U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA

00812

FINAL

SEAD-13

PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT THE IRFNA DISPOSAL PITS (SEAD-13)

SEPTEMBER 1997

PARSONS ENGINEERING SCIENCE, INC.

Prudential Center • Boston, Massachusetts 02199-7697 • (617) 859-2000 • Fax: (617) 859-2043

September 26, 1997

Ms. Dorothy Richards
U.S. Army Corps of Engineers
Engineering ans Support Center, Huntsville
Attn: CEHNC-PM-EO
4820 University Square
Huntsville, AL 35816-1822

SUBJECT: The Final Project Scoping Plan for SEAD-13, SEDA, Romulus, NY

Dear Ms. Richards:

Parsons Engineering Science (Parsons ES) is pleased to submit the responses to EPA comments for the Final Project Scoping Plan for Performing a CERCLA Remedial Investigation/Feasibility Study at SEAD-13 at the Seneca Army Depot Activity (SEDA) located in Romulus, New York. Several inserts were prepared in response to the EPA comments, and they are included as attachments to this letter. Please incorporate these inserts into the existing Final Scoping Plan, which will bring it to "final" Final status.

Please feel free to call me at (617) 859-2492 if you have any questions regarding this submittal.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

(for Michael Duchesneau)
pfm

Michael Duchesneau, P.E.
Project Manager

cc: Mr. Stephen Absolom, SEDA
Ms. Carla Struble, USEPA
Mr. Marden Chen, NYSDEC
Mr. Randall Battaglia, CENAN-PP-HE
Mr. Keith Hoddinott, USACHPPM (prov.)
Mr. Jeff Waugh, USACE
Mr. Don Williams, USACE-MRD

MD/pfm/

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Inserts

The inserts listed below are attached. Please replace the existing pages in the Draft Final Scoping Document for the SEAD-13 Scoping Plan with these pages to bring it to Final status.

1. Table 4-1
2. Page 4-17
3. Insert for Chemical Data Acquisition Plan, Appendix C.
4. Response to Comments to be inserted in Appendix E
5. Cover and spine

PARSONS ENGINEERING SCIENCE, INC.

Prudential Center • Boston, Massachusetts 02199-7697 • (617) 859-2000 • Fax: (617) 859-2043

June 27, 1997

Ms. Dorothy Richards
CEHNC-PM-EO
Engineering Support Center, Huntsville
4820 University Square
Huntsville, Alabama 35816-1822

SUBJECT: Submittal of a Final Project Scoping Plan for Performing a CERCLA Remedial Investigation Feasibility Study (RI/FS) at the Inhibited Red Fuming Nitric Acid Disposal Site (SEAD-13)

Dear Ms. Richards:

Parsons Engineering Science, Inc. (Parsons ES) is pleased to submit the Final Project Scoping Plan for performing a Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA) Remedial Investigation/Feasibility Study (RI/FS) at the Inhibited Red Fuming Nitric Acid Disposal Site (SEAD-13) at the Seneca Army Depot Activity (SEDA) located in Romulus, New York. This Final report incorporates EPA, and Army comments; NYSDEC did not provide comments on the Draft final. This work was performed in accordance with the Scope of Work (SOW) for Delivery Order 0041 to the Parsons ES Contract DACA87-92-D-0022.

To update the Draft Final to Final status please replace the existing pages in the Scoping Plan with the inserts (A through K) that are attached to this letter.

Parsons ES appreciates the opportunity to work with the USACE on this important project and looks forward to a continued relationship on this and other projects. Please feel free to call me at 617-859-2492.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Michael Duchesneau, P.E.
Project Manager

K:\seneca\scoping\comments\sead-13\25june.doc

cc: Mr. Stephen Absolom, SEDA
Ms. Carla Struble, USEPA Region II
Mr. Randall Battaglia, CENAN-PP-HE
Mr. Keith Hoddinott, USACHPPM (Prov.)
Mr. Harry Klieser, USAEC
Mr. Don Williams, USACE-MRD
Mr. Marsden Chen, NYSDEC

PROJECT SCOPING PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
AT SEAD-13
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Prepared For:

Seneca Army Depot Activity
Romulus, New York

Prepared By:

Parsons Engineering Science, Inc.
Prudential Center
Boston, Massachusetts

727651 **January 1997**

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LIST OF ACRONYMS

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-31	Electromagnetic
EPA	Environmental Protection Agency
ESI	Expanded Site Inspections
FS	Feasibility Study
ft	Feet
ft/ft	Feet per foot
ft/sec	Feet per second
ft/yr	Feet per year
GA	Classification: The best usage of Class GA waters is as a source of potable water supply. Class GA waters are fresh groundwaters
GC	Gas chromatograph
gpm	Gallons per minute
GPR	Ground penetrating radar
GRI	Gas Research Institute
GSSI	Geophysical Survey Systems, Inc.

LIST OF ACRONYMS
(Cont.)

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	Minature 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 Geodedic 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
OVM	Organic Vapor Meter
Pb	Lead
PAH	Polynuclear Aromatic Hydrocarbon
Parsons ES	Parsons Engineering Science, Inc.
PCB	Polychlorinated biphenyls
PID	Photoionization detector
ppm	parts per million
ppmv	parts per million per volume
PSCR	Preliminary Site Characterization Report
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
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

LIST OF ACRONYMS
(Cont.)

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
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 Project Scoping Plan is to outline the work proposed for a Remedial Investigation/Feasibility Study (RI/FS) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at SEAD-13 (the Inhibited Red Fuming Nitric Acid disposal site at the Seneca Army Depot Activity (SEDA) in Romulus, New York. This Plan is based on the results and recommendations for SEAD-13 presented in the draft Expanded Site Inspection (ESI) Report for Three Moderate Priority SWMUs (Parsons ES, May 1995). These sites are called SWMUs (a RCRA term) because the Army elected in their Federal Facilities Agreement to combine RCRA and CERCLA obligations, and the Army has decided to use RCRA terms in referencing various units. The purpose of the RI/FS is to determine the nature and extent of environmental impacts, and to evaluate and select appropriate remedial actions. These actions will comply with ARARs and take into account the risks to human health and the environment.

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

This Project Scoping Plan provides site specific information for the RI/FS project at SEAD-13. The Generic Installation RI/FS Workplan is designed to serve as a foundation for this document and provides generic information that is applicable to all site activities at SEDA.

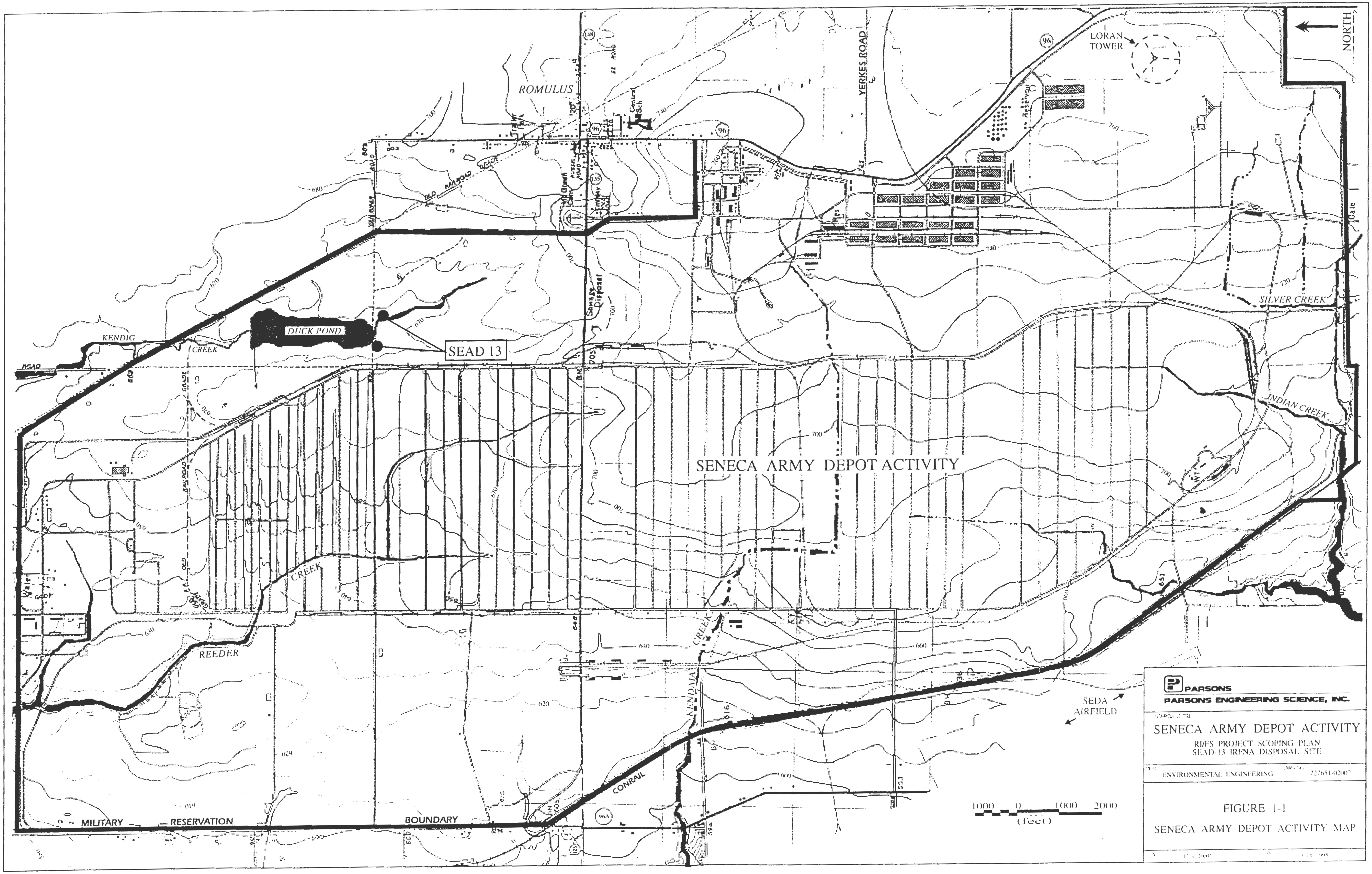
1.2 REPORT ORGANIZATION

The remaining sections of this report are organized to describe the overall site conditions, to provide a scoping of the RI/FS, and to provide task plans for the RI and FS. Section 2.0 presents a description of regional geologic and hydrogeologic 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, data gaps, and data 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

The Inhibited Red Fuming Nitric Acid (IRFNA) disposal site (SEAD-13) is located in the northeastern portion of SEDA as shown in Figure 1-1. The site includes two suspected IRFNA disposal areas located on the eastern and western sides of the Duck Pond, noticeably close to the entrance of the pond's source tributary as shown in Figure 1-2. The land surface at both areas is no less than two feet above the water level in the Duck Pond.

IRFNA is an oxidizer used in missile liquid propellant systems. In the past there was a need to dispose of quantities of unserviceable IRFNA and SEDA was selected as one of these locations. Details of the history are presented in Section 3.1.1.



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SENECA ARMY DEPOT ACTIVITY

RI/FS PROJECT SCOPING PLAN
SEAD-13 IRENA DISPOSAL SITE

ENVIRONMENTAL ENGINEERING 727651-02007

FIGURE 1-1

SENECA ARMY DEPOT ACTIVITY MAP

1" = 2000'

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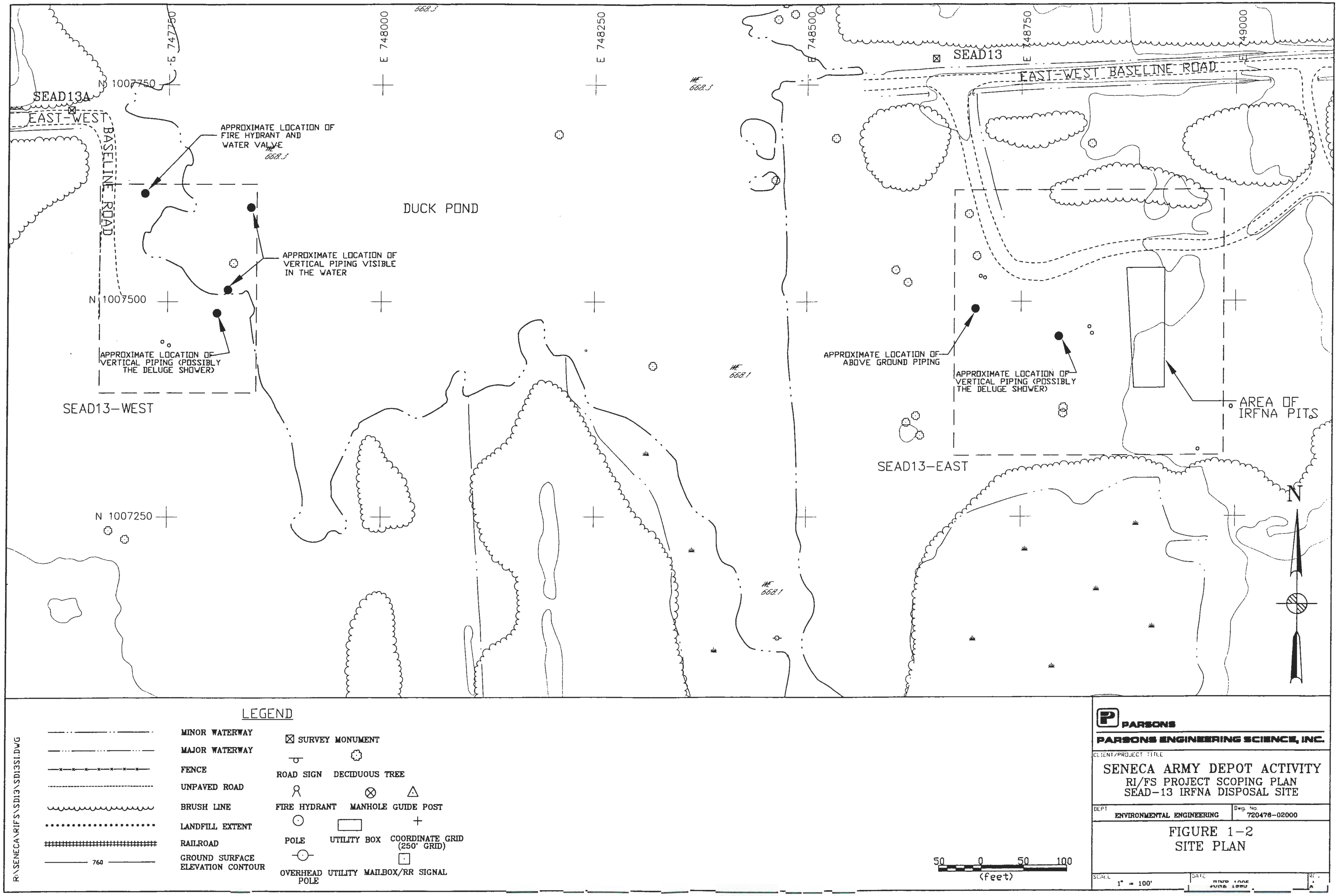

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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-13 IRFNA DISPOSAL SITE

DEPT
ENVIRONMENTAL ENGINEERING

Dwg. No.
720476-02000

FIGURE 1-2
SITE PLAN

SCALE
1" = 100'

DATE
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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 regional geological 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 regional hydrogeological setting 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-13 based upon the results presented in the draft ESI Report (Parsons ES, May 1995). This includes the development of a conceptual model describing all known contaminant sources and receptor pathways based upon actual sampling data. The conceptual model will be used to develop and implement additional studies which may be required in order to fully assess risks to human health and the environment. Other considerations discussed in this section are data quality objectives (DQOs) and potential remedial actions for SEAD-13. These considerations will also be integrated into the scoping process to ensure that adequate data is collected to complete the RI/FS process for this area of concern (AOC).

3.1 CONCEPTUAL SITE MODEL

The conceptual site model, which was developed for SEAD-13 and presented in the draft ESI Report (Parsons ES, May 1995), identifies potential source areas, release mechanisms, potential exposure pathways, and receptors. The model takes into account site conditions and accepted pollutant behavior to formulate an understanding of the site. These factors will serve as the basis for determining necessary additional studies for the RI. The model was developed by evaluating the following aspects:

1. Historical usage and waste disposal practices.

2. Physical site characteristics: This considers the physical aspects of environmental conditions at the site and the effects these conditions may have on potential pollutant migration. Physical aspects include soil characteristics, topography, subsurface geology, groundwater characteristics and local vegetation.

3. Environmental fate of constituents: This considers the fate and transport of residual materials in the environment based upon known chemical and physical properties.

3.1.1 Site History

The IRFNA Disposal Site (SEAD-13) was active during the early 1960s when there was a continuing need to dispose of quantities of unserviceable IRFNA. IRFNA is an oxidizer used in missile liquid propellant systems (Dept. of Sanitary Engineering Study No. 3642E4-60, 1960). Its composition is 81.3%-84.5% nitric acid (HNO_3), 13%-15% nitrogen dioxide (NO_2), 0.5%-0.7% hydrofluoric acid (HF) and 2.0%-3.0% water (H_2O). The method of disposal used at SEAD-13 involved a shallow trench partially filled with limestone or slaked lime. The limestone or slaked

lime was completely covered with water and the acid was introduced into the trench under water. The SEAD-13 site consisted of six pits which were 30 feet long, 8 feet wide and 4 feet deep and were suspected to be located in two separate areas. The pits were constructed by excavation to the native shale at a depth of approximately 4 feet below ground. Following excavation, limestone was placed in the bottom of the pits to a depth of approximately 2.5 feet below ground. The sides of the pits were also lined with limestone. Barrels of unserviceable IRFNA were stored on pallets near the west end of each of the pits. A stainless steel ejector, operated by water pressure, was fitted into a barrel with water flowing through the ejector. The ejector discharged a mixture of water and IRFNA through a long polyethylene hose under the water surface in the pit being used. During this period the IRFNA was allowed to mix with the limestone in the pit to facilitate the neutralization of the acid. Five minutes were required to empty a barrel. Ten barrels were usually discharged into a single pit during a day's operation. At present, the site has been abandoned.

3.1.2 Physical Site Characterization

3.1.2.1 Physical Site Setting

At SEAD-13, the eastern area (SEAD-13-East) is bounded by mostly deciduous trees and the East-West Baseline Road to the north, by deciduous trees and grassland to the east and south, and by the Duck Pond to the west as shown in Figure 1-2. The western area (SEAD-13-West) is bounded by grassland and low brush to the north, west and south, and by the Duck Pond to the east. The East-West Baseline Road, which has been intersected by the Duck Pond, is north of SEAD-13-East and SEAD-13-West Figure 1-2.

SEAD-13-East is comprised of six elongated disposal pits (possibly seven) that are visible on the ground surface immediately south of a dirt access road off of East-West Baseline Road. The pits, which are each generally 20-30 feet long with long axes oriented east-west, are surficially marked by sparse vegetation, crushed shale and 1-inch diameter limestone pieces. Vertical water and shower pipes are located west of the pits.

SEAD-13-West, which is located at the end of a dirt road off of East-West Baseline Road is a broad, low plain which extends to the shoreline of the Duck Pond. The area has no visible evidence of former IRFNA disposal pits at the surface. There is, however, an area characterized by sparse vegetation and some crushed shale but it does not resemble the eastern pits. A vertical shower pipe and head is located in the eastern portion of SEAD-13-West, approximately 50 feet from the Duck Pond.

3.1.2.2 Site Geology

Based on the results of the drilling program, till and calcareous weathered shale are the two primary types of geologic materials present on-site. The soil boring logs are included in Appendix G. Both materials were encountered at all but one of the drilling locations. It is noteworthy that at one location (SB13-3/MW13-3) no black calcareous shale was encountered during the drilling of a 23 feet deep soil boring. Collectively, the drilling data does not show an apparent trend towards a thickening of overburden soils.

At the IRFNA Disposal Site (both the eastern and western sides) there appears to be a stratigraphic division within the till (an upper and lower unit) which is defined more by a change in density than by a change in composition. The density change occurs between approximately 5 and 6 feet below the ground surface. The relative density of the two units, as measured by blow counts during drilling are generally between 10 and 50 blows per 6 inches of penetration of the spoon for the upper till, and are between 50 and 120 blows for the lower till. The density change may be explained by a difference in mode of deposition for the two till units, or by weathering of the upper portion of the till, rendering it less dense than the unweathered till below. The till is light brown and composed of silt and clay, and some black shale fragments. Oxidized areas were noted in the upper portions of the till.

Competent, calcareous black shale was encountered at depths between approximately 7 and 23 feet below the ground surface. The competent shale bedrock slopes generally to the west at SEAD-13-East. Seismic and drilling programs revealed no such similarity at SEAD-13-West.

3.1.2.3 Geophysics

Seismic refraction surveys, electromagnetic (EM-31) surveys, and ground penetrating radar (GPR) surveys were performed at SEAD-13 as part of the geophyscial investigations for the ESI.

<u>Seismic Survey</u>

A total of seven seismic profiles were conducted at SEAD-13: four on the eastern side of the pond and three on the western. The results of the seismic refraction survey are presented in Tables 3-1 and 3-2, respectively. In all of the profiles the zero point for the survey was at the end of the profile closest to the center of the site. The profiles detected from 7 to more than 20 feet of till (seismic velocities from 1,100 to 7,900 ft/s) overlying bedrock (9,500 to 11,700 ft/s). In particular, the till material included unsaturated till (1,100 to 2,100 ft/s), saturated till (4,200 to 6,300 ft/s), and dense glacial till (7,900 ft/s).

TABLE 3-1
SEAD-13, EAST
EXPANDED SITE INSPECTION
RESULTS OF SEISMIC REFRACTION SURVEY

Profile	Direction	Distance[1]	Ground Elev.[2]	Water Table		Dense Till		Bedrock	
				Depth	Elev.	Depth	Elev.	Depth	Elev.
P1	East	0	100.0	3.2	96.8	9.7	90.3	>20.0	<80.0
		57.5	99.3	3.8	95.5	10.5	88.8	>20.0	<79.3
	West	115	99.2	3.0	96.2	8.1	91.1	>20.0	<79.2
P2	North	0	99.8	3.6	96.2	NI	NI	13.2	86.6
		57.5	99.4	3.4	96.0	NI	NI	10.3	89.1
	South	115	99.4	4.0	95.4	NI	NI	12.0	87.4
P3	West	0	102.3			NI	NI	6.6	95.7
		57.5	103.1			NI	NI	9.6	93.5
	East	115	103.2	4.6	98.6	NI	NI	12.6	90.6
P4	South	0	101.6	5.0	96.6	NI	NI	15.0	86.6
		57.5	101.1	5.3	95.8	NI	NI	14.6	86.5
	North	115	101.4	4.3	97.1	NI	NI	13.7	87.7

[1] All distances are in feet.

[2] All elevations are relative elevations in feet.

NI = Not Identified. The dense till was not identified by seismic refraction surveys due to insufficient thickness and/or insufficient velocity contrasts.

TABLE 3-2
SEAD-13, WEST
EXPANDED SITE INSPECTION
RESULTS OF SEISMIC REFRACTION SURVEY

Profile	Direction	Distance[1]	Ground Elev.[2]	Water Table		Dense Till		Bedrock	
				Depth	Elev.	Depth	Elev.	Depth	Elev.
P5	South	0	100.0	3.1	96.9	NI	NI	12.5	87.5
		57.5	99.4	3.1	96.3	NI	NI	11.9	87.5
	North	115	99.5	3.1	96.4	NI	NI	6.9	92.6
P6	East	0	100.1	4.3	95.8	NI	NI	9.5	90.6
		57.5	100.2	3.9	96.3	NI	NI	12.0	88.2
	West	115	100.5	3.0	97.5	NI	NI	9.4	91.1
P7	North	0	99.7	6.0	93.7	NI	NI	13.6	86.1
		57.5	100.0	5.7	94.3	NI	NI	16.0	84.0
	South	115	100.3	5.6	94.7	NI	NI	17.7	82.6

[1] All distances are in feet.

[2] All elevations are relative elevations in feet.

NI = Not Identified. The dense till was not identified by seismic refraction surveys due to insufficient thickness and/or insufficient velocity contrasts.

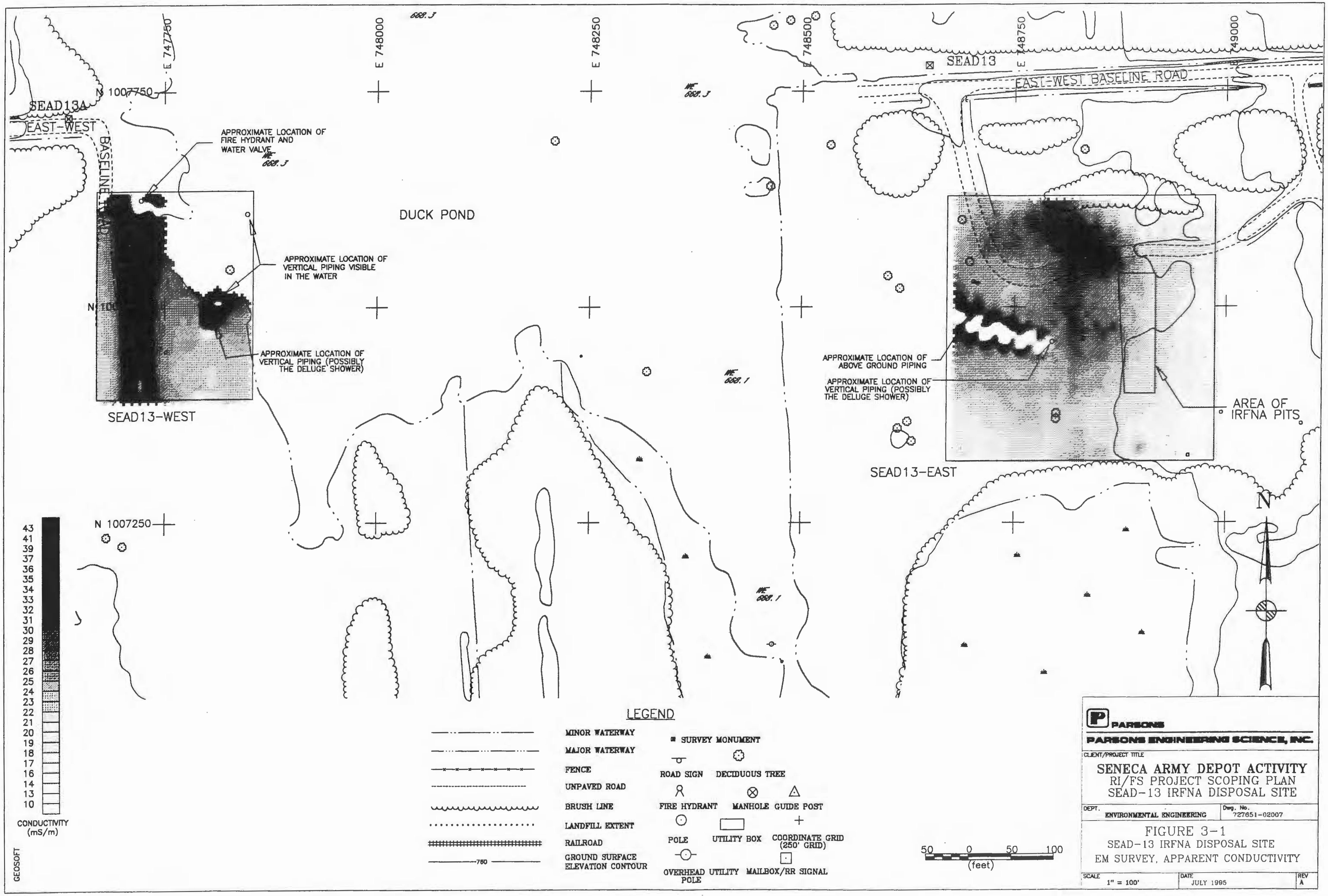
Several of the seismic profiles, including P1, P2, and P7, were conducted on saturated ground. However, seismic velocities characteristic of saturated till were interpreted to be located at a depth of 3 to 6 feet along these profiles. It is common in swampy areas to encounter a low-velocity near-surface layer. This may be attributed to the effects of entrapped gas in swamp deposits and the inability of the seismic method to accurately resolve layers substantially thinner than the wavelength of the seismic energy. In spite of these limitations, a review of Table 3-1 suggests that groundwater flows to the west or northwest at SEAD-13-East. The seismic survey conducted at the SEAD-13-West site shows groundwater at a uniform level; therefore, a flow direction could not be reliably determined.

Unusually low bedrock velocities (9,400 to 9,500 ft/s) were detected on the east side of the pond. These velocities are characteristic of weathered rock. Profile P1 measured a basal velocity of only 7,900 ft/s, which is within the expected range of dense glacial till. Based on the seismic survey, it is likely that the depth to competent bedrock exceeds 20 feet beneath profile P1. Monitoring well MW13-3, drilled on the eastern side of the pond, was augered to a depth of 23 feet without encountering refusal (i.e., competent shale).

Electromagnetic Survey

Figure 3-1 shows the apparent conductivity measured at both sites within SEAD-13. SEAD-13-East shows a pronounced linear anomaly projecting from the western edge towards the center of the electromagnetic (EM) grid. This feature is attributed to a pipe, two inches in diameter, that can be seen on the ground surface. This pipe terminates at the vertical shower pipe located in the west-central portion of the grid. The other pronounced EM anomaly at SEAD-13-East is a zone of elevated conductivities in the central and northern portions of the grid. The high conductivities measured in the groundwater sample collected from MW13-2 suggest that this EM anomaly represents a groundwater plume with a high concentration of dissolved ionic solids. It is likely that the groundwater contains dissolved salts, a by-product of the former activities at this site which involved the disposal and neutralization of acids. The suspected plume originates in the area of the former pits and extends towards the west-northwest presumably in the suspected direction of groundwater flow.

The apparent conductivity measured in the grid at SEAD-13-West also shows several anomalies, each attributed to pipes. The pronounced north-treading zone of elevated conductivities occurring the western portion of the grid is caused by a pipe running parallel to the EM lines. A second pipe, treading east to west, is marked by a linear zone of low conductivities originating near the northern edge of the grid. Low conductivities are measured by the EM-31 directly over a pipe if the boom of the instrument is oriented perpendicular to the pipe.



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-13 IRFNA DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING

Dwg. No. 727651-02007

FIGURE 3-1
SEAD-13 IRFNA DISPOSAL SITE
EM SURVEY, APPARENT CONDUCTIVITY

SCALE 1" = 100'

DATE JULY 1995

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The reverse is true if the pipe is parallel to the orientation of the boom. Alignment of EM anomalies suggests that this second pipe connects with the pipe located on the eastern side of the pond. The apparent conductivity anomaly in the eastern portion of the EM grid is caused by a third pipe running between a water valve seen protruding from the pond and the vertical shower head located in the eastern portion of the grid.

The in-phase response of the EM survey at SEAD-13 is shown in Figure 3-2. SEAD-13-East shows a generally featureless response. A weak signature from the pipe is evident on the western side of the grid. A small isolated anomaly is located directly south of the pipe. The circular in-phase anomaly along the southern edge of the grid is the effect of metallic debris lying on the surface. The in-phase response from the grid at SEAD-13-West is dominated by the north- to south-trending pipe running through the surveyed area.

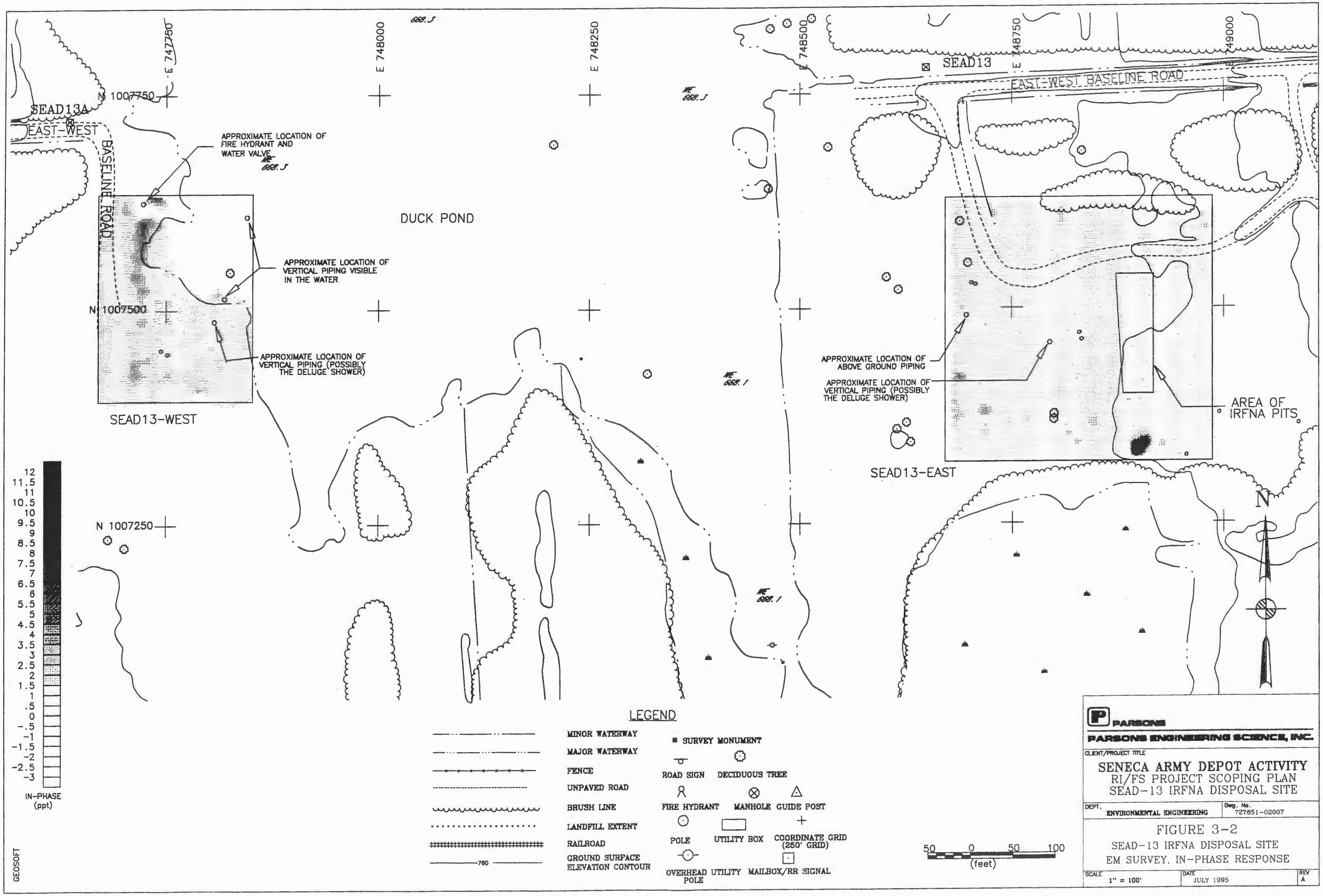
GPR Survey

A GPR survey was conducted at both SEAD-13-East and SEAD-13-West to determine the location of the former IRFNA disposal pits. Data quality was degraded in certain areas due to standing water from recent rainfall. Penetration was limited to less than 30 nanoseconds (ns) or about 3 to 4 feet. Preparation for the geophysical surveys involved the cutting of tall grass, brush, and small trees throughout the area of investigation. At SEAD-13-East 7 or 8 former pits were identified by visual inspection following the removal of vegetation. The pits were typically 10 to 15 feet wide by 40 to 50 feet long (according to the geophysical survey). The pits were located along a north to south line within the central portion of the geophysical grid. Figure 3-3 shows a GPR transect across several of the former IRFNA disposal pits. The pits are characterized by a disruption in the normal layering of the overburden. Without prior knowledge concerning the location of these pits, positive identification from the GPR records alone would have been difficult. The amplitude of the GPR reflections in the vicinity of the former pits was unusually weak. This is the effect of enhanced attenuation of the radar signal due to the higher ground conductivity in this area, as demonstrated by the EM survey.

