little coarse gray Shale fragments, trace fine to medium gray Shale fragments, Coarse Shale Gravel, loose, wet to saturated.	SM
.03	40 62 72 92	2.00	2.0	0	BGD	4.9		Brown very fine to fine SAND, trace(+) Silt, trace fine gray Shale fragments, little coarse Shale fragments, loose, wet to saturated.	SM
						5.0		Tan siltstone GRAVEL, trace iron staining.	GM
						6.4		AA, (4-4.9').	SM
.04	78 100/.3	0.80	0.8	0	BGD	6.7		Gray-brown very fine SAND, little Silt, little gray coarse Shale fragments, trace Clay, trace fine gray Shale fragments, medium stiff, wet.	ML
						6.8		Gray fractured SHALE, saturated.	-
								No Recovery	
								BORING TERMINATED AT 7.8'	

NOTES: Bottom of overburden at 6.7'. The following samples were collected for chemical analysis: SB64D-1.00(0-2"), SB64D-1.01(2"-2'), SB64D-1.02(2'-4').

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LOG OF BORING SB64D-1

Sheet 1 of 1

LOG OF BORING NO. SB64D-2

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/23/94**
DATE COMPLETED: **06/23/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **6.7**
BORING LOCATION (N/E): **991351.4 740802.4**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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 4 5 5	2.00	1.3	0	BGD	1.0		Brown, very fine SAND + SILT, little fine gray Shale fragments, trace medium Gravel, trace iron-stained Clay, trace organics, medium stiff, dry to moist.	ML
						1.3		Brown SILT, trace organics, soft, moist.	ML
						2.0		No Recovery	-
.02	3 4 4 4	2.00	1.6	0	BGD	2.3		AA, (0-1'), soft, moist.	ML
						3.0		AA, (1-1.3'), trace roots, trace fine Gravel.	ML
						3.6		Light brown, iron-stained SILT + very fine SAND, little Clay, trace organics, trace very fine, weathered gray Shale fragments, medium stiff, moist.	ML
						4.0		No Recovery	-
.03	12 18 20 18	2.00	2.0	0	BGD	4.3		AA, (3-3.6'), little very fine to fine gray Shale fragments.	ML
						5.4		Gray, fine to coarse, fractured + weathered SHALE fragments + very fine to fine SAND, trace Silt and Clay, medium dense, moist.	GM
						6.0		AA, (4-4.3').	ML
.04	18 20 26 16	2.00	1.3	0	BGD	6.5		Light brown very fine to fine SAND, some gray, very fine to medium weathered Shale fragments, trace Silt, medium stiff, wet.	SW
						6.7		AA, saturated.	SW
						7.1		Gray fractured + weathered, SHALE, saturated (6.7-6.8'), moist to wet (6.8-7.1'), iron stained.	-
						7.3		AA, (6.5-6.7').	SW
						8.0		No Recovery	-
.05	41 100/.3	0.80	0.5	0	BGD	8.5		Gray highly fractured, medium weathered SHALE, trace iron-stained, 0.1 lenses of olive gray Silt and very fine Sand, moist.	-
						10.0		No Recovery	-

NOTES: Bottom of overburden at 6.7'. The following samples were collected for chemical analysis: SB64D-2.00(0-2"), SB64D-2.01(2"-1.3'), SB64D-2.02(2.3'-3.6'), SB64D-2.03(4'-6').

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LOG OF BORING SB64D-2

LOG OF BORING NO. SB64D-3

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/24/94**
DATE COMPLETED: **06/24/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **3.2**
BORING LOCATION (N/E): **992695.3 741196.0**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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	4 6 10 8	2.00	2.0	0	BGD	1.2		Dark brown SILT, some very fine Sand, little organics, grading from soft to medium stiff, slightly moist to moist.	ML
						2.0		Light brown-orange SILT + very fine SAND, trace very fine Gravel and gray Shale fragments, little orange Clay, trace organics, stiff, dry to slightly moist.	ML
.02	6 12 10 5	2.00	0.4	0	BGD	2.7		Light brown SILT and very fine SAND, trace very fine Gravel and gray Shale fragments, little orange Clay, stiff, moist.	ML
						3.2		Light brown SILT + very fine to fine SAND, little medium Sand, trace fine Gravel and gray Shale fragments, trace Gravel Cobble, wet.	ML
						3.4		Fine SAND, little very fine Sand and Silt, trace fine Gravel and gray Shale fragments, saturated.	SW
						4.0		No Recovery	-
.03	10 38 25 17	2.00	0.9	0	BGD	4.4		Brown CLAY + SILT, trace fine to medium gray Shale fragments, saturated.	ML
						4.9		Gray highly fractured, medium to coarse SHALE fragments, saturated, iron stained.	GW
						6.0		No Recovery	-
.04	65 12 10 14	2.00	1.3	0	BGD	6.4		Gray highly fractured, medium to coarse SHALE fragments, trace olive gray Silt, iron-stained fragments, saturated.	GM
						7.0		Very fine to coarse gray SHALE fragments + gray, iron-stained CLAY, stiff, saturated.	GC
						7.3		Light brown, iron-stained SILT + very fine SAND + fine to medium gray SHALE fragments, stiff, saturated.	GM
						8.0		No Recovery	-
.05	100/.4	0.40	0.4	0	BGD	8.2		Light gray, iron-stained CLAY + fine gray SHALE fragments, stiff, wet.	GC
						8.4		AA, (6-6.4'), dry to moist.	GC
						10.0		No Recovery	-

NOTES: Bottom of overburden at 8.4'. The following samples were collected for chemical analysis: SB64D-3.00(0-2"), SB64D-3.01 (0.2-2.0'), SB64D-3.02 (2'-3.2'), SB64D-3.01 MRD (0.2-2.0'), and SB64D-3.20 (duplicate of .01)

Sheet 1 of 1

LOG OF BORING NO. SB64D-4

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/24/94**
DATE COMPLETED: **06/24/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **4.0**
BORING LOCATION (N/E): **992588.8 741199.6**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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	4 8 10 14	2.00	1.7	0	BGD	0.4		Brown SILT, little very fine Sand, little organic material, moist.	ML
						0.9		Light brown CLAY, trace Silt, trace(-) organic material, stiff, moist.	CL
						1.7		Light gray CLAY + SILT, little weathered Siltstone, trace Shale fragments, trace organic material, loose, moist.	ML
						2.0		No Recovery	-
.02	32 50 41 25	2.00	1.7	0	BGD	2.7		Light gray-olive brown CLAY, little Silt, trace weathered Shale fragments, loose, dry.	CL
						2.9		Gray fractured SHALE, wet.	-
						3.7		Light brown, very fine SAND, some Silt, little weathered, fractured Shale, loose, moist, saturated at (3.6-3.7').	SM
						4.0		No Recovery	-
.03	11 9 2 5	2.00	0.9	0	BGD	4.4		Light brown very fine SAND, trace(+) Silt, trace Shale fragments.	SP
						4.9		Light brown-tan SILT, little very fine Sand, saturated.	ML
						6.0		No Recovery	-
.04	25 100/.5	1.00	1.0	0	BGD	6.4		AA, (4.4-4.9').	ML
						7.0		Dark gray, highly weathered SHALE, wet.	-
						8.0		No Recovery	-
.05	100/.4	0.40	0.4	0	BGD			Gray, highly weathered SHALE, dry to damp.	-
								BORING TERMINATED AT 8.4'	

NOTES: Bottom of overburden at 6.5'. The following samples were collected for chemical analysis: (SB64D-4.00), (SB64D-4.01), (SB64D-4.02).

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LOG OF BORING SB64D-4

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LOG OF BORING NO. SB64D-5

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/25/94**
DATE COMPLETED: **06/25/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **6.0**
BORING LOCATION (N/E): **991240.7 740681.3**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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	4 6 7 8	2.00	1.7	0	BGD	0.3		Brown SILT, little very fine Sand, little organic material, trace fine Shale fragments, loose, moist.	ML
						1.7		Light brown SILT, some very fine Sand trace(-) fine Gravel, trace(-) organic material, loose, damp.	ML
						2.0		No Recovery	-
.02	11 11 14 16	2.00	1.6	0	BGD	3.6		Light brown very fine SAND + SILT, trace(+) very fine to fine Shale fragments, trace(-) organic material, medium stiff, dry.	ML
						4.0		No Recovery	-
.03	13 13 24 77	2.00	1.9	0	BGD	5.2		Light brown SAND + SILT, trace(+) very fine to fine Shale fragments, trace Clay, medium stiff, dry.	ML
						5.9		Light brown alternating lenses of very fine SAND, little(+) Silt, trace Clay and weathered/fractured Shale, wet.	ML
						6.0		No Recovery	
.04	74 48 100/.1	1.10	1.0	0	BGD	6.7		Weathered + fractured SHALE w/little lense of light brown very fine Sand and Silt, saturated.	-
						7.0		Gray weathered/fractured SHALE, saturated.	-
						8.0		No Recovery	-
.05	100/.2	0.20	0.1	0	BGD			Gray fractured SHALE.	-
								BORING TERMINATED AT 8.2'	

NOTES: Bottom of overburden at 5.5'. The following samples were collected for chemical analysis: SB64D-5.00(0-2"), SB64D-5.01(2"-2'), SB64D-5.02(2'-4').

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LOG OF BORING SB64D-5

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LOG OF BORING NO. SB64D-6

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/25/94**
DATE COMPLETED: **06/25/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **NA**
BORING LOCATION (N/E): **993876.2 740349.0**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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 8 16 15	2.00	1.3	0	BGD	0.6		Brown SILT, little very fine Sand, little organic material, trace(-) fine Shale, loose, moist.	ML
						1.3		Light brown SILT + very fine SAND, trace(+) very fine Shale fragments, trace(-) organic material, medium stiff, organic.	ML
						2.0		No Recovery	-
.02	24 18 35 57	2.00	1.8	0	BGD	2.3		Light brown CLAY, trace(-) Silt + very fine Sand.	CL
						2.8		Gray-brown SILT + very fine SAND, little very fine to fine Gravel (Shale), trace Clay, trace medium to coarse Shale fragments, medium stiff, moist to wet.	ML
						3.4		Olive gray-gray weathered SHALE + CLAY w/little Silt, trace organic material, dry.	GC
						3.8		Olive gray to gray highly weathered SHALE, dry.	-
						4.0		No Recovery	-
.03	25 100/.4	0.90	0.5	0	BGD	4.5		AA, (3.4-3.8'), moist to wet.	-
						6.0		No Recovery	-
.04	100/.2	0.20	0.1	0	BGD			Dark gray fractured SHALE, dry.	-
								BORING TERMINATED AT 6.2'	

NOTES: Bottom of overburden at 4.5'. The following samples were collected for chemical analysis: SB64D-6.00(0-2"), SB64D-6.01(2"-2'), SB64D-6.02(2'-4').

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LOG OF BORING NO. SB64D-7

PROJECT: SEVEN LOW PRIORITY AOCs
PROJECT LOCATION: SENECA ARMY DEPOT, ROMULUS NY
ASSOCIATED UNIT/AREA: SEAD-64D
PROJECT NO: 720518-01000
DATE STARTED: 06/24/94
DATE COMPLETED: 06/24/94
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATIONS
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 3" SPLIT SPOONS

DEPTH TO WATER (ft): 4.2
BORING LOCATION (N/E): 993532.9 740778.6
REFERENCE COORDINATE SYSTEM: New York State Plane
GROUND SURFACE ELEVATION (ft): NA
DATUM: NAD 1983
INSPECTOR: KK, LR
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	5 6 8 10	2.00	1.7	0	BGD	0.5		Brown SILT, little(-) very fine Sand, trace(+) organic material, loose, moist to wet.	ML
						1 1.5		Light brown SILT, some very fine Sand, trace weathered fine Shale fragments, trace(-) organic material, medium stiff, moist.	ML
						1.7		Light brown tan SILT + very fine SAND, loose, wet.	ML
						2.0		No Recovery	-
.02	18 18 24 40	2.00	1.6	0	BGD	2 3 3.6		Light brown-gray SILT, some very fine Sand, little(-) Clay, trace(+) Shale fragments, moist.	ML
						4.0		No Recovery	-
.03	42 100/.4	0.90	0.9	0	BGD	4		Gray highly weathered SHALE, wet to saturated (4.2-4.6'), damp to moist (4.6-4.9').	-
								BORING TERMINATED AT 4.9'	

NOTES: Bottom of overburden at 4'. Samples taken for chemical analysis were: SB64D-7.00(0-2"), SB64D-7.01(2"-2'), SB64D-7.02(2'-4').

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LOG OF BORING NO. SB64D-8

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/24/94**
DATE COMPLETED: **06/24/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **4**
BORING LOCATION (N/E): **993098.6 740816.8**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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	4 5 9 10	2.00	1.9	0	BGD	0.6		Dark brown SILT, some very fine Sand, little organics, trace very fine gray Shale fragments.	ML
						1.9		Grading from light brown to olive gray SILT, little very fine Sand, trace organics, trace very fine to fine gray Shale fragments, little iron-stained Clay, medium stiff to stiff, slightly moist.	ML-GC
						2.0		No Recovery	
.02	12 14 18 16	2.00	1.8	0	BGD	3.8		Olive-gray SILT, some very fine Sand, little heavily iron-stained Clay, little very fine to coarse gray Shale fragments, trace coarse Gravel, trace coarse gray fine fragments, fractured Shale from (3.5-3.8), stiff, slightly moist.	ML
						4.0 ▼		No Recovery	-
.03	29 65 71 100/.3	1.70	1.7	0	BGD	4.3 4.5		Gray very fine to medium SHALE fragments, some light gray Clay and Silt, saturated.	GC-GM -
						4.8		Highly fractured, slightly weathered SHALE, trace light gray Clay, saturated.	-
						5.7		Highly fractured, highly weathered SHALE, moist. AA, iron-stained medium Shale fragments from (4.5-5.7'), dry to moist.	-
								No Recovery	

BORING TERMINATED AT 5.8'

NOTES: Bottom of overburden at 4.3'. The following samples were collected for chemical analysis: SB64D-8.00 (0-2"), SB64D-8.01 (0.2-2.0'), SB64D-8.02 (2.0-4.0').

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LOG OF BORING NO. SB64D-9

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/25/94**
DATE COMPLETED: **06/25/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **4.5**
BORING LOCATION (N/E): **993140.6 741264.7**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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)
.01	4 6 14 8	2.00	2.0	0	BGD
.02	6 14 15 12	2.00	1.9	0	BGD
.03	6 4 7 10	2.00	1.9	0	BGD
.04	6 100/.2	0.70	0.7	0	BGD

Depth (ft): 1, 2, 3, 4, 5, 6

Macro Lithology boundaries (ft): 0.2, 0.8, 1.2, 2.0, 2.8, 3.2, 3.5, 3.9, 4.0, 4.5, 4.9, 5.4, 5.9, 6.0, 6.4, 6.7

DESCRIPTION	USCS
Dark brown SILT, little Clay, little very fine Sand, little organics, loose, moist.	ML
Light brown to brown SILT and very fine SAND, trace very fine Gravel, trace organics, medium stiff to soft, slightly moist.	ML
Brown SILT, little iron-stained Clay, trace very fine Sand, trace very fine to fine gray Shale fragments, trace organics, medium stiff.	ML
Gray-brown CLAY and + highly fractured, weathered, iron-stained SHALE, little Silt, medium soft to soft, moist.	GC
AA(.8-1.2')	GC
AA, little very fine Sand.	CL
Light brown very fine to fine SAND, trace fine to medium gray Shale fragments, little coarse sand-sized gray Shale fragments, little Silt, iron-stained, wet.	SW
Fractured, weathered, iron-stained SHALE fragments and light brown, iron-stained Silt and very fine Sand, wet to moist.	GM
No Recovery	
Brown SILT + very fine SAND, little fine to coarse gray Shale fragments, iron-stained, soft, moist to wet.	ML
AA, saturated.	ML
Light brown very fine to medium SAND, trace very fine to fine gray SHALE fragments, loose, saturated.	SW
Light gray, iron-stained CLAY and very fine to coarse, weathered gray SHALE fragments, trace very fine Sand, soft, wet.	CL
No Recovery	
Olive gray SILT and CLAY, very fine to coarse gray Shale fragments, loose, saturated.	CL
Gray, fractured, weathered, iron-stained, coarse gray Shale fragments, saturated.	-
No Recovery	

BORING TERMINATED AT 6.8'

NOTES: Bottom of overburden at 6.4'. The following samples were collected for chemical analysis: SB64D-9.00(0-2"), SB64D-9.01(2"-2'), SB64D-9.02(2'-4').