No evidence of former IRFNA disposal pits was found at SEAD-13-West. There were no well-defined zones of sparse vegetation, no elongate depressions in the surface topography,
no crushed limestone visible on the surface, and no geophysical response that would suggest the presence of former pits.

3.1.2.4 Site Hydrology and Hydrogeology

Surface water flow from precipitation events is controlled by the topography at the site. In general, the land surface slopes towards the Duck Pond, which separates SEAD-13 West from SEAD-13-



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PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-13 IRFNA DISPOSAL SITE

DEPT. ENVIRONMENTAL ENGINEERING

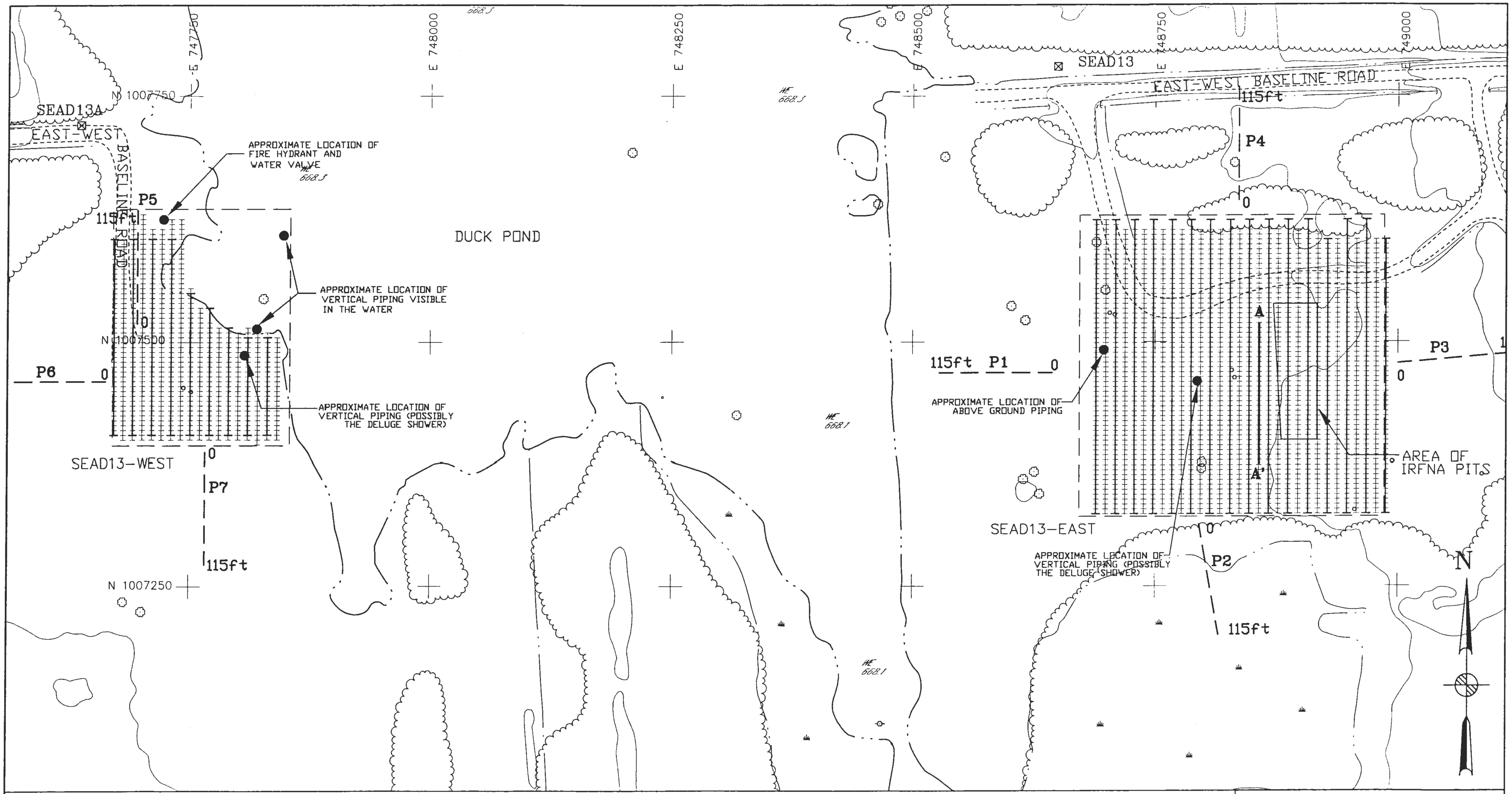
Dwg. No. 727651-02007

FIGURE 3-2
SEAD-13 IRFNA DISPOSAL SITE
EM SURVEY, IN-PHASE RESPONSE

SCALE 1" = 100'

DATE JULY 1995

REV A



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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
- — — — SEISMIC PROFILE
- EM TRANSECT
- GPR TRANSECT
- A'—— A GPR Record (shown in report)

50 0 50 100 (feet)

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SEAD-13 IRFNA DISPOSAL SITE

DEPT ENVIRONMENTAL ENGINEERING
Dwg No. 720476-02000

FIGURE 3-3
LOCATION OF GEOPHYSICAL SURVEYS

SCALE 1" = 100'
DATE JANUARY 1997
REV A

East. Both areas abut the pond. Because no well developed drainage swales are present at either area, it is likely that any standing water present on the ground surface eventually drains into the pond.

The Duck Pond itself is fed by a small stream which enters from the south through a cove and wetland area. A beaver dam is also located near the intersection of the stream with the pond. The outflow for the pond is approximately 3500 feet north of the site.

The groundwater at SEAD-13-East flows to the west-northwest and at SEAD-13-West flow is to the east-northeast. As expected, groundwater generally flows toward the Duck Pond at both areas, as shown in Figure 3-4. These flow directions are based on groundwater elevations measured in 5 monitoring wells at SEAD-13 on April 4, 1994. The data are shown in Table 3-3 and Figure 3-4. The groundwater contours were established using a straight-line interpolation method between monitoring wells. The elevations determined at monitoring wells MW13-3 (a deep overburden well) and MW13-7 (a shallow overburden well) are not believed to represent the true water table. Well MW13-3 is screened in the dense till and since it has very little water in it, this well represents the dense till hydrology more accurately than the entire aquifer hydrology. Shallow well MW13-7 is screened in the upper, less dense till. The anomalous water table elevation in MW13-7 may be due to a lack of stabilization in the well prior to the measurement. The elevation of the water in the Duck Pond is 668± feet as determined from the photogrammetric reduction of the areal photos with a ground truth survey, which lends more support for the contention that the elevation of the water table in MW13-7 is not representative of static groundwater conditions. The groundwater elevation data collected from monitoring wells MW13-4 and MW13-5 on November 13, 1993, indicated that the groundwater flow direction at SEAD-13-West was to the west-southwest. This flow direction is opposite to the one established by the April 4, 1994 groundwater elevation survey indicating that seasonal changes in groundwater flow directions may occur at SEAD-13-West. Depth to water measurements from a more complete array of monitoring wells will help establish better control of groundwater flow directions

The distribution of groundwater in the aquifer was not always apparent because of the dense nature of the till. Generally the aquifer characterized by moist soil with occasional coarse-grained lenses of water-saturated soil. In some locations the weathered shale horizon was water-saturated. Recharge of groundwater to the wells during sampling was generally fair to poor.

3.1.2.5 Chemical Analysis Results

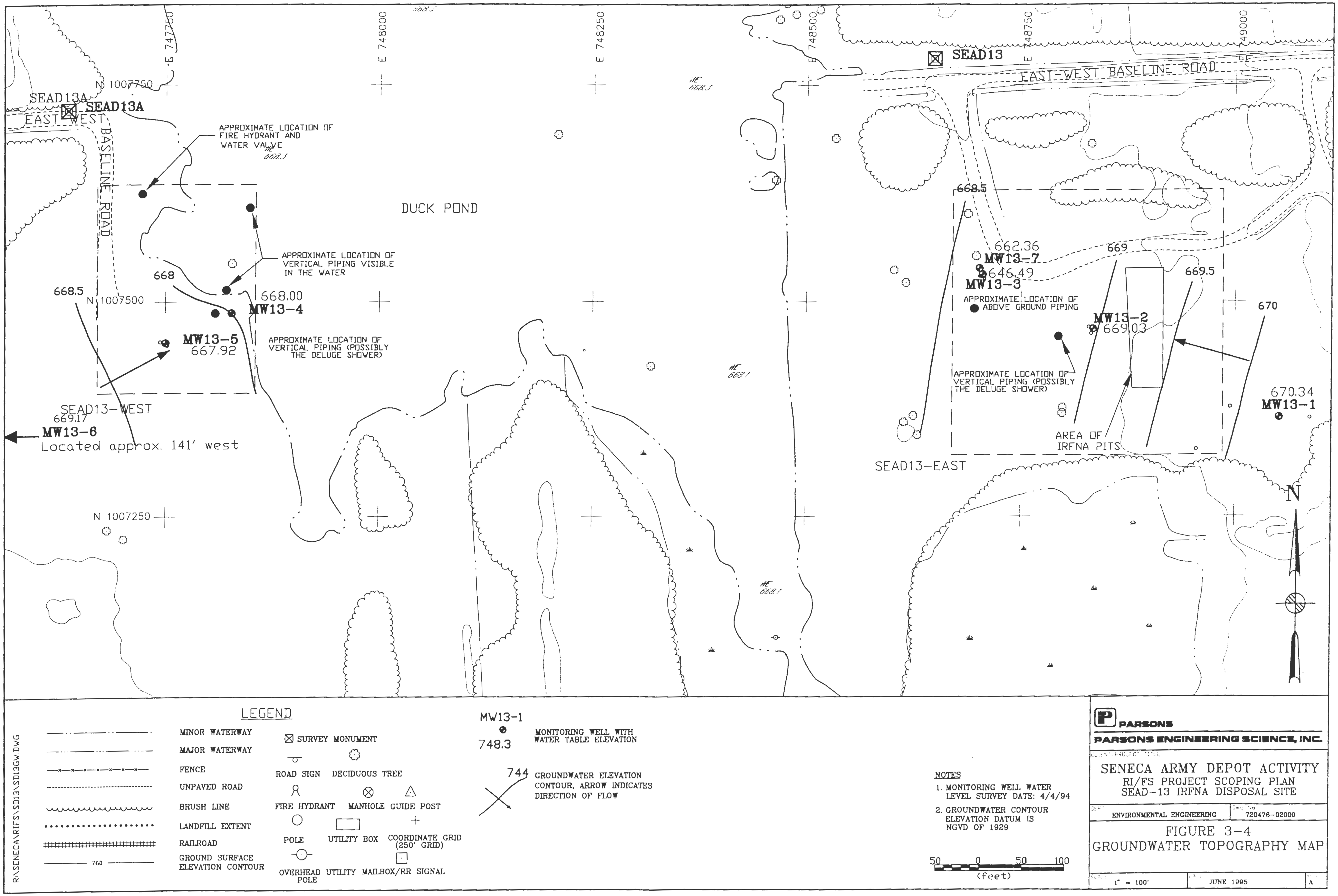
A total of 10 surface soil samples and 20 subsurface soil samples were collected at SEAD-13. To assess the potential impact of the IRFNA disposal pits on adjacent surface water bodies, 3 surface water and 3 sediment samples were collected from the Duck Pond. Seven monitoring wells were

TABLE 3-3
SEAD-13, GROUNDWATER MONITORING WELL WATER LEVEL SUMMARY

SENECA ARMY DEPOT
SEAD-13

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)
MW13-1	673.16	1/9/94	4.62	668.54	2/3/94	3.14	670.02	4/4/94	2.82	670.34
MW13-2	672.32	11/10/93	3.95	668.37	11/18/93	3.72	668.60	4/4/94	3.29	669.03
MW13-3	671.31	11/6/93	DRY	NA	2/3/94	DRY	NA	4/4/94	24.82	646.49
MW13-4	670.79	11/10/93	3.13	667.66	2/4/94	3.13	667.66	4/4/94	2.79	668.00
MW13-5	671.23	11/10/93	9.80	661.43	2/4/94	3.90	667.33	4/4/94	3.31	667.92
MW13-6	672.11	1/10/94	5.00	667.11	2/4/94	3.76	668.35	4/4/94	2.94	669.17
MW13-7	669.28	3/4/94	DRY	NA	2/4/94	NS	NA	4/4/94	6.92	662.36

H:\ENG\SENECA\RIFS\TABLES\SD13ELEV.WK3



NOTES

1. MONITORING WELL WATER LEVEL SURVEY DATE: 4/4/94
2. GROUNDWATER CONTOUR ELEVATION DATUM IS NGVD OF 1929

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ENVIRONMENTAL ENGINEERING
720476-02000

FIGURE 3-4
GROUNDWATER TOPOGRAPHY MAP

1" = 100'
JUNE 1995
A

also installed and sampled as part of this investigation. The following sections describe the nature and extent of contamination identified at SEAD-13.

Soil Sampling Summary

The analytical results for the 10 surface and 20 subsurface soil samples collected as part of the SEAD-13 ESI are presented in Tables 3-4. The following sections describe the nature and extent of chemical impacts in SEAD-13 East and SEAD-13 West soils.

Volatile Organic Compounds

Surface Soils

Four volatile organic compounds were detected in 3 of the 10 surface soil samples collected at SEAD-13. All were found at low concentrations, well below their respective associated TAGM values. The maximum detected concentration was 86 µg/kg of acetone in the surface soil sample SB13-6.1 at SEAD-13 West. The volatile organic compounds acetone and 2-butanone are considered to be common laboratory contaminants. Therefore, these compounds can potentially be attributed to the laboratory and not site conditions. Toluene and chloroform, while not common laboratory contaminants, are also not suspected to be indicative of significant wide-ranging impacts to soil chemistry due to the low concentrations detected in a small number of samples. Thus, while these VOCs were not screened out in the data validation process, these data indicate that VOCs in surface soils should not be a primary concern in the SEAD-13 RI field program. Thus, there is no strategy in the proposed field program in Section 4.0 for locating samples for the sole purposed of investigating the extent of VOCs in soil.

Subsurface Soils

Methylene chloride, carbon disulfide, and toluene were detected at low concentrations in four of the 20 subsurface soil samples analyzed. All were found at low concentrations, well below their respective TAGM values. Methylene chloride was found in three subsurface soil samples at an estimated concentration of 4 µg/kg. Methylene chloride is considered to be a common laboratory contaminant, and given the number of samples in which it was detected, and the low concentrations, it can potentially be attributed to the laboratory and not significant wide-ranging

impacts to site soils. Carbon disulfide was detected in one sample, SB13-1.4 (at SEAD-13 East), at an estimated concentration of 2 µg/kg. Toluene was found at an estimated concentration of 2 µg/kg in one sample only, SB13-5.5. Thus, while these VOCs were not screened out in the data validation process, these data indicate that VOCs in subsurface soils were below their respective TAGMs and they should not be a primary concern in the SEAD-13 RI field program. Again, there is no strategy in the proposed field program in Section 4.0 for locating samples for the sole purposed of investigating the extent of VOCs in soil.

TABLE 3-4

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-13 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM (g)	NO. ABOV TAGM	SOIL SEAD-13 0-2 12/08/93 SB13-1.1 206397	SOIL SEAD-13 6-8 12/08/93 SB13-1.3 206398	SOIL SEAD-13 8-10 12/08/93 SB13-1.4 206399	SOIL SEAD-13 0-2 11/09/93 SB13-2.1 204003	SOIL SEAD-13 4-6 11/09/93 SB13-2.3 204004	SOIL SEAD-13 8-10 11/09/93 SB13-2.5 204005	SOIL SEAD-13 0-2 12/08/93 SB13-3.1 206400	SOIL SEAD-13 4-6 12/08/93 SB13-3.3 206401	SOIL SEAD-13 8-10 12/08/93 SB13-3.5 206402
VOLATILE ORGANICS														
Methylene Chloride	ug/kg	4	10.0%	100	0	12 U	3 J	4 J	11 UR	11 U	12 UJ	12 U	11 U	11 U
Acetone	ug/kg	86	3.3%	200	0	12 U	13 UJ	15 UR	11 UR	11 U	12 UJ	12 U	11 U	11 U
Carbon Disulfide	ug/kg	2	3.3%	2700	0	12 U	11 UJ	2 J	11 UR	11 U	12 UJ	12 U	11 U	11 U
Chloroform	ug/kg	2	3.3%	300	0	12 U	11 UJ	11 UR	11 UR	11 U	12 UJ	12 U	11 U	11 U
2-Butanone	ug/kg	26	3.3%	300	0	12 U	11 UJ	11 UR	11 UR	11 U	12 UJ	12 U	11 U	11 U
Toluene	ug/kg	6	6.7%	1500	0	12 U	11 UJ	11 UR	6 J	11 U	12 UJ	12 U	11 U	11 U
SEMIVOLATILE ORGANICS														
Phenol	ug/kg	14000	3.3%	30	1	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
1,4-Dichlorobenzene	ug/kg	3300	3.3%	85	1	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
4-Methylphenol	ug/kg	9200	3.3%	500	1	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
Naphthalene	ug/kg	510	3.3%	13000	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
Acenaphthene	ug/kg	650	3.3%	50000 *	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
Dibenzofuran	ug/kg	340	3.3%	6200	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
Phenanthrene	ug/kg	1400	3.3%	50000 *	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
Carbazole	ug/kg	180	3.3%	50000 *	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
Di-n-butylphthalate	ug/kg	20	3.3%	8100	0	400 U	360 U	20 J	360 U	380 U	370 U	400 U	370 U	360 U
Fluoranthene	ug/kg	800	3.3%	50000 *	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
Pyrene	ug/kg	540	3.3%	50000 *	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
bis(2-Ethylhexyl)phthalate	ug/kg	1900	20.0%	50000 *	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
Di-n-octylphthalate	ug/kg	210	10.0%	50000 *	0	210 J	360 U	110 J	360 U	380 U	370 U	400 U	370 U	53 J
Benzo(g,h,i)perylene	ug/kg	20	3.3%	50000 *	0	400 U	360 U	350 U	360 U	380 U	370 U	400 U	370 U	360 U
PESTICIDES/PCB														
4,4'-DDE	ug/kg	3.6	3.3%	2100	0	4 U	3.6 U	3.5 U	3.6 J	3.8 U	3.7 U	4 U	3.7 U	3.6 U
METALS														
Aluminum	mg/kg	21200	100.0%	15523	8	18300	8250	11700	10700	12700	5700	10800	8720	13100
Antimony	mg/kg	5.8	23.3%	5	3	5.1 J	3.7 UJ	2.8 UJ	6.3 UJ	12.2 UJ	8.7 UJ	4.5 UJ	4.1 J	4.1 UJ
Arsenic	mg/kg	10.2	100.0%	7.5	8	7	6.2	5.7	5.6	5.4	5.3	5.5	6.7	6.5
Barium	mg/kg	584	100.0%	300	1	106	88.1	33.9	58.8	94.9	71.7	54.3	97.8	137
Beryllium	mg/kg	1.1	100.0%	1	2	0.92 J	0.42 J	0.54 J	0.52 J	0.62 J	0.27 J	0.52 J	0.43 J	0.65 J
Calcium	mg/kg	98100	100.0%	120725	0	3570	87700	50300	28800	61700	76100	83900	86900	64400
Chromium	mg/kg	35.8	100.0%	24	10	29.4	13.3	19.6	21.2	22.9	10.7	17.1	14.1	20.7
Cobalt	mg/kg	18.9	100.0%	30	0	12	7.2 J	11.1	11.3	12	7.4 J	10.2 J	8.8	12.8
Copper	mg/kg	45.2	100.0%	25	16	11.6	18.4	17.6	45.2	23.5	18.9	26.9	23.4	23.7
Iron	mg/kg	42500	100.0%	28986	9	32500	17400	24700	25000	27700	13600	23100	18500	26400
Lead	mg/kg	25.6	100.0%	30	0	15 R	9 R	11.7	25.6	9.3	7.7	10.6 R	11.9	14.1 R
Magnesium	mg/kg	25600	100.0%	12308	14	5890	20800	12600	5380	13300	21200	25600	21700	14300
Manganese	mg/kg	934	100.0%	759	1	451	517	404	336	445	411	443	390	446
Mercury	mg/kg	0.08	56.7%	0.1	0	0.03 J	0.07 J	0.02 U	0.04 J	0.02 U	0.03 U	0.02 U	0.03 U	0.02 U
Nickel	mg/kg	57.1	100.0%	37	14	34.9	24	33.1	46.6	40.8	20	31.4	27.1	34.4
Potassium	mg/kg	2590	100.0%	1548	15	2190	1390	1270	1120	1410	1040	1150	1230	1980
Selenium	mg/kg	1.4	86.7%	2	0	0.26 J	0.56 J	0.51 J	0.83 J	0.53 J	0.32 J	0.14 U	0.14 U	0.64 J
Silver	mg/kg	1	3.3%	0.5	1	0.9 U	0.71 U	0.54 U	0.8 UJ	1.5 UJ	1.1 UJ	0.88 U	0.65 U	0.79 U
Sodium	mg/kg	196	100.0%	114	17	80.6 J	155 J	134 J	90.2 J	131 J	145 J	163 J	152 J	163 J
Thallium	mg/kg	0.91	43.3%	0.3	13	0.43 J	0.43 J	0.64 J	0.35 J	0.27 U	0.25 U	0.91 J	0.71 J	0.75 J
Vanadium	mg/kg	35.8	100.0%	150	0	32.7	13.3	16.3	19.3	21.4	12.2	17.1	14.1	19.3
Zinc	mg/kg	103	100.0%	90	5	81.9	56.2	45.8	63.6	78.6	45	62.4	46.9	62.3
OTHER ANALYSES														
Nitrate/Nitrite-Nitrogen	mg/kg	176	100.0%	NA	NA	0.1	0.02	0.02	0.31	129	176	0.04	5.6	4.8
Total Solids	%W/W	95.8		NA	NA	82.3	92.4	93.4	90.3	86.9	88.8	83.5	90	91.8
Fluoride	mg/kg	193	96.6%	NA	NA	68	55	99	80	138	135	125	170	142

TABLE 3-4

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-13 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM (g)	NO. ABOV TAGM	SOIL SEAD-13 0-2 12/15/93 SB13-4.1 207023	SOIL SEAD-13 2-4 12/15/93 SB13-4.2 207024	SOIL SEAD-13 4-6 12/15/93 SB13-4.3 207025	SOIL SEAD-13 0-1 11/08/93 SB13-5.1 203820	SOIL SEAD-13 2-4 11/08/93 SB13-5.3 203821	SOIL SEAD-13 12-13 11/08/93 SB13-5.5 203822	SOIL SEAD-13 0-2 12/15/93 SB13-6.1 207026	SOIL SEAD-13 4-6 12/15/93 SB13-6.3 207027
VOLATILE ORGANICS													
Methylene Chloride	ug/kg	4	10.0%	100	0	12 U	11 U	11 U	11 U	11 U	11 U	13 U	11 U
Acetone	ug/kg	86	3.3%	200	0	12 U	11 U	11 U	11 U	11 U	11 U	86	11 U
Carbon Disulfide	ug/kg	2	3.3%	2700	0	12 U	11 U	11 U	11 U	11 U	11 U	13 U	11 U
Chloroform	ug/kg	2	3.3%	300	0	12 U	11 U	11 U	11 U	11 U	11 U	13 U	11 U
2-Butanone	ug/kg	26	3.3%	300	0	12 U	11 U	11 U	11 U	11 U	11 U	26	11 U
Toluene	ug/kg	6	6.7%	1500	0	12 U	11 U	11 U	11 U	11 U	2 J	13 U	11 U
SEMIVOLATILE ORGANICS													
Phenol	ug/kg	14000	3.3%	30	1	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
1,4-Dichlorobenzene	ug/kg	3300	3.3%	85	1	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
4-Methylphenol	ug/kg	9200	3.3%	500	1	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Naphthalene	ug/kg	510	3.3%	13000	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Acenaphthene	ug/kg	650	3.3%	50000 *	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Dibenzofuran	ug/kg	340	3.3%	6200	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Phenanthrene	ug/kg	1400	3.3%	50000 *	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Carbazole	ug/kg	180	3.3%	50000 *	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Di-n-butylphthalate	ug/kg	20	3.3%	8100	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Fluoranthene	ug/kg	800	3.3%	50000 *	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Pyrene	ug/kg	540	3.3%	50000 *	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
bis(2-Ethylhexyl)phthalate	ug/kg	1900	20.0%	50000 *	0	410 U	24 J	16 J	370 U	380 U	370 U	56 J	370 U
Di-n-octylphthalate	ug/kg	210	10.0%	50000 *	0	410 U	380 U	360 U	370 U	380 U	370 U	410 U	370 U
Benzo(g,h,i)perylene	ug/kg	20	3.3%	50000 *	0	410 U	20 J	360 U	370 U	380 U	370 U	410 U	370 U
PESTICIDES/PCB													
4,4'-DDE	ug/kg	3.6	3.3%	2100	0	4.1 U	3.8 U	3.6 U	3.7 U	3.8 U	3.7 U	4.1 U	3.7 U
METALS													
Aluminum	mg/kg	21200	100.0%	15523	8	21200	15500	20400	13000	14000	8230	16000	13500
Antimony	mg/kg	5.8	23.3%	5	3	4 UJ	4.5 J	3.2 UJ	7.8 UJ	9 UJ	8.3 UJ	3.2 UJ	2.5 UJ
Arsenic	mg/kg	10.2	100.0%	7.5	8	8.1	6.8	9.6	4.6	6.3	4.7	4.6	2.7
Barium	mg/kg	584	100.0%	300	1	129	96.9	79.1	56.7	98.6	132	103	60.4
Beryllium	mg/kg	1.1	100.0%	1	2	1.1	0.78 J	1	0.63 J	0.63 J	0.4 J	0.92	0.71
Calcium	mg/kg	98100	100.0%	120725	0	28800	68000	10200	21600	25700	88000	5140	31800
Chromium	mg/kg	35.8	100.0%	24	10	30.2	25.8	35.8	25.4	23.3	14.8	21.5	23.5
Cobalt	mg/kg	18.9	100.0%	30	0	10.6	12.4	12.1	13.1	8.8	9.9	10.6	15
Copper	mg/kg	45.2	100.0%	25	16	21.6	21.1	26.5	31.2	26.4	26.5	16	27.4
Iron	mg/kg	42500	100.0%	28986	9	31600	30100	42500	28600	24300	19600	25300	26900
Lead	mg/kg	25.6	100.0%	30	0	13.6	13.6	7.1	21.3	12.8	8.3	13.8	11.6
Magnesium	mg/kg	25600	100.0%	12308	14	8780	10600	9660	6740	8990	20700	3750	6640
Manganese	mg/kg	934	100.0%	759	1	363	607	398	335	273	461	934	508
Mercury	mg/kg	0.08	56.7%	0.1	0	0.05 J	0.01 J	0.02 J	0.04 J	0.02 U	0.02 U	0.03 J	0.01 U
Nickel	mg/kg	57.1	100.0%	37	14	38.1	43.2	53	46.1	36.8	29	22.7	41.9
Potassium	mg/kg	2590	100.0%	1548	15	2130	1570	1810	1350	1630	1260	1330	1120
Selenium	mg/kg	1.4	86.7%	2	0	0.53 J	0.2 J	0.28 J	0.58 J	0.26 J	0.59 J	1.2	0.11 J
Silver	mg/kg	1	3.3%	0.5	1	0.77 U	0.69 U	0.63 U	0.99 UJ	1.1 UJ	1 UJ	0.62 U	0.49 U
Sodium	mg/kg	196	100.0%	114	17	81.5 J	183 J	87.8 J	94.7 J	87 J	187 J	61.9 J	116 J
Thallium	mg/kg	0.91	43.3%	0.3	13	0.22 U	0.2 U	0.18 U	0.2 U	0.27 U	0.19 U	0.18 U	0.14 U
Vanadium	mg/kg	35.8	100.0%	150	0	35.8	23.1	30.7	20	23.7	15.1	29.9	18.5
Zinc	mg/kg	103	100.0%	90	5	89.4	65.8	93	53.2	64.4	51.4	62.5	64.7
OTHER ANALYSES													
Nitrate/Nitrite-Nitrogen	mg/kg	176	100.0%	NA	NA	0.09	0.2	0.09	0.04	0.07	0.06	0.55	0.9
Total Solids	%W/W	95.8		NA	NA	80.3	87	91.6	89	87.1	88.1	80.5	90.5
Fluoride	mg/kg	193	96.6%	NA	NA	64	91	2.2 U	56	124	193	78	50

TABLE 3-4

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-13 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM (g)	NO. ABOV TAGM	SOIL SEAD-13 6-8 12/15/93 SB13-6.4 207028	SOIL SEAD-13 0-2 12/07/93 SB13-7.1 206405	SOIL SEAD-13 0-2 12/07/93 SB13-7.10 206408 SB13-7.1DUP	SOIL SEAD-13 2-4 12/07/93 SB13-7.2 206406	SOIL SEAD-13 6-8 12/07/93 SB13-7.4 206407	SOIL SEAD-13 0-2 12/07/93 SB13-8.1 206409	SOIL SEAD-13 2-4 12/07/93 SB13-8.2 206410	SOIL SEAD-13 4-6 12/07/93 SB13-8.3 206411
VOLATILE ORGANICS													
Methylene Chloride	ug/kg	4	10.0%	100	0	11 U	12 U	12 UJ	12 U	11 U	13 U	11 U	11 U
Acetone	ug/kg	86	3.3%	200	0	11 U	12 U	12 UJ	14 U	11 U	13 U	11 U	11 U
Carbon Disulfide	ug/kg	2	3.3%	2700	0	11 U	12 U	12 UJ	12 U	11 U	13 U	11 U	11 U
Chloroform	ug/kg	2	3.3%	300	0	11 U	12 U	2 J	12 U	11 U	13 U	11 U	11 U
2-Butanone	ug/kg	26	3.3%	300	0	11 U	12 U	12 UJ	12 U	11 U	13 U	11 U	11 U
Toluene	ug/kg	6	6.7%	1500	0	11 U	12 U	12 UJ	12 U	11 U	13 U	11 U	11 U
SEMIVOLATILE ORGANICS													
Phenol	ug/kg	14000	3.3%	30	1	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
1,4-Dichlorobenzene	ug/kg	3300	3.3%	85	1	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
4-Methylphenol	ug/kg	9200	3.3%	500	1	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Naphthalene	ug/kg	510	3.3%	13000	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Acenaphthene	ug/kg	650	3.3%	50000 *	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Dibenzofuran	ug/kg	340	3.3%	6200	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Phenanthrene	ug/kg	1400	3.3%	50000 *	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Carbazole	ug/kg	180	3.3%	50000 *	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Di-n-butylphthalate	ug/kg	20	3.3%	8100	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Fluoranthene	ug/kg	800	3.3%	50000 *	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Pyrene	ug/kg	540	3.3%	50000 *	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
bis(2-Ethylhexyl)phthalate	ug/kg	1900	20.0%	50000 *	0	24 J	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Di-n-octylphthalate	ug/kg	210	10.0%	50000 *	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
Benzo(g,h,i)perylene	ug/kg	20	3.3%	50000 *	0	350 U	390 U	390 U	400 U	370 U	440 U	400 U	360 U
PESTICIDES/PCB													
4,4'-DDE	ug/kg	3.6	3.3%	2100	0	3.5 U	3.9 U	3.9 U	4 U	3.7 U	4.4 U	4 U	3.6 U
METALS													
Aluminum	mg/kg	21200	100.0%	15523	8	10200	9810	14900	14200	8490	15500	19600	9710
Antimony	mg/kg	5.8	23.3%	5	3	2.9 UJ	4.4 UJ	4.5 UJ	4.7 J	3.6 UJ	5.4 UJ	3.1 UJ	5.7 J
Arsenic	mg/kg	10.2	100.0%	7.5	8	2.3	10	8.5	6.2	5.9	8.2	10.2	6
Barium	mg/kg	584	100.0%	300	1	56.8	37.3 J	89.5	79.1	62.7	125	96	119
Beryllium	mg/kg	1.1	100.0%	1	2	0.58 J	0.43 J	0.79 J	0.7 J	0.42 J	0.95 J	0.97	0.48 J
Calcium	mg/kg	98100	100.0%	120725	0	45200	25400	11000	33100	74800	6540	4010	76600
Chromium	mg/kg	35.8	100.0%	24	10	17.8	17.6	21.7	23	14.4	22	32.4	15.3
Cobalt	mg/kg	18.9	100.0%	30	0	11.3	9.9 J	8.8 J	13.1	11.5	8.1 J	18.9	10.6
Copper	mg/kg	45.2	100.0%	25	16	14.5	31.8	26.9	27.6	21.6	19.4	31.5	22.2
Iron	mg/kg	42500	100.0%	28986	9	20700	23000	24800	29500	18400	25500	41100	19600
Lead	mg/kg	25.6	100.0%	30	0	11.7	26.8 R	31.6	17.9 R	10.5	19 R	10 R	11.2
Magnesium	mg/kg	25600	100.0%	12308	14	5220	4800	4850	18400	17200	4130	7940	19500
Manganese	mg/kg	934	100.0%	759	1	556	313	266	518	466	358	687	380
Mercury	mg/kg	0.08	56.7%	0.1	0	0.01 U	0.05 J	0.08 J	0.03 J	0.02 U	0.06 J	0.02 J	0.02 U
Nickel	mg/kg	57.1	100.0%	37	14	33	38.7	31.9	38.1	34	24.7	55.6	31.4
Potassium	mg/kg	2590	100.0%	1548	15	1000	1080	1950	1840	1150	1660	1420	1590
Selenium	mg/kg	1.4	86.7%	2	0	0.24 J	0.72 J	0.65 J	0.14 U	0.26 J	0.98 J	0.29 J	0.14 U
Silver	mg/kg	1	3.3%	0.5	1	0.56 U	0.86 U	0.87 U	0.89 U	0.7 U	1.1 U	0.6 U	0.84 U
Sodium	mg/kg	196	100.0%	114	17	141 J	86.3 J	77.2 J	108 J	148 J	63.9 J	62 J	144 J
Thallium	mg/kg	0.91	43.3%	0.3	13	0.23 U	0.55 J	0.47 J	0.78 J	0.62 J	0.3 J	0.5 J	0.75 J
Vanadium	mg/kg	35.8	100.0%	150	0	13.8	16.1	24.2	22.9	13.3	26.7	27.1	15.8
Zinc	mg/kg	103	100.0%	90	5	39.3	47.1	84.3	75.4	47.4	91.2	103	68.5
OTHER ANALYSES													
Nitrate/Nitrite-Nitrogen	mg/kg	176	100.0%	NA	NA	0.09	0.11	0.02	0.15	0.03	3.1	0.31	0.03
Total Solids	%W/W	95.8		NA	NA	93.4	83.8	85.1	82.5	90.5	74.6	82.8	90.7
Fluoride	mg/kg	193	96.6%	NA	NA	62	154	72	158	171	24	47	11.7