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LOG OF BORING NO. SB64D-10

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/25/94**
DATE COMPLETED: **06/25/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **5.0**
BORING LOCATION (N/E): **992967.4 741344.7**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **NA**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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 4 5 5	2.00	1.6	0	BGD	0.7		Dark brown SILT, little organics, moist.	ML
						1.4		Little brown, iron-stained SILT and CLAY, trace very fine Sand, trace organic, trace(-) very fine gray Shale fragments, medium stiff, moist.	ML
						1.6		Brown SILT, trace iron-stained Clay, little very fine to fine gray Shale fragments, soft to medium stiff, moist.	ML
						2.0		No Recovery	-
.02	9 15 18 18	2.00	2.0	0	BGD	2.5		AA (1.4-1.6'), medium stiff.	ML
						3.3		Light iron stained CLAY, trace very fine to fine gray Shale fragments, stiff, slightly moist.	CL
.03	8 12 19 10	2.00	1.1	0	BGD	4.3		Olive gray SILT, little very fine Sand, trace Clay, little very fine to fine gray Shale fragments, stiff to medium stiff, slightly moist	ML
						5.0		AA, (2.5-3.3'), trace decayed organics.	CL
						5.2		Light brown very fine SAND and SILT, little weathered fine gray Shale fragments, soft, saturated.	ML
						6.0		No Recovery	-
.04	19 24 27 30	2.00	1.0	0	BGD	6.7		Slightly weathered, highly fractured, coarse gray SHALE fragments, iron-stained, saturated.	GW
						7.0		Olive gray CLAY and very fine to coarse gray SHALE fragments, saturated.	GC
						8.0		No Recovery	-
.05	85 55 50 100/.1	1.60	0.7	0	BGD	8.7		Gray fractured SHALE, trace iron staining, saturated.	-
								No Recovery	-
								BORING TERMINATED AT 9.6'	

NOTES: Bottom of overburden at 6.0'. The following samples were collected for chemical analysis: SB64D-10.00(0-2"), SB64D-10.01(2"-2'), SB64D-10.03(4'-5.1').

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LOG OF BORING SB64D-10

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LOG OF BORING NO. MW64D-1

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **03/28/94**
DATE COMPLETED: **03/28/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **3.0**
BORING LOCATION (N/E): **993059.7 741523.1**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **666.6**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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	1 2 6 8	2.00	1.5	0	BGD	1 1.2		Dark brown SILT, little organic, trace fine to medium Shale fragments and Gravel, soft, moist.	ML
						1.5		Light green-gray CLAY, iron staining, medium stiff, moist.	CL
						2.0		No Recovery	-
.02	9 18 40 40	2.00	1.7	0	BGD	2 2.7		Light olive gray CLAY, little fine to medium Shale fragments, trace Silt, soft, wet, iron staining.	CL
						3.0		Olive gray CLAY, some fine to medium Shale fragments, trace very fine Sand, trace Silt, very soft, wet to saturated.	CL
						3 3.7		Gray fractured, slightly weathered, SHALE, trace Silt, loose, saturated.	GM
						4.0		No Recovery	-
.03	30 39 100/.3	1.30	1.3	0	BGD	4 4.4		Gray fractured + weathered SHALE fragments and olive gray CLAY, trace very fine Sand, loose, saturated.	GC
						5.0		Gray fractured, SHALE, trace olive gray Clay, loose, saturated.	GC
						5 5.2		Light gray CLAY, iron staining, stiff, moist	CL
								Gray SHALE.	-

BORING TERMINATED AT 5.3'
AUGER REFUSAL

NOTES: Bottom of overburden at 3.0'. No samples were collected for chemical analysis.

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LOG OF BORING MW64D-1

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LOG OF BORING NO. MW64D-2

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/21/94**
DATE COMPLETED: **06/21/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **3" SPLIT SPOONS**

DEPTH TO WATER (ft): **3.6**
BORING LOCATION (N/E): **993638.6 740197.6**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **633.7**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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 2 3 4	2.00	1.2	0	BGD	0.3	Dark brown SILT + very fine SAND, trace fine Gravel, some organics, soft, moist.	ML
						0.9	Brown SILT + CLAY, trace organics, very soft, moist to wet.	ML
						1.2	Tan-pink CLAY, little(-) brown Silt, trace fine Gravel, medium stiff, moist.	CL
						2.0	No Recovery	-
.02	3 5 5 6	2.00	2.0	0	BGD	3.3	AA (0.9-1.2'), yellow, red, pink, gray, light brown Clay, trace fine Gravel, trace medium Sand, medium stiff, moist.	CL
						3.4	Red + pink fine SAND, wet to saturated.	SP
						4.0	Brown-gray SILT + very fine SAND, little fine gray Shale fragments, little coarse Sand-sized gray Shale fragments, wet to saturated.	ML
.03	5 8 9 15	2.00	2.0	0	BGD	4.7	Gray fine to medium SHALE fragments + brown-gray very fine SAND, little Silt, loose, saturated.	GM
						5.1	Light gray CLAY + SILT, little fine gray Shale fragments, little coarse gray Shale fragments, soft, saturated.	ML
						6.0	Gray fine to coarse SHALE fragments + brown-gray, iron-stained SILT, loose, saturated.	GM
.04	21 38 45 59	2.00	1.3	0	BGD	6.4	Gray fine to medium SHALE fragments + gray SILT, saturated.	GM
						6.9	Gray highly fractured SHALE, trace gray Silt, saturated.	-
						7.3	AA, (6-6.4').	GM
						8.0	No Recovery	-
.05	100/.5	0.50	0.5	0	BGD	8.5	Gray coarse SHALE fragments + gray-brown CLAY + SILT, soft, saturated.	GM-GC
.06	100/.1	0.10	0	NA	NA	9	No Recovery	-
							BORING TERMINATED AT 9'	

NOTES: Bottom of overburden at 8.0'. No samples were collected for chemical analysis.

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Romulus, New York

LOG OF BORING MW64D-2

Sheet 1 of 1

LOG OF BORING NO. MW64D-3

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/20/94**
DATE COMPLETED: **06/20/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" SPLIT SPOONS**

DEPTH TO WATER (ft): **6.4**
BORING LOCATION (N/E): **993017.4 740735.8**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **647.3**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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 4 5	2.00	1.3	0	BGD	0.1		Dark brown SILT, some organics, soft, moist.	ML
						1 1.3		Grading from SILT + some Clay, to CLAY + some Silt, dark brown to tan, trace organics, trace(-) fine Gravel, soft, moist.	ML
						2.0		No Recovery	-
.02	8 10 15 17	2.00	1.6	0	BGD	2 2.3		AA (1.0-1.3'), tan Clay, some Silt, soft, iron-stained.	CL
						2.9		Tan-gray, heavily iron-stained CLAY, little Silt, trace organics, trace fine gray Shale fragments, stiff, dry.	CL
						3 3.1		Limestone Cobble.	-
						3.6		AA, (2.3-2.9'), some fine Sand, wet (3.2-3.4'), dry (3.4-3.6'), medium Shale fragments (3.6').	CL
						4.0		No Recovery	-
.03	16 20 20 20	2.00	2.0	0	BGD	4 5 5.7		Brown SILT + very fine SAND, some fine to medium gray Shale fragments, trace coarse Sand-sized gray Shale fragments, moist to wet.	ML
						6.0		AA, trace fine Shale fragments, loose, wet.	ML
.04	27 55 100/.4	1.40	1.4	0	BGD	6 6.4		Brown SILT + CLAY + gray fine to medium weathered SHALE fragments, stiff, moist, iron-stained.	GM-GC
						6.8		Gray weathered SHALE, trace Silt, loose, saturated.	-
						7.0		AA, (6.0-6.4').	ML
						7 7.4		Gray highly weathered SHALE, dry.	-
								No Recovery	-
								BORING TERMINATED AT 7.8'	

NOTES: Bottom of overburden at 7'. No samples were collected for chemical analysis.