TABLE 3-4

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-13 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM (g)	NO. ABOV TAGM	SOIL SEAD-13 0-2 12/16/93 SB13-9.1 207029	SOIL SEAD-13 0-2 12/16/93 SB13-9.7 207031 SB13-9.1DUP	SOIL SEAD-13 6-8 12/16/93 SB13-9.4 207182	SOIL SEAD-13 10-12 12/16/93 SB13-9.6 207183	SOIL SEAD-13 0-2 12/17/93 SB13-10.1 207184	SOIL SEAD-13 0-2 12/17/93 SB13-10.10 207188 SB13-10.1DUP	SOIL SEAD-13 6-8 12/17/93 SB13-10.4 207186	SOIL SEAD-13 8-10 12/18/93 SB13-10.5 207187
VOLATILE ORGANICS													
Methylene Chloride	ug/kg	4	10.0%	100	0	12 U	12 U	11 U	11 U	12 U	12 U	11 U	2 J
Acetone	ug/kg	86	3.3%	200	0	12 U	12 U	11 U	11 U	12 U	12 U	11 U	10 UJ
Carbon Disulfide	ug/kg	2	3.3%	2700	0	12 U	12 U	11 U	11 U	12 U	12 U	11 U	10 UJ
Chloroform	ug/kg	2	3.3%	300	0	12 U	12 U	11 U	11 U	12 U	12 U	11 U	10 UJ
2-Butanone	ug/kg	26	3.3%	300	0	12 U	12 U	11 U	11 U	12 U	12 U	11 U	10 UJ
Toluene	ug/kg	6	6.7%	1500	0	12 U	12 U	11 U	11 U	12 U	12 U	11 U	10 UJ
SEMIVOLATILE ORGANICS													
Phenol	ug/kg	14000	3.3%	30	1	430 U	400 U	360 U	350 U	14000 J	370 UJ	340 U	320 U
1,4-Dichlorobenzene	ug/kg	3300	3.3%	85	1	430 U	400 U	360 U	350 U	3300 J	370 UJ	340 U	320 U
4-Methylphenol	ug/kg	9200	3.3%	500	1	430 U	400 U	360 U	350 U	9200 J	370 UJ	340 U	320 U
Naphthalene	ug/kg	510	3.3%	13000	0	430 U	400 U	360 U	350 U	510 J	370 UJ	340 U	320 U
Acenaphthene	ug/kg	650	3.3%	50000 *	0	430 U	400 U	360 U	350 U	650 J	370 UJ	340 U	320 U
Dibenzofuran	ug/kg	340	3.3%	6200	0	430 U	400 U	360 U	350 U	340 J	370 UJ	340 U	320 U
Phenanthrene	ug/kg	1400	3.3%	50000 *	0	430 U	400 U	360 U	350 U	1400 J	370 UJ	340 U	320 U
Carbazole	ug/kg	180	3.3%	50000 *	0	430 U	400 U	360 U	350 U	180 J	370 UJ	340 U	320 U
Di-n-butylphthalate	ug/kg	20	3.3%	8100	0	430 U	400 U	360 U	350 U	3900 UJ	370 UJ	340 U	320 U
Fluoranthene	ug/kg	800	3.3%	50000 *	0	430 U	400 U	360 U	350 U	800 J	370 UJ	340 U	320 U
Pyrene	ug/kg	540	3.3%	50000 *	0	430 U	400 U	360 U	350 U	540 J	370 UJ	340 U	320 U
bis(2-Ethylhexyl)phthalate	ug/kg	1900	20.0%	50000 *	0	62 J	27 J	360 U	350 U	1900 J	370 UJ	340 U	320 U
Di-n-octylphthalate	ug/kg	210	10.0%	50000 *	0	430 U	400 U	360 U	350 U	3900 UJ	370 UJ	340 U	320 U
Benzo(g,h,i)perylene	ug/kg	20	3.3%	50000 *	0	430 U	400 U	360 U	350 U	3900 UJ	370 UJ	340 U	320 U
PESTICIDES/PCB													
4,4'-DDE	ug/kg	3.6	3.3%	2100	0	4.3 U	4 U	3.7 U	3.6 U	3.8 U	3.9 U	3.6 U	3.4 U
METALS													
Aluminum	mg/kg	21200	100.0%	15523	8	18300	14200	12000	13800	12000	16500	12100	17100
Antimony	mg/kg	5.8	23.3%	5	3	5.6 UJ	4 UJ	5.8 J	4.6 J	4.4 UJ	5 J	3.7 UJ	4.1 UJ
Arsenic	mg/kg	10.2	100.0%	7.5	8	7.8	5.3	8	5.5	3.8	5.7	6.6	4.5
Barium	mg/kg	584	100.0%	300	1	124	105	191	173	72.2	157	174	584
Beryllium	mg/kg	1.1	100.0%	1	2	1.1 J	0.79 J	0.69 J	0.73 J	0.63 J	0.91 J	0.72 J	0.88 J
Calcium	mg/kg	98100	100.0%	120725	0	4800	7980	98100	78900	2070	4220	78900	32500
Chromium	mg/kg	35.8	100.0%	24	10	26.2	20.2	21.2	24.6	16.2	27.2	20.1	30.8
Cobalt	mg/kg	18.9	100.0%	30	0	10.3 J	7.9 J	13.8	10.4	4.3 J	8.2 J	17.8	18.6
Copper	mg/kg	45.2	100.0%	25	16	27.8	24.2	44	32.7	7.5 J	26.6 J	33.7	17.1
Iron	mg/kg	42500	100.0%	28986	9	31700	24300	25200	26800	16500	29000	25800	36800
Lead	mg/kg	25.6	100.0%	30	0	13.3	14.4	14.4	10.4	9	11	14.8	12.5
Magnesium	mg/kg	25600	100.0%	12308	14	5250	4350	17700	19800	2840	6210	16100	8700
Manganese	mg/kg	934	100.0%	759	1	473	352	532	396	104	204	708	546
Mercury	mg/kg	0.08	56.7%	0.1	0	0.04 J	0.03 J	0.02 J	0.02 J	0.03 J	0.03 J	0.02 J	0.02 U
Nickel	mg/kg	57.1	100.0%	37	14	35.4	28.5	45.9	40.9	14.1	32.6	57.1	53
Potassium	mg/kg	2590	100.0%	1548	15	1650	975	2150	2590	974 J	1500	1880	1580
Selenium	mg/kg	1.4	86.7%	2	0	1.4	0.69 J	0.52 J	0.47 J	0.29 J	0.32 J	0.45 J	0.42 J
Silver	mg/kg	1	3.3%	0.5	1	1.1 U	0.78 U	0.93 U	0.84 U	0.85 U	0.95 U	0.72 U	1 J
Sodium	mg/kg	196	100.0%	114	17	56 J	42.6 J	196 J	175 J	40 J	57 J	166 J	125 J
Thallium	mg/kg	0.91	43.3%	0.3	13	0.27 U	0.2 U	0.24 U	0.24 U	0.27 U	0.27 U	0.13 U	0.19 U
Vanadium	mg/kg	35.8	100.0%	150	0	34.8	25.6	25.8	24.5	21.6	31.7	21.6	24.3
Zinc	mg/kg	103	100.0%	90	5	56.9	48.5	73.5	98	40.7	68.7	92.8	82.2
OTHER ANALYSES													
Nitrate/Nitrite-Nitrogen	mg/kg	176	100.0%	NA	NA	0.03	0.19	0.04	0.04	0.33	0.5	0.17	0.05
Total Solids	%W/W	95.8		NA	NA	75.8	82.2	89.3	92.1	84.6	84.7	91.7	95.8
Fluoride	mg/kg	193	96.6%	NA	NA	78	97	89	72	75	34	28	27

Notes:
a) * = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm.
b) NA = Not Available
c) U = Compound was not detected.
d) J = the reported value is an estimated concentration.
e) R = the data was rejected in the data validating process.
f) UJ = the compound was not detected; the associated reporting limit is approximate.
g) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.
Soil cleanup objectives are based on a soil organic carbon content estimate of 1%.

Semivolatile Organic Compounds

Surface Soils

A total of 12 semivolatile organic compounds were found at varying concentrations in the surface soil samples collected at SEAD-13. In general, the concentrations of semivolatile compounds were low, with only 3 results, (phenol, 1,4-dichlorobenzene, and 4-methylphenol), exceeding their TAGM values. The criteria for phenol, (30 μg/kg), 1,4-dichlorobenzene, (85 μg/kg), and for 4-methylphenol, (500 μg/kg), were exceeded in one surface soil sample, collected in SEAD-13 West. Although 10 of the 12 SVOCs were detected only in surface soil sample SB-13-10.1 in SEAD-13 East, none were detected in the duplicate sample. Four samples contained phthalates [bis(2-ethylhexl)phthalate and/or Di-n-octyl(phthalate)] which are common laboratory contaminants, and they can potentially be attributed to the laboratory and not significant wide-ranging site impacts to site soils. Thus, while these SVOCs were not screened out in the data validation process, these data indicate that SVOCs in surface soils should not be a primary concern in the SEAD-13 RI field program. However, some of the detected concentrations for individual SVOCs exceeded their proposed TAGM values.

Subsurface Soils

Benzo(g,h,i)perylene, bis(2-Ethylhexyl)phthalate, di-n-octylphthalate, and di-n-butylphthalate were the only SVOC compounds detected in the subsurface soil samples analyzed. Benzo(g,h,i)perylene was detected at an estimated concentration of 20 μg/kg in subsurface soil sample SB13-4.2 (SEAD-13 West). The highest concentration of the three phthalates detected was an estimated concentration of 110 μg/kg (of di-n-octylphthalate) in subsurface soil sample SB13-1.4 (SEAD-13 East). Phthalates are also considered to be common laboratory contaminants, and they can be potentially attributed to the laboratory and not significant wide-ranging site impacts to site soils. Thus, while these SVOCs were not screened out in the data validation process, these data indicate that SVOCs in subsurface soils should not be a primary concern in the SEAD-13 RI field program. However, as discussed above, some of the detected concentrations for individual SVOCs in one surface soil sample exceeded their proposed TAGM valves.

Pesticides and PCBs

Surface Soils

Only one pesticide compound was detected in the 10 surface soil samples collected at SEAD-13. The pesticide 4,4'-DDE, was found in only one sample, SB13-2.1 (SEAD-13 East), at an estimated concentration of 3.6 µg/kg, which is well below the TAGM value of 2,100 µg/kg.

Subsurface Soils

No pesticide or PCB compounds were detected in the subsurface soil samples analyzed.

Herbicides

Surface Soils

No herbicide compounds were detected in the surface soil samples collected from SEAD-13.

Subsurface Soils

No herbicide compounds were detected in the subsurface soil samples collected from SEAD-13.

Metals

All metals were found at concentrations above the criteria, most just slightly above the TAGM which is attributable to natural variations in soils. One exception to this was thallium, which was detected in soil samples at two-times the TAGM value. The determination as to whether the soils have been impacted by metals is based on a comparison to NYSDEC TAGMs, and if no TAGM exists it is based on a comparison to a background soil concentration established from a large SEDA-wide database (Table 3-4). In instances where both a TAGM value and a soil background concentration are available, the higher of the two values is used for comparison (i.e., as the TAGM). In this way the natural background soil concentrations are factored into the evaluation of impacts. The TAGM list in Table 3-4 incorporates applicable NYSDEC TAGMS and soil background concentrations.

Surface Soils

A variety of surface soil samples were found to contain metals at concentrations that exceed the associated TAGM values. Of the 22 metals reported, 12 were found in one or more samples at concentrations above the TAGM values. Several metals were identified in a large number of samples above the TAGM value. Of these metals, aluminum, arsenic, chromium, copper, iron, nickel, and thallium were found at the highest concentrations and in the largest number of samples above the TAGM values.

Chromium was detected at concentrations above the TAGM value (24 mg/kg) in 4 of the surface soil samples and in one of the duplicate samples collected. The highest concentration, 30.2 mg/kg, was detected in the surface soil sample SB13-4.1 (SEAD-13-West).

Copper was detected at concentrations exceeding the TAGM value (25 mg/kg) in 5 of the surface soil samples and in two of the duplicate samples analyzed. Most were only slightly above the

TAGM value with a maximum copper concentration of 45.2 mg/kg detected in the soil sample SB13-2.1 (SEAD-13-East).

Nickel concentrations exceeded the TAGM value (37 mg/kg) in 4 of the surface soil samples collected. Most exceeded the criteria by only a slight amount with a maximum concentration of 46.6 mg/kg detected in the soil sample SB13-2.1 (SEAD-13-East).

Thallium concentrations exceeded the criteria value (0.30 mg/kg) in 4 surface soil samples. The highest estimated concentration was 0.91 mg/kg in SB13-3.1 (SEAD-13-East).

Subsurface Soils

A variety of samples were found to contain metals at concentrations that exceed the associated TAGM values. Of the 22 metals reported, 12 were found in one or more samples at concentrations above the TAGM values. Several metals were identified in a large number of samples above the associated TAGM values. Of these metals, aluminum, arsenic, chromium, copper, iron, nickel, and thallium were found at the highest concentrations and in the largest number of samples above the associated associated TAGM values.

Chromium was detected at concentrations above the TAGM value (24 mg/kg) in 5 of the subsurface soil samples collected. The highest concentration, 35.8 mg/kg, was detected in the soil sample SB13-4.3 at SEAD-13-West. Other elevated concentrations were detected in samples SB13-8.2 (32.4 mg/kg), and SB13-10.5 (30.8 mg/kg), which are also from SEAD-13-West.

Copper was detected at concentrations exceeding the TAGM value (25 mg/kg) in 9 of the subsurface soil samples analyzed. Most were only slightly above the TAGM value with a maximum copper concentration of 44 mg/kg detected in the subsurface soil sample SB13-9.4 (SEAD-13 West).

Nickel concentrations exceeded the TAGM value (37 mg/kg) in 10 of the subsurface soil samples collected. Most exceeded the TAGM value by only a slight amount with a maximum concentration of 57.1 mg/kg detected in the soil sample SB13-10.4 (SEAD-13-West).

Thallium concentrations exceeded the TAGM value of 0.30 mg/kg in 8 subsurface soil samples. The highest is an estimated concentration of 0.78 mg/kg in SB13-7.2 (SEAD-13-East).

Nitroaromatics

Surface Soils

No nitroaromatic compounds were detected in the surface soil samples collected at SEAD-13.

Subsurface Soils

No nitroaromatic compounds were detected in the subsurface soil samples collected at SEAD-13.

Indicator Compounds

Surface Soils

The surface soil samples at the site were analyzed for nitrate/nitrite nitrogen and fluoride. Nitrate/nitrite nitrogen concentrations ranged from a low of 0.02 mg/kg to a high of 3.1 mg/kg, found in the surface soil sample SB13-8.1. Fluoride concentrations ranged from a low of 24 mg/kg, to a high of 154 mg/kg detected in surface soil sample SB13-7.1. Both of these borings are located in SEAD-13-East.

Subsurface Soils

The subsurface soil samples were analyzed for nitrate/nitrite nitrogen and fluoride. Nitrate/nitrite nitrogen concentrations ranged from 0.02 mg/kg to 176 mg/kg, found in subsurface soil sample SB13-2.5 located in the central portion of SEAD-13-East. Fluoride concentrations ranged from 11.7 mg/kg to a high of 193 mg/kg, found in subsurface soil sample SB13-5.5 located in the central portion of SEAD-13-West.

Groundwater Sampling Summary

Seven monitoring wells were installed as part of the ESI at SEAD-13. Monitoring wells MW13-3 and MW13-7 were found to be dry during sampling and therefore, no groundwater sample was collected. Concentrations of constituents were compared to the NY AWQS Class GA groundwater criteria and the Federal Primary and Secondary Drinking Water Maximum Contaminant Levels (MCLs). The summary of chemical analyses are presented in Table 3-5. The following sections describe the nature and extent of groundwater contamination identified at SEAD-13.

TABLE 3-5

GROUNDWATER ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-13 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	MCL STANDARD	NO. ABOVE CRITERIA	WATER SEAD-13 02/03/94 MW13-1 210501	WATER SEAD-13 11/18/93 MW13-2 205063	WATER SEAD-13 02/04/94 MW13-4 210496	WATER SEAD-13 02/04/94 MW13-8 210499 MW13-4DUP	WATER SEAD-13 02/05/94 MW13-5 210497	WATER SEAD-13 02/04/94 MW13-6 210498
SEMIVOLATILE ORGANICS												
bis(2-Ethylhexyl)phthalate	ug/L	23	40.0%	50	NA	0	11 U	11 U	17		23	10 U
METALS												
Aluminum	ug/L	42400	100.0%	NA	NA	NA	42400	89.6 J	5540		53.1 J	2810
Antimony	ug/L	52.7	80.0%	3	6	4	33.9 J	52.5 U	31.5 J		43 J	52.7 J
Arsenic	ug/L	9.3	40.0%	25	50	0	9.3 J	1.4 J	1.4 U		1.4 U	1.4 U
Barium	ug/L	337	100.0%	1000	2000	0	337	28.7 J	71.2 J		33.5 J	34.3 J
Beryllium	ug/L	2.2	20.0%	3	4	0	2.2 J	0.3 U	0.4 U		0.4 U	0.4 U
Calcium	ug/L	592000	100.0%	NA	NA	NA	181000	592000	182000		105000	81500
Chromium	ug/L	69.4	60.0%	50	100	1	69.4	2.5 U	9.9 J		2.6 U	6.1 J
Cobalt	ug/L	34.6	40.0%	NA	NA	NA	34.6 J	4.9 U	6.7 J		4.4 U	4.4 U
Copper	ug/L	23.3	40.0%	200	1300(g)	0	23.3 J	3.7 U	3.3 J		3.1 U	3.1 U
Iron	ug/L	69400	100.0%	300	NA	4	69400	562	8010		75.8 J	4550
Lead	ug/L	34.8	60.0%	25	15(h)	1	34.8	0.6 U	3.1		0.5 U	1.5 J
Magnesium	ug/L	188000	100.0%	35000	NA	5	50300	188000	44900		55300	51500
Manganese	ug/L	1120	100.0%	300	NA	3	1120	342	299		143	376
Mercury	ug/L	0.05	20.0%	2	2	0	0.05 J	0.07 UJ	0.04 U		0.04 U	0.04 U
Nickel	ug/L	99.8	100.0%	NA	100	0	99.8	5 J	17.5 J		4.6 J	8.6 J
Potassium	ug/L	10100	100.0%	NA	NA	NA	10100	8690	4460 J		5460	6780
Selenium	ug/L	3.6	80.0%	10	50	0	3.6 J	2.9 J	1.2 J		0.7 U	2.3 J
Sodium	ug/L	17000	100.0%	20000	NA	0	9350	17000	9340		14000	7880
Vanadium	ug/L	70.8	60.0%	NA	NA	NA	70.8	3.3 U	8.8 J		3.7 U	5.9 J
Zinc	ug/L	143	100.0%	300	NA	0	143	3.8 J	138		101	50.6
OTHER ANALYSES												
Nitrate/Nitrite-Nitrogen	mg/L	460	80.0%	10	10	1	0.01 U	460	0.03		0.12	0.16
Fluoride	mg/L	0.45	100.0%	1500	4	0	0.45	0.1	0.3	0.23	0.22	0.28
pH	standard units	7.72					7.4	7.17	7.14		7.3	7.72
Specific Conductivity	umhos/cm	3150					380	3150	750		600	400
Turbidity	NTU	195					18.2	4.2	8.1		195	12.3

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
g) The value listed is an action level for copper at the tap, and not an MCL
h) The value listed is an action level for lead at the tap, and not an MCL
I) The duplicate sample from MW13-8 was only collected for fluoride. Duplicates for the other analytes were collected from another site during the combined 10 SWMU ESI field program.

Volatile Organic Compounds

No volatile organic compounds were detected in the five groundwater samples collected at SEAD-13.

Semi-Volatile Organic Compounds

One semivolatile organic compound, bis(2-ethylhexyl)phthalate, was detected in two groundwater samples collected at SEAD-13. A maximum concentration of 23 µg/L was found in the sample MW13-5. Both detected concentrations were below the criteria value of 50 µg/L, however, this phthlate is a common laboratory contaminant. Therefore, this compound can be potentially attributed to the laboratory and not site conditions. Thus, while bis(2-ethylhexyl)phthalate was not screened out in the data validation process, these data indicate that SVOCs in groundwater should not be a primary concern in the SEAD-13 RI field program.

Pesticides and PCBs

No pesticides or PCBs were found in the five groundwater samples collected at SEAD-13.

Herbicides

No herbicides were found in the five groundwater samples collected at SEAD-13.

Metals

Six metals, antimony, chromium, iron, lead, magnesium, and manganese were found in the groundwater samples at concentrations above the criteria value. Magnesium was found in all of the monitoring wells at concentrations above the criteria value of 35,000 µg/L. The maximum concentration for magnesium, 188,000 µg/L, was found in the groundwater sample collected from monitoring well MW13-2 at SEAD-13-East. Iron exceeded the NYSDEC Class GA criteria in four of the five wells sampled, MW13-1, MW13-2, MW13-4, and MW13-6. The maximum concentration, 69,400 µg/L, was detected in the groundwater sample collected from monitoring well MW13-1, which is the background well at SEAD-13-East.

Manganese was found in three of the five samples at concentrations exceeding the NYSDEC Class GA groundwater standard of 300 µg/L, with a maximum concentration of 1120 µg/L found in the groundwater sample collected from monitoring well MW13-1, the background well. Chromium and lead were found in MW13-1 at a concentration above their criteria values. Concentrations of 69.4 µg/L for chromium and 34.8 µg/L for lead were found in this well.

Antimony was found in four of the five samples at concentrations exceeding the NYSDEC Class GA groundwater standard of 3 μg/L and the federal MCL standard of 6 μg/L. Estimated concentrations of antimony ranged from 31.5 μg/L in MW13-4 to 52.7 μg/L MW13-6.

Indicator Parameters

One of the five groundwater samples analyzed had nitrate/nitrite nitrogen concentrations well above the criteria value of 10 mg/L. The maximum nitrate value detected was 460 mg/L in sample MW13-2, which is located downgradient from the former IRFNA pits in SEAD-13-East. Figure 3-5 shows the nitrate/nitrite nitrogen concentrations in the groundwater samples. Fluoride was detected at concentrations ranging from 0.1 to 0.45 mg/L in all of the groundwater samples analyzed. All of the reported concentrations were below the NY AWQS Class GA criteria value of 1.5 mg/L and the MCL standard of 4 mg/L.

Surface Water Sampling Summary

Three surface water samples were collected as part of the SEAD-13 investigation. The summary results of the chemical analyses are presented in Table 3-6. Two of the surface water samples were collected along the edges of the Duck Pond downgradient of SEAD-13-East and SEAD-13-West; the samples were SW13-1 and SW13-2, respectively. The final sample (SW13-3) was collected at a background location near where a small stream enters the Duck Pond. The following sections describe the nature and extent of surface water impacts identified at SEAD-13.

Volatile Organic Compounds

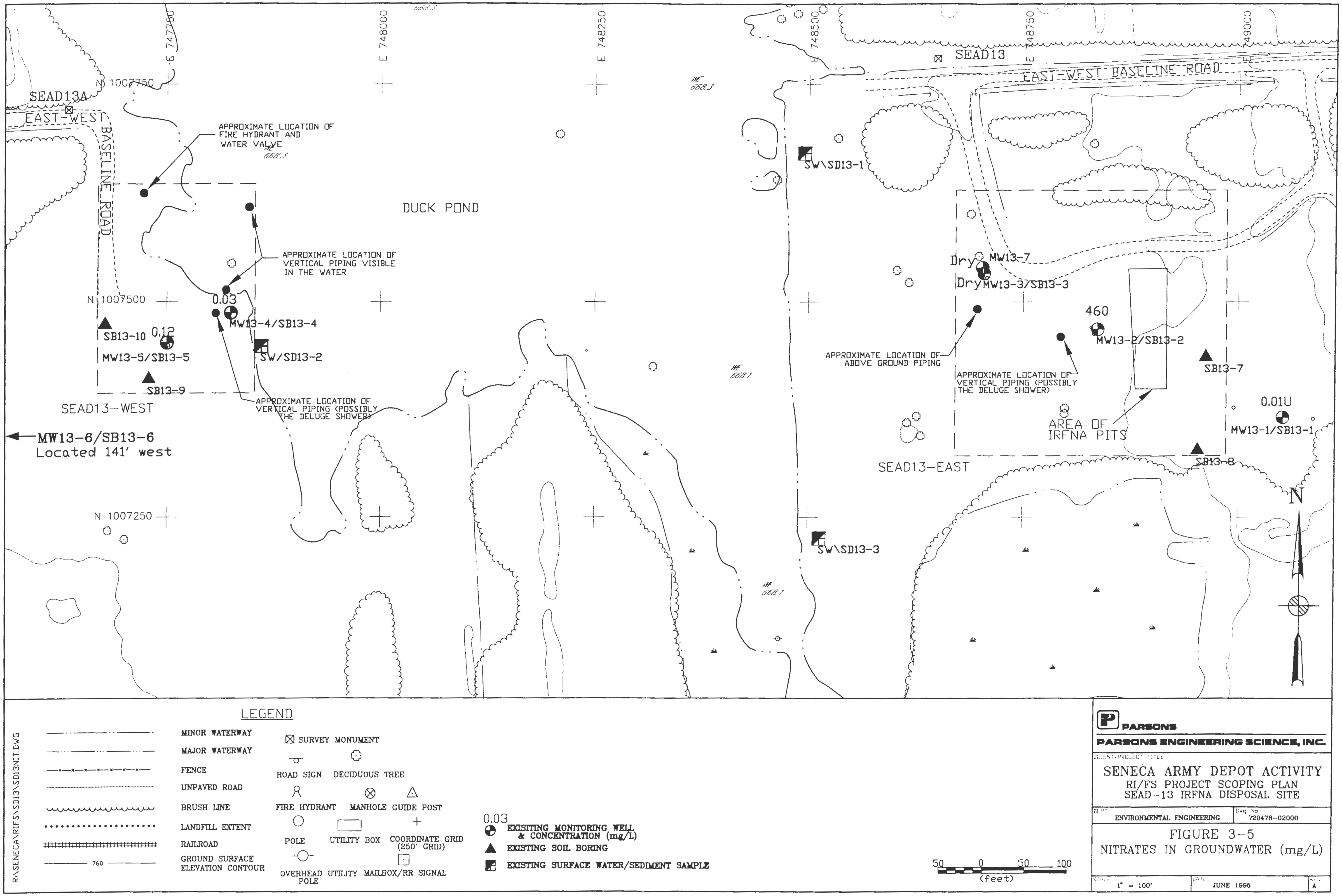
No volatile organic compounds were found in the three surface water samples collected at SEAD-13.

Semi-Volatile Organic Compounds

No semi-volatile organic compounds were found in the three surface water samples collected at SEAD-13.

Pesticides and PCBs

No pesticide or PCB compounds were found in the surface water samples collected at SEAD-13.



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-13 IRFNA DISPOSAL SITE

DEPT ENVIRONMENTAL ENGINEERING	Dwg. No 720476-02000

FIGURE 3-5
NITRATES IN GROUNDWATER (mg/L)

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

TABLE 3-6

SURFACE WATER ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-13 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYS GUIDELINES (a) CLASS D	EPA AWQC ACUTE	EPA AWQC CHRONIC	NO. ABOVE CRITERIA	WATER SEAD-13 11/03/93 SW13-1 203410	WATER SEAD-13 11/03/93 SW13-2 203411	WATER SEAD-13 11/04/93 SW13-3 203412
METALS										
Aluminum	ug/L	3830	100.0%	NA	750	87	3	3830	2410	162 J
Barium	ug/L	91.6	100.0%	NA	NA	NA	NA	91.6 J	50.4 J	31.8 J
Calcium	ug/L	75300	100.0%	NA	NA	NA	NA	75300	61400	73200
Chromium	ug/L	5.4	33.3%	4270	4270	509	0	5.4 J	2.5 U	2.5 U
Copper	ug/L	6.6	33.3%	50	50	30	0	6.6 J	3.7 U	3.7 U
Iron	ug/L	5790	100.0%	300	NA	1000	3	5790 J	4310 J	458 J
Lead	ug/L	7.5	66.7%	330	330.6	12.9	0	4.4	7.5	0.8 U
Magnesium	ug/L	14200	100.0%	NA	NA	NA	NA	14200	12800	13200
Manganese	ug/L	296	100.0%	NA	NA	NA	NA	268	296	85.3
Nickel	ug/L	7.1	66.7%	4250	3592.5	399.4	0	7.1 J	5.5 J	4.1 U
Potassium	ug/L	7200	100.0%	NA	NA	NA	NA	7200	4740 J	5240
Sodium	ug/L	70000	100.0%	NA	NA	NA	NA	62100	53400	70000
Vanadium	ug/L	6.2	33.3%	190	NA	NA	0	6.2 J	3.3 U	3.3 U
Zinc	ug/L	27.7	66.7%	800	297	269	0	27.7	15.9 J	3.1 U
OTHER ANALYSES										
Nitrate/Nitrite-Nitrogen	mg/L	0.1	100.0%	NA	NA	NA	NA	0.1	0.02	0.04
Fluoride	mg/L	0.39	100.0%	28700	NA	NA	0	0.37	0.39	0.27
pH	standard units	7.68						7.68	7.62	7.51
Specific Conductivity	umhos/cm									
Turbidity	NTU									

Notes:
a) The New York State Ambient Water Quality Standards and Guidelines for Class "D" Water.
b) EPA Water Quality Criteria Summary (1991), Quality Criteria for Water 1986 Updates # 1 and # 2.
c) Hardness dependent values assume a hardness of 300 mg/l.
d) NA = Not Available
e) U = Compound was not detected.
f) J = the reported value is an estimated concentration.
g) R = the data was rejected in the data validating process.
h) UJ = the compound was not detected; the associated reporting limit is approximate.

Herbicides

No herbicide compounds were found in the surface water samples collected at SEAD-13.

Metals

Two metals, aluminum and iron, were found in all three of the surface water samples analyzed at concentrations above their respective criteria values of 87 µg/L and 300 µg/L. The highest concentration of aluminum (3,830 µg/L) and an estimated concentration of iron (5,790 µg/L) were found in the sample SW13-1, which was collected on the east side of the pond. Though all three surface water samples had concentrations of aluminum and iron which exceeded criteria values, the two downgradient surface water samples, SW13-1 and SW13-2, had reported concentrations of these two metals that were an order of magnitude greater than the concentrations detected in the upgradient sample, SW13-3.

Nitroaromatics

No nitroaromatic compounds were found in the surface water samples collected at SEAD-13.

Indicator Compounds

Nitrate/nitrite nitrogen was detected in all three of the surface water samples collected at SEAD-13 with concentrations ranging from 0.02 mg/L to 0.1 mg/L. The maximum concentration, 0.10 mg/L, was found in sample MW13-1. Fluoride also was detected in all three of the surface water samples analyzed. The reported concentrations ranged from 0.27 to 0.39 mg/L, which were well below the NYS Class D guideline value of 28,700 mg/L.

Sediment Sampling Summary

A total of three sediment samples were collected as part of the SEAD-13 investigation. The summary chemical analyses are presented in Table 3-7. The sediment samples were collected in the same locations as the surface water samples described above. The following sections describe the nature and extent of sediment contamination identified at SEAD-13.