Sheet 1 of 1

LOG OF BORING NO. MW64D-4

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/20/94**
DATE COMPLETED: **06/20/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" SPLIT SPOONS**

DEPTH TO WATER (ft): **3.5**
BORING LOCATION (N/E): **992533.5 741082.2**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **659.7**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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	4 7 9 12	2.00	1.5	0	BGD	0.4		Brown SILT + very fine SAND, little organics, trace(-) fine gray Shale fragments, soft, moist.	ML
						0.5		Gray fractured SHALE fragments, trace brown Silt, dry.	
						1.0		Red CLAY, little(-) brown Silt, trace organics, soft, moist.	CL
						1.3		Gray fractured SHALE fragments, dry.	-
						1.5		Fine to medium gray SHALE fragments + brown SILT + CLAY, trace very fine Sand, soft, moist.	GM-GC
						2.0		No Recovery	-
.02	40 38 15 12	2.00	1.9	0	BGD	2.5		AA, (1.3-1.5').	ML
						3.5		Gray highly weathered SHALE, dry. Also, .01 lense of light brown, moist Clay at (2.6'), (2.9'), and (3.2').	-
						3.9		Brown SILT, and very fine to fine Sand, little fine gray Shale fragments, soft, saturated.	ML
						4.0		No Recovery	
.03	6 7 9 8	2.00	1.7	0	BGD	4.3		Brown SILT, fine Sand and very fine Sand, little coarse Sand-sized gray Shale fragments, trace fine gray Shale fragments, soft, saturated.	ML
						4.6		Fine to coarse SAND, trace Shale fragments, trace Silt, loose, saturated.	SM
						4.8		SILT, very fine SAND + coarse SHALE fragments, loose, saturated.	GM
						5.2		AA, (4.3-4.6'), saturated.	GM
						5.7		AA, (5.2-5.7'), 4-4.3'), saturated.	GM
						6.0		No Recovery	-
.04	9 14 12 18	2.00	2.0	0	BGD	6.2		AA, (4.3-4.6), saturated.	GM
						6.4		Gray CLAY + fine to medium gray SHALE fragments, medium stiff, moist.	GC
						6.7		AA, (4.6-4.8'), wet to saturated.	GC
						6.9		Gray weathered + fractured SHALE, moist iron-stained.	-
						7.1		AA, (6.2-6.4'), iron-stained, moist.	CL
						7.5		Gray fractured SHALE, trace Silt, saturated.	-
.05	100/.3	0.30	0.3	0	BGD	8.3		Gray highly weathered SHALE, dry to moist, trace iron staining.	-
								No Recovery BORING TERMINATED AT 9.9'	-

NOTES: Bottom of overburden at 7.5'. No samples were collected for chemical analysis.

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LOG OF BORING MW64D-4

Sheet 1 of 1

Sheet 1 of 1

LOG OF BORING NO. MW64D-5

PROJECT: **SEVEN LOW PRIORITY AOCs**
PROJECT LOCATION: **SENECA ARMY DEPOT, ROMULUS NY**
ASSOCIATED UNIT/AREA: **SEAD-64D**
PROJECT NO: **720518-01000**
DATE STARTED: **06/22/94**
DATE COMPLETED: **06/22/94**
DRILLING CONTRACTOR: **EMPIRE SOILS INVESTIGATIONS**
DRILLING METHOD: **HOLLOW STEM AUGER**
SAMPLING METHOD: **2" SPLIT SPOONS**

DEPTH TO WATER (ft): **6.2**
BORING LOCATION (N/E): **991371.4 740724.3**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **651.0**
DATUM: **NAD 1983**
INSPECTOR: **KK, LR**
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 2 4 7	2.00	1.3	0	BGD	0.4		Dark brown SILT, little organics, soft, moist.	ML
						1.0		Light brown SILT, little Clay, trace(-) fine gray Shale fragments, trace organics, soft, moist.	ML
						1.3		Gray brown SILT, soft, moist.	ML
						1.4		Gray limestone Cobble.	
						2.0		No Recovery	-
.02	12 18 15 14	2.00	2.0	0	BGD	2.6		Gray fine to medium SHALE fragments, medium to highly weathered, some light gray to light brown Silt + Clay, slightly moist.	GM-GC
						3.1		Light brown very fine SAND + SILT, little fine gray Shale fragments, little coarse gray Shale fragments, medium dense, moist to wet.	ML
						4.0		Light brown SILT + fine to medium weathered gray Shale fragments, trace fine Sand, medium stiff, moist to wet.	ML
.03	7 8 49 64	2.00	1.7	0	BGD	4.9		Light brown very fine SAND + fine to medium gray Shale fragments, medium to highly weathered, little coarse gray Shale fragments, saturated to wet.	GM
						5.5		Gray highly weathered SHALE, dry.	-
						5.7		Light brown SILT + very fine SAND, some fine to medium gray weathered Shale fragments, wet to moist.	SM
						6.0			-
.04	58 100/.2	0.70	0.7	0	BGD	6.2		No Recovery	-
						6.7		Highly weathered SHALE, dry to moist.	GM
								Gray fine to medium SHALE fragments, little light brown Silt, saturated.	
								No Recovery	-

BORING TERMINATED AT 7.2'

NOTES: Bottom of overburden at 6.7'. No samples were collected for chemical analysis.

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LOG OF BORING MW64D-5

Sheet 1 of 1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: USACOE

TEST PIT #: TP64D-1

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/13/94
COMPLETION DATE: 6/13/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
20'	3'	8'	BACKHOE

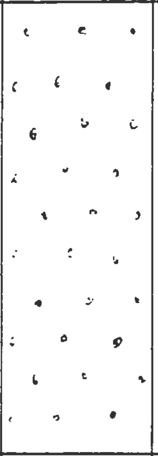
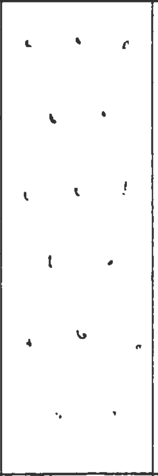
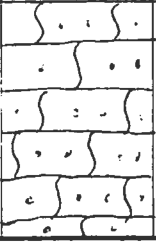
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	0930am / 6/13/94
VICTOREEN-190	pancake	10-15 µR/Hr	0930am / 6/13/94

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
	0 ppm				Top Soil	
1 2	0ppm BKGD				1" Light Brown SILT (Fill) with Domestic waste	
3 4	3.7ppm BKGD				2' Little Light Brown SILT (Fill) in Domestic waste	Found: metal cans, glass, Trash bags (Full) Lamp Carpet Paint can
5	0ppm BKGD				4' Light Gray SILT with Shale Clasts	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: 64D-1

PAGE 1 OF 1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: USACOE

TEST PIT #: TP64D-2

PROJECT: 15 SWMU ESI
LOCATION: ROMULUS, NY

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/13/94
COMPLETION DATE: 6/13/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
32'	2'3"	4'	BACKHOE

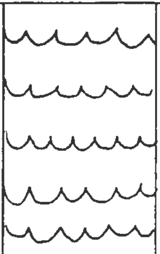
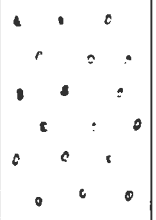
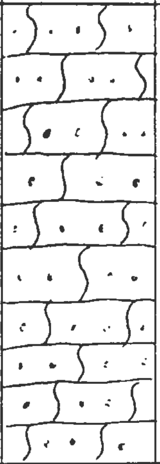
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0 PPM	1030 Am / 6/13/94
VICTOREEN-190	pancake	10-15 µR/Hr	1030 Am / 6/13/94

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				Topsoil One 15' Long Section of 8 gauge wire found at 2"	
2	0ppm BKGD				1'1" Light Brown Silt	
3 4	0ppm BKGD				2'1" Olive Gray Silt w/ Shale Clasts 3" ID; 4" ID Red clay pipe at 2' 3" -- pipe Runs E-W, was Dry and not Back Filled.	
5					▽ 4'2" Bottom of Pit Weathered Shale with Some olive Gray Silt	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP64D-2

PAGE 1 OF 1

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	**CLIENT:** USACOE	**TEST PIT #:** TP64D-3

PROJECT: 15 SWMU ESI
LOCATION: Romulus NY

JOB NUMBER: 720518
EST. GROUND ELEV.
INSPECTOR: JWC/ABS
CONTRACTOR: ES/ESI
START DATE: 6/13/94
COMPLETION DATE: 6/13/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
13'	3'	4'	BACKHOE

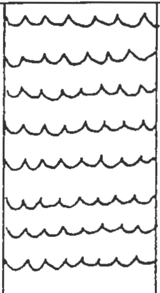
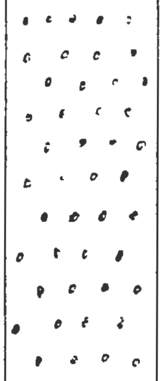
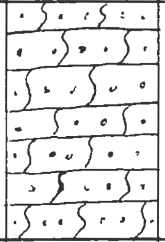
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0eV	0 ppm	1145 Am / 6/13/94
Victoreen 190	pancake	10-15 µR/Hr	1145 Am / 6/13/94