Volatile Organic Compounds

A total of two VOCs were identified in the three sediment samples collected at SEAD-13. Both of these compounds, acetone and 2-butanone, are common laboratory contaminants and therefore, they can be potentially attributed to the laboratory and not site conditions. The maximum

TABLE 3-7

SEDIMENT ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-13 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC SEDIMENT CRITERIA FOR AQUATIC LIFE (a)	NYSDEC SEDIMENT CRITERIA FOR HUMAN HEALTH (a)	NYSDEC SEDIMENT CRITERIA FOR WILDLIFE (a)	LOT (b)	NO. ABOVE CRITERIA	SOIL SEAD-13 0-0.5 11/03/93 SD13-1 203406	SOIL SEAD-13 0-0.5 11/03/93 SD13-4 203409 SD13-1DUP	SOIL SEAD-13 0-0.5 11/03/93 SD13-2 203407	SOIL SEAD-13 0-0.5 11/03/93 SD13-3 203408
VOLATILE ORGANICS												
Acetone	ug/kg	380	100.0%	NA	NA	NA		NA	380 J	110 J	150 J	110 J
2-Butanone	ug/kg	140	33.3%	NA	NA	NA		NA	140 J	28 UJ	43 UJ	28 UJ
NITROAROMATICS												
Tetryl	ug/kg	200	33.3%	NA	NA	NA		NA	130 UJ	130 UJ	200 J	130 UJ
SEMIVOLATILE ORGANICS												
Phenanthrene	ug/kg	35	33.3%	1390	NA	NA		0	970 UJ	35 J	990 UJ	2700 UJ
Fluoranthene	ug/kg	69	33.3%	NA	NA	NA		NA	69 J	63 J	990 UJ	2700 UJ
Pyrene	ug/kg	60	33.3%	NA	NA	NA		NA	60 J	54 J	990 UJ	2700 UJ
METALS												
Aluminum	mg/kg	18200	100.0%	NA			NA	NA	14500 J	18200 J	16900 J	17800 J
Barium	mg/kg	162	100.0%	NA			NA	NA	97.2 J	134 J	112 J	162 J
Beryllium	mg/kg	1	100.0%	NA			NA	NA	0.67 J	0.95 J	0.77 J	1 J
Calcium	mg/kg	7200	100.0%	NA			NA	NA	7000 J	5750 J	5780 J	7200 J
Chromium	mg/kg	26.9	100.0%	26			111	2	21.7 J	26.9 J	23.3 J	26.1 J
Cobalt	mg/kg	11.3	100.0%	NA			NA	NA	6.7 J	10.8 J	9.1 J	11.3 J
Copper	mg/kg	20.7	100.0%	19			114	2	16.5 J	20.7 J	18.3 J	20.6 J
Iron	mg/kg	28100	100.0%	24000			40000	2	19400 J	28100 J	21100 J	27200 J
Lead	mg/kg	25.7	100.0%	27			250	0	18.1 J	25.7 J	25.4 J	8.5 J
Magnesium	mg/kg	4680	100.0%	NA			NA	NA	4100 J	4610 J	3980 J	4680 J
Manganese	mg/kg	428	100.0%	428			1100	1	235 J	428 J	361 J	424 J
Mercury	mg/kg	0.09	66.7%	0.11			2	0	0.03 J	0.06 J	0.09 J	0.02 UJ
Nickel	mg/kg	31.1	100.0%	22			90	3	24.6 J	30.8 J	25.7 J	31.1 J
Potassium	mg/kg	2350	100.0%	NA			NA	NA	2350 J	2210 J	2210 J	2040 J
Selenium	mg/kg	0.49	66.7%	NA			NA	NA	0.49 J	0.37 J	0.54 UJ	0.42 J
Silver	mg/kg	3.2	33.3%	NA			NA	NA	3.4 UJ	3.2 J	4 UJ	2.7 UJ
Sodium	mg/kg	326	100.0%	NA			NA	NA	299 J	326 J	292 J	244 J
Vanadium	mg/kg	33.6	100.0%	NA			NA	NA	26.3 J	33.6 J	31.5 J	31.8 J
OTHER ANALYSES												
Nitrate/Nitrite-Nitrogen	mg/kg	0.18	100.0%	NA			NA	NA	0.09	0.18	0.15	0.05
Total Solids	%W/W	43.4							33.8	43.4	32.9	40.1
Fluoride	mg/kg	270	100.0%	NA			NA	NA	188	194	210	270

NA stands for NOT ANALYZED

NOTES:

a) NYSDEC Sediment Criteria - 1989.
b) LOT = limit of tolerance; represents point at which significant toxic effects on benthis species occur.
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 validation process
g) UJ = the coumpound was not detected; the associated reporting limit is approximate.

concentrations for both compounds were identified in sample SD13-1, which was collected at the waters edge on the east side of the pond. Also, no NYSDEC sediment criteria were found for these compounds. Thus, while these VOCs were not screened out in the data validation process, these data indicate that VOCs in sediment should not be a primary concern in the SEAD-13 RI field program. There is no strategy in the proposed field program in Section 4.0 for locating samples for the sole purpose of investigating the extent of VOCs in a sediment.

Semi-Volatile Organic Compounds

A total of three SVOCs were identified in the three sediment samples collected at SEAD-13. The SVOCs detected were all PAHs, and were found at low concentrations. The maximum concentration detected was an estimated value of 69 μg/kg of fluoranthene found in the sediment sample SD13-1. This sediment sample, which was collected on the east side of the pond downgradient of SEAD-13 East, had the only SVOCs detected of the three samples analyzed.

Pesticides and PCBs

No pesticide or PCB compounds were detected in the three sediment samples collected at SEAD-13.

Herbicides

No herbicide compounds were found in the sediment samples collected at SEAD-13.

Metals

A number of metals were detected in the sediment samples collected at SEAD-13. Of these, chromium, copper, iron, and nickel were detected in excess of the NYSDEC Sediment Criteria for Aquatic Life. Nickel was detected at an estimated concentration of 24.6 mg/kg in the sample SD13-1, at an estimated concentration of 25.7 mg/kg in the sample SD13-2, and at an estimated concentration of 31.1 mg/kg in sample SD13-3. All of these exceeded the sediment criteria for nickel of 22 mg/kg. The chromium estimated concentrations of 26.1 mg/kg reported for sample SD13-3 and 26.9 mg/kg for sample SD13-1Dup exceeded the sediment criteria of 26 mg/kg. The copper criteria of 19 mg/kg was exceeded by the samples SD13-3 (estimated concentration of 20.6 mg/kg) and SD13-1Dup (estimated concentration of 20.7 mg/kg). The iron criteria of 24,000 mg/kg was exceeded by samples SD13-3 (estimated concentration of 27,200 mg/kg) and SD13-1Dup (estimated concentration of 28,100 mg/kg).

concentrations for both compounds were identified in sample SD13-1, which was collected at the waters edge on the east side of the pond. Thus, while these VOCs were not screened out in the data validation process, these data indicate that VOCs in sediment should not be a primary concern in the SEAD-13 RI field program.

Semi-Volatile Organic Compounds

A total of three SVOCs were identified in the three sediment samples collected at SEAD-13. The SVOCs detected were all PAHs, and were found at low concentrations. The maximum concentration detected was an estimated value of 69 μg/kg of fluoranthene found in the sediment sample SD13-1. This sediment sample, which was collected on the east side of the pond downgradient of SEAD-13-East, had the only SVOCs detected of the three samples analyzed.

Pesticides and PCBs

No pesticide or PCB compounds were detected in the three sediment samples collected at SEAD-13.

Herbicides

No herbicide compounds were found in the sediment samples collected at SEAD-13.

Metals

A number of metals were detected in the sediment samples collected at SEAD-13. Of these, chromium, copper, iron, and nickel were detected in excess of the NYSDEC Sediment Criteria for Aquatic Life. Nickel was detected at an estimated concentration of 24.6 mg/kg in the sample SD13-1, at an estimated concentration of 25.7 mg/kg in the sample SD13-2, and at an estimated concentration of 31.1 mg/kg in sample SD13-3. All of these exceeded the sediment criteria for nickel of 22 mg/kg. The chromium estimated concentrations of 26.1 mg/kg reported for sample SD13-3 and 26.9 mg/kg for sample SD13-1Dup exceeded the sediment criteria of 26 mg/kg. The copper criteria of 19 mg/kg was exceeded by the samples SD13-3 (estimated concentration of 20.6 mg/kg) and SD13-1Dup (estimated concentration of 20.7 mg/kg). The iron criteria of 24,000 mg/kg was exceeded by samples SD13-3 (estimated concentration of 27,200 mg/kg) and SD13-1Dup (estimated concentration of 28,100 mg/kg).

Nitroaromatics

One nitroaromatic compound, Tetryl, was found in the sediment sample SD13-2 near SEAD-13-West at an estimated concentration of 200 µg/kg.

Indicator Compounds

Nitrate/nitrite nitrogen was detected in all of the sediment samples analyzed. The maximum concentration detected was 0.18 mg/kg in sample SD13-1 (duplicate). Fluoride also was detected in all of the sediment samples analyzed. The reported concentrations ranged from 188 to 270 mg/kg.

3.1.3 Environmental Fate of Constituents at SEAD-13

The potential contaminants of concern at SEAD-13 are metals, and nitrate/nitrite. The following discussion is meant to present general information on the fate of the 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 site-wide is provided in the Generic Installation RI/FS Workplan. A summary of fate and transport characteristics for the constituents of concern is presented in Table 3-8.

3.1.3.1 Metals

In general, metals tend to be persistent in the environment and relatively insoluble. The behavior of heavy metals in soil is unlike organic compounds in many aspects. 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.

Table 3-8

SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR SELECTED ORGANIC COMPOUNDS

SENECA ARMY DEPOT

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

Table 3-8

SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR SELECTED ORGANIC COMPOUNDS

SENECA ARMY DEPOT

COMPOUND	SOLUBILITY (mg/l)	VAPOR PRESSURE (mmHg)	HENRY'S LAW CONSTANT (atm-m^3/mol)	Koc (ml/g)	Kow	HALF - LIFE (days)	BCF
Pesticides/PCBs							
beta-BHC	0.24	2.80E-07	4.47E-07	3.80E+03	7.94E+03		
gamma-BHC (Lindane)	7.8	0.00016	7.85E-06	1.08E+03	7.94E+03	Neg. Deg.	250
Heptachlor	0.18	0.0003	8.19E-04	1.20E-04	2.51E+04	Neg. Deg.	3600-37000
Aldrin	0.18	6.00E-06	1.60E-05	9.60E+04	2.00E+05	Neg. Deg.	3890-12260
Endosulfan I	0.16	0.00001	3.35E-05	2.03E+03	3.55E+03		
Heptachlor epoxide	0.35	0.0003	4.39E-04	2.20E+02	5.01E+02	Neg. Deg.	851-66000
Dieldrin	0.195	1.78E-07	4.58E-07	1.70E+03	3.16E+03	Neg. Deg.	3-10000
4,4'-DDE	0.04	6.50E-06	6.80E-05	4.40E+06	1.00E+07	Neg. Deg.	110000
Endrin	0.024	2.00E-07	4.17E-06	1.91E+04	2.18E+05	Neg. Deg.	1335-49000
Endosulfan II	0.07	0.00001	7.65E-05	2.22E+03	4.17E+03		
4,4'-DDD	0.16	2.00E-09	3.10E-05	2.40E+05	3.60E+05		
Endosulfan sulfate	0.16			2.33E+03	4.57E+03		
4,4'-DDT	0.005	5.50E-06	5.13E-04	2.43E+05	1.55E+06	Neg. Deg.	38642-110000
Endrin aldehyde							
alpha-Chlordane	0.56	0.00001	9.63E-06	1.40E+05	2.09E+03	Neg. Deg.	400-38000
Aroclor-1254	0.012	0.00008	2.70E-03	4.25E+04	1.07E+06	42	10E4-10E6
Aroclor-1260	0.0027	0.000041	7.10E-03	1.30E+06	1.38E+07	Neg. Deg.	10E4-10E6

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).

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. Metals which exist in metallic form, i.e., as bullets or projectiles, will tend to dissolve more slowly than the metallic salts.

Oxidation and reduction involves the change of the valence state of the metals and has a large influence on fate mechanisms. A good example of the variation in contamination fate 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 far more soluble than Fe(III) and therefore has a greater mobility. The redox state may also affect the toxicity of a compound.

Soil pH is often correlated with potential 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. Metals would be most mobile in highly acidic soil (pH of less than 5).

The surface soil at SEDA has pH values ranging from 5 to 8.4 (SCS, 1972). Subsurface soil has even higher pH values, with the data indicating values ranging from 7 to 9. Therefore, metals at SEDA would be expected to be present primarily in insoluble forms. A detailed evaluation of select metals (barium, copper, lead and mercury) is given below.

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.

3.1.4 Data Summary and Conclusions

The ESI conducted at SEAD-13 identified several areas which have been impacted by releases of metals, nitrates/nitrites and fluoride.

A total of 30 subsurface soil samples were collected at SEAD-13. To evaluate the extent of surface water runoff impacts, three surface water and three sediment samples were collected from the pond. Additionally, five groundwater samples were collected as part of this investigation. The impacts to these media are summarized below.

Surface Soils

Surface soils at the site (both SEAD-13-East and SEAD-13-West) have been impacted primarily by metals and fluoride. Other constituents that were detected include several semi-volatile organic compounds and nitrate/nitrite nitrogen. Constituents analyzed for but not detected on-site include volatiles, PCBs, pesticides and herbicides.

Of the 22 metals reported in soils, 12 of these were found in one or more samples at concentrations above the associated TAGM values. Several metals were identified in a large number of samples at concentrations above the associated TAGM values. Of these metals, aluminum, arsenic, chromium, copper,iron, nickel, and thallium were found at the highest concentrations and in the largest number of samples.

Chromium was detected at concentrations above the TAGM value (24 mg/kg) in 4 of the surface soil samples and one of the duplicate samples collected. The highest concentration, 30.2 mg/kg, was detected in the surface soil sample SB13-4.1.

Copper was detected at concentrations exceeding the TAGM value (25 mg/kg) in 5 of the surface soil samples and 2 of the duplicate samples analyzed. Most were only slightly above the TAGM value. The maximum copper concentration detected was 45.2 mg/kg in soil sample SB13-2.1. Nickel concentrations exceeded the TAGM value (37 mg/kg) in 4 of the surface soil samples collected. Most exceeded the TAGM value by only a slight amount with a maximum concentration of 46.6 mg/kg in soil sample SB13-2.1. Thallium concentrations exceeded the TAGM value (0.30 mg/kg) in 4 samples. The highest concentration was 0.91 mg/kg in SB13-3.1.

Subsurface Soils

The occurrence and distribution of constituents which were significantly above their respective TAGM values or were found in numerous samples at concentrations which exceeded their

respective TAGM values were similar to those found in the surface soil samples. The major constituents of concern were the inorganic elements aluminum, arsenic, chromium, copper, iron, nickel and thallium and the indicator compounds nitrate/nitrite nitrogen and fluoride. The metals chromium, copper, nickel, and thallium were found at concentrations above TAGM values in at least 30% of the subsurface soil samples analyzed.

Groundwater

Groundwater at the site appears to have been impacted by metals, fluoride and nitrate/nitrite. The other constituent that was detected, but is considered to be of less significance, was the semivolatile organic compound bis(2-ethylhexyl)phthalate, which is a laboratory contaminant. This latter constituent was considered to be insignificant because it was present at concentrations which were below the NY AWQS Class GA criteria of 50 μg/L. Constituents that were not detected on-site include volatile organic compounds, pesticides and PCBs, and herbicides.

Six metals, antimony, chromium, iron, lead, magnesium, and manganese were found in one or more of the groundwater samples at concentrations above their criteria values. Chromium, antimony, lead and nitrate/nitrite nitrogen were considered to be the major constituents of concern due to their presence at significant concentrations in one or more of the groundwater samples. Chromium and lead were found in MW13-1, the background well at SEAD-13-East, at concentrations of 69.4 μg/L for chromium and 34.8 μg/L for lead both of which were above their respective criteria values.

Antimony was found in four of the five samples exceeding the groundwater criteria. A maximum concentration of 52.7 μg/L was found in the groundwater sample collected from monitoring well MW 13-6, the background well at SEAD-13-West.

One groundwater sample from SEAD-13-East had a nitrate/nitrite nitrogen concentration above the associated criteria value of 10 μg/L. A concentration of 460 μg/L of nitrate was detected in the groundwater sample from monitoring well MW13-2, which is located downgradient of the disposal pits east of the Duck Pond.

Monitoring well MW13-1, the upgradient well at SEAD-13-East, appears to have been impacted by metals. These impacts may be due to activities at SEAD-46 (Small Arms Range), which is located southeast of SEAD-13-East. SEAD-46 was used to test military ordnance from the 1940s to 1960. The munitions which were tested typically contained metals (as organometallic compounds and metallic components of munitions, e.g., iron, copper, aluminum, arsenic, barium, lead, tin, zinc). The direction of groundwater flow at SEAD-46 is believed to be to the north-northwest, towards SEAD-13.

Surface Water

Two metals, aluminum and iron, were found in the three surface water samples at concentrations above the most stringent state or federal criteria value. Constituents that were not detected in SEAD-13 surface waters include volatile organic compounds, semivolatile organic compounds, pesticides and PCBs, and herbicides.

Sediment

The major constituents of concern in the sediments at the site are inorganic elements. Other constituents that were detected include volatile organic compounds, semi-volatile organic compounds, nitroaromatics and nitrate/nitrite nitrogen. Herbicides, pesticides, and PCBs, were not detected on-site.

None of the metals were found at concentrations exceeding the NYDSDEC Limit of Tolerance values, however, the five metals chromium, copper, iron, manganese, and nickel, were found at concentrations above the NYSDEC sediment criteria values for protection of aquatic life. The maximum concentration detected for chromium was 26.9 mg/kg, the maximum concentration for copper was 20.7 mg/kg, and the maximum concentration for nickel was 31.1 mg/kg. Two sediment samples collected from the pond (SD13-2 and SD13-3) had concentrations of chromium, copper, and nickel that exceeded the NYSDEC sediment criteria values for protection of aquatic life. Generally, surface water runoff appears to be the likely mechanism for the distribution and concentration of metals in the pond. Tetryl was detected at an estimated concentration of 200 µg/kg in SD13-2.

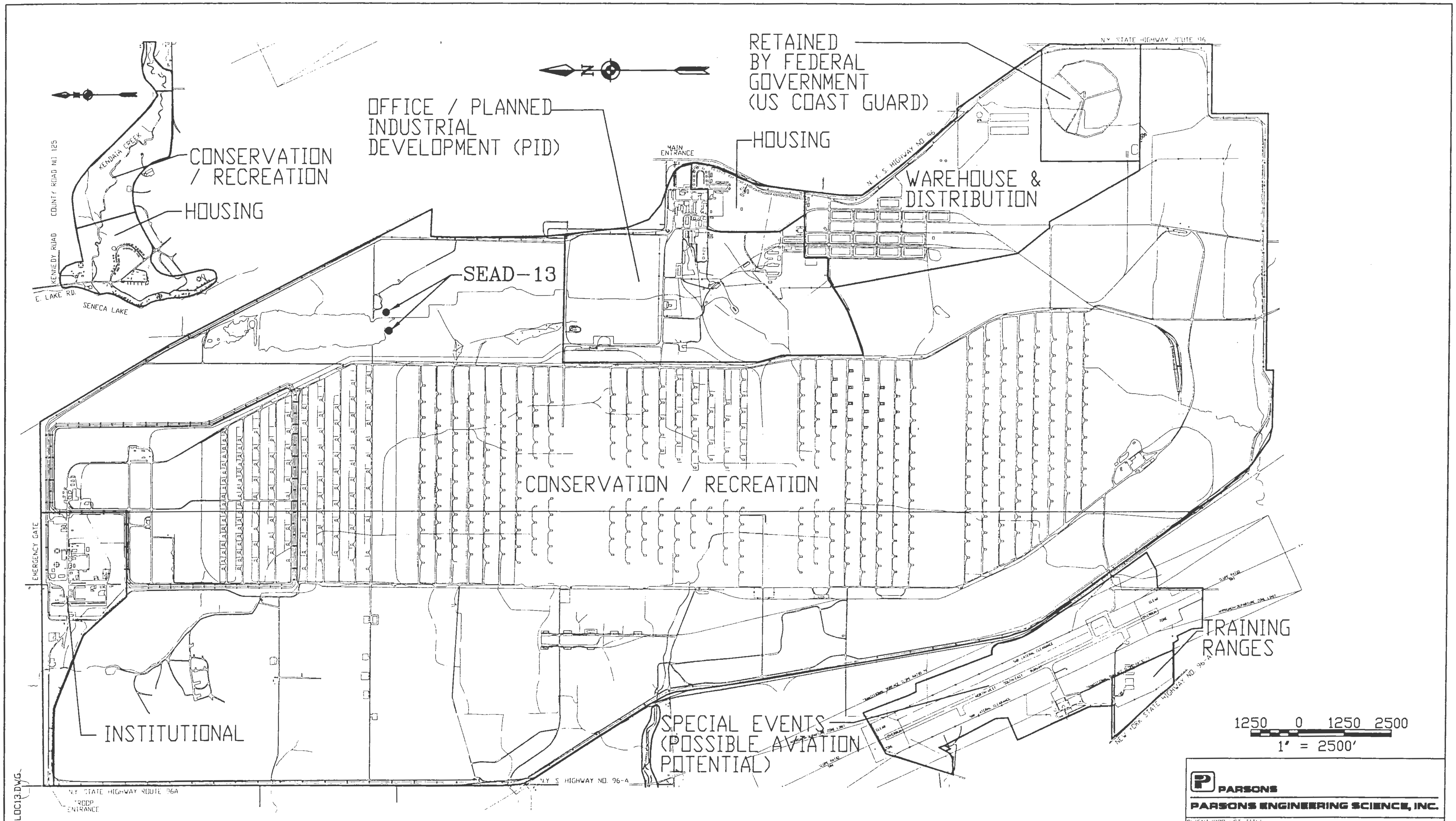
3.2 PRELIMINARY IDENTIFICATION OF POTENTIAL RECEPTORS AND EXPOSURE SCENARIOS

This section will identify the source areas, release mechanisms, potential exposure pathways and the likely human and environmental receptors at SEAD-13 based upon the results of the conceptual site model, which was described in the previous section.

This section discusses the current understanding of site risks for SEAD-13 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 SEAD-13 are valid or if they may be eliminated from further consideration prior to conducting a risk assessment. Additionally, this information will determine what additional data are necessary to develop a better conceptual understanding of the site in order to determine risks to human health and the environment, to better define the ARARs, and to develop appropriate remedial actions.

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 the Reuse Plan describes the preferred land use for the entire Depot and identifies nine land uses. The portion of the Depot that is occupied by SEAD-13 East and SEAD-13 West is proposed as "Conservation/Recreation Land" (Figure 3-6). The description under this land use as given in the Reuse Plan is as follows:

> 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, 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 Local Redevelopment Authority (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, as well as provide assistance in negotiations



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PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-13 IRFNA DISPOSAL PITS

DEPT ENVIRONMENTAL ENGINEERING
Dwg. No. 726510-02007

FIGURE 3-6
FINAL LAND USE PLAN

SCALE 1" = 2500'
DATE JANUARY 1997
REV. A

> regarding the transfer of property from the Department of the Army to another user."

The Reuse Plan and Implementation Strategy for the Depot is based on extensive evaluation of site factors, existing market conditions, and the financial implementations of the various development options. Direction provided by the LRA, as well as numerous public meetings also influenced the development of the land use plan.

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

The complete potential exposure pathways from sources to receptors area shown schematically in Figure 3-7, Exposure Pathway Summary.

3.2.1 Potential Source Areas and Release Mechanisms

The primary source area for SEAD-13 includes contaminated soils within and adjacent to the IRFNA disposal pits. The primary release mechanisms from the IRFNA disposal pits are surface water runoff and infiltration of precipitation. Wind is also a release mechanism as dust from impacted soil may be introduced into the breathing zone, although this is not expected to be significant as the site is vegetated.

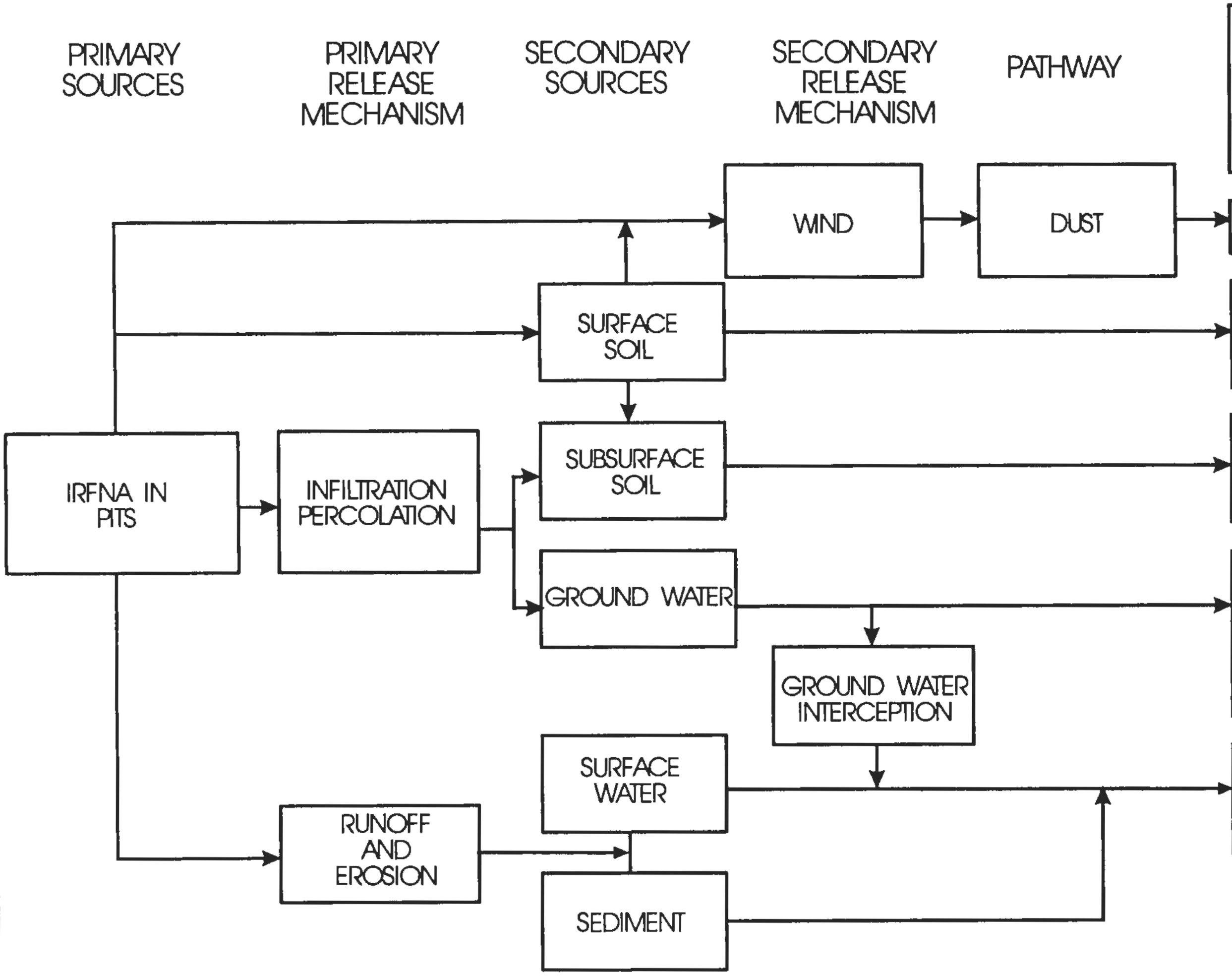
3.2.2 Potential Exposure Pathways and Receptors - Current Uses

The potential for human exposure is directly affected by the accessibility to the site. Within the boundaries of SEDA, human and vehicular access to the site is not restricted.

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

1. SEDA personnel or visitors (i.e., hunters) who may visit the IRFNA disposal pits;
2. Terrestrial biota on or near the IRFNA disposal pits; and
3. Aquatic biota in the Duck Pond.

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



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	NA	●	NA	●	●
DERMAL CONTACT	NA	●	NA	●	●

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE RECEPTOR

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-13 IRFNA DISPOSAL PITS

DEPT. ENVIRONMENTAL ENGINEERING

DWG NO. 726510-02007

FIGURE 3-7
EXPOSURE PATHWAY SUMMARY

SCALE NA

DATE JANUARY 1997

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3.2.2.1 Ingestion and Dermal Exposure Due to Surface Water Runoff and Sediment

Surface water flow is controlled by local topography although very little relief is present on the eastern and western IRFNA disposal areas. In general, the topography of the land slopes toward the Duck Pond which separates the two disposal areas. Because no well developed drainage swales are present at either disposal areas, it is likely that surface water ponds on the surface eventually drains into the Duck Pond. Surface soils eroded from the site would be deposited within the Duck Pond.

The primary human receptors of the surface water and sediment impacts are current SEDA personnel and other site workers/visitors. Current SEDA personnel and visitors to the site could experience dermal exposure from wading in the Duck Pond and could inadvertently ingest surface water or sediment. Hunters only walk through the site. Future on-site residents could come in contact with surface water and sediment. Since the site is abandoned and overgrown, wind-blown dust is not a significant release mechanism.

The primary environmental receptors of any impacted surface water and sediment are the biota of the low-lying areas and the Duck Pond. Organisms which feed on the biota may be affected due to bioaccumulation of pollutants from the water and sediment. Terrestrial and aquatic biota that ingest and come in contact with impacted surface water bodies (e.g., the Duck Pond) may also be affected.

3.2.2.2 Incidental Soil Ingestion and Dermal Contact

Inadvertent ingestion of and dermal contact with soil is a potential exposure pathway for on-site visitors and workers, and terrestrial biota.

3.2.2.3 Groundwater Inhalation, Ingestion and Dermal Contact

The groundwater beneath the IRFNA disposal pits 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 to the groundwater from the site under current uses. Groundwater flow direction on the eastern disposal area is to the west-northwest and in the western disposal area to the east-northeast, although seasonal variations in these groundwater flow directions may occur. In both areas, groundwater generally flows toward the Duck Pond. The potential groundwater contribution to the surface water (i.e., the Duck Pond) could result in the exposures identified for surface water and sediments above.

3.2.3 Potential Exposure Pathways and Receptors - Future Uses

The proposed future use of the area that encompasses SEAD-13 East and SEAD-13 West 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. Recreator/Camper who may visit the IRFNA disposal pits;
2. Hunter who may visit the IRFNA disposal pits;
3. Terrestrial biota on or near the former IRFNA disposal pits; and
4. Aquatic biota in the Duck Pond.

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

For future use of SEAD-13, 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 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 swimming at the Duck Pond.

The hunter would be exposed in much the same manner as described in the current site use scenario noted in Section 3.2.2.

Aquatice and Terrerstial biota would also be exposed in much the same manner as described in the current site use scenario noted in Section 3.2.2.

The numerical assumptions that will be used in the risk assessment for the current and future exposure scenarios are lised in Table 3-7.

3.3 SCOPING OF POTENTIAL REMEDIAL ACTION ALTERNATIVES

Based upon sampling data gathered during the ESI, the media of concern at SEAD-13 for protection of human health and the environment and compliance with ARARs are:

a. surface and subsurface soils containing metals, fluoride and nitrate/nitrite compounds,
b. groundwater containing metals and nitrate/nitrite, and
c. surface water and sediment in the Duck pond may contain metals.

A comprehensive list of remedial response action alternatives are discussed 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 are 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-13 RI/FS reports.

A comprehensive list of ARARs is discussed in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

3.5 DATA QUALITY OBJECTIVES (DQOs)

Any further investigations conducted at SEAD-13, either as part of this RI or additional work, will conform with all the stated DQOs. Additional sampling of groundwater, soil, sediment and surface water will generally require Level IV quality data.

The DQOs are discussed 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 ESI at SEAD-13 was conducted to gain a preliminary understanding of the nature and extent of contamination. The data collected as part of the ESI were used to evaluate the potential for risks to human health and the environment. A conceptual site model was developed identifying potential source area release mechanisms and receptor pathways. The results of the investigations at SEAD-13 were used to determine additional data requirements for a complete evaluation of risks to human health and the environment, compliance with ARARs and the development of preliminary remedial action alternatives.

The data needs for SEAD-13 are a direct result of the need to meet the DQOs identified in the Generic Installation RI/FS Workplan. By media, these data needs are:

Soil Data

- Establish the level of contamination in surface and subsurface soils,
- Obtain additional soil samples from the disposal site to evaluate whether the IRFNA disposal has impacted the soil quality,
- Excavate test pits to investigate all the geophysical anomalies detected in the ESI and any additional anomalies detected from the geophysical investigations completed as part of this RI/FS study,
- Determine the lateral and vertical extent of the IRFNA disposal pits by using test pits and soil borings. Collect soil samples and analyze them for general chemical and physical parameters for risk assessment and evaluation of remedial action alternatives, and
- Establish a database to determine compliance with ARARs, to perform baseline risk assessment and to develop remedial action alternatives.

Groundwater Data

- Determine the hydraulic conductivity of the aquifer to assess the potential for contaminant migration and to select potential remedial action alternatives,
- Install 5 additional monitoring wells to further characterize the groundwater on-site,
- Analyze groundwater samples for general chemical parameters to evaluate potential remedial actions,
- Determine the background groundwater quality at SEAD-13 to allow comparison to other SEAD-13 groundwater data, and
- Establish database to determine compliance with ARARs, to perform baseline risk assessment and to develop remedial action alternatives.

Surface Water/Sediment Data

- Define the hydrology of the site by determining the location of all drainage areas, surface water bodies and the direction of flow to the pond,
- Evaluate whether surface water runoff transports flouride and metals present in the surface soils to the Duck Pond,
- Determine background surface water and sediment quality by obtaining samples of surface water and sediment at the mouth of the small stream that drains into the Duck Pond from the

south. Thus, the analytical results would be representative of surface water and sediment entering the Duck Pond via this stream, or reference conditions in the Duck Pond,

- Analyze surface water and sediment samples for general chemical parameters to evaluate potential remedial alternatives,
- Perform fugitive dust emissions modeling, and
- 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, and
- Establish database to determine compliance with ARARs, to perform baseline risk assessment and to develop remedial action alternatives.

4.0 TASK PLAN FOR THE REMEDIAL INVESTIGATION (RI)

This section describes the tasks required to complete the Remedial Investigation (RI) at SEAD-13. These tasks include the following:

- Pre-field activities
- Field investigations
- Data reduction, interpretation and assessment
- Data reporting
- Task Plan Summary

4.1 PRE-FIELD ACTIVITIES

The pre-field activities include the following:

1. A comprehensive review of the Health & Safety Plan with field team members to ensure that site hazards and preventive and protective measures are completely understood,
2. The inspection and calibration of all equipment necessary for field activities to ensure proper functioning and usage, and
3. A comprehensive review of sampling and work procedures with field team members.

4.2 FIELD INVESTIGATIONS AT SEAD-13

The following field investigations will be performed at SEAD-13:

- Soil investigations (surface soils, test pits, soil borings),
- Surface water and sediment investigation,
- Groundwater investigation (overburden wells),
- Ecological investigation, and
- Surveying.

The details of each investigation are described below.

4.2.1 Soil Investigation

For the soil investigation program, both surface and subsurface soil samples will be collected at SEAD-13. The surface and subsurface soils will be evaluated with soil borings, surface soil samples and test pit excavations.