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	0 ppm/ BKGD				Topsoil, Root systems - Debris on Surface: 6" ID clay pipes, metal fencing, Drums, cans.	
2 3	0 ppm/ BKGD				1'3" Light Brown Silt	
4	0 ppm/ BKGD				3'0" Olive gray Silt with Some shale clasts	
5					Bottom of pit: 4'0" Weathered Shale with Some Olive gray Silt	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP64D-3

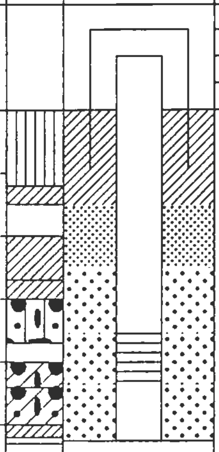
COMPLETION REPORT OF WELL No. MW64D-1

PROJECT:	SEVEN LOW PRIORITY AOCs	WELL LOCATION (N/E):	993059.7 741523.1
PROJECT LOCATION:	SENECA ARMY DEPOT, ROMULUS NY	REFERENCE COORDINATE SYSTEM:	New York State Plane
DRILLING CONTRACTOR:	EMPIRE SOILS INVESTIGATIONS	GROUND SURFACE ELEVATION (ft):	666.6
DRILLING METHOD:	HOLLOW STEM AUGER	DATUM:	NAD 1983
WELL INSTALLATION STARTED:	03/28/94	GEOLOGIST:	K.KELLY
WELL INSTALLATION COMPLETED:	03/28/94	CHECKED BY:	FO

STRATA

MICRO DESCRIPTION (from boring log)	DEPTH (ft)
	0
ML	
CL	
-	
CL	
CL	
GM	
-	
GC	
GC	5
CL	5.3
-	

SYMBOL / WELL DETAILS



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	666.6
1.5	TBS	665.1
2.5	TSP	664.1
3.6	TSC	663.1
4.4	BSC	662.3
5.3	POW	661.4

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: 4
Type: RISER
Interval: 3.5

RISER
Diameter: 2
Type: SCH. 40-PVC
Interval: 4.2

SCREEN
Diameter: 2
Type: SCH. 40-PVC/0.010
Interval: .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: 2.75

WELL DEVELOPMENT DATA
Date: 6/25/94
Method: BAIL/PUMP
Duration: 3 DAYS
Rate: .232 L/MIN

WATER LEVELS

	Date	Time	Depth,TR
▽	6/23	1430	4.71
▼	6/25	1315	5.5
▽			
▽			
▽			
▼			

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.45	15.9	700	2.5

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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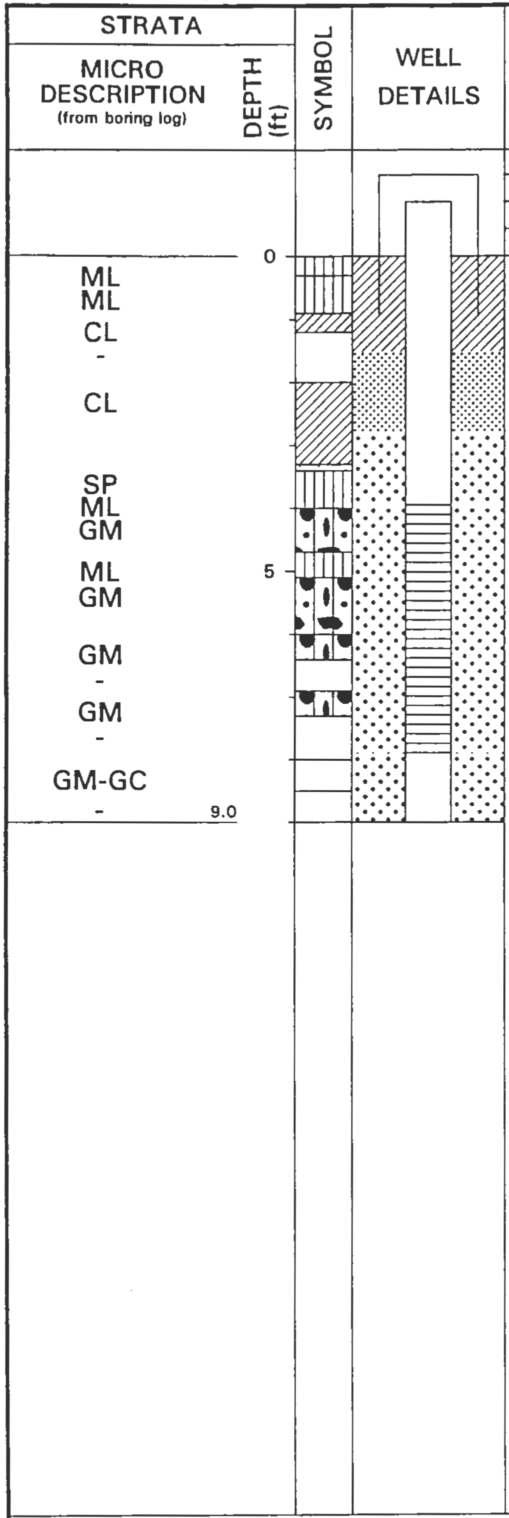
COMPLETION REPORT OF
WELL No. MW64D-1

Sheet 1 of 1

COMPLETION REPORT OF WELL No. MW64D-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: **06/21/94**
WELL INSTALLATION COMPLETED: **06/21/94**

WELL LOCATION (N/E): **993638.6 740197.6**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **633.7**
DATUM: **NAD 1983**
GEOLOGIST: **K.KELLY**
CHECKED BY: **FO**



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	633.7
1.5	TBS	632.2
2.8	TSP	630.9
4.0	TSC	629.8
7.9	BSC	625.8
9.0	POW	624.7

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: **3.95**

SURFACE SEAL
Type: **CEMENT**
Interval: **1.5**

GROUT
Type: **N/A**
Interval: **N/A**

SEAL
Type: **BENTONITE PELLETS**
Interval: **1.3**

SANDPACK
Type: **#1, #3**
Interval: **6.3**

WELL DEVELOPMENT DATA
Date: **6/28/94**
Method: **BAIL**
Duration: **170 MIN**
Rate: **.720 L/MIN**

WATER LEVELS

	Date	Time	Depth,TR
▽	6/28	0955	4.05
▼	6/28	1240	4.48
▽			
▽			
▽			
▼			

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.2	14	450	2.54

LEGEND

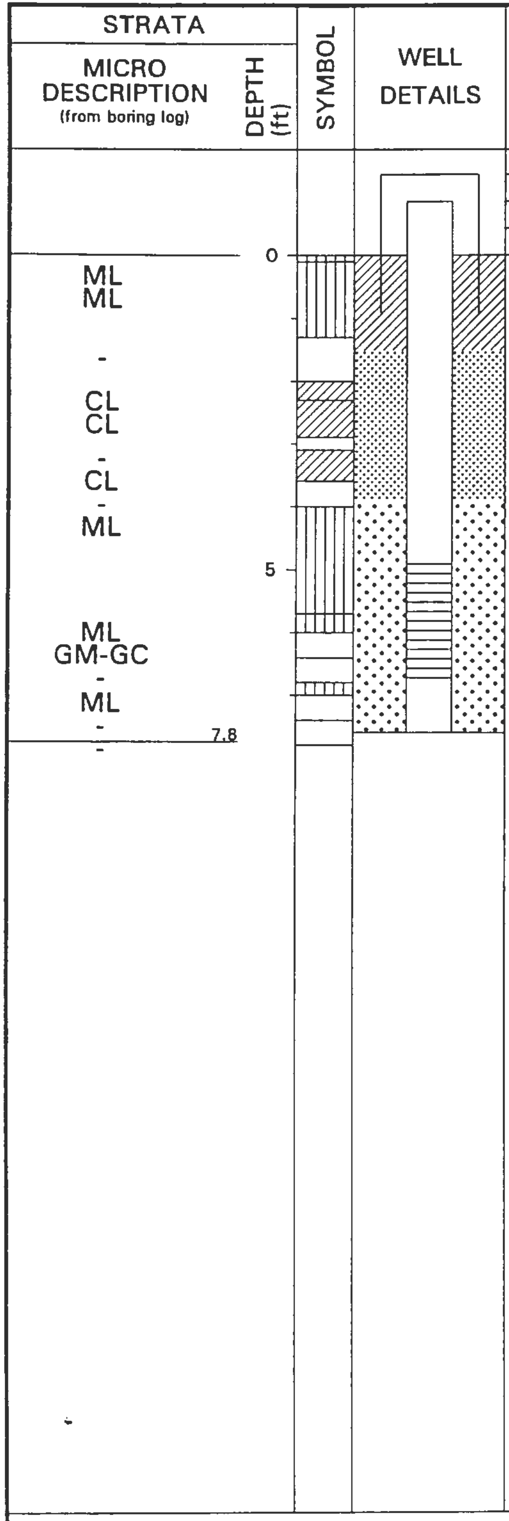
▨	SURFACE SEAL	●	GRAVEL
▩	GROUT	⋰	SAND
░	SEAL	▥	SILT
⁘	SANDPACK	▨	CLAY
		☒	NO RECOVERY