Statistical methods were not used to locate the soil boring and surface soil samples because the source areas for the impacts are generally known, and the proposed soil borings and surface soil samples are designed to define the extent of these impacts. In our opinion, these sampling are best located using professional judgement, considering existing analytical data and physical site characteristics (i.e., size of source areas, and groundwater flow directions) and not statistical analyses.

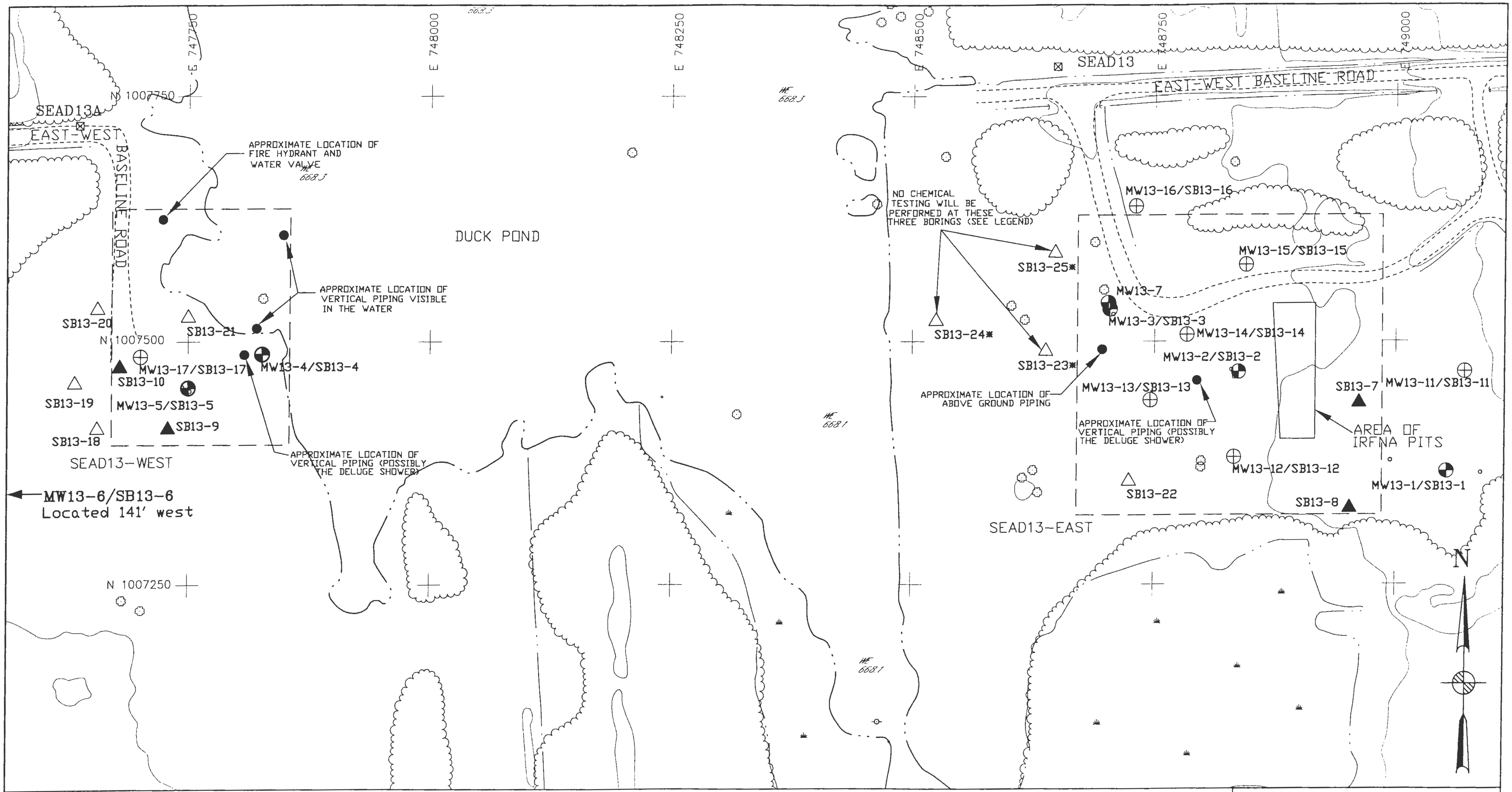
4.2.1.1 Soil Boring Program

Subsurface Soils

A total of fifteen (15) soil borings will be completed at SEAD-13. The soil boring locations are shown in Figure 4-1. Twelve (12) of the soil borings will be performed to collect soil samples for chemical analysis. Of these twelve soil boring locations, seven (7) of them will be completed as monitoring wells with the screened section across the aquifer. One of these soil borings (SB13-11) will be performed in a background location. This will complement the two other background soil borings performed during the ESI. All of these background boring samples will be added to the SEDA-wide background soil database, which contains background samples from all over SEDA. At the other five (5) locations monitoring wells will not be installed. The soil borings will be completed to observe subsurface soils, to measure bedrock elevation, and to obtain soil samples for chemical analysis. These data will also be used to assess the potential for contaminant migration to groundwater from the soil.

Each soil boring will be drilled using hollow stem augers and continuous split-spoon sampling. Samples will be collected at two foot depth intervals, starting at the ground surface. At each boring location, a 0-2 inch surface soil sample will be collected and submitted for chemical testing. Two more soil samples will be collected for chemical testing from each boring in addition to the 0-2 inch sample. The criteria for the selection of the subsurface soil samples submitted to the laboratory is provided in Section 3.4.2 of Appendix A, Field Sampling and Analysis Plan of the Generic Work Plan.

Lastly, three of the fifteen (15) soil borings at SEAD-13-East, located 100 feet west of both MW13-3 and MW13-7, will be drilled to measure and document the thickness of the till\weathered shale layer. No chemical testing will done at these three locations.



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PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-13 IRFNA DISPOSAL SITE

DEPT ENVIRONMENTAL ENGINEERING	DWG NO 720476-02000

FIGURE 4-1
LOCATION OF PROPOSED
SOIL BORINGS

SCALE 1" = 100'	DATE NOVEMBER 1995	A

Surface Soils

A total of nine (9) surface soil samples will be collected from the proposed locations shown in Figure 4-2 at SEAD-13-West. Each surface soil sample will be collected from a depth of 0 to 2 inches. The purpose of these samples will be to evaluate the environmental impacts to surface soil at SEAD-13-West. All nine (9) sample locations are identified by the grid, in which the samples are spaced approximately 50 feet apart. Surface soil sampling procedures are described in Section 3.4.4 of Appendix A, Field Sampling and Analysis Plan, in the Generic Work Plan.

4.2.1.2 Test Pitting Program

A total of six (6) test pits will be excavated at SEAD-13-East as part of the test pitting program. The locations of the proposed test pits are shown in Figure 4-3. The test pits will be excavated to visually evaluate the subsurface soils and to collect soil samples for chemical testing.

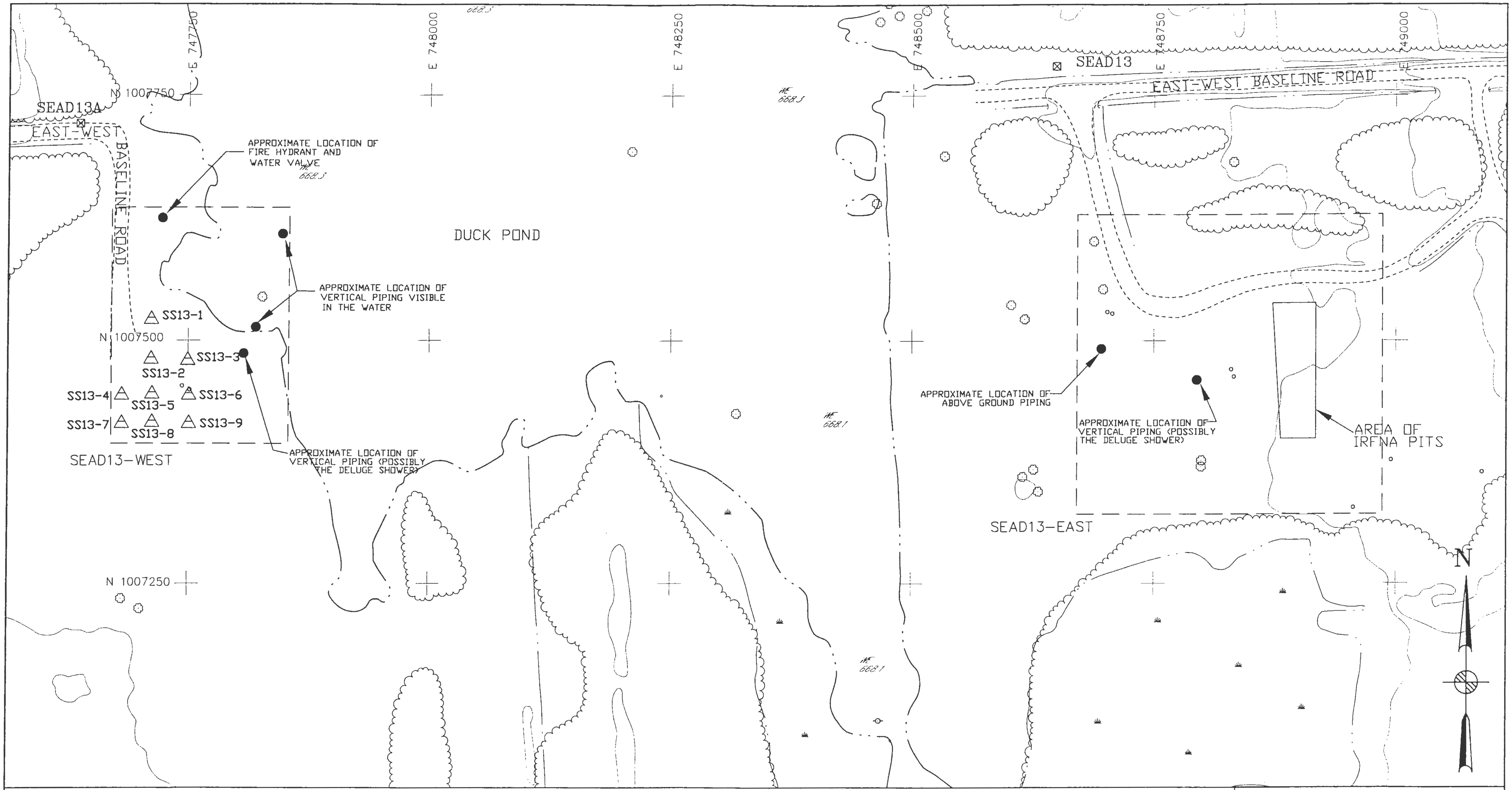
The six (6) test pits will be excavated until to the bottom of each IRFNA disposal pit has been identified. Excavation will begin at either the north or south end of each pit. Photos taken in 1959 appear to indicate that six IRFNA pits appear to exist side-by-side, with the long axis of each pit extending east-west. Each pit will be explored separately.

The bottom of the test pit will be documented at each test pit location. Two (2) soil samples will be collected where there is evidence of impacts. If no impacts are evident, the samples will be collected from the floor of the pit and at the pit wall mid-depth. Test pitting procedures are provided in Section 3.4.3 of Appendix A, Field Sampling and Analysis Plan, in the Generic Work Plan.

All personnel performing the test pit operation will be required to wear Level B personal protective equipment to avoid possible exposure. Level B protection procedures are provided in Appendix B, Health and Safety Plan.

4.2.1.3 Soil Sampling Summary

Twelve (12) surface and twenty-four (24) subsurface soil samples will be collected from twelve (12) soil boring locations. Nine (9) additional surface soil samples will be collected from designated surface soil sampling locations at SEAD13-West. Two (2) soil samples will be collected from each of the six (6) test pits excavated in the IRFNA disposal pit area at SEAD13-East. In total, 57 soil samples will be collected for chemical testing. The soil sampling procedures are described in Appendix A, Field Sampling and Analysis Plan.



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

△ PROPOSED SURFACE SOIL SAMPLE

R:\SENECA\RIFS\SD13\SD13PSS.DWG

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FIGURE 4-2
LOCATION OF PROPOSED
SURFACE SOIL SAMPLING POINTS

SCALE 1" = 100'
DATE JUNE 1995
REV A

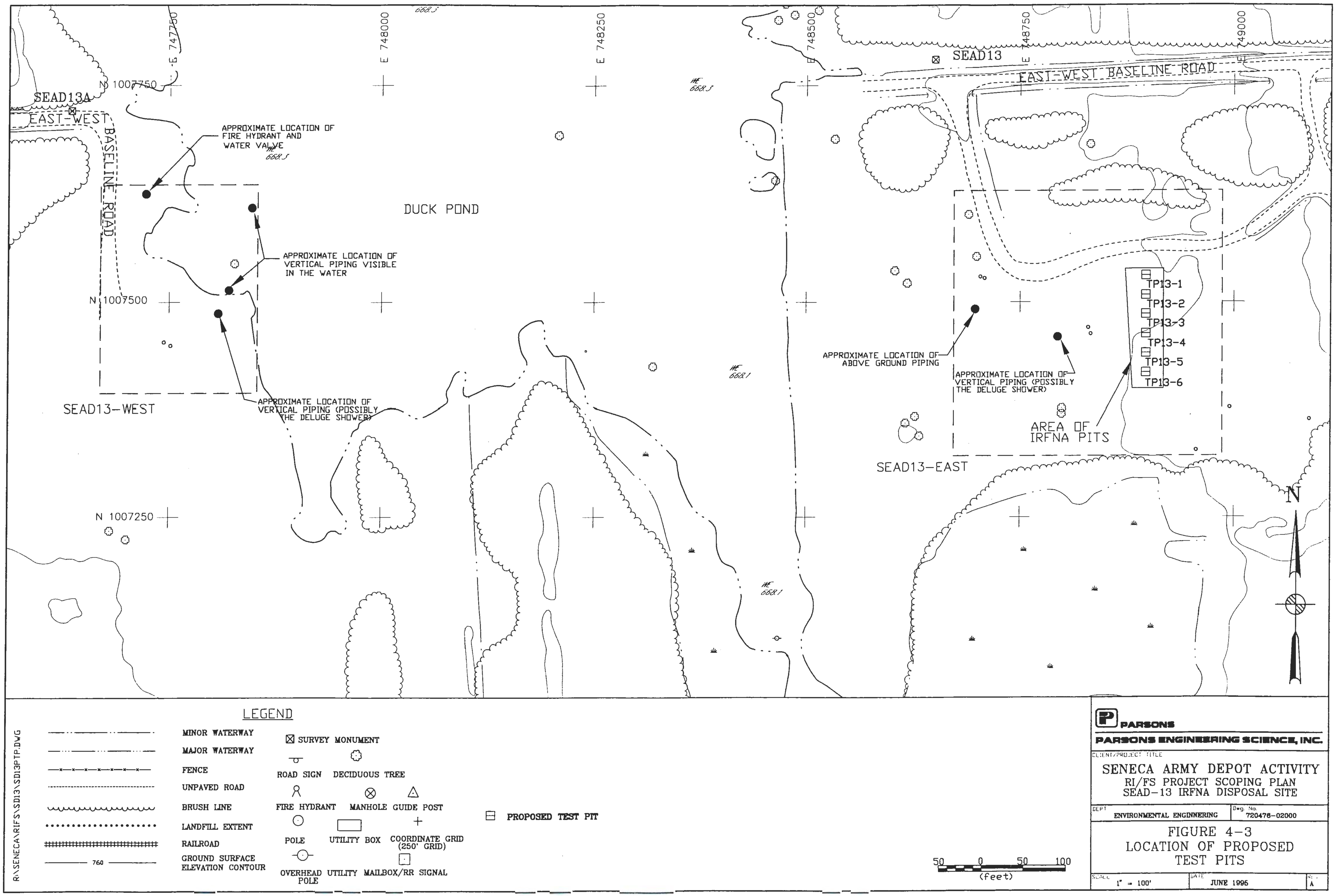

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FIGURE 4-3
LOCATION OF PROPOSED
TEST PITS

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

In addition, soil samples will be collected for physical testing and limited chemical testing. Specifically, soil samples will be collected from two soil boring locations and analyzed for grain size, total organic carbon, cation exchange capacity, pH, and density. The two soil borings from which these additional samples will be collected, will be chosen at random from the fifteen proposed soil borings. At the chosen soil boring locations, three samples will be collected: one from the surface, one from below the water table and one from an intermediate depth. These soil samples will be tested according to the analyses specified in Section 4.2.5, Analytical Program.

4.2.2 Surface Water and Sediment Investigation

Surface water and sediment sampling will be conducted in areas of SEAD-13 which have the potential for acting as an exposure pathway or for off-site transport of site contaminants. Statistical methods were not used to located the surface water and sediment samples. The surface water and sediment sample locations are shown in Figure 4-4.

Six sediment samples will be collected in the Duck Pond. Nine surface water and sediment samples will be collected at locations along the edge of the Duck Pond, and three surface water and sediment samples will be collected in the drainage ditches north of the IRFNA pits. One of these surface water and sediment locations is a reference location (SW/SD13-4). The exact locations of the sediment samples will be in depositional areas identified in close proximity to the proposed locations. The surface water and sediment sampling procedures are described in Section 3.7 of Appendix A, Field Sample and Analysis Plan, in the Generic Work Plan.

These data will be used to determine if there is a surface water or sediment exposure pathway at SEAD-13. If concentrations exceeding applicable standards and guidelines are present, the data will be used to perform a baseline risk assessment for this exposure pathway. The surface water and sediment will be tested according to the analyses described in section 4.2.5, Analytical Program.

In addition, a staff gauge (WL13-1) will be installed in the Duck Pond to allow an accurate determination to be made between the elevation of the surface of the Duck Pond and the elevation of the nearby aquifer (Figure 4-4). The staff gauge will be survyed.

4.2.3 Groundwater Investigation

Parsons ES does not feel that it is appropriate to locate the monitoring wells at SEAD-13 using statistical techniques. The wells are designed to determine the extent of the impacts. Specifically, they are located upgradient and downgradient of the source areas, and for this purpose we believe

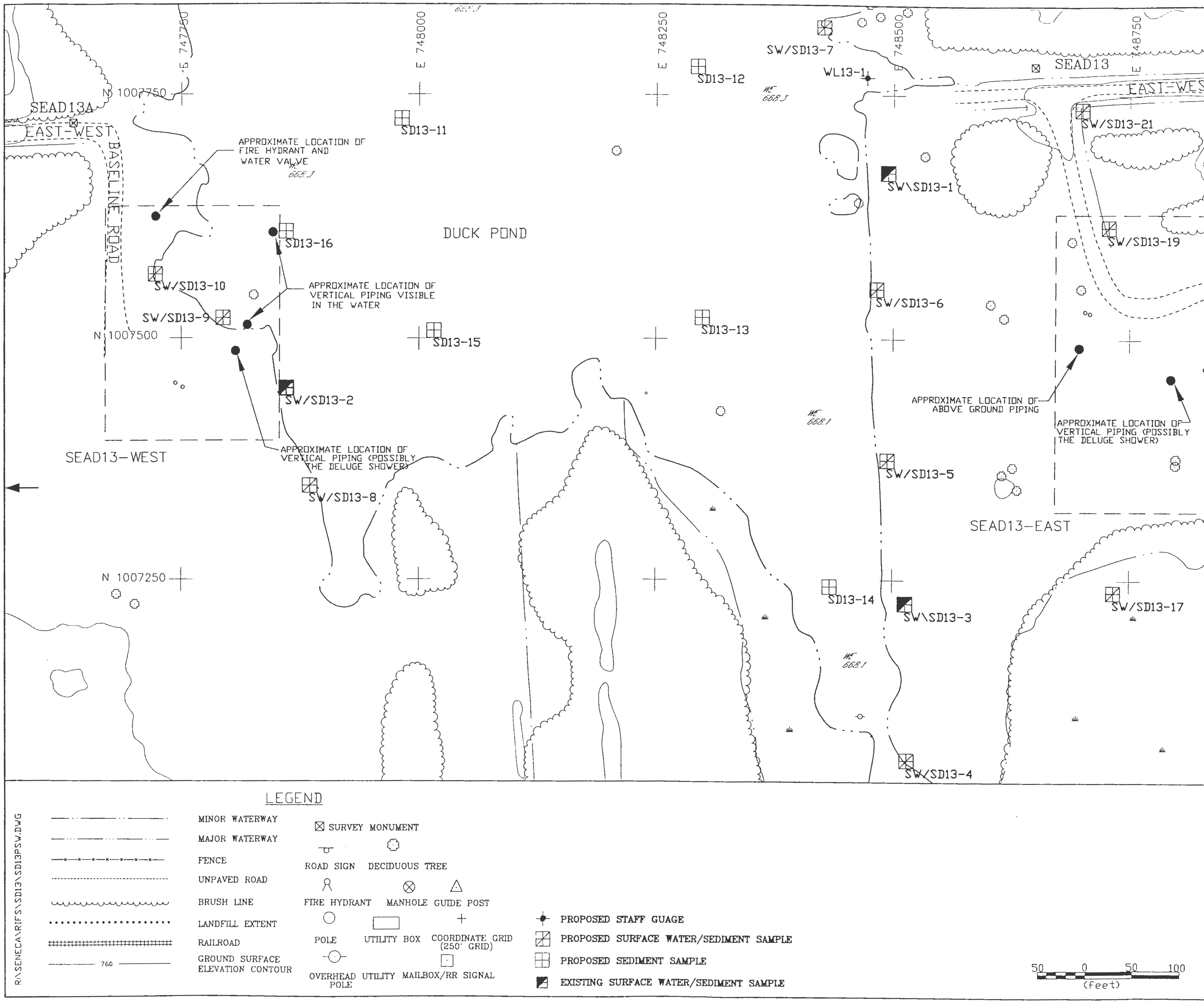

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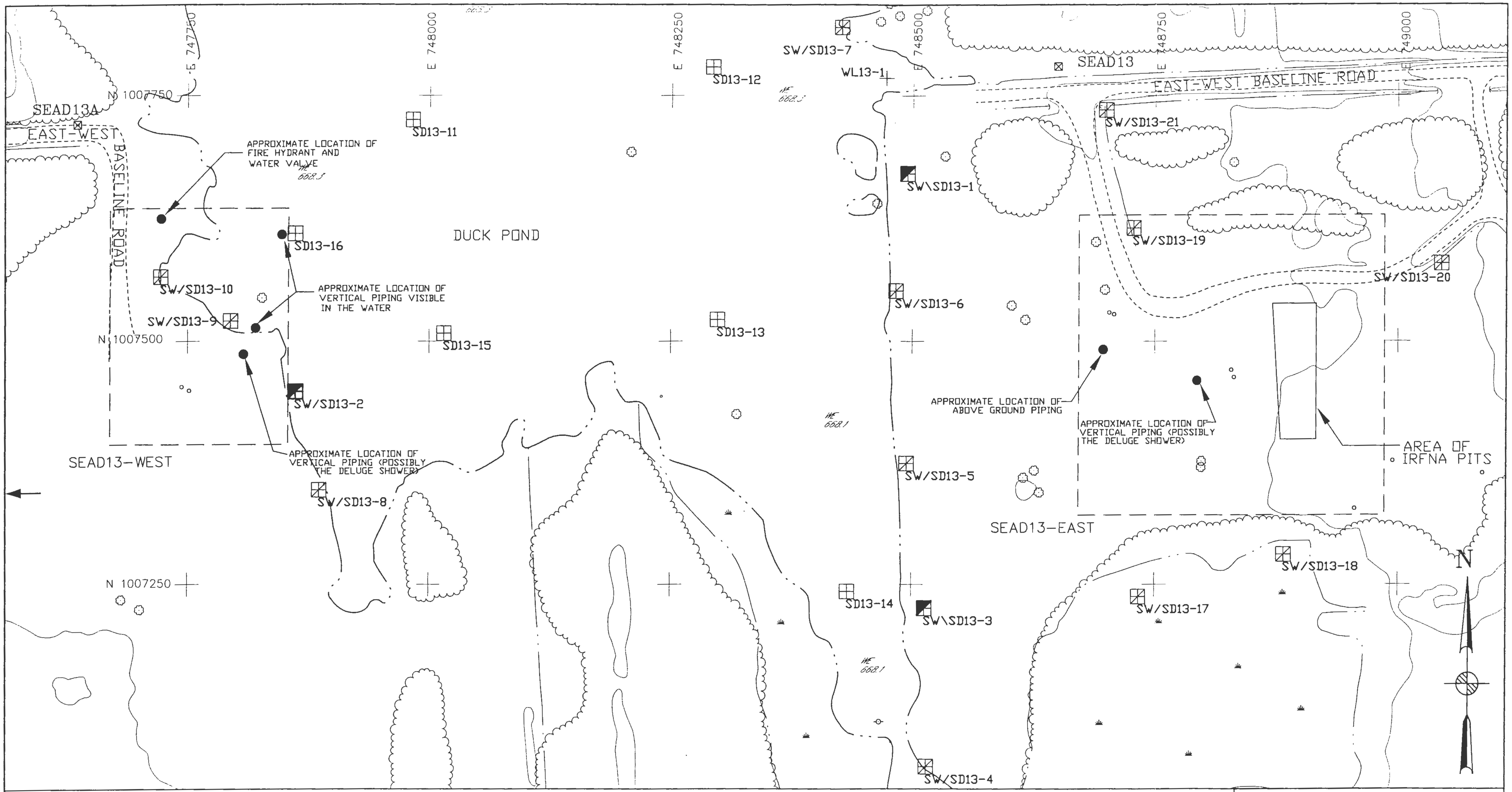
FIGURE 4-4
LOCATION OF PROPOSED LOCATION OF SURFACE WATER/SEDIMENT

SCALE	DATE	REV
1" = 100'	JANUARY 1997	A



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
- + PROPOSED STAFF GUAGE
- ▨ PROPOSED SURFACE WATER/SEDIMENT SAMPLE
- ⊞ PROPOSED SEDIMENT SAMPLE
- ◩ EXISTING SURFACE WATER/SEDIMENT SAMPLE

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FIGURE 4-4
LOCATION OF PROPOSED LOCATION
OF SURFACE WATER/SEDIMENT

SCALE 1" = 100'
DATE JANUARY 1997
REV. A

that they are best located using professional judgment, supporting analytical data, and physical site characteristics (i.e., size of the source areas and directions of groundwater flow).

4.2.3.1 Monitoring Well Installation and Sampling

Seven (7) groundwater monitoring wells were installed at SEAD-13 as part of the ESI. The groundwater flow direction at SEAD-13-East is to the west-northwest and at SEAD-13-West to the east-northeast. Groundwater samples analyzed during the ESI contained 6 metals (antimony, iron, chromium, manganese, lead, and magnesium) at concentrations exceeding state or federal drinking water criteria values. However, the extent of potential impacts from the SEAD-13 East and West areas has not been fully characterized.

The groundwater investigation performed as a part of the RI will be performed to supplement previous sampling data, determine the extent of groundwater impacts, gather additional potentiometric data to confirm the groundwater flow direction, determine background groundwater quality, and determine the hydraulic conductivity of the aquifers. To accomplish this, eleven (11) additional monitoring wells will be installed at the approximate locations shown in Figure 4-5. Seven (7) of these wells will be installed in the till/weathered shale aquifer and four (4) will be installed in the upper 10 feet of the competent shale (bedrock) aquifer (if no water is present in the upper 10 feet of competent bedrock at the time of drilling the rig will drill deeper into the shale; based on data at other sites at SEDA, water should be present in the upper 10 feet of competent shale). Only one well, an overburden well, will be installed at SEAD-13 West, and the rest will be installed at SEAD-13 East. At SEAD-13 East one of these locations (MW13-11/MW13-18D) is a location where an overburden and bedrock well pair will be installed. This background location will complement the other two background well locations installed during the ESI (MW13-1 and MW13-6). The main criteria for locating these wells at SEAD-13 East will be the existing EM data that defines high conductivity plume because this data provides some insight as to the likely extent of the plume. The proposed wells are designed to determine the highest conductivity concentrations near the central portion of the plume, as defined by the EM survey, and to determine the lateral and vertical extent of the plume. The other overburden and bedrock wells will be installed downgradient of the IRFNA pits and the high apparent conductivity plume shown on Figure 3-1. The location of paired wells MW13-15/SB13-5 and MW13-20D will be determined using the apparent conductivity map (Figure 3-1), which shows a plume of relatively high apparent conductivity northeast of the IRFNA pits; this well pair will be installed near the center of this conductivity plume as indicated by the highest conductivity readings in ms/m on Figure 3-1. Additional wells will be installed in locations downgradient of wells MW13-3 and MW13-7 if they are dry during the next sampling round for the RI.

As described in Section 4.2.1.1, seven of the wells will also double as borings where chemical samples will be collected, and they will be continuously sampled to competent bedrock. A monitoring well will then be installed in the boring and screened over the length of the saturated overburden overlying the shale bedrock.

Two rounds of groundwater sampling will be performed for each monitoring well for this RI. The groundwater samples will be tested according to the analyses described in Section 4.2.5, Analytical Program.

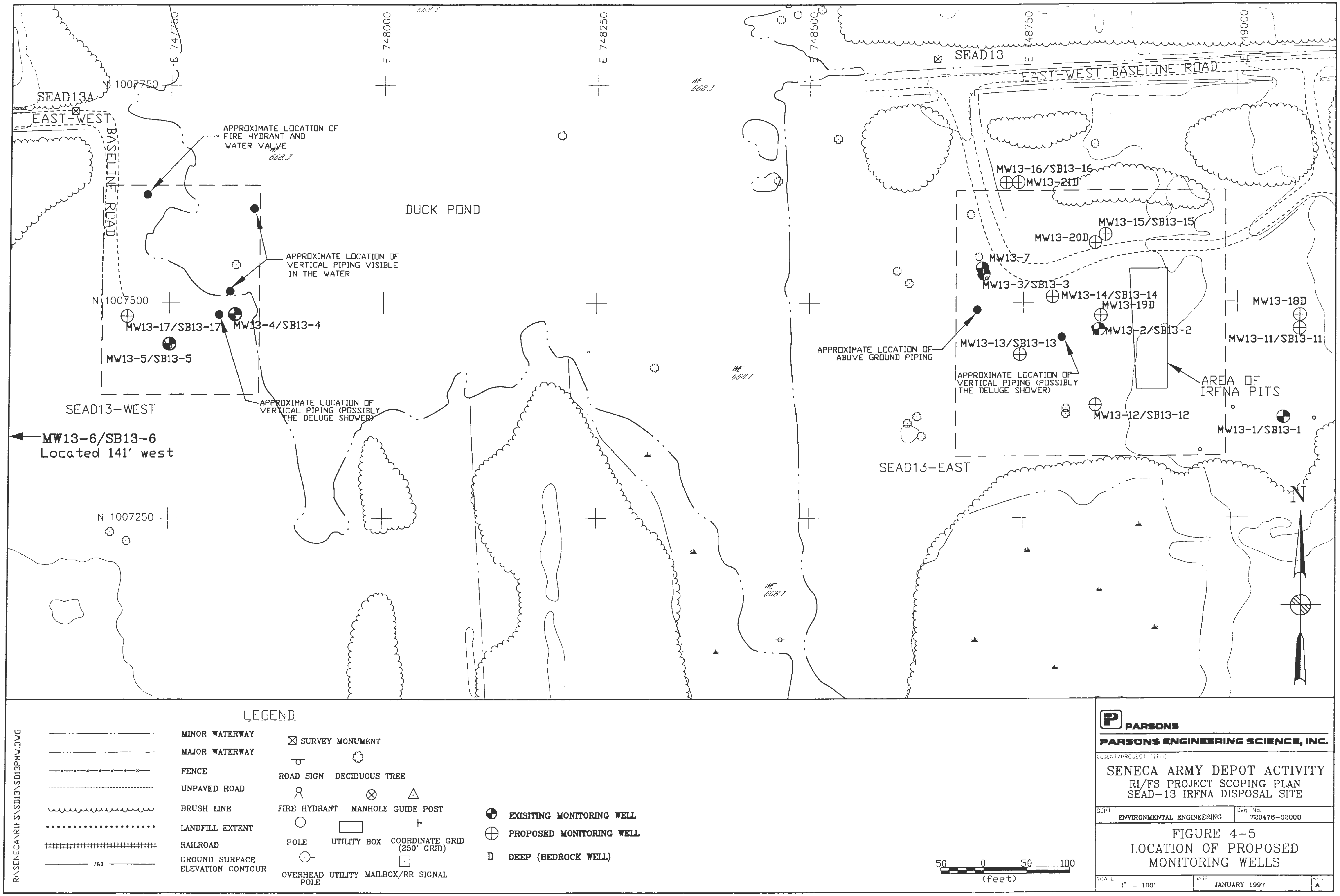

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FIGURE 4-5
LOCATION OF PROPOSED
MONITORING WELLS

SCALE	DATE	REV
1" = 100'	JANUARY 1997	A

Monitoring well installation, development and sampling procedures are described in Appendix A, Field Sampling and Analysis Plan. All monitoring wells will be properly developed prior to sampling. Groundwater Sampling procedures are described in Section 3.5 of Appendix A, Field Sampling and Analysis Plan, in the Generic Work Plan.

4.2.3.2 Aquifer Testing

Three rounds of water levels will measured during the RI. The first round will occur during well development, and will not be used for constructing a groundwater topogrphy map for the site. The second and third rounds of water levels will be measured at the wells at SEAD-13 prior to each of the groundwater sampling rounds, and these data will be used to construct groundwater topography maps for the site.

Slug tests will be performed on the seven existing and eleven new monitoring wells at SEAD-13 to estimate the hydraulic conductivity of the overburden aquifer. Slug tests will be performed on a total of 18 wells. Vertical connection test will be performed as well pairs.

Procedures for water level measurements and slug testing are outlined in Appendix A, Field Sampling and Analysis Plan.

4.2.4 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 analysis data obtained for the RI.

4.2.4.1 Site Description

The purpose of the site description is to determine whether aquatic and terrestrial resources are present at the site. 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; sources of this information are indicated in parentheses. These include the following: habitats supporting endangered, threatened or rare species or species of concern (letter from the United States Dept. of Interior Fish and Wildlife Service dated June 21, 1994); regulated wetlands (National Wetlands Inventory (NWI) maps of the Dresden, Geneva Smith, Ovid and Romulus quadrangles, and New York State Regulated Wetland maps for the same quadranges); wild and scenic rivers; significant coastal zones (Federal Emergency Management Agency Flood Insurance Rate Maps (FIRM), Town of Varick, New York Seneca County Community-Panel Number 3607580010B, December 17, 1987); streams (United States Geological Survey Quadrangles Romulus, Ovid, Dresden and Geneva South 7.5 minute quadrangles); lakes (United States Geological Survey Quadrangles Romulus, Ovid, Dresden and Geneva South 7.5 minute quadrangles); and other major resources. Two additional sources of information are 1) NYSDEC Region 8 at 6274 Past Avalon-Lima Road in Avon, NY (716) 225-2466 and 2) NYSDEC Wildlife Resources Center - Information Service, New York Heritage Program at 700 Troy-Schenectady Road in Latham, NY (518) 783-3932.

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

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

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

4.2.4.2 Contaminant-Specific Impact Analysis

Information from the site description developed in Section 4.2.5.1 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.

EPA's draft *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA, 1994) states that the selection of assessment endpoints, which represent environmental values to be protected and generally refer to characteristics of populations and ecosystems, depends on the following:

1. The constituents present and their concentrations,
2. Mechanisms of toxicity to different groups of organisms,
3. Potential species present, and
4. Potential complete exposure pathways.

To assess whether significant adverse ecological effects have occurred or may occur at the sites as a result of ecological receptor's exposure to chemical of potential concern (COPC), ecological endpoints will be selected. An ecological endpoint is a characteristic of an ecological component that may be affected by exposure to a stressor, such as a chemical.

Given the diversity of the biological world and the multiple values placed on it by society, there is no universally-applicable list of assessment endpoints. Therefore, EPA, in the Proposed Guidelines for Ecological Risk Assessment (EPA, 1996) has suggested three criteria that should be considered in selecting assessment endpoints suitable for a specific risk assessment. There criteria are: ecological relevance, susceptibility to the contaminant(s) and representation of management goals.

4.2.5 Analytical Program

A total of 57 soil samples, 36 groundwater samples (18 for each round), 12 surface water, and 18 sediment samples will be collected from SEAD-13 for chemical testing. Analysis for all of the media to be sampled are summarized in Table 4-1. All of these samples will be analyzed for the following: Target Compound List (TCL) VOCs (EPA Method 524.2 rev. 4, August 1992 for groundwater samples only), semivolatile organic compounds, TCL pesticides/PCBs, Target Analyte List (TAL) metals and cyanide according to the NYSDEC Contract Laboratory Program (CLP) Statement of Work (SOW), and nitrate-nitrogen by EPA Method 353.2 for aqueous samples only (the method for soil samples will be modified as described in Table 4-1). Additional analyses to be performed on specific media are provided below.

Six (6) of the soil samples from two soil borings (2 surface and 4 subsurface samples) will also be analyzed for limited chemical testing and physical testing including Total Organic Carbon (TOC) by the Lloyd Kahn method, grain size distribution (including the distribution within the silt and

Table 4-1

Summary of Sampling and Analyses
Seneca Army Depot Activity
SEAD-13

	VOCs		SVOCs	Pest/Pcbs	Metals	Hex. Chrom.	Nitrate-N03	Grain Size*	pH	Hardness	TSS	TDS	Alkalinity	Ammonia	Phosphate	Cat Ex Cap.	Density	TOC
	NYSDEC	EPA	NYSDEC	NYSDEC	NYSDEC	EPA	EPA	ASTM	EPA	EPA	EPA	EPA	EPA	EPA	EPA	EPA	COE	EPA
	TCL	Method	TCL	TCL	TAL	Method	Method	Method	Method	Method	Method	Method	Method	Method	Method	Method	Method	Method
MEDIA	CLP	524.2 rev.2 (1992)	CLP	CLP	CLP	7196	353.2	D:422-63	150.1/9045#	130.2	160.2	160.1	310.1/310.2	350.1/350.2	365.2	9081	1110	415.1/Llyod Kahn^
Soil Surface	21	0	21	21	21	0	21@	2	2	0	0	0	0	0	0	2	2	2
Subsurface	36	0	36	36	36	0	36@	4	4	0	0	0	0	0	0	4	4	4
Groundwater (18 per round)	0	36	36	36	36	28	36	0	0	0	0	0	0	0	0	0	0	36
Surface water	12	0	12	12	12	0	12	0	12	12	12	12	12	12	12	0	0	12
Sediment	- 18	0	18	18	18	0	18@	18	18	0	0	0	0	0	0	18	18	18

Notes:
1) * Grain size analysis includes determination of the grain size distribution within the silt and clay size fraction.
2) @ The method for soil samples will be modified. For soils, a known quantity of soil will be mixed with known volume of water, stirred, and filtered to form an aqueous extract.
3) # Method 9045 will be used for soil samples. Method 150.1 will be used for water samples.
4) ^ Method 415.1 will be used for water and the Llyod Kahn Method will be used for soils.
5) QA/QC samples are not included in the totals shown above. QA/QC sampling requirements are described in Section 5.3 of Appendix C of the Generic Installation RI/FS Workplan.
6) EPA = Environmental Protection Agency
7) ASTM = American Society for Testing and Materials
8) COE = Corps of Engineers
9) Groundwater sampling at SEAD-13 East will include chromium VI sampling and analysis by EPA Method 7196 (see Sections 4.2.5 of the Scoping Plan)

clay size fraction) ASTM Method D:422-63, Cationic Exchange Capacity (CEC) Method 9081, pH Method 150.1, and density COE Method 1110.

In additon to the groundwater analyses listed above, chromium VI analyses will be performed during rounds 1 and 2 at SEAD-13 east. Note that the samples have a 24 hour holding time and must be collected and shipped on the same day, and received at the laboratory the next morning (The laboratory should be notified before the chromium VI samples are collected and shipped).

The thirty six (36) groundwater samples 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: nitrate-nitrogen and total organic carbon (TOC).

The twelve (12) surface water samples will be analyzed in the field for pH, temperature, specific conductivity, and dissolved oxygen and turbidity. The following analyses will be performed by the laboratory: total suspended solids (TSS) by Method 160.2, total dissolved solids (TDS) by Method 160.1, alkalinity by Method 310.1/310.2, hardness by Method 130.2, ammonia by method 350.1/350.2, nitrate/nitrite by Method MCAWW 353.2, and TOC by Method 415.1. The 12 sediment samples will be analyzed for grain size by ASTM Method D:422-63, TOC by Lloyd Kahn, CEC by Method 9081, and pH by Method 150.1.

A detailed description of these methods, as well as lists of each compound included in each of the categories is presented in Appendix C, Chemical Data Acquisition Plan of the Generic Installation RI/FS Work Plan.

4.2.6 Surveying

Surveying will be performed at SEAD-13 for the following purposes:

- Locate all the environmental sampling points
- Map the direction and compute the velocity of groundwater movement
- Serve as the basis for volume estimates of impacted soil and sediment which may require a remedial action
- Map the extent of any impacted groundwater above established ARAR limits

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

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

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

4.3 DATA REDUCTION, ASSESSMENT AND INTERPRETATION

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

To determine if the air pathway is significant, air dispersion modeling will be performed. The protocol described in the Superfund Exposure Assessment Manual (EPA, 1988) will be followed in order to evaluate the total emission rates for this transport mechanism. This method is further defined in Agricultural Handbook No. 346, "Wind Erosion Forces in the United States and Their Use in Predicting Soil Loss." (USDA, 1968). This technique, which estimates annual losses of surface soil to wind erosion, will be used to estimate the potential particulate emissions of hazardous constitutents associated with the surface soils at the site. The results of the dispersion modeling will provide useful information for the risk assessment.

4.4 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.

The scenarios and future receptors evaluated in the baseline risk assessment will be based on the land uses specified in the Reuse Plan and Implementation Strategy for Seneca Army Depot (December, 1996). For SEAD-13, the proposed land use is Recreation/Conservation (Figure 3-6)

Also, the numerical assumptions listed in Table 4-2 will be used for the human health risk assessment.

4.5 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.

Table 4-2
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 = Inhilation 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 = Inhilation 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 Tendancy and Reasonable Maximum Exposure

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

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4.6 TASK PLAN SUMMARY FOR THE RI

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

A detailed Task Plan Summary that indicates the number and type of samples to be collected at SEAD-13 is provided in Table 4-1

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 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.

Additionally, as part of the FS process, at least one innovative technology will be evaluated for the IRFNA Disposal site. And, a wetlands assessment and restoration plan will be needed for any wetlands impacted or disturbed by contamination or remedial actions.

5.3 SCREENING OF REMEDIAL ACTION ALTERNATIVES

A discussion of the screening 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.

Additionally, as part of the FS process, at least one innovative technology will be evaluated for the IRFNA Disposal site.

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/FS 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 ER 1110-3-1301. 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 Work Plan is to present and describe the activities that will be required for the site Remedial Investigation/Feasibility Study at SEAD-13. The Field Sampling and Analysis Plan (Appendix A), details procedures which will be used during the field activities. Included in this plan are procedures for sampling soil, sediments, 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) details procedures to be followed during field activities to protect personnel involved in the field program.

The Chemical Data Acquisition Plan (Appendix C) 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 schedule for the RI/FS at SEAD-13 is shown in Figure 6-1. Because the start date was unknown at the time of the preparation of this Scoping Plan, the times indicated at relative to an arbitrary start date.

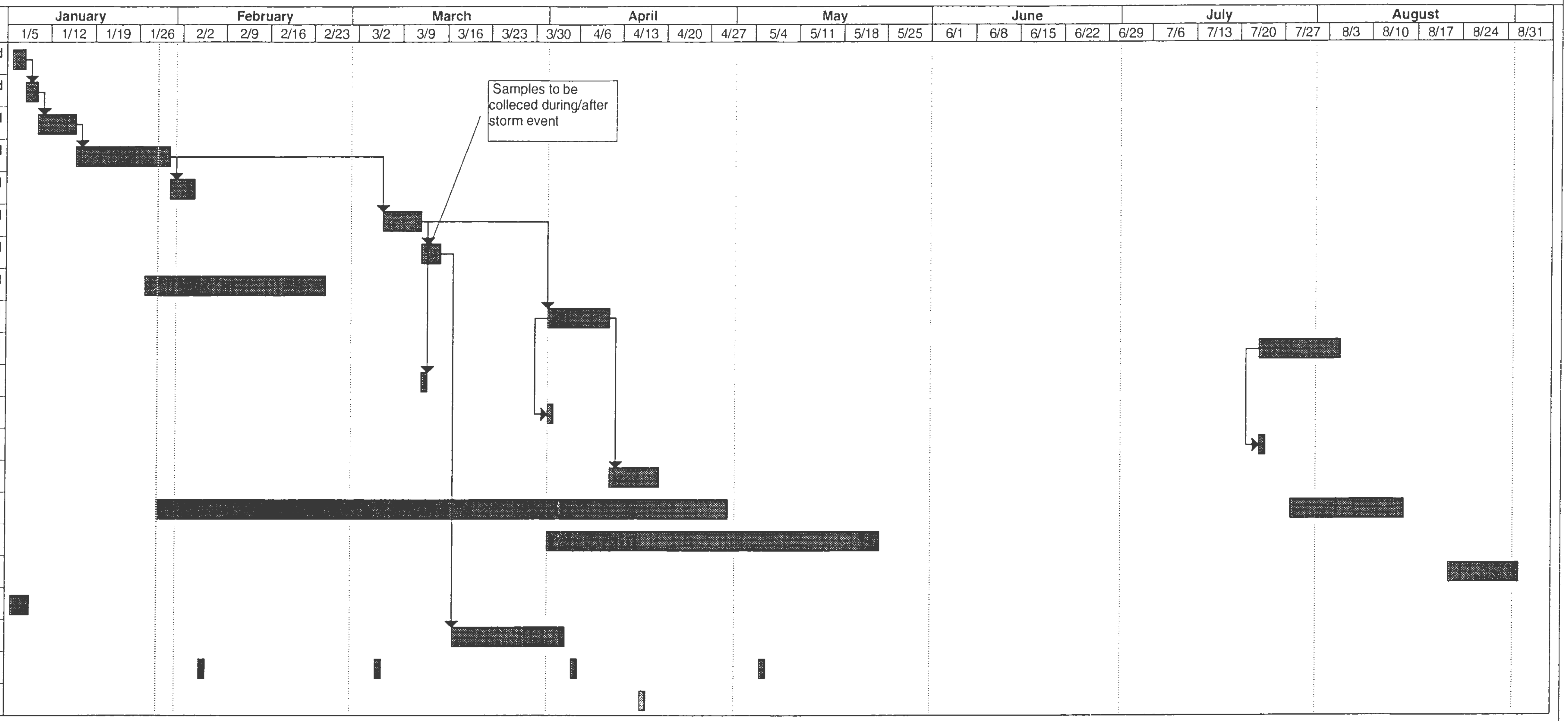
6.2 STAFFING

The staffing for the RI/FS at SEAD-13 is shown in Figure 6-2.

Figure 6-1

Project Schedule for SEAD-13 (start date is uncertain)

ID	Task Name	Duration
1	Mark Sample locations	2d
2	Surface Soil Sampling	2d
3	Soil Borings	4d
4	Monitoring Well Installation	11d
5	Test Pitting at IRFNA Pits	2d
6	Monitoring Well Development	4d
7	Surface Water/Sediment Sampling	3d
8	Ecological Investigation	21d
9	Ground Water Sampling 1	9d
10	Groundwater Sampling 2	9d
11	Water Level Measurements 1	1d
12	Water Level Measurements 2	1d
13	Water Level Measurements 3	1d
14	Aqufier Testing	6d
15	**Sample Analysis**	**143d**
18	Data Validation 1	40d
19	Data Validation 2	7d
20	Surveying 1	3d
21	Surveying 2	14d
22	**Field Activity Reports**	**65d**
27	Field Sampling Letter Reports	1d

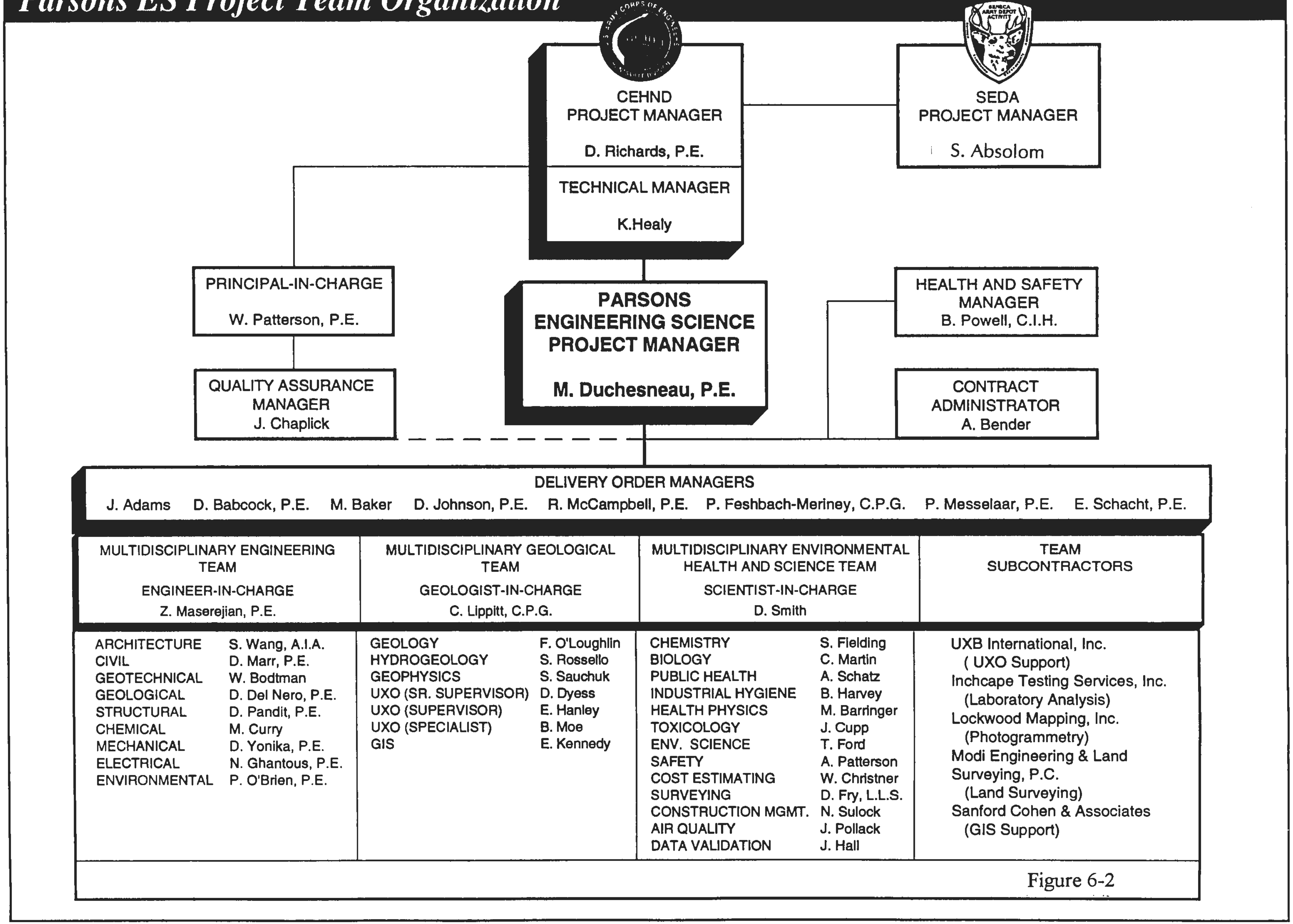


Samples to be colleced during/after storm event

Project:
Date: Wed 1/29/97

Task ▨ rolled up task ▨

Parsons ES Project Team Organization



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CONSTRUCTION MGMT.	N. Sulock
AIR QUALITY	J. Pollack
DATA VALIDATION	J. Hall

TEAM
SUBCONTRACTORS

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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 6-2

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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

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

APPENDIX C

CHEMICAL DATA AQUISITION PLAN

Additional Information for Chemical Data Acquisition Plan

I. Groundwater Analyses	Preparation Method	Analytical Method	Reporting Limits (μg/L)
A. Inorganics			
Chromium (cr^{+6})	SW-846 7196	SW-846 7196	0.0005

Notes:

1) The pervative for hexavalent chromium is 4° C and the holding time 24 hours. Therefore, the sample(s) must be collected and shipped on the same day, and received at the laboratory the following morning.

4. Response to Comments to be inserted in Appendix K

RESPONSE TO COMMENTS
BY
U.S. EPA
FOR FINAL SEAD-13 PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT THE INHIBITED RED FUMING NITRIC ACID DISPOSAL SITE
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
COMMENT DATE: JULY 25, 1997

TOXIC AND HAZARDOUS WASTE SECTION

Comment #1 At this time, SEDA has not accepted EPA's recommendation to perform groundwater sampling and analysis for hexavalent chromium. Depending upon the results obtained from future RI sampling, this recommendation may be reiterated by EPA to SEDA at a later date.

Response #1 Agreed. Because one of the wells at SEAD-13 East contained chromium above the NYSDEC GA standard, groundwater sampling rounds 1 and 2 for the RI at SEAD-13 East will include chromium VI analyses. The analysis to be used by the laboratory is EPA Method 7196, which has a detection limit of 0.005 ppm, and a 24-hour holding time. This information has been added to Section 4.2.5 and Table 4-1 of the Scoping Plan. Also, a one page insert for Chromium VI analysis has been provided for the Chemical Data Acquisition Plan, Appendix C.

Comment #2 As stated in previous comment letters to you, the generic work plan approval is awaiting SEDA's response regarding their modification of existing analytical methods to comply with MCLs. The methods in question will be implemented at SEAD-13. Your response to EPA is expected by 7/26/97. Thus, the approval of the Final Scoping Plan for SEAD-13 is dependent upon the adequacy of the 7/26/97 submittal.

Response #2 Agreed. The information regarding the modification of the existing analytical methods has been submitted to the Army, EPA and NYSDEC under separate cover (letter dated September 9, 1997), and it will be incorporated into the Generic Work Plan.

5. Cover and spine

APPENDIX D

UNITED STATES DEPARTMENT OF INTERIOR FISH AND WILDLIFE SERVICES ENDAGERED 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

APPENDIX E

RESPONSE TO REVIEW COMMENTS

RESPONSE TO COMMENTS
BY
U.S. EPA
FOR DRAFT FINAL SEAD-13 PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT THE INHIBITED RED FUMING NITRIC ACID DISPOSAL SITE
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
COMMENT DATE: MAY 1997

Comment #1 **(New)**

On Page 3-38 P1, the text refers to "...Chapter 21..." of this report. It is uncertain which report is being discussed, however, the scoping document does not contain a Chapter 21. The text should be clarified as to which document is being discussed.

Response #1 Agreed. The text on page 3-38 P1 has been clarified to indicate that Chapter 21 is part of the Reuse Plan.

Comment #2 **(Previously Comment 4)**

A different symbol should be used for the staff gauge location, to eliminate confusion with the co-ordinate grid intersections.

Response #2 Agreed. The symbol for the staff gauge has been modified on Figure 4-4.

Comment #3 **(Previously Comment 5)**

The statement that the results are not representative of true soil chemistry is misleading. The results are accurate and "true" for the area sampled. However, the results may not indicate a wide ranging problem within surface soils. The use of the word "true" should be removed from the response and the text of the document and a more accurate term used. This also applies to later comments.

Response #3 Agreed. The word "true" has been removed from the text on pages 3-14 and 3-19 (Surface Soils and Subsurface Soils)

Comment #4 **(Previously Comment 10).**

While the results may only slightly exceed the TAGM, the TAGM is based on 95 percent upper concentration and as such any exceedence of this number would be reasonably be assumed to be an anomaly.

Response #4 Acknowledged. We do not dispute that the data indicate a slight exceedence of the TAGM, which is assumed to be an anomaly as stated in the comment above, however, we maintain that the concentrations in SB13-8 do not suggest a nearby source area for these metals for reasons provided in the previous response, and

that additional soil samples to address impacts solely from these metals are not necessary in this area of the site. No change was made to the text of the Scoping Plan.

Comment #5 **(Previously Comment 12).**

The response to this comment is reasonable, with the understanding that additional monitoring wells will be required if the wells are dry during the next sampling round, or if groundwater concentrations exceed NYS Class GA standards. Parsons ES should be prepared to drill deeper if the upper 10 feet of competent bedrock is "dry" at the time of drilling. Text to this effect should be added to the document. The text should also state how it will be determined that the well yields produce sufficient volume for sampling.

Response #5 Agreed. Text has been added to the Scoping Plan (page 4-9) that states that additional wells will be installed downgradient of wells MW13-3 and MW13-7 if no water is present in these wells at the time of sampling. Also, text was added (page 4-9) to state that the drilling rig will drill deeper if no water is present in the upper 10 feet of competent shale. While it is the goal of the RI to define the extent of impacts, the specification that wells be installed if NYS Class GA standards are exceeded as part of this Scoping Plan is not reasonable, because the analytical results from groundwater samples collected from these wells will not be available during the field program. However, additional wells will be considered once the groundwater data has been validated and analyzed for the RI. No text was added to address the well yield issue for the wells, because if water is present in the wells (in either till or competent shale) the groundwater will be sampled from the well according the to the procedure described in the Generic Work Plan (the low-flow sampling method), which accounts for sampling monitoring wells with low yields.

Comment #6 **(Previously Comment 14).**

The text should be further clarified to state that a total of 36 groundwater samples will be collected, 18 samples per round of sampling.

Response #6 Agreed. The text on pages 4-15 and 4-17 has been clarified as suggested in the comment.

BTAG COMMENTS

Comment #1 See previous comment #10 above.

Response #1 See the response for Comment #10 above.

Comment #2 See previous comment #5 above.

Response #2 See the response for Comment #5 above.

Comment #5	The purpose of and RI is to determine the nature and extent of contamination, and as such you need to determine the source of contamination. This should be done for SEAD-13.
Response #5	Agreed. One of the purposes of an RI is to determine the nature and extent of contamination, and we believe the proposed work for this RI at SEAD-13 will provide information that will allow us to determine this. We do not believe the current sediment data indicates that samples need to be collected at off-site locations (i.e., SEAD-46), as you recommended in your original comment. Also, we believe the proposed surface water and sediment locations, one of which is upgradient of SD13-3, will provide information needed to determine if more upgradient samples are needed. No change was made to the text of the Scoping Plan.

TOXIC AND HAZARDOUS WASTE SECTION

Comment #1	The response states that the turbidity of the sample from monitoring well MW13-1 was elevated. A review of the data indicates that the turbidity was only 18.2 NTU, this is not considered to elevated [sic] especially when compared to MW13-5 which was 195 NTUs.
Response #1	Agreed. We acknowledge that 18.2 NTU is not elevated compared to the turbidity of groundwater in MW13-5, which was 195 NTU. But, for reasons cited in the previous response, we do not believe that SEAD-13 requires analysis for chromium VI. No change was made to the text of the Scoping Plan.

RESPONSE TO COMMENTS
BY
U.S. ARMY
FOR DRAFT FINAL SEAD-13 PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT THE INHIBITED RED FUMING NITRIC ACID DISPOSAL SITE
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
COMMENT DATE: APRIL 1997 (Scott Bradley), FEBRUARY 1997 (USACHPPM and HTRW-CX)

Comments by Scott Bradley

Comment #1 Section 3.1.2.5, p. 3-14, VOC's: Subsurface Soils

This section states that VOC's in subsurface soils should not be of concern. Please provide more justification for this statement and for the subsequent exclusion of soil analysis for VOC's in the field program per Table 4-1. Emphasize that the detected compounds are not only common laboratory contaminants but were also present at well below TAGM values.

Response #1 Agreed. The text on page 3-14 in Section 3.1.2.5 for subsurface soils has been revised to note that all VOC concentrations were found at low concentrations, well below their respective TAGM values. Also, text has been added to this section that states that there is no strategy in the proposed field program in Section 4.0 for locating samples for the sole purpose of investigating the extent of VOCs in soil. However, the program, as indicated on Table 4-1, does include VOCs analyses as part of the analytical suite, based on previous QC sample results and EPA comments.

Comment #2 Section 3.1.2.5, p. 3-14, SVOCs: Surface Soils, Subsurface Soils

The last sentence of these sections are identical to the previous sections but SVOC's are not excluded from further field investigation. Emphasize that some of the detected concentrations exceeded proposed TAGM standards for individual SVOC's. Rephrase last sentence : "Thus, while these SVOC's were not...RI field program" so the reader does not expect SVOC's to be excluded from Table 4-1.

Response #2 Agreed. The last sentence of the discussion of SVOCs for these media have been modified so the reader does not expect SVOCs to be excluded from Table 4-1.

Comment #3 Sections 3.1.2.5, p. 3-28, Sediment

See comments 1 and 2 above as they relate to sediment to ensure consistency in approach and verbiage.

Response #3 Agreed. Text has been added to page 3-30 in Section 3.1.2.5, Sediment, that states that there is no strategy in the proposed field program in Section 4.0 for locating samples for the sole purpose of investigating the extent of VOCs in sediment and information on sediment criteria has been added.

Comment #4 Section 4.2.3, p. 4-9.

Correct typo: "characteristics". Also, provide some criteria by which well locating will occur. Note which aspects of the conductivity map are used, what site characteristics will be assessed, etc.

Response #4 Agreed. The spelling of "characteristics" has been corrected. And, additional text has been added to page 4-9 to clarify the criteria to be used for installing wells, and to explain which aspects of the conductivity map will be used, and what site characteristics will be assessed.

Comments by Keith Hoddinott

Comment #1 The U.S. Army Center for Health Prevention and Preventive Medicine (USACHPPM) reviewed the subject document without comment on behalf of the Office of the Surgeon General. We agree with the changes the contractor has made to address our concerns. This document does not have to be resubmitted to USACHPPM for futher review prior to finalization.

Response #1 Acknowledged.

Comments by HTRW-CX (Chemistry, Compliance, Cost Engineering, Geotechnical, Health and Safety, Innovative Tech, Process Engineer, Risk Assessment)

Comment #1 Reviewed; No comments.

Response #1 Acknowledged.

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RESPONSE TO COMMENTS
BY
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA)
FOR DRAFT SEAD-13 PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)
AT THE INHIBITED RED FUMING NITRIC ACID DISPOSAL SITE
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
DATE OF COMMENTS: 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 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 Installation Investigation/Feasibility Study Work Plan than in the SEAD-specific Work Plans. The SEAD-specific Work Plans should cross reference the Generic Plan.

Response #1 Agreed. We agree that because the Reuse Plan for Seneca has been adopted, and it affects all future RI/FS activities, the Generic Installation Remedial Investigation Work Plan should be revised to address how future use scenarios will be evaluated for individual SEADs. The Generic Work Plan has been revised to include a description of the future proposed land uses at SEDA as identified in the Reuse Plan. Section 3.2.2 of the Generic Work Plan has been revised. Also, future uses at the individual SEADs will be determined by the designations provided in the Reuse Plan. Section 3.2 of the Scoping Plan identifies the category of proposed land use for SEAD-13 as Recreation/Conservation Land.

Comment #2 Page 3-3, Section 3.1.2.3, Seismic Survey: The text, figures, or tables should state where the zero point starts, so that the data may be effectively reviewed.

Response #2 Agreed. The zero point for the seismic survey has been unidentified in the text, tables, and one figure. A note has been added to the text in Section 3.1.2.3 that explains that the standard for the profiles was to locate the zero point nearest to the center of the SEAD being investigated. The zero point was also added to Tables 3-1 and 3-2 and to Figure 3-3.

Comment #3 Table 3-1 and 3-2: These tables differ, why is the depth and elevation of the glacial till not given in Table 3-2 as it is in Table 3-1.

Response #3 Agreed. To clarify the data on these two tables, a "Glacial Till" column was added to Table 3-2. And, a note was added to the tables that explains that the depth and elevation of the till identified on Table 3-1 is the depth to a "dense" till, which was identified in only one seismic profile (P1 at SEAD-13, East); bedrock, however, was not identified at this location. The note on the tables states that the

dense glacial till was not identified by seismic refraction surveys due to insufficient thickness and/or insufficient velocity contrasts.

The "dense" till has been identified at other SEADs at the depot and always at locations where the depth to bedrock is significantly greater than that which was observed over most of the site (usually between 4 and 10 feet). Possible explanations are that at these locations, there is a discernible density difference between weathered till, which would exist from the ground surface to a depth of between 8 and 10 feet, and unweathered till, which would occur below these depths. Thus, in most instances at SEDA the "dense" (or unweathered) till would not be observed due to the relatively shallow depth to bedrock over most of the site.

Another explanation may be that there are distinct density differences between an upper ablation till and lower lodgement till in these areas. As noted in Section 4.2.1.1, three boring are planed in the areas of the site immediately west of wells MW13-3 and MW13-7 to characterize the till and further define the stratigraphy in this area of the site. A previous boring in the area was terminated at 23 feet (Section 3.1.2.2).

Comment #4 Page 3-11, Section 3.1.2.4: It is unclear how the photogrammetric elevation of the pond relates to the April 1994 water level elevations. To obtain a more accurate water level elevation of the Duck Pond a surveyed staff gauge should be installed.

Response #4 Agreed. a staff gauge will be added at the Duck Pond. Text that describes the installation of the staff gauge has been added to Section 4.2.2. The location of the proposed staff gauge is shown in Figure 4-4.

Comment #5 Page 3-14, Section 3.1.2.5, p5: Toluene and chloroform are not generally considered common laboratory contaminates as stated in this document. However, these compounds may be related to carry over from previous analyses. If this is the case analysis of the method blanks may indicate this.

Response #5 Agreed. The data reported in the table have been validated, and the mechanisms used to validate the sample results (e.g., laboratory method blanks, trip blanks, and rinsate analyses, etc.), do not provide evidence to invalidate these results. However, we suspect that both toluene and chloroform are not indicative of the true surface soil chemistry at the site. Toluene was detected in only two samples at estimated concentrations of 2 μg/kg and 6 μg/kg. Chloroform was detected in only one sample at an estimated concentration of 2 μg/kg. On the basis of these data, we do not believe that the RI field program should focus on defining the extent of volatile organic compounds in surface soil. We have revised the text for Volatile Organic Compounds in surface soils based on this comment.

Comment #6 Page 3-19, Section 3.1.2.5, p1: See above comment on laboratory contamination.

Response #6 Agreed. The data reported in the table have been validated, and the mechanisms used to validate the sample results (e.g., laboratory method blanks, trip blanks,

and rinsate analyses, etc.), do not provide evidence to invalidate these results. However, we suspect that toluene is not indicative of the true surface soil chemistry at the site. Toluene was detected in only one sample at an estimated concentrations of 2 µg/kg. On the basis of these data, we do not believe that the RI field program should focus on defining the extent of volatile organic compounds in surface soil. We have revised the text for Volatile Organic Compounds in subsurface soils based on this comment.

Comment #7 Table 3-5: Why is the column labeled MW13-8 blank for the majority of compounds? This sample is a duplicate of MW13-4, which has reported results for all the analytes missing in sample MW13-8.

Response #7 Agreed. An explanation is as follows. SEAD-13 ESI was performed under the 10 SWMU ESI Work Plan and it included nine other sites at the depot. The sampling program for the 10 SWMU ESI spanned the 10 different sites. In the instance noted above, a duplicate sample was collected at another site as part of one SDG, but analysis for fluoride was not required at the site. And, when sampling was performed at SEAD-13, which did require a fluoride analysis, the duplicate fluoride sample was collected. Because duplicates of the other parameters had been previous collected for the SDG, additional duplicates were not collected at SEAD-13. To clarify this a note has been added to Table 3-5.

Comment #8 Page 3-24, Section 3.1.2.5, Indicator Parameters: The text states "... maximum nitrate value detected was 460 mg/l in sample MW13-2, which is downgradient from the former IRFNA pits in SEAD13-West." This well is located downgradient of SEAD13-East and not SEAD13-West as stated.

Response #8 Agreed. The text in Section 3.1.2.5 has been changed to read SEAD-13-East not SEAD-13-West.

Comment #9 Page 4-2, Section 4.2.1.1, p4: The text here incorrectly states that wells MW13-3 and MW13-7 are dry wells. As shown in Table 3-3 these wells have been dry in the past but, on April 4, 1994 groundwater was present in both wells.

Response #9 Agreed. We agree that text should not refer to these wells as "dry wells" if groundwater has at one time been found in them. The parenthetical reference to "dry wells" has been removed from the 3rd paragraph in Section 4.2.1.1.