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

COMPLETION REPORT OF WELL No. MW64D-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: **06/20/94**
WELL INSTALLATION COMPLETED: **06/20/94**

WELL LOCATION (N/E): **993017.4 740735.8**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **647.3**
DATUM: **NAD 1983**
GEOLOGIST: **K.KELLY**
CHECKED BY: **FO**



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	647.3
1.5	TBS	645.8
3.9	TSP	643.4
4.9	TSC	642.4
6.9	BSC	640.4
7.6	POW	639.7

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: **4**
Type: **RISER**
Interval: **3.5**

RISER
Diameter: **2**
Type: **SCH. 40-PVC**
Interval: **6.15**

SCREEN
Diameter: **2**
Type: **SCH. 40-PVC/0.010**
Interval: **1.95**

SURFACE SEAL
Type: **CEMENT**
Interval: **1.5**

GROUT
Type: **N/A**
Interval: **N/A**

SEAL
Type: **BENTONITE PELLETS**
Interval: **2.4**

SANDPACK
Type: **#1, #3**
Interval: **4.2**

WELL DEVELOPMENT DATA
Date: **6/27/94**
Method: **BAIL/PUMP**
Duration: **110 MIN**
Rate: **VARIABLE**

WATER LEVELS

	Date	Time	Depth,TR
▽	6/27	1445	3.72
▼	6/27	1435	4.90
▽			
▽			
▽			
▽			
▼			

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.30	13.5	500	12

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

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Romulus, New York

COMPLETION REPORT OF
WELL No. MW64D-3

COMPLETION REPORT OF WELL No. MW64D-4

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: **06/20/94**
WELL INSTALLATION COMPLETED: **06/20/94**

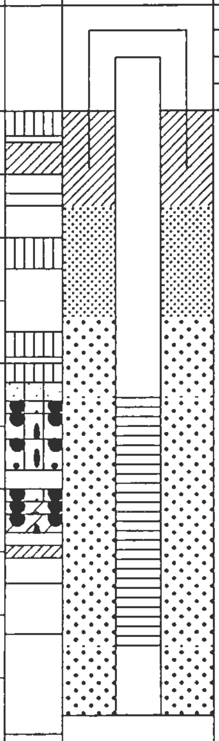
WELL LOCATION (N/E): **992533.5 741082.2**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **659.7**
DATUM: **NAD 1983**
GEOLOGIST: **K.KELLY**
CHECKED BY: **FO**

STRATA

MICRO DESCRIPTION (from boring log) | DEPTH (ft)

0
ML
-
CL
-
GM-GC
-
ML
-
ML
-
ML
SM
5
GM
GM
GM
-
GM
GC
GC
-
CL
-
-
-
9.9

SYMBOL / WELL DETAILS



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	659.7
1.5	TBS	658.2
3.3	TSP	656.5
4.6	TSC	655.2
8.5	BSC	651.2
9.6	POW	650.1

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: **3.95**

SURFACE SEAL
Type: **CEMENT**
Interval: **1.5**

GROUT
Type: **N/A**
Interval: **N/A**

SEAL
Type: **BENTONITE PELLETS**
Interval: **1.75**

SANDPACK
Type: **#1, #3**
Interval: **6.6**

WELL DEVELOPMENT DATA
Date: **6/27/94**
Method: **BAIL**
Duration: **124 MIN**
Rate: **.540 L/MIN**

WATER LEVELS

Date	Time	Depth,TR
6/27	0900	7.94
6/27	1100	8.42

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.09	12	500	1.41

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

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COMPLETION REPORT OF
WELL No. MW64D-4

COMPLETION REPORT OF WELL No. MW64D-5

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: **06/22/94**
WELL INSTALLATION COMPLETED: **06/22/94**

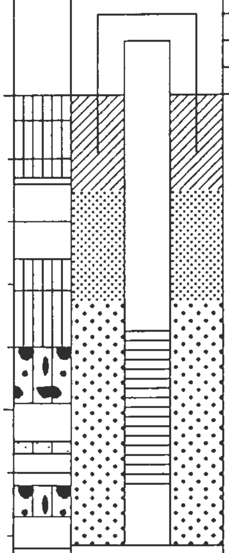
WELL LOCATION (N/E): **991371.4 740724.3**
REFERENCE COORDINATE SYSTEM: **New York State Plane**
GROUND SURFACE ELEVATION (ft): **651.0**
DATUM: **NAD 1983**
GEOLOGIST: **K.KELLY**
CHECKED BY: **FO**

STRATA

MICRO DESCRIPTION (from boring log) / DEPTH (ft)

0
ML
ML
ML
-
-
GM-GC
ML
ML
GM
5
-
SM
-
-
GM 7.2
-

SYMBOL / WELL DETAILS



DEPTH (ft)		ELEVATION (ft)
	TPC	
	TR	
	TC	
0.0	GS	651.0
1.5	TBS	649.5
3.3	TSP	647.8
3.8	TSC	647.3
6.3	BSC	644.7
7.2	POW	643.9

WELL CONSTRUCTION DETAILS

PROTECTIVE COVER
Diameter: **4**
Type: **RISER**
Interval: **3.5**

RISER
Diameter: **2**
Type: **SCH. 40-PVC**
Interval: **5.9**

SCREEN
Diameter: **2**
Type: **SCH. 40-PVC/0.010**
Interval: **1.95**

SURFACE SEAL
Type: **CEMENT**
Interval: **1.5**

GROUT
Type: **N/A**
Interval: **N/A**

SEAL
Type: **BENTONITE PELLETS**
Interval: **1.75**

SANDPACK
Type: **#1, #3**
Interval: **3.85**

WELL DEVELOPMENT DATA
Date: **7/10/94**
Method: **BAIL/PUMP**
Duration: **10 DAYS**
Rate: **.411 L/MIN**

WATER LEVELS

	Date	Time	Depth,TR
∇	6/28	1330	7.26
▼	7/10	1535	6.06
▼	7/10	1635	6.64
▼			
∇			
▼			

Final Measurements:

pH	Temperature (degrees C)	Conductivity (micromhos/cm)	Turbidity (NTU)
7.00	13.3	470	15

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

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Romulus, New York

COMPLETION REPORT OF WELL No. MW64D-5

WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** USACOE | **WELL #:** MW64D-1

PROJECT : 15 SWMU ESI (SEAD- 64D
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY
DATE: 6/23/94
PROJECT NO. :

DRILLING METHOD (s): HSA
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Teflon Bailer
INSTALLATION DATE: 3/28/94

INSPECTOR: KKS
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/23
END DEVELOPMENT DATE: 6/25

WATER DEPTH (TOC): 4.71 ft
WELL DIA. (ID CASING): 2.0" ft
BORING DIAMETER: 8.5" ft

Stickup = 1.0'
INSTALLED POW DEPTH(~~TOC~~) G.S.: 5.25 ft
MEASURED POW DEPTH(TOC): 6.24 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 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

1.53 x .163
STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = .25 GAL. = A

STANDING WATER IN ANNULAR SPACE = 1.53 x (2.95 - .163) x .3
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR - WELL DIAM. FACTOR) X 0.3 = 1.28 GAL. = B

SINGLE STANDING WATER VOLUME = A + B = ... 1.53 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 7.65 GALS.
3x = 4.6