Comment #10 Page 4-3, Section 4.2.1.1, Surface Soils: Additional surface soil samples should be collected in the area of SB13-8, SEAD13-East. The additional samples will aid in delineating the reported exceedences of several inorganics reported in the near surface soils in the area.

Response #10 Disagree. We do not believe that the concentrations of metals in surface soils at SB13-8 (0 to 2 feet) are such that they require additional sampling to define the area of exceedences for these metals. A total of four metals exceeded the most recent NYSDEC TAGM values for SEDA, which is partly based on the background data base for soils at SEDA. At SB13-8 the exceedences were for

arsenic, beryllium, thallium, and zinc. The concentrations that exceeded the TAGM at this location are shown in comparison to the TAGM value and the background maximum in the following table (concentrations are in mg/Kg):

Metal	TAGM	SB13-8	Background Max.
Arsenic	7.5	8.2	21.5
Beryllium	0.73	0.95 J	1.4
Thallium	0.28	0.3 J	0.8
Zinc	82.5	91.2	219

On the basis of these results, we do not believe that these concentrations, along with the surface soil conditions observed in the field, and the site history, suggest a significant nearby source area for these metals and, thus, we do not believe that additional soil samples are necessary in this area of the site. Rather, we believe that these concentrations reflect the natural variability of metals concentrations in the soil, and because of this variation, the concentrations of some of the metals are slightly above the NYSDEC TAGMs, which incorporate the 95th Upper Concentration Limit of background concentrations where applicable. [The soil background data base includes 57 samples]. Also, the background maximum concentrations for these metals are all above the concentrations found in the surface soil sample at this location.

Comment #11 Page 4-7, Section 4.2.2: Additional surface water/sediment samples should be collected from the wetland area located to the south of SEAD13-East, since this area may have received runoff from the IRFNA pit area. Additional samples should also be collected from two drainage ditches north and northeast of the IRFNA pit areas. Both of these drainage ditches originate close to the IRFNA pit area and may have received run-off. Additional sediment samples should be collected in the area of "vertical pipes" at SEAD13-West. Additional geophysical studies may also be appropriate to locate the origin of these pipes, to better understand their former use and their potential for being a source of contamination.

Response #11 Agreed. Two surface water/sediment samples have been proposed for the wetland that exists immediately south of the SEAD-13-East site. Also, Three surface water samples are proposed to be collected in the drainage ditches north and northeast of the IRFNA pits. The text in Section 4.2.2 and Figure 4-4 have been revised to reflect this change.

Also, One additional sediment sample is proposed to be collected near the northernmost vertical pipe, which is located in the Duck Pond. The other vertical pipe is near the proposed sample SW/SD13-9. The text in Section 4.2.2 and Figure 4-4 have been revised to reflect this change.

We disagree with the recommendation for additional geophysical studies at SEAD-13. The existing geophysical data defines the locations of piping on both SEAD-13 East and SEAD-13 West and these pipes were believed to have been used to carry water that was used in the process of neutralization of IRFNA. The

locations of these pipes off of the sites is not believed to be critical since they are believed to tie into water lines that service this area.

Comment #12 Page 4-10, Section 4.2.3.1, Monitoring Well Installation: The vertical extent of contamination should be investigated downgradient of the IRFNA pits. Groundwater from the existing well (MW13-2) had several exceedences of inorganics along with elevated concentrations of nitrate/nitrite-nitrogen and elevated specific conductance. The IRFNA pits were reportedly excavated into bedrock (ref. Section 3.1.1, page 3-2, p1). As such the bedrock water quality should be monitored downgradient and upgradient of the pits to evaluated potential impacts. Since groundwater samples were unable to be collected from MW13-3 and MW13-7 during the ESI it would be appropriate to install additional wells downgradient of this cluster, since groundwater quality is unknown in this direction. As an alternative, groundwater samples could be collected prior to the installation of new wells as to evaluate if groundwater quality has been affected at this cluster. Then, as appropriate, additional downgradient wells would be required.

Response #12 Agreed. We agree to install a limited number of bedrock monitoring wells in areas downgradient and upgradient of the IRFNA pits to address the vertical extent of impacts. Specifically, one well will be installed adjacent to background well MW13-11 to provide background concentrations in bedrock. Another well will be installed adjacent to MW13-2, which was shown to have a relatively high conductivity in the ESI. The third well will be installed adjacent to the proposed well MW13-15, which will be located in the center of the plume of highest apparent conductivity based on the geophysical survey results. To address the extent of any impacts that may be present downgradient of this plume, an additional well will be installed adjacent to proposed well MW13-16. The text in Section 4.2.3.1 and Figure 4-5 have been revised to include these bedrock wells.

With regard to the second part of the comment, under the current plans for the RI program, we are not scheduled to collect groundwater samples prior to installing the new wells for this RI field program. On the basis of the April 1994 depth to groundwater data, we believe that it is likely that these two wells will contain water. We do not feel that it is necessary at this time to install additional wells downgradient of wells MW13-3 and MW13-7.

Comment #13 Page 4-10, Section 4.2.3.2: If groundwater is present at the time of sampling, both wells, MW13-3 and MW13-7, should be sampled.

Response #13 Agreed. If groundwater is present in these wells at the time of sampling, these wells will be sampled. The current RI sampling program calls for sampling these wells, therefore, no change was made to the text of the Scoping Plan.

Comment #14 Page 4-14, Section 4.2.5: This text states that 14 groundwater samples will be collected. However, the referenced table (Table 4-1) shows that 13 samples will be analyzed. Page 4-15, p1: This text states that 21 groundwater samples will be analyzed. The text should be corrected.

Response #14 Agreed. The text in Section 4.2.5 and Table 4-1 will be revised so that they are consistent with the proposed sampling program. A total of 18 overburden and bedrock wells will be sampled on both SEAD-13 West and SEAD-13 East.

Biological Technical Assistance Group

Comment #1 There are two areas at SEAD-13, to the east and west of Duck Pond, where Inhibited Red Fuming Nitric Acid (IRFNA) was disposed of in several lime pits. Surface soil samples in these areas were obtained from the top 2'. Proposed surface soil samples will be collected from the top 2" (page 4-2). 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". The approved Reuse Plan for SEDA includes SEAD-13 in the Conservation/Recreation area. 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. Proposed surface soil sampling should include area SEAD13-East.

Response #1 This comment has several components each of which is responded to separately below.

Disagree. The issue of defining the depth range that represents surface soil samples (e.g., 0-2 inch, 0-12 inch) has arisen previous to this comment. Based on previous discussions with NYSDEC, EPA and the Army surface soils at SEDA have been defined as soil that occurs between 0 and 2 inches below the ground surface (after upper organic and root matter has been remove). Soils collected from this interval have provided chemical results that have been used for both human health and ecological risk assessments. And, for this reason, the soil sampling program will adhere to this previously agreed upon definition of surface soil at Seneca Army Depot Activity.

Agree. We agree that soil analysis results should be compared to NYSDEC TAGMs in the ESI and these results will also be compared to these TAGMs in the RI, to characterize the extent of impacts at the site (Section 4.0 of the RI). However, in the Ecological Risk Assessment (Section 6.0 of the RI) the soil COCs for ecological receptors are screened against site reference values.

The last part of the comment recommends surface soil sampling at SEAD-13 East, but it does not provide an indication as to where EPA would like these samples to be collected or justification for collecting the samples. We do not believe that the data indicates that additional surface soil samples are necessary at SEAD-13 East.

Comment #2 VOCs identified in surface and subsurface soils and sediment samples, along with several SVOCs in surface and subsurface soils and groundwater, were attributed

to laboratory contamination rather than site contamination. Data validation should assist in determining whether these contaminants are laboratory artifacts.

Response #2 The response to this comment is provide below.

The data reported in the tables have been validated, and the mechanisms used to validate the sample results (e.g., laboratory method blanks, trip blanks, and rinsate analyses, etc.), do not provide evidence to invalidate these results. In response to this comment, the text in each of the respective subsections has been revised accordingly.

VOCs

However, we suspect that toluene and chloroform are not indicative of the true surface soil chemistry at the site. Toluene was detected in only two samples at estimated concentrations of 2 µg/kg and 6 µg/kg. Chloroform was detected in only one sample at an estimated concentration of 2 µg/kg. On the basis of these data, we do not believe that the RI field program should focus on defining the extent of volatile organic compounds in surface soil. We have revised the text for Volatile Organic Compounds in subsurface soils based on this comment.

Even though the compounds toluene was not screened out in the data validation for the ESI, we believe that toluene is not indicative of the true subsurface soil chemistry at the site. Toluene was detected in only one sample at an estimated concentration of 2 µg/kg. On the basis of these data, we do not believe that the RI field program should focus on defining the extent of these volatile organic compounds in subsurface soil.

Even though the compounds acetone and 2-butanone, two common laboratory contaminants, were not screened out in the data validation for the ESI, they are not believed to be representative of the true sediment chemistry at SEAD-13. Acetone occurred in all four samples at approximately the same concentration, except for one sample which had a higher concentration. The compound 2-butanone was found in one sample. Also, both of these compounds were also found in rinsate samples and in trip blanks that were collected as part of this ESI program.

SVOCs

Even though both di-n-butylphthalate and di-n-octylphthalate were not screened out in the data validation process for soils, and realizing that phthalates are common laboratory contaminants, these two compounds are not believed to be representative of true soil chemistry at SEAD-13.

The compound bis-2-ethylhexylphthalate was also not screened out of one groundwater sample during data validation; and this was the only sample in which this compound was found. Again, phthalates are a common laboratory contaminant and this compound is not believed to be representative of groundwater chemistry at SEAD-13.

Comment #3 We recommend the use of the acute and chronic effects levels from the federal ambient water quality criteria (AWQC) appearing in the Federal Register, Volume 57, No. 246, Dec. 22, 1992. TAGM values refer to soil criteria and should not be referenced for surface water (page 3-26). Where specific contaminants have been dropped (e.g., aluminum, iron), the 1991 criteria values may still be considered for guidance levels. These numbers should be reflected in Table 3-6, "Surface Water Analysis Results." Further, several inorganic analytes are missing from this table including, but not limited to arsenic, cadmium, and mercury. Surface water should also undergo a full TCL analysis, and TAL inorganic analysis. All analyses results should be provided in the data tables.

Response #3 The responses to this comment are presented below.

The acute and chronic effect levels from federal ambient water quality criteria (AWQC) 1992 will be referenced for surface water in the RI. Although TAGMs were not used in Table 3-6, the reference to these criteria as "TAGMs" was in error on page 3-26; this reference has been corrected. Because the discussion presented in the text is based on the values listed in Table 3-6, and both the table and the discussion is from the Final ESI report for SEAD-13, the text was not updated. However, a note was added to Section 4.2.2 that the surface water samples shall be compared to acute and chronic effect levels from federal ambient water quality criteria (AWQC) 1992.

The several inorganics that you state are missing from the Table 3-26 are not shown because this is a summary table. For clarity in the discussion of the chemical impacts, the data have been distilled, and only those chemicals that were detected in surface water are shown on the table. The complete list of chemical results is reported in Appendix E of the ESI of Three Moderate Priority SWMUs, SEAD-11, SEAD-13 and SEAD-57, Final, December, 1995. No change was made the text of the Scoping Plan.

Surface water samples that will be collected for the SEAD-13 RI will be analyzed for the full TCL and TAL analyses, as stated in Section 4.2.5 and in Table 4-1. No change was made to the text of the Scoping Plan.

Finally, all analyses will be provided in the Appendix of the RI report, which is customary for the RI reports. However, the summary tables in Section 4.0 of the RI report will only provide the list of chemicals that were detected in the various media. No change was made to the text of the Scoping Plan.

Comment #4 Three sediment samples were collected from Duck Pond, one (SD13-1) near SEAD13-East, one (SD13-2) near SEAD13-West (SD13-2) and one near the mouth of Duck Pond (SD13-3) which is considered a "background" sample. The BTAG recommends 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). These criteria should be included in Table 3-7, "Sediment Analysis Results." Additionally, in Table 3-7, the reference to the 1989 NYSDEC

Sediment guidance should be revised to the 1994 document. Although no total organic carbon data (TOC) were provided, using a default vale of 5% TOC, the PAH data were screened against Ontario SELs. The three PAH values reported were all less than their respective SEL values. Metals data were also screened against Ontario guidelines, and all results were less than the SEL values. Proposed sediment sampling locations should include depositional areas.

Response #4 Agreed. For the RI, the freshwater sediments will be screened against the LELs and SELs taken from Persuad et al., 1993, which is currently done for the RIs at SEDA. However, because the table and the discussion are from the Final ESI for SEAD-13 the text was not changed. Also, in the RI for SEAD-13, 1994 NYSDEC sediment guidance will be used; as a note the 1994 guidance is currently used in the RIs prepared for SEDA. TOC data will be available for sediment samples collected during the SEAD-13 RI to make adjustments to the parameters whose guidance values are based on a TOC-correction. The proposed sediment sampling locations are shown on Figure 4-4, and they are intended to be in depositional areas. A note has been added to the text in Section 4.2.2 that sediments samples are to be collected in depositional areas that are identified near the proposed sample location.

Comment #5 Although sediment sample SD13-3 is identified as the "background" sample, contaminant levels in this sample were greater than SD13-2 and SD13-1. "Surface water runoff appears to be the likely mechanism for the distribution of metals in the pond" (page 3-37). The impact of the groundwater and other sites (areas of concern) upstream of SEAD-13 on Duck Pond should be evaluated. It is noted that background monitoring well (MW13-1) may be impacted by metals from nearby SEAD-46, which is a small arms range (page 3-36). Therefore, it is equally possible that contaminants from other sites upstream of SEAD may be migrating via this small stream or surface water runoff to Duck Pond. Proposed sediment/surface water sampling objectives include determining background quality by obtaining samples at the mouth of the small stream that drains into Duck Pond from the south. "Thus the analytical results would be representative of surface water/sediment entering the Duck Pond via this stream, or background conditions in the Duck Pond" (page 3-43). Although the first part of this statement is correct, the latter is not. The latter part of the statement leads us to believe that data collection from other parts of the pond would be compared to these "background" data and remedial action levels would be based on these samples. Due to the fact that contaminants from other areas of concern may be entering the Pond via the stream, remedial action goals should not be based on these levels. Further these "background" data should not be combined with other SEAD background data to arrive at a basewide "background" level. These samples should be referred to as "reference" samples, rather than "background" samples.

Response #5 Responses to the different phases of this comment are provided below.

We do not agree that the RI at SEAD-13 should evaluate the impact of the groundwater and other sites (areas of concern) upstream of the SEAD-13 on the Duck Pond. Although, the RI is designed to establish the background (or

reference) chemistry in the aquifer at SEAD-13 East and SEAD-13 West. It will also establish the background (or reference) chemistry of surface water and sediment in the tributary that feeds into the southern end of the Duck Pond. One of the purposes of the is RI is to determine the impact that past site activities at SEAD-13 have had on the various media at the site. The RI is not intended to determine the source of impacts that may be from other upgradient sites. Future RI investigations at these other sites will investigate these impacts.

Also, it is likely that the results from the background (or reference) locations will be compared to surface water and sediment samples collected in other parts of the Duck Pond, because this a reasonable comparison to judge the impact from SEAD-13. Ultimately, remedial action levels will be established during the FS, and they may or may not take these reference data into consideration.

We agree that the surface water and sediment background data should not be combined with other SEDA background data to arrive at a basewide "background" concentration. We do not intend to develop such a data base for surface water and sediment at SEDA.

Lastly, we agree that these samples should be referred to as "reference" samples, rather than "background" samples. The word "reference" replaced "background" in the text in Sections 3.6 and 4.2.2.

Comment #6 Duck Pond is fed by a small stream which enters from the south through a cove and wetland area (page 3-11). Note that a wetlands assessment and restoration plan will be needed for any wetlands impacted or disturbed by contamination or remedial activities.

Response #6 Agreed. We agree that a wetlands assessment and restoration plan will be needed for any wetland impacted or disturbed by contamination or remedial activities. A note to this effect has been added to Section 5.2 of the Scoping Plan.

Comment #7 Figure 3-6 illustrates the exposure pathways. For biota, inhalation and dermal contact are diagrammed as a pathway considered to pose potential risk from soil and dust. Due to the fact that limited ecological data are available for these exposure routes, exposure via ingestion is the primary concern. Further, potential exposure to receptors from surface water runoff and sediment (page 3-40) should include aquatic receptors in additional to terrestrial biota. The contribution of groundwater to Duck Pond should be addressed.

Response #7 Agreed. We agree that the inhalation and dermal contact are diagrammed as a pathway considered to pose potential risk from soil and dust, and that exposure via ingestion is the primary concern. Also, the potential exposure to receptors from surface water runoff and sediment does include aquatic receptors in additional to terrestrial biota (Figure 3-6). However, this discussion was omitted from the text on page 3-40. Text that describes aquatic receptors for this category has been added to Section 3.2.2.1.

Also, the last portion of this comment mentions that the contribution of groundwater to Duck Pond should be addressed, however, there is no explanation of the context for the comment. We assume that the comment refers to the volumetric contribution of groundwater to the Duck Pond but and this can be addressed in the RI. Beyond this, more specific information is needed to address this portion of the comment.

Comment #8 In the "Site Description" section of the "Ecological Investigation," the purpose of the site description includes determining whether aquatic and terrestrial receptors were "present at the site prior to contaminant introduction; and if they were... to provide the appropriate information to design a remedial investigation of the resources" (page 4-11). The methodology which will be used to determine whether or not organisms were at the site prior to contamination should be provided. Further, the remedial investigation should not be designed solely on whether or not certain organisms are present. "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" (page 4-12). It should be indicated if this assessment will include the site itself.

Response #8 Acknowledged. The introduction incorrectly states that the ecological investigation will determine if aquatic and terrestrial resources were present at the site prior to contaminant introduction. Thus, this determination is no longer included in the first paragraph of the Site Description section (Section 4.2.4.1) of the ecological investigation.

We also agree that the ecological portion of the remedial investigation will not be designed solely on whether or not certain organisms are present. No change was made to the text of the Scoping Plan.

Also, the qualitative assessment will include the site itself as well as the area that extends one-half mile from the site. No change was made to the text of the Scoping Plan.

Comment #9 On page 4-14, four approaches to evaluating toxicological effects are listed - indicator species analysis, population analysis, community analysis, and ecosystem analysis. While these levels represent a variety of difference assessment endpoints, more information should be provided on measurement endpoints, i.e., how these assessment endpoints will be reached.

Response #9 Agreed. The text at the end of Section 4.2.4.2 has been revised to include an explanation of how these ecological assessment endpoints will be reached.

Toxic and Hazardous Waste Section

Comment #1 Section 3.1.2.5, pages 3-14 - 3-30.

a) Pages 3-14 and 3-19 state that the VOC compounds detected in the surface and subsurface soil from the ESI samples can be attributed to lab contamination and not site conditions. In order to support these statements, this Scoping Plan should

include the conclusions drawn from validation of the QC sample results associated to these surface and subsurface soils. For example, the results obtained from the trip blank, field blank and laboratory blank may be indicative as to the source of the detected contaminants and support the statement that is presented. If these QC samples do not contain the contaminants detected in the soil samples, then these results should not be considered extraneous.

If it is demonstrated that the source of the contamination is the analytical laboratory, then the subsequent sampling and analytical program should take the appropriate precautionary measures to ensure that this situation is not repeated. This can become problematic if the contaminant concentrations detected exceed the associated TAGM values.

b) The comments presented in 1a above apply to the Semi-volatile compounds detected in the ESI soil samples as well.

c) In both the surface and subsurface soils analyzed during the ESI, chromium was detected above the TAGM value. For the groundwater, one sample detected Cr(III) above the NY AWQS Class GA standard and for the sediment, two samples exceeded the NYSDEC Sediment Criteria for Aquatic Life. At present, the Scoping Plan does not discuss the analysis of hexavalent Chromium (Cr(VI)) in addition to the planned analysis for CR (III). Please provide the justification supporting the omission of sample analysis for CR (VI) in the affected matrices.

d) The comments presented in 1a above also apply to Semi-volatile compounds detected in the ESI groundwater samples and the VOCs in the ESI sediment samples.

Response #1 **a)** Acknowledged. The data reported in the tables have been validated, and the mechanisms used to validate the sample results (e.g., laboratory method blanks, trip blanks, and rinsate analyses, etc.), do not provide evidence to invalidate these results. In response to this comment, the text in each of the respective subsections has been revised accordingly.

However, we still suspect that toluene and chloroform are not indicative of the true surface soil chemistry at the site. Toluene was detected in only two samples at estimated concentrations of 2 µg/kg and 6 µg/kg. Chloroform was detected in only one sample at an estimated concentration of 2 µg/kg. On the basis of these data, we do not believe that the RI field program should focus on defining the extent of volatile organic compounds in surface soil. We have revised the text for Volatile Organic Compounds in subsurface soils based on this comment.

Even though the compounds toluene was not screened out in the data validation for the ESI, we believe that toluene is not indicative of the true subsurface soil chemistry at the site. Toluene was detected in only one sample at an estimated concentration of 2 µg/kg. On the basis of these data, we do not believe that the RI field program should focus on defining the extent of these volatile organic compounds in subsurface soil.

Parson ES will coordinate with the laboratory (Inchcape Testing Services) so that they are aware of the issues involved with these reported SVOCs at SEAD-13.

b) Acknowledged. The data reported in the tables have been validated, and the mechanisms used to validate the sample results (e.g., laboratory method blanks, trip blanks, and rinsate analyses, etc.), do not provide evidence to invalidate these results. In response to this comment, the text in each of the respective subsections has been revised accordingly.

Even though both di-n-butylphthalate and di-n-octylphthalate were not screened out in the data validation process for soils, and realizing that phthalates are common laboratory contaminants, these two compounds are not believed to be representative of true soil chemistry at SEAD-13. And, given the types of SVOCs found and their low concentrations, the RI program should not concentrate on identifying the nature and extent of impacts from SVOCs in soil at SEAD-13.

Parson ES will coordinate with the laboratory (Inchcape Testing Services) so that they are aware of the issues involved with these reported SVOCs at SEAD-13.

c) Agreed, we will provide an explanation as to why chromium VI analysis should not be performed at SEAD-13. First, the concentrations of total chromium on-site do not indicate chromium exceedences are significant when compared to the background data set of 57 samples. For example, the maximum chromium concentration in soil at SEAD-13 is 35.8 µg/kg, which is equal to the maximum chromium concentration in the soil background data set. In groundwater, the one chromium concentration that was found above the NYS GA groundwater standard was at the background location (MW13-1), and this may have been due to elevated turbidity in the sample; also, most metals were significantly higher at this one background location compared to the other downgradient locations. The new low-flow sampling method will significantly reduce the turbidity of the groundwater samples in the RI sampling program. The two concentrations of chromium in sediment cited in the comment (26.9 µg/kg and 26.1µg/kg) are only slightly greater than the NYS sediment criteria for aquatic life of 26µg/kg.

Also, there is no historical information to indicate that chromium VI would be present at SEAD-13.

On the basis of the information presented above, we do not believe that this site is a good candidate for chromium VI analysis.

d) Acknowledged. The data reported in the tables have been validated, and the mechanisms used to validate the sample results (e.g., laboratory method blanks, trip blanks, and rinsate analyses, etc.), do not provide evidence to invalidate these results. In response to this comment, the text in each of the respective subsections has been revised accordingly.

The compound bis-2-ethylhexylphthalate was also not screened out of one groundwater sample during data validation; and this was the only sample in which this compound was found. Again, phthalates are a common laboratory

contaminant and, thus suggests to us that this compound is not representative of the true groundwater chemistry at SEAD-13.

Even though the compounds acetone and 2-butanone, two common laboratory contaminants, were not screened out in the data validation for the ESI, they are not believed to be representative of the true sediment chemistry at SEAD-13. Acetone occurred in all four samples at approximately the same concentration, except for one sample which had a higher concentration. The compound 2-butanone was found in one sample. Also, both of these compounds were also found in rinsate samples and in trip blanks that were collected as part of this ESI program.

And, given the types of SVOCs and VOC found and their low concentrations, we believe that the RI program should not concentrate on identifying the nature and extent of impacts from SVOCs in groundwater and VOCs in sediment at SEAD-13.

Parson ES will coordinate with the laboratory (Inchcape Testing Services) so that they are aware of the issues involved with these reported SVOCs and VOCs at SEAD-13.

Comment #2 Section 4.2 Field Investigation at SEAD 13

This section should reference the corresponding, matrix specific sample collection procedures delineated in the generic Work Plan. Currently this Scoping Plan references it's Appendix A, which in turn, references the generic Work Plan. However, it is recommended that each subsection of this Scoping Plan, i.e., subsurface soil, test pits, surface soil, surface water and sediment, and groundwater, reference the specific section in the generic Work Plan where the actual sampling procedures can be found.

Response #2 Agreed. The text in the Subsection in Section 4.2 has been revised to include references to specific and applicable sections of the Generic Work Plan.

Comment #3 Section 4.2.1.1. Soil Boring Program

a) At each of the fifteen soil borings proposed, this plan indicates that a surface soil sample will be collected at a depth of 0-2 inches. The Army must verify that this depth is appropriate to measure surface soil contamination versus the standards associated with risk assessment.

In addition, for the proposed chemical testing of these surface soil samples, the lab (Inchcape/Aquatec) must be consulted to ensure that sufficient sample mass is attained from a two inch depth to fulfill the initial weight requirements stated in the method.

b) This section should specify the depth at which the proposed nine surface soil samples will be collected. See comment 3a above.

Response #3 a) Acknowledged. We are unsure as to what form of verification EPA is suggesting in the comment. It would seam by association that if the 0 to 2 inch surface soil sample is appropriate to evaluate risk of human exposure to impacts in surface soils, then chemical analysis of the soil from this interval would be "appropriate to measure surface soil contamination..." Given this, the determination as to whether the sample is appropriate to measure surface soil contamination is based on how surface soils are defined, and for what purpose the samples are collected. In this case, the definition of surface soils is soil collected from 0-2 inches below organic/root matter (a definition applicable to the human health risk assessment). If the definition of surface soils were to change, then the 0-2 inch sample would not be "appropriate." A response involving somewhat circular logic is unavoidable given the nature of the comment.

With regard to the second part of this comment, the mass of soil collected from the 0 to 2 inches is not an issue for the laboratory because the sample is collected using a 3-inch split-spoon from an area that is large enough to supply the required mass for the analysis.

b) Agreed. The text in Section 4.2.1.1 has been revised to include the depth interval for the surface soil samples.

Comment #4 Section 4.2.5 Analytical Program

a) This section specifies Method 352.1 for the nitrate/nitrite analyses. This contradicts with the information presented in the generic Work Plan, Table C-2 which lists Method 353.2 for this parameter for aqueous samples only. Please correct this inconsistency to agree with the generic Work Plan. Also, see comment 6 below.

b) The appropriate method for TOC analysis is the Region II method for TOC in soil/sediment matrices which has been previously provided in our comments pertaining to the Scoping Plan for SEAD-4. Please correct this section accordingly.

Response #4 a) Agreed. the nitrate-nitrogen analysis in the Scoping Plan has been changed from 353.1 to 353.2 for aqueous samples so that it is consistent with the Generic Work Plan. A short description of the modification for soils was added to Table 4-1.

b) Agreed. the appropriate method for the TOC analysis has been incorporated into Section 4.2.5.

Comment #5 Section 4.5 Data Reporting

The appropriate terminology used to define the data deliverables package to be produced is the NYSDEC ASP Category B deliverables. See comment 11 below on the Generic FSP/CDAP for additional details on the NYSDEC deliverables package.

Response #5 Agreed. The Data Reporting section of the Generic Work Plan has been previously revised (during comments for the SEAD-4 Scoping Plan) to reference NYSDEC ASP Category B Deliverables. [Note: there is no comment 11 in this comment letter.]

Comment #6 Table 4-1

a) The parameter and method number listed for analysis of nitrate-nitrite is incorrect and inconsistent with the information presented in the generic CDAP. Nitrate-nitrite analysis is to be performed by MCAWW Method 353.2, Automated Cadmium Reduction method for aqueous samples only. Remove reference to this analysis for soil matrices, or provide the method modification which the lab will utilize to accommodate soil samples.

b) Please provide the method modifications on the following which will be used by the lab to accommodate soil samples: Method 150.1 for pH and Method 415.1 for TOC. This will be in accordance with the SEAD-4 Scoping Plan as well as the Generic RI/FS Work plan.

c) Method 524.2, Revision 4.0, August 1992 is the correct reference for the analysis of VOCs in groundwater. This will be in accordance with the SEDA-4 Scoping Plan as well as the Generic RI/FS Work Plan.

Response #6 a) Agreed. The reference to 353.2 on Table 4-1 has been removed from the soil matrix and it was replaced by an explanation of the modified method that will be used by the laboratory.

b) Agreed. Modifications to the pH and TOC analyses of soil were added to Table 4-1.

c) Agreed. The cited description of Method 524 has been added to Table 4-1

Generic Work Plan-Field Sampling Plan

Comment #1 CDAP: Table C-2.

Correct the method specified in Part IIC, (3) for TPH in an aqueous matrix to EPA Method 1664, dated 10/94 published by EPA's Office of Water (document #EPA-821-8-94-004). Copies may be obtained from:

Water Resource Center
Mail Code RC-4100
401 M Street, SW
Washington, DC 20460
(202) 260-7786 or (202) 260-2814

Response #1 Agreed. The method for the analysis of TPH in an aqueous matrix was modified to EPA Method 1664 as recommended in the comment.

RESPONSE TO COMMENTS
BY
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC)
FOR DRAFT SEAD-13 PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT THE INHIBITED RED FUMING NITRIC ACID DISPOSAL SITE
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
COMMENT DATE: DECEMBER 1996

Comment #1

The site investigation results indicate that volatile organic, semi-volatile organic and pesticides/PCBs compounds were detected at levels much below the applicable criteria, except in one soil sample (0-2, SB13-101, 207184). This sample detected phenol, 1,4-dichlorobenzene and 4-methyl phenol at an estimated concentration of 14,000, 3,300 and 9,200 ppb respectively. It appears that this sample may be a laboratory error and therefore the laboratory data for this sample should be reviewed before finalizing analytes for remedial investigation. The review should include:

a. Determine why all the semi-volatile compound results (detections and non-detections) are flagged J (J = estimate) only on this sample.

b. Determine why this sample was run at a dilution. Review of analysis results shows that the dilution was not necessary to analyze the detections of target analytes within the calibration range. Detections as high as 62,000 ppb would be within the calibration range on an analysis of an undiluted sample extract. Also, a review of the TICs data table does not show levels of detections that indicate that a dilution was necessary.

c. Determine if the ion spectra matches are definitive for the target analytes detected. Since phenol and 1,4-dichlorobenzene are method spike compounds, particular attention should be given to 4-methyl phenol. Possibly this detection is 2- chlorophenol or 4-chloro-3-methyl phenol, which are also spike compounds. This would indicate that these detections may be due to laboratory contamination due to glassware, or other articles contaminated with the spike compound mixture.

d. We would be glad to review the laboratory data if the deliverable package is sent to us. Based on the laboratory data review, if it is determined that this sample result was a laboratory error, the NYSDEC would not require sample analysis for semi-VOCs in addition to VOCs and pesticide/PCBs. In other words, we would require sample analysis for metals only out of the full target compound list (TCL).

Response #1

a. Acknowledged. All of the semivolatile results are likely to have been flagged J in this sample because of the discrepancy between the chemical results reported for this sample and the results reported for the duplicate

of this sample. Also, all of the detections were below the reporting limits for this diluted sample, except for phenol and 4-methylphenol.

b. The sample may have been dilution because the laboratory determined in a pre-screen analysis that the sample contained elevated concentrations of SVOCs and, therefore, needed to be diluted so that the lab instruments would not be adversely impacted by the relatively high concentrations in the sample. However, as you point out in your comment, dilution may not have been necessary in this instance.

c. Acknowledged. While some of the compounds detected in the sample may be the same as those used for the spiked sample, we do not believe that the these results indicate laboratory contamination. First, the MS/MSD was performed on another sample, SB13-9-4, and not the sample in question (SB13-10-1). The list of spiked compounds for the MS/MSD sample in this SDG included the following:

Phenol
2-chlorophenol
1,4-dichlorophenol
N-nitroso-di-n-propylamine
1,2,4-trichlorobenzene
4-chloro-3-methylphenol
Acenaphthene
4-nitrophenol
2,4-dinitrophenol
pentachlorophenol
pyrene

Of the eleven compounds spiked into the MS/MSD sample (SB13-9-4), the laboratory indicated that four were found in the sample SB13-10-1. But, the spiked concentrations are not consistent in all cases with the concentrations found in the sample. For example, 14,000 μg/Kg of phenol was detected in the sample and only 2,600-2,700 μg/kg was spiked into the MS/MSD sample according to the MS/MSD recovery data provided by the lab. The concentration of 1,4-dichlorobenzene was two times that of the spike added to the MS/MSD sample for this compound. The concentrations of Acenaphthene and pyrene were about one half of the concentrations used for the MS/MSD sample. Thus, it is the higher concentrations of phenol and 1,4-dichlorobenzene that suggest that carryover from glassware may not be responsible for the detection of these compounds.

Also, besides the two compounds that NYDEC indicates may have been misidentified by the lab, several other compounds not included in the spiked compound mixture (naphthalene, dibenzofuran, phenanthrene, carbazole, and fluoranthene) were found in sample SB13-10-1.

While we can not provide information to explain the discrepancy between the sample and the duplicate from location SB13-10-1, we believe, for the reasons cited above, that most of the evidence suggests that it is unlikely that the sample results reported are from a spiked sample or from laboratory contamination due to glassware. or other articles contaminated with the spike compound mixture.

d. Acknowledged. We appreciate NYDEC's offer to review the laboratory data, but we do not feel that external review of the data is necessary in this instance. Is it clear from the data at SEAD-13 that SVOCs are not the primary constituents to be defined at the site. But, the likelihood that SVOCs could be dropped from the list of parameters analyzed for at this site is very low. One reason for this is that EPA has historically required that SVOCs, as well as VOCs, pesticides and PCB, and metals be required analyses at Seneca Army Depot Activity. Also, to consider total risk at the sites, these other data need to be collected.

Comment #2 The task plan (section 5) for the FS refers to the generic installation RI/FS work plan as a supplement to this document. Neither document refers to the Fish and Wildlife Impact Analysis for Inactive Hazardous Waste sites (FWIA) to be used as guidance in developing the FS. Step III - Ecological Effects of Remedial Alternatives needs to be done during the FS phase and this should be included in this Scoping Plan.