1/24
ods of rain
wy at
times

	DATE	ACTIVITY	STARTING H20 DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
	6/23	surge	4.71 ~~6.24~~ toc	1430	1450	20	1 gal				Dark Brown	1000+	6.1 DRY
	6/25	surge	3.88	1107	1122	15	1.5 gal				Light Brown	1000+	6.0 Dry
60 ml/min	6/25	pump 1st (B)	4.30	1200	1220	20	1.5	7.43	700	16.0	lighter ~~Brown~~ clear	23.0	6.3 Dry
85 ml/min	6/25	pump 2nd	5.30 ~~4.20~~	1230	1305	35	1.5	7.42	675	15.8	clear	14.0	6.0
50 ml/min	6/25	pump 3rd	5.5	1315	1345	30	1.5	7.45	700	15.9	clear	2.5	5.6
							Complete						
	TOTALS/FINAL						7						

RECOVERY
GOOD [✓ FAIR] [✓ POOR]

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/23	6/25			
VOLUME	1 gal	6 gals			
DRUM #	640-3	63-2			

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW64D-1

6/25 Recovers 0.1'/20 sec
0.3/1 min @ 5.5',
.1/2 min @ 4.9'

Note: needs Stamp

H:\ENG\SENECA\15SWMU\FIELDFMS\WELLDEV.WK3

WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. **CLIENT:** USACOE

WELL #: MW64D-2

PROJECT: 15 SWMU ESI (SEAD- 64D

LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

DATE: 6/28/94

PROJECT NO.: 720518

DRILLING METHOD (s): HSA

PUMP METHOD (s): peristaltic

SURGE METHOD (s): teflon bailer

INSTALLATION DATE: 6/22/94

(measured 6/28 after rain)

INSPECTOR: ES

CONTRACTOR:

CREW:

START DEVELOPMENT DATE: 6/28/94

END DEVELOPMENT DATE: 6/28/94

stickup = 1.34 ft

WATER DEPTH (TOC): (4.05) 5.58 ft

WELL DIA. (ID CASING): 2" ~~ft~~

BORING DIAMETER: 8.5" ~~ft~~

INSTALLED POW DEPTH(~~TOC~~): GS 9.0 ft

MEASURED POW DEPTH(TOC): 10.34 ft

SILT THICKNESS: ft

POW AFTER DEVELOPMENT: 10.36 ft

4.14 TSO
5.58 ∇
10.34

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

Values in parentheses are for ∇ at 4.05. Using TSC at 4.14

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = 0.8 (1.0) GAL. = A

(10.34 - 5.58) = 4.76 4.76 x .163

using 4.05' ∇ (10.34 - 4.05 = 6.29) 6.29 x .163

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR - WELL DIAM. FACTOR) X 0.3 = 4 (5.2) GAL. = B

4.76 (2.95 - .163) .3

6.29 x 2.787 x .3

SINGLE STANDING WATER VOLUME = A + B = ... 4.8 (6.0) GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 24 (30) GALS.

Flow Rate
.720
720

DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
6/28	surging	4.05	9:55	10:15	20 min	3						4.26
	1st vol cont.	4.10	10:30	10:50	20 min.	3	7.23	475	15°c	H. brn.	1000 +	4.44
	2nd vol.	4.44	10:50	11:20	30 min.	6	7.24	475	14.5°c	clearing	9.1	4.46
	3rd vol	4.46	11:20	11:25	5 min	1						
	Surge # 2	4.14	11:30	11:50	20 min	6						4.16
4th	4th vol.	4.48	11:50	12:15	25 min	6	7.24	475	15°c	cloudy	212	4.46
5th	5th vol.	4.46	12:15	12:40	25 min	6	7.23	450	14°c	clear	6.85	4.48
	6th vol.	4.48	12:40	13:05	25 min	6	7.20	450	14°c	clear	2.54	4.46
TOTALS/FINAL						37						

RECOVERY

[✓ GOOD] FAIR POOR

after rain

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/28				
VOLUME	37				
DRUM #	640-9W				

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS **WELL #:** MW64D-2

WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC. CLIENT: AcoE WELL #: MW64D-3

PROJECT: SEAD - 15 SWMU
LOCATION: SEAD - 64D
DATE: 6-27-94
PROJECT NO.: 720518

DRILLING METHOD (s): HSA
PUMP METHOD (s): Peristaltic
SURGE METHOD (s): Teflon Bailer
INSTALLATION DATE:

INSPECTOR: F KKS
CONTRACTOR: –
CREW: –
START DEVELOPMENT DATE: 6-27-94
END DEVELOPMENT DATE: 6-27-94

WATER DEPTH (TOC): 3.72 ft
WELL DIA. (ID CASING): 2.0" ft
BORING DIAMETER: 8.5" ft

INSTALLED POW DEPTH(TOC): ft
MEASURED POW DEPTH(TOC): 9.22 ft
SILT THICKNESS: 0 ft
POW AFTER DEVELOPMENT: 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

5.5 - .163
STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = .9 GAL. = A

4.0 x 2.787 x .3
STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 3.34 GAL. = B

SINGLE STANDING WATER VOLUME = A + B = ... 4.25 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 21.25 GALS.

ACTIVITY	Start Depth	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	NTU OTHER	Stop Depth
Surge	3.72 ~~4.20~~	1445	1505	20	5				Dark Brown	1000+	5.5
Pump	4.20	1515	1535	20	5	7.20	500	14.1	Silty	100+	5.0
Pump	4.50	1540	1550	10	5	7.37	500	14.5		6.0	4.5
Surge		1555	1605	10	5				Dark Brown	1000+	4.7
Pump	4.7	1605	1625	20	5	7.49	500	13.9	silty	100+	4.8
Pump	4.8	1625	1435	10	5	7.38	490	13.6	clear	3.3	4.9
Pump	4.9	1435	1455	20	5	7.30	500	13.5	clear	12	4.7
							Complete				
TOTALS/FINAL					35						

COMMENTS:

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW64D-3

Waste
Date 6/27
Volume 35
Drum # 64D-3

Note - no pressure cap

ver. 05–Nov–93

WELLDEV.WK1

Needs well caps!

WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: USACOE

WELL #: MW64D - 4

PROJECT: 15 SWMU ESI (SEAD- 64D)

LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

DATE: 6/27/94

PROJECT NO.: 720518

DRILLING METHOD (s): HSA

PUMP METHOD (s): peristaltic

SURGE METHOD (s): teflon bailer

INSTALLATION DATE: 6/20/94

INSPECTOR: ES

CONTRACTOR:

CREW:

START DEVELOPMENT DATE: 6/27/94

END DEVELOPMENT DATE: 6/27/94

stickup = 1.62

WATER DEPTH (TOC): 7.94 ft

WELL DIA. (ID CASING): 2" ft

BORING DIAMETER: 8.5" ft

INSTALLED POW DEPTH(TOC): 9.6 ft

MEASURED POW DEPTH(TOC): 11.22 ft

SILT THICKNESS: ft

POW AFTER DEVELOPMENT: 11.22 ft

.87 TSP
.94 ▽
.12 BSC
22 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

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = .5 GAL. = A

(11.22 - 7.94) .163

STANDING WATER IN ANNULAR SPACE =

WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR - WELL DIAM. FACTOR) X 0.3 = 2.7 GAL. = B

11.22- 7.94 = 3.28 3.28 (2.95 - .163).3 =

SINGLE STANDING WATER VOLUME = A + B = ... 3.2 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 16 GALS.

Flow Rate
540 ml/m

DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
6/27	surging	7.94	9:00	9:25		5					1000+	8.36
	2nd vol,	7.97	9.30	10:05		3.2	7.14	500	13°C	clear	3.02	8.30
	3rd vol,	8.30	10:05	10:25		3.2	7.14	500	13°C	clear	5.46	8.32
	surge	8.32	10.30	10:40		4					1000+ *	8.52
	4th vol,	8.38	10:41	11.00		3.2	7.09	500	13°C	clear	4.44	8.42
	5th vol.	8.42	11:00	11:15		3.2	7.09	500	12°C	clear	1.41	8.36
TOTALS/FINAL						21.8						

RECOVERY

[✓ GOOD] FAIR POOR

* Turbidity reading

begin of pumping after surge # 2	130.0
after 1 gal pumped	20.9
after 1 vol. (3.2 gal)	4.44

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/27				
VOLUME	21.8				
DRUM #	~~64D 7W~~ 64D-	13 W			

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW64D-4

H:\ENG\SENECA\15SWMU\FIELDFMS\WELLDEV.WK3

pg 1 of 3

WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC.
CLIENT: USACOE
WELL #: MW64D-5

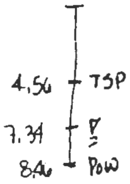
PROJECT: 15 SWMU ESI (SEAD- 64D)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY
DATE: 6/27/94
PROJECT NO.: 720518

DRILLING METHOD (s): HSA
PUMP METHOD (s): peristaltic
SURGE METHOD (s): teflon bailer
INSTALLATION DATE: 6/22/94

INSPECTOR: ES
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/27/94
END DEVELOPMENT DATE: 7/6/94
Stickup = 1.31

WATER DEPTH (TOC): 7.34 ft
WELL DIA. (ID CASING): 2" ft
BORING DIAMETER: 8.5" ft

INSTALLED POW DEPTH(~~TOC~~) GS: 7.15 ft
MEASURED POW DEPTH(TOC): 8.46 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 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 = .18 GAL. = A
(8.46 - 7.34) = 1.12 1.12 × .163 =

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR - WELL DIAM. FACTOR) X 0.3 = .94 GAL. = B
(8.46 - 7.34) = 1.12 1.12 × (2.95 - .163) .3 =

SINGLE STANDING WATER VOLUME = A + B = ... 1.12 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 5.6 GALS.

DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
6/27	Surge	7.34 ~~7.26~~ bkcs										Dry
6/28	Surge	7.26		Not enough standing water to surge								
45ml/min 6/28	Pump	7.26 ~~[illegible]~~	1330	1340	10	.3	7.80	825	see note		100+	Dry
6/29	"	6.88										
7/6	Surge	5.61	1650	1910	20	.3				muddy	1000+	5.66
TOTALS/FINAL												

RECOVERY
GOOD FAIR [✓ POOR]

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/28	7/6			
VOLUME	.3	.3			
DRUM #	#64D-7	"			

Note:
rate too slow for repeatable readings

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #:

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WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC. CLIENT: USACOE

WELL #: MW64D-5

PROJECT: 15 SWMU ESI (SEAD- 64D)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

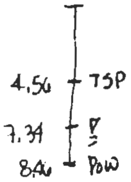
DATE: 6/27/94
PROJECT NO.: 720518

DRILLING METHOD (s): HSA
PUMP METHOD (s): peristaltic
SURGE METHOD (s): teflon bailer
INSTALLATION DATE: 6/22/94

INSPECTOR: ES
CONTRACTOR:
CREW:
START DEVELOPMENT DATE: 6/27/94
END DEVELOPMENT DATE: 7/6/94
Stickup = 1.31

WATER DEPTH (TOC): 7.34 ft
WELL DIA. (ID CASING): 2" ft
BORING DIAMETER: 8.5" ft

INSTALLED POW DEPTH(~~TOC~~) GS: 7.15 ft
MEASURED POW DEPTH(TOC): 8.46 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 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 = .18 GAL. = A
(8.46 - 7.34) = 1.12 1.12 × .163 =

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR - WELL DIAM. FACTOR) X 0.3 = .94 GAL. = B
(8.46 - 7.34) = 1.12 1.12 × (2.95 - .163) .3 =

SINGLE STANDING WATER VOLUME = A + B = ... 1.12 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... 5.6 GALS.

DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
6/27	Surge	7.34 ~~7.26~~ ES										Dry
6/28	Surge	7.26		Not enough standing water to surge								
45ml/min 6/28	Pump	7.26 ~~[illegible]~~	1330	1340	10	.3	7.80	825	see note		100+	Dry
6/29	"	6.88										
7/6	Surge	5.61	1650	1910	20	.3				muddy	1000+	5.66
	TOTALS/FINAL											

RECOVERY
GOOD FAIR [✓ POOR]

INVESTIGATION DERIVED WASTE (IDW)

DATE	6/28	7/6			
VOLUME	.3	.3			
DRUM #	#64D-7	"			

Note:
rate too slow for repeatable readings

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: ____

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WELL DEVELOPMENT REPORT

ENGINEERING–SCIENCE, INC. CLIENT: USACOE

WELL #: MW64D-5

PROJECT: 15 SWMU ESI (SEAD- 64D)

LOCATION: SENECA ARMY DEPOT, ROMULUS, NY

DATE: 7-10-94

PROJECT NO.: 720518-01000

DRILLING METHOD (s):
PUMP METHOD (s):
SURGE METHOD (s):
INSTALLATION DATE:

INSPECTOR: KLK
CONTRACTOR: —
CREW: —
START DEVELOPMENT DATE:
END DEVELOPMENT DATE:

WATER DEPTH (TOC): 6.06 ft
WELL DIA. (ID CASING): ft
BORING DIAMETER: ft

INSTALLED POW DEPTH(TOC): ft
MEASURED POW DEPTH(TOC): 6.47 ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: 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

.75
↓
.05

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = .4 GAL. = A
2.41

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = 2.02 GAL. = B
2.79

SINGLE STANDING WATER VOLUME = A + B = 2.42 GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C 12 GALS.

pump rate ml/min

DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	~~ELAPSED TIME~~	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
7/10	pump	6.06	1535		300	1.5	7.36	510	15.2	murky		6.28
	↓				300	.75	7.40	490	14.8	very cloudy	(1000+)	6.28
					300	.75	7.42	500	14.8	cloudy		6.28
					300	.75	7.36	500	14.4	slightly cloudy		6.28
					300	.5	7.42	500	14.6	clear		6.28
					500	.75	7.43	500	14.1	murky	1000+	6.40
					500	.75	7.33	500	14.1	cloudy		6.46
7/10				1645	500	.75	7.42	500	14.2	cloudy	NTU 13.0	6.52
										complete		
	TOTALS/FINAL					6.5						

RECOVERY by 1653 waterlevel → 6.09
GOOD FAIR POOR

INVESTIGATION DERIVED WASTE (IDW)

DATE	7-9-94			
VOLUME	7 gal			
DRUM #	640-7-W			

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW64D-5

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WELL DEVELOPMENT REPORT

ENGINEERING-SCIENCE, INC.
CLIENT: USACOE
WELL #: MW64D-5

PROJECT: 15 SWMU ESI (SEAD- 64D)
LOCATION: SENECA ARMY DEPOT, ROMULUS, NY
DATE: 7-10-94
PROJECT NO.:

DRILLING METHOD (s):
PUMP METHOD (s):
SURGE METHOD (s):
INSTALLATION DATE:

INSPECTOR: KLK, KKS
CONTRACTOR:
CREW:
START DEVELOPMENT DATE:
END DEVELOPMENT DATE:

WATER DEPTH (TOC): 6.23 ft
WELL DIA. (ID CASING): ft
BORING DIAMETER: ft

INSTALLED POW DEPTH(TOC): ft
MEASURED POW DEPTH(TOC): ft
SILT THICKNESS: ft
POW AFTER DEVELOPMENT: ft

DIAMETER FACTORS (GAL/FT):

DIAMETER (IN):	2	3	4	5	6	7	8	9	10	11	12
GALLONS/FT:	0.163	0.367	0.654	1.02	1.47	2.00	2.61	3.30	4.08	4.93	5.87

STANDING VOLUME INSIDE WELL = WATER COLUMN X WELL DIAMETER FACTOR = ______ GAL. = A

STANDING WATER IN ANNULAR SPACE =
WATER COL. BELOW SEAL(ft) X (BORING DIAM. FACTOR – WELL DIAM. FACTOR) X 0.3 = ______ GAL. = B

SINGLE STANDING WATER VOLUME = A + B = ... ______ GAL. = C

MINIMUM VOLUME TO BE REMOVED = 5 X C .... ______ GALS.

00ml/min
600ml
600ml/min
800ml/min

DATE	ACTIVITY	STARTING H2O DEPTH	START TIME	END TIME	ELAPSED TIME	GALLONS REMOVED	pH	CONDUCTIVITY	TEMP	COLOR	Turbidity (NTU)	Ending Water Depth
7/10	Surge	6.23	1600	1611	11	.25				brown		
7/10	pump		1610	1635	25	2.5	6.84	475	13.6	cloudy		6.64
7/10	pump	6.64	1635	1655	20	2.5	7.22	470	13.3	sl. cloudy	clear (15.0)	6.66
7/10	pump	6.66				3.0				sl. cloudy		7.1
TOTALS/FINAL												

RECOVERY
[✓ GOOD] FAIR POOR

INVESTIGATION DERIVED WASTE (IDW)

DATE	7-10-94
VOLUME	0.25
DRUM #	64D-7-W

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS WELL #: MW64D-5

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