Response #2 Agreed. The requirements of the Fish and Wildlife Impact Analysis for Inactive Hazardous Waste sites (FWIA) have been added to Section 5.2 of the Project Scoping Plan. Specifically, the section mentions the need for Step III - Ecological Effects of Remedial Alternative during the FS process.

RESPONSE TO COMMENTS
BY
U.S. ARMY
FOR DRAFT SEAD-13 PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)
AT THE INHIBITED RED FUMING NITRIC ACID DISPOSAL SITE
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
COMMENT DATE: DECEMBER 1995

Comments By Healy

Comment #1 Section 3.2

In the last line of page 3-37, please delete the sentence "Currently, the Army has no plans ... transfer the ownership. When this document was first written, this was true. However, with SEDA's listing as a BRAC facility, this is no longer the case.

Response #1 Agreed. We agree that this sentence is no longer applicable. In the place of this text, we have added a reference to the future uses of land at SEDA as defined in the ReUse Plan that was developed under BRAC.

Comments By Bradley

Comment #1 General.

Previous comments adequately addressed.

Response #1 Acknowledged.

Comment #2 Sections 4.2.1, 4.2.2, 4.2.3, and 4.2.5.

Concur with rational for disagreement with previous comments on these sections, however, statements explaining basis for use of engineering judgment as provided in the comment responses would be valuable in the appropriate text sections.

Response #2 Agreed. The explanations provided in the previous response to comments have been incorporated into the relevant subsection of Section 4.2. In all, three such explanation were provided in Sections 4.2.1, 4.2.2, and 4.2.3.

Comments By Nebelsick

Comment #1 General.

Based on the past data collection and the known extent of contamination, the sampling program appears to be excessive. As stated in previous reviews, soil

data from SEAD should be compiled to develop a data base of background soil concentrations specifically for metals. Recommend a preliminary risk assessment be performed to determine actual contaminants of concern. This risk screening could also determine metals that require further action and focus this investigation.

Response #1 Responses to the various portions of the is comments are provided below.

Disagree. We believe that the sampling program is appropriate, based on the available evidence from the ESI and the nature of comments received from both the EPA and NYSDEC. The sampling program reflects EPA concerns for impacts to various media and in many cases they have required that the sampling be performed so that the vertical and horizontal extent of impacts be defined at SEAD-13. Through the comment and response process, it has become clear what the EPA expectations are for the RI sampling programs, and the Scoping Plans, including the one for SEAD-13, reflect most of these expectations.

Also, the Army is intent on not performing a second phase of field work for the RIs at SEDA, and thus the Scoping Plans are designed somewhat conservatively, in that they address all potential issues that need to be supported in the RI and FS reports. No changes was made to the text of the Scoping Plan.

With regard impacts to soils at SEDA, the determination that soils have been impacted by metals is based on a comparison with NYSDEC TAGMs, which incorporate site background concentrations for certain metals. And if no TAGM exists for a metal, the TAGM is based on a comparison to background soil concentrations established from a large data base at SEDA; the data base includes a total of 57 soil samples. In this way the natural background soil concentrations are factored into the evaluation as to whether the soil has been impacted. Thus, NYSDEC TAGMs incorporate these background concentrations. This particular issue was previous addressed in the response to Army Pre-Draft comments (July 1995) - Response #5 for a comment by Waterbury (page 4 of response letter).

Lastly, there is no or mechanism (or protocols) to incorporate a minirisk assessment into the CERCLA programs at SEDA. And, thus this can not be implemented under the current program that exists between the EPA, NYSDEC and the Army for investigating these sites.

Comment #2 Page 4-14.

Provide justification for analysis of volatile organics, semi-volatile organics, pesticides/PCBs, cyanide and TAL metals. Based on previous site data only six metals appear to be of concern. Clarify.

Response #2 Disagree. We agree that the focus of the RI at SEAD-13 is not on VOCs, SVOCs, and pesticides/PCBs, however, the list of analytical parameters must include VOCs, SVOCs, and pesticides/PCBs in addition to metals because these parameters have been historically required by EPA, and NYSDEC in most instances. It is highly unlikely that the Army would be allowed to delete these categories of parameters, or individual parameters, from the analytical list for the

RI at SEAD-13. Discussions about reducing the base analytical requirements for the RIs at SEDA have occurred with EPA in the past and they have held to these required parameters. No change was made to the text in the Scoping Plan.

Another reason for including these parameters is that the evaluation of the total site risk is based on all constituents found on site, including those that are not considered to have caused the most significant impacts at the site.

Comment #3 General 2.

Recommend critical contaminant concentrations be identified on a Figure that helps justify the need for additional samples. The site appears to have several locations defined yet additional samples are being collected to define the area. Clarify.

Response #3 Acknowledged. We believe that for the SEAD-13 Scoping Plan the text and tables provide adequate means by which to determine the chemistry associated with the areas where samples are proposed. without having to produce separate figures that show the distribution of the chemicals. Based on these data, and comments provided from EPA and NYSDEC, we feel that the number and location of samples that are proposed in the Scoping Plan is necessary to accomplish the goals of the RI/FS. Critical contaminant concentrations are identified in the text and tables of Section 3.1.2.5, Chemical Analysis Results.

Comment #4 General.

Clarify the number of sampling rounds performed on the monitoring wells. A minimum of three sampling events should be performed, prior to installing additional wells, to draw adequate conclusions. It's not uncommon for monitoring wells to have elevated metals data due to local background conditions.

Response #4 Agreed. The number of sampling rounds to be performed on the wells for the RI is two (Section 4.2.3.1 of the Scoping Plan). For wells that were part of the ESI, three rounds will have been performed at the completion of the RI.

While we agree that it would be ideal to base the RI on data collected from several sampling rounds, the current mechanism for investigating the sites at SEDA does not allow for multiple rounds of ground water sampling prior to installing new wells for the RI. Also, we acknowledge the fact that metals are naturally occurring chemicals and can occur at elevated concentration in an aquifer due to the aquifer material and local bedrock geology. Metals can also be elevated by the presence of particulates in a water sample. Currently, low-flow sampling pumps are used at SEDA to obtain low turbidity groundwater samples from the wells, which greatly reduces the influence of turbidity on the concentrations of metals in the samples. While background wells do provide a basis for arguing for naturally high metals concentrations, the current standards include EPA MCLs, and NYS GA groundwater standards. No change was made to the text in the Scoping Plan.

Comment #5 General.

Previous Work Plans from Seneca have addressed the possibility of field screening for metals. If performed in the past a more cost effective approach may be developed. Clarify.

Response #5 While metals screening programs have been used in the past where a large number of surface soil samples were being collected (e.g., OB Grounds RI), we do not feel that the sampling program proposed for the RI field program at SEAD-13 is appropriate for metals screening. For example, at the OB Grounds, which is relatively large, the screening was used to select samples for Level IV analysis, which greatly reduced analytical costs. Thus, we were able to cover large expanses of the site and collect Level IV data from areas that were shown to be of interest via the screening data. Also screening for metals made good sense given that metals were primary constituents of concern at the site.

However, given the relatively small size of the sites, we feel that the distribution of the Level IV data at SEAD-13 is adequate to provide the necessary density of chemical results that can be used to define the vertical and horizontal extent of impacts, and to be used in the risk assessment (only Level IV data is appropriate for the risk assessment). Thus, in this instance, a screening program would only add more samples to the program for screening purposes. While screening can save on analytical costs in some instances, we feel that it is necessary to maintain the distribution of Level IV data currently proposed in the RI sampling program.

<u>Comments by Hoddinott</u>

Comment #1 The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) review the subject document, without comment, on behalf of the Office of the Surgeon General. We agree with the changes the contractor has made to address our concerns. This document does not have to be resubmitted to USACHPPM for further review prior to finalization.

Response #1 Acknowledged.

Comment #2 The scientist reviewing this document was Mr. Keith Hoddinott, Health Risk Assessment and Risk Communication Program, DSN, 584-5209 or commercial (410) 671-5209.

Response #2 Acknowledged.

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APPENDIX F

SCOPE OF WORK

27 Jan 95
SEDAWP2.SOW

ANNEX AQ
PREPARATION OF WORK PLANS FOR REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES AT VARIOUS SITES AT SENECA ARMY DEPOT ACTIVITY, ROMULUS, NEW YORK

1.0 GENERAL STATEMENT OF SERVICES

1.1 Background. As part of its continuing program of evaluating its hazardous waste management practices, the Army will perform Remedial Investigations/Feasibility Studies (RI/FS) at various sites on Seneca Army Depot Activity (SEDA). The RI/FS investigations are to be conducted to determine the magnitude of environmental contamination and appropriate remedial actions. The US Army Corps of Engineers, Huntsville Division, on behalf of SEDA, will contract for the required work.

1.2 Location. Seneca Army Depot Activity is a US Army facility located in Seneca County, New York. SEDA occupies approximately 10,700 acres. It is bounded on the west by State Route 96A and on the east by State Route 96. The cities of Geneva and Rochester are located to the northwest (14 and 50 miles, respectively); Syracuse is 53 miles to the northeast and Ithaca is 31 miles to the south. The surrounding area is generally used for farming.

1.3 Regulatory Status. SEDA was proposed for the Federal Facilities National Priorities List on 13 July 1989. Consequently, all work to be performed under this contract shall be performed according to CERCLA guidance as put forth in the Interim Final "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA", dated October 1988 (Reference 11.13). Additionally, all work performed as part of this

contract shall be performed according to the Interagency Agreement negotiated between Seneca Army Depot, the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (USEPA), Region II (Reference 11.10).

1.4 Previous Investigations. Previous investigations have been performed at various SEDA units. In general, an "Installation Assessment and Update" (USATHAMA Reports No. 157 (1980) and 157(U) (1987), respectively) (References 11.1 and 11.3) was conducted by the U.S. Army Toxic and Hazardous Materials Agency. The purpose of the assessment was to identify potentially contaminated areas at the Depot. The U.S. Army Environmental Hygiene Agency's Groundwater Contamination Survey No. 38-26-0868-88, "Evaluation of Solid Waste Management Units, Seneca Army Depot" (Reference 11.4) identified and described all solid waste management units (SWMU's) at SEDA at the time of its preparation. More recently, a "SWMU Classification Report" (Reference 11.5) was prepared to present the results of records searches at all currently identified SWMU's at SEDA and, based on its recommendations, site investigations have been completed at twenty five SWMU's where additional work was recommended as being necessary (References 11.6,11.7, 11.8 and 11.9). A complete list of previous investigations is presented as References in Section 11.0.

1.5 Units to be Investigated Under this Contract. Work Plans for RI/FS investigations will be prepared for the following sites: 1) Building 804 and the associated Radioactive Waste Burial sites (SEAD-12); the Pitchblende Storage igloos (SEAD-48); the Miscellaneous Components Burial site (SEAD-63); the Munitions Washout Facility Leach Field (SEAD-4); the Garbage Disposal Areas (SEAD-64A and 64D); the IRFNA Disposal Pits (SEAD-13); the Ammunition Breakdown Area (SEAD-52); the Oil Discharge Area Adjacent to Building 609 (SEAD-60); the Sewage Sludge Piles (SEAD-005); the Fill Area West of Building 135 (SEAD-59);

Alleged Paint Disposal Area (SEAD-71) and the Explosive Ordnance Disposal Area (SEAD-57).

1.6 Security Requirements. Compliance with SEDA security requirements is mandated. These requirements are presented in Section 9.0.

2.0 OBJECTIVE

The objective of this Statement of Work is to prepare a site specific Project Scoping Plan for each of the Areas of Concern listed in Section 1.5 of this SOW. At completion, these Project Scoping Plans, taken together with the generic RI/FS Work Plan previously prepared for SEDA, shall form a complete Work Plan for implementing an RI/FS at each site. All Work Plans shall be developed as defined by Office of Solid Waste and Emergency Response Directive 9355 (Reference 11.13, beginning with the RI/FS scoping process and ending with a regulatorally approved Work Plan at the identified site. Additionally, this Work Plan shall maintain the basic format of the Work Plan developed for the SEDA Ash Landfill and Open Burning Grounds RI/FS (References 11.11 and 11.12).

3.0 DETAILED DESCRIPTION OF SERVICES

3.1 General Requirements. All work performed by the AE shall be designed and implemented in a manner which complements earlier investigations and shall conform to this Statement of Work (SOW). The AE, through the Work Plans, shall present a complete description of the RI/FS process as applied to each operable unit. All work shall be performed under the general supervision of a Professional Engineer registered in the State of New York.

3.2 (Task 1) Site Visit and Review Existing Data. The AE shall perform a visual inspection of the sites, review records, reports and other data provided by the Contracting Officer and the facility, or made available to the AE from sources such as

public records, the USEPA, the State Regulators, the State Geological Survey, or from interviews with local residents and officials who have knowledge of past site activities.

3.3 (Task 2) RI/FS Project Scoping Plan Preparation.

3.3.1 General. The AE shall prepare multiple site specific Project Scoping Plans which are intended to do the following: (1) to provide a consolidated report on site history, current site activities, and resulting environmental impacts; (2) to familiarize personnel who will be working on the project with site conditions; and (3) to provide project plans and proposed tasks by which RI/FS activities shall be conducted. These scoping plans shall provide a summary of site specific conditions, give an overview of the RI/FS process at each operable unit and describe how the process will be implemented at each. The plans shall conform to the outline presented in Figure 1. All detailed information required to implement a thorough RI/FS investigation at each Area of Concern shall be presented. The documents shall be prepared as follows:

3.3.3.2 Site Specific Health Plan. The AE shall develop a Site-Specific Safety and Health Plan (SSHP), as part of the HSP, in accordance with the requirements of Section 5.0 of this SOW. The SSHP shall be submitted to the Contracting Officer for review and approval prior to any field work.

3.3.3.3 Field Sampling Plan. The AE shall prepare and submit, as part of the Project Scoping Plans, a Field Sampling Plan (FSP). The FSP shall describe in detail all sampling and analysis activities to be exercised including site background, sampling objectives, sampling locations and frequency, designations, equipment and procedures and handling and analysis requirements to be applied at each site. It is intended that the AE, in the Field Sampling Plan, propose and justify how the field investigation activities will be allocated. As part of the FSP, the A-E shall discuss specific plans to meet all QA/QC requirements.

FIGURE 1
WORK PLAN OUTLINE

- INTRODUCTION
  - Background
- SITE CONDITIONS
  - Physical Setting
  - Geological Setting
  - Hydrogeology
    - Regional
    - Local
  - Results of Previous Investigations
- SCOPING OF THE RI/FS
  - Conceptual Site Model
    - Physical Site Characterization
    - Environmental Fate of Constituents at SEAD
    - Identification of Potential Receptors and Exposure Scenarios
    - Potential Source Areas and Release Mechanism
    - Potential Exposure Pathways and Receptors - Current Uses
    - Potential Exposure Pathways and Receptors - Future Uses
  - Scoping of Potential Remedial Action Alternatives
    - No Action
    - Capping
    - Excavation and Landfilling
    - In Situ Detoxification and Solidification
    - Resource Reclamation
    - Institutional Controls
    - Composting
    - Soil Washing/Soil Flushing
    - Excavation, Incineration and Disposal

FIGURE 1 (CONTINUED)

- Carbon Adsorption
- Ion Exchange
- Chemical Oxidation
- Reverse Osmosis
- Preliminary Identification of Applicable or Relevant and Appropriate Requirements (ARARs)
  - Introduction
  - Preliminary Identification of ARARs and "To Be Considered" (TBCs)
    - Potential ARARs
    - Potential Sources of Items To Be Considered" (TBC) as Alternative Sources of ARARs
    - Potential Chemical-Specific ARAR and TBC Levels
- Data Quality Objectives (DQO's)
  - Intended Use of Data
  - Data Quality
  - Data Quantity
- Data Gaps and Data Needs

TASK PLAN FOR THE RI

- Pre-Field Activities
- Field Investigations
  - Geophysical Investigation
  - Soils Investigation
  - Surface Water and Sediment Investigation
  - Groundwater Investigation
  - Ecological Investigation
  - Surveying
- Data Reduction, Assessment and Interpretation

FIGURE 1 (CONTINUED)

- Baseline Risk Assessment
    - Identification of Contaminants of Concern
    - Exposure Assessment
    - Toxicity Assessment
    - Risk Characterization
    - Environmental Assessment
    - Identification of ARARs
- Data Reporting
    - Preliminary Reports
    - Quarterly Reports
    - Monthly Report

TASK PLAN FOR THE FS

- Development of Remedial Action Objectives
- Develop Remedial Action Alternatives
- Screening of Remedial Action Alternatives
- Detailed Analysis of Remedial Action Alternatives

3.4 (Task 3) Project Management. The AE shall manage the delivery order in accordance with Appendix A of the basic contract statement of work. All project management associated with the delivery order, with the exception of the direct technical oversight of the work described in the preceding tasks, shall be accounted for in this task.

4.0 SUBMITTALS AND PRESENTATIONS

4.1 Format and Content. All submittals identified in the SOW shall be prepared in accordance with the suggested RI/FS Format as presented in the RI/FS Guidance Manual. Each submittal shall be accompanied by an EPA completeness checklist (where applicable), completed by the AE, which references the specific location of each required item within the submitted document. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features on the installation site map. When drawings are required, data may be combined to reduce the number of drawings. The documents shall consist of 8-1/2" x 11" pages with drawings folded, if necessary, to this size. A decimal paragraphing system shall be used, with each section and paragraph of the documents having a unique decimal designation. The document covers shall consist of vinyl 3-ring binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A document title page shall identify the AE, the Corps of Engineers, Huntsville Division, and the date. The AE identification shall not dominate the title page. Each page of draft and draft-final documents shall be stamped "DRAFT" and "DRAFT-FINAL" respectively. Each document shall identify the members and title of the AE's staff which had significant, specific input into the document's preparation or review. Submittals shall include incorporation of all previous review comments accepted by the AE as well as a section describing the disposition of each comment. Disposition of comments submitted with the final document shall be separate

from the document itself. All final submittals shall be sealed by both the registered Professional Engineer-In-Charge.

4.2 Presentations. The AE shall make presentations of work performed according to the schedule in paragraph 4.6. Each presentation will consist of a summary of the work accomplished and anticipated followed by an open discussion among those present. The AE shall provide a minimum of two persons at the meetings which are expected to last one day each.

4.3 Conference Notes. The AE will be responsible for taking notes and preparing the reports of all conferences, presentations, and review meetings. Conference notes will be prepared in typed form and the original furnished to the Contracting Officer (within five (5) working days after date of conference) for concurrence and distribution to all attendees. This report shall include the following items as a minimum:

a. The date and place the conference was held with a list of attendees. The roster of attendees shall include name, organization, and telephone number.

b. Written comments presented by attendees shall be attached to each report with the conference action noted. Conference action as determined by the Government's Project Manager shall be "A" for an approved comment, "D" for a disapproved comment, "W" for a comment that has been withdrawn, and "E" for a comment that has an exception noted.

c. Comments made during the conference and decisions affecting criteria changes, must be recorded in the basic conference notes. Any augmentation of written comments should be documented by the conference notes.

4.4 Confirmation Notices. The AE will be required to provide a record of all discussions, verbal directions, telephone conversations, etc., participated in by the AE and/or representatives on matters relative to this contract and the work. These records, entitled "Confirmation Notices", will be numbered sequentially and shall fully identify participating personnel,

subject discussed, and any conclusions reached. The AE shall forward to the Contracting Officer as soon as possible (not more than five (5) work days), a reproducible copy of said confirmation notices. Distribution of said confirmation notices will be made by the Government.

4.5 Progress Reports and Charts. The AE shall submit progress reports to the Contracting Officer with each request for payment. The progress reports shall indicate work performed, and problems incurred during the payment period. Upon award of this delivery order, the AE shall, within 15 days, prepare a progress chart to show the proposed schedule for completion of the project. The progress chart shall be prepared in reproducible form and submitted to the Contracting Officer for approval. The actual progress shall be updated and submitted by the 15th of each month and may be included with the request for payment.

4.6 Schedule of Deliverables and Review Meetings. Deliverables shall be submitted according to the following schedule.

Deliverable/Meeting	Date
Preliminary-Draft Project Scoping Plans	16 Jun ~~26 May~~ 95
Comments Provided by the Army	30 ~~16~~ Jun 95
Draft, Project Scoping Plans	21 Jul 95
Regulatory Comments Provided	25 Aug 95
Draft-Final, Project Scoping Plans	13 Oct 95
Final, Project Scoping Plans	17 Nov 95
Project Review Meetings (3)	TBD
Contract Completion	1 Mar 96

4.7 Submittals.

4.7.1 General Submittal Requirements.

4.7.1.1 Distribution. The AE is responsible for reproduction and distribution of all documents. The AE shall furnish copies of submittals to each addressee listed in paragraph 4.7.3 in the quantities listed in the document submittal list.

Submittals are due at each of the addressees not later than the close of business on the dates shown in paragraph 4.6.

4.7.1.2 Partial Submittals. Partial submittals will not be accepted unless prior approval is given.

4.7.1.3 Cover Letters. A cover letter shall accompany each document and indicate the project, project phase, the date comments are due, to whom comments are submitted, the date and location of the review conference, etc., as appropriate. (Note that, depending on the recipient, not all letters will contain the same information.) The contents of the cover letters should be coordinated with CEHND-PM-ED prior to the submittal date. The cover letter shall not be bound into the document.

4.7.1.4 Supporting Data and Calculations. The tabulation of criteria, data, circulations, and etc., which are performed but not included in detail in the report shall be assembled as appendices. Criteria information provided by CEHND need not be reiterated, although it should be referenced as appropriate. Persons performing and checking calculations are required to place their full names on the first sheet of all supporting calculations, and etc., and initial the following sheets. These may not be the same individual. Each sheet should be dated. A copy of this scope of work shall be included as appendix A in the Draft RI/FS report only.

4.7.1.5 Reproducibles. One camera-ready, unbound copy of the final submittal of each document shall be provided to the Contracting Officer in addition to the submittals required in the document and submittal list. All final submittals shall also be provided on 3.5-inch floppy disks compatible with the Intel 310/80286 computer in ASCII format and in WordPerfect 5.1/5.2 format.

4.7.3 Addressees.

Commander
U.S. Army Corps of Engineers
Huntsville Division
ATTN: CEHND-PM-ED (Ms. Richards)
106 Wynn Drive
Huntsville, AL 35805-1957

Commander
U.S. Army Environmental
Hygiene Agency (USAEHA)
ATTN: HSHB-ME-SR (Mr. Hoddinott)
Building 1677
Aberdeen Proving Ground
MD 21010-5422

Commander
U.S. Army Material Command (USAMC)
ATTN: AMCEN-A (Mr. Bob King)
5001 Eisenhower Ave.
Alexandria, VA 22333-0001

Commander
U.S. Army Environmental Center
ATTN: CETHA-IR-D (Dr. Buchi)
Aberdeen Proving Ground,
MD 21010-5401

Commander
U.S. Army Depot Systems
Command (DESCOM)
ATTN: AMSDS-EN-FD
(Ms. Johnson)
Chambersburg, PA 17201

Commander
U.S. Army Corps of Engineers
Missouri River Division
ATTN:CEMRD-ED-GL
(Ms. Percifield)
420 South 18th Street
Omaha, Nebraska, 68102

Commander
US Army Corps of Engineers,
New York District
ATTN: CENAN-PP-E
26 Federal Plaza
New York, New York, 10278

Commander
Seneca Army Depot Activity
ATTN:SDSSE-HE(Randy Battaglia)
Romulus, New York,14541

Commander
U.S. Army Corps of Engineers,
North Atlantic Division,
ATTN: CENAD-CO-EP (Mr. Pickett)
90 Church Street
New York, NY 10007-9998

4.6.4 Document and Submittal List.

	No. of Copies			
	Preliminary-Draft	Draft	Draft-Final	Final
CEHND-ED-PM	4	4	4	4
DESCOM	2	2	2	2
AEC	1	1	1	1
CEMRD-EA-GL	1	1	1	1
SDSSE-HE	2	23	23	23
CENAD-CO-EP	1	1	1	1
CENAN-PP-E	2	2	2	2
AMC	1	1	1	1
USAEHA	8	8	8	8
TOTAL	22	43	43	43

~~AAL-13~~

AAQ-13

APPENDIX G

SUBSURFACE INVESTIGATIONS

- Boring Logs
- Monitoring Well Installation Diagrams

Boring Logs

PAGE 1 OF

OVERBURDEN BORING REPORT

SB13-1

ENGINEERING–SCIENCE, INC.

CLIENT: ACOE

BORING NO.: MW13-1

PROJECT : 10 SWMU

LOCATION : SEAD 4

JOB NO. :

EST. GROUND ELEV.:

START DATE: 12-8-93

FINISH DATE:

CONTRACTOR: Empire

DRILLER: John W

INSPECTOR: ES/BH/MB

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		0-2000	0	840	12-8-93			

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		

PAGE 2 OF

OVERBURDEN BORING REPORT

SB13-1

ENGINEERING-SCIENCE, INC. **CLIENT:** ACOE **BORING #:** MW13-1

MONITORING			
INSTRUMENT	INTERVAL	BGD	TIME
OVM		0	840

COMMENTS:

DRILLER: Empire

INSPECTOR: ES/BH/MB

DATE: 12-8-93

DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS
	BLOWS PER 6 INCHES	PENETRATION RANGE (FEET)	RECOVERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN			
	2	0		0				Topsoil		
	5				13-			Lt. brown SILT, some Clay, oxidation, moist, dense.		
1	10		1.5		1.1	0	X			
2	16	2		2						
	19	2		2	13-			AA, little Cobbles. (to 3" dia.)		
3	19		1.3		1.2	0	X			
	39									
4	43	4		4						
	28	4		4						
5	38		No Recovery		X	0	X	Rock in spoon.		
	100/4									
6		6		6						
	43	6		6	13-					
7	40		1.8		1.3	0	X			
	42									
8	46	8		8						
	70	8		8	13-			Gray weathered Shale, some SILT, wet.		
9	52		1.5		1.4	0	X			
	60									
10	100/3	10		10						
	100/4							gray weathered Shale, wet.		
11										
12								Spoon refusal at 10.4 Augered to 12.0'		
15										
20										

PAGE 2 OF SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS BORING #:

ver. 05-Nov-93 OBBORP2.WK1

OVERBURDEN BORING REPORT

SB13-2

ENGINEERING-SCIENCE, INC. CLIENT: ACOE BORING NO.: MW13-2

PROJECT: 10 SWMU
LOCATION: SEAD 13

JOB NO.:
EST. GROUND ELEV.:
START DATE: 11/9/93
FINISH DATE: 11/9/93
CONTRACTOR: Empire
DRILLER: Bob
INSPECTOR: ES
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			CALIBRATION		WEATHER
			READING	TIME	DATE	TIME	DATE	
OVM		0-2000	0-.6	1095	11/9/93			
DUST		0-0.99	0	1095	11/9/93			

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 2 OF

OVERBURDEN BORING REPORT

SB13-2

ENGINEERING-SCIENCE, INC. | **CLIENT:** ACOE | **BORING #:** MW13-2

MONITORING			
INSTRUMENT	INTERVAL	BGD	TIME
OVM	0-2000	0-.6	1045
Dust	0-.99	0	1045

COMMENTS:

DRILLER: Empire / Bob

INSPECTOR: ES / LB

DATE: 11/9/93

DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS
	BLOWS PER 6 INCHES	PENETRATION RANGE (FEET)	RECOVERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN			
1 2		0 2	1.9	0 2	B-2 .1	0	-	.4' topsoil + organics ~~wet~~ gray weathered SHALE fill, moist to wet at bottom of spoon (to 1.5" dia)		
3 4		2 4	1.6	2 4	B- 2.2	0		Lt. gray. SILT and CLAY, trace Shale fragments, oxidation, moist very, dense Sand lense - .1' from bottom		
5 6		4. 6	1.6	4 6	B- 2.3	4.2	-	Lt. brown SILT, some Clay, little weathered shale fragments, cobbles (rounded) (1.5" dia.) oxidation, moist, dense		
7 8		6 8	1.8	6 8	13- 2.4	0	-	Lt brown SILT, some CLAY, trace Shale fragments, dry to moist, very dense.		
9 10		8 10	1.7	8 10	B- 2.5		-	Lt to med brown SILT, some CLAY, some fine SAND, oxidation, moist Lt brown SILT, Some CLAY, trace Shale fragments, moist, dense.		
11 12		10 12	1.0	10 12	13- 2.6	0	-			
13 14		12 14	1.0	12 14	13- 2.7	0	-	Gray SILT, some Clay, little Shale fragments, trace Cobbles (rounded), moist to wet.		
15 16	100/.3	14 16	0.1	X	X	X	X	gray weathered SHALE Spoon refusal @ 14.3' Augered to 16.0' Water ≈ 10.0'		
20										

OVERBURDEN BORING REPORT

SB13-3

ENGINEERING-SCIENCE, INC. **CLIENT:** ACOE **BORING NO.:** MW13-3

PROJECT: 10 SWMU
LOCATION: SEAD 13

JOB NO.:
EST. GROUND ELEV.:
START DATE: 12-8-93
FINISH DATE: 12-8-93
CONTRACTOR: Empire
DRILLER: Bob
INSPECTOR: ES
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING	HOLE	DEPTH	SAMPLER		HAMMER	
METHOD	DIA.	INT.	SIZE	TYPE	TYPE	WT/FALL
HSA	8 1/2"		3"x2'	SS	Hme	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	DETECTOR	RANGE	BACKGROUND			CALIBRATION		
TYPE	TYPE/ENERGY		READING	TIME	DATE	TIME	DATE	WEATHER
OVM			0.0	1220	12-8-93			Sunny

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

SB13-3

ENGINEERING-SCIENCE, INC. | **CLIENT:** ACOE | **BORING #:** MW13-3

MONITORING			
INSTRUMENT	INTERVAL	BGD	TIME
OVM		0.0	1240

COMMENTS: Begin at 16.0' on 12-13-93. Driller 12-13-93 Bob

DRILLER: John W./Bob

INSPECTOR: ES/LB

DATE: 12-8-93/12-13

DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION	USCS CLASS	STRATUM CLASS
	BLOWS PER 6 INCHES	PENETRATION RANGE (FEET)	RECOVERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN	(As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)		
1 2	1 3 6 9	0 2	1.6	0 2	13-3.1	0	X	.4 organics Lt. brown SILT, ~~t~~ some Clay, little Cobbles, ML moist NR 1.6		
3 4	14 21 26 27	2 4	1.7	2 4	13-3.2	0	X	AA. 3.7 NR 4.3 4.6 Lense of medium sand AA.		
5 6	22 34 50 57	4 6	1.7	4 6	13-3.3	0	X	Lt. brown SILT, some Clay, little Cobbles (to 1" dia.), little ~~to~~ Shale fragments (to 1.5" dia.) moist 5.7 NR		
7 8	96 100/.4	6 8	1.0	6 8	13-3.4	0	X	Lt. brown SILT, some Clay, little Cobbles (to .5"), little shale fragments (to 1.5" dia.) dry, dense. NR		
9 10	42 75 100/3	8 10	1.0	8 10	13-3.5	0	X	AA. NR		
11 12	45 51 75 100/.4	10 12	1.8	10 12	13-3.6	0	X	Gray SILT, some Clay, little shale, Cobbles (.5" dia.) dry, dense. 11.8 NR		
13 14	56 100/.4	12 14	0.7	12 14	X	0	X	12.7 NR 14		
15 16	57 85 105	14 16	1.6	14 16	X		X	15.6 NR 16		
17 18	82 100/4	16 18	0.9	16 18	X		X	16.9 NR		
19 20	55 [illegible]	18 [illegible]	1.0	18 20				19.0 NR		

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

BORING #:

PAGE 2 OF 2

OVERBURDEN BORING REPORT

SB13-3

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	BORING #: MW13-3

MONITORING				COMMENTS	
INSTRUMENT	INTERVAL	BGD	TIME		DRILLER: Bob
					INSPECTOR: ES
					DATE: 12-13-93

DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS
	BLOWS PER 6 INCHES	PENE-TRATION RANGE (FEET)	RECOV-ERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN			
20	85	20		20				Gray SILT, some Clay, little Shale		
	100/.3							Fragments (.25 to 1" dia), es ~~dry~~, dense. moist		
21			0.1		X		X			
		22		22						
22	100/.2									
23	100/.3*									

* Drove 2" Dia. spoon

PAGE OF SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS BORING #:

PAGE 1 OF

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. **CLIENT:** ACOE **BORING NO.:** MW13 -4

SB13- 4

PROJECT : 10 SWMU

LOCATION : SEAD 13

JOB NO. :

EST. GROUND ELEV.:

START DATE: 12-15-93

FINISH DATE:

CONTRACTOR: Empire

DRILLER: Scott

INSPECTOR: BS/MB/KK

CHECKED BY:

CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER 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	DETECTOR	RANGE	BACKGROUND			CALIBRATION		
TYPE	TYPE/ENERGY		READING	TIME	DATE	TIME	DATE	WEATHER
OVM		0-2000	0.0	1030	12-15-93		12-15-93	misty

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

SB13-4

ENGINEERING–SCIENCE, INC.	CLIENT: ACOE	BORING #: MW13 - 4

MONITORING				COMMENTS:	
INSTRUMENT	INTERVAL	BGD	TIME	-	DRILLER: Empire / Scott
					INSPECTOR: ES/MB / KK
					DATE: 12-15-93

DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION	USCS CLASS	STRATUM CLASS
	BLOWS PER 6 INCHES	PENE-TRATION RANGE (FEET)	RECOV-ERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN	(As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)		
	1	0		0	13-			Topsoil		
1	2		1.7		4.1	0	X	Lt. brown - gray CLAY, little Silt. trace fine Gravel, moist. oxidation, trace Shale fragments.		
	5									
	8	2		2						
2	8	2		2	13-			Lt. brown - gray CLAY and SILT, trace fine Gravel, trace Shale Fragments, moist. dense.		
3	15		1.8		4.2	0	X			
	20									
	24	4		4						
4	15	4		4	13					
5	25		1.8		4.3	0	X	Gray weathered shale, some Silt, moist.		
	40									
	44	6		6						
6	66									
	100/.3									
7								Spoon refusal at 6.5'		
8								Augered to 8.5'		
9										
10										
15										
20										

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

BORING #:

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. CLIENT: ACOE

BORING NO.: MW13-5/ SB13-5

PROJECT: 10 SWMU

LOCATION: SEAD 13

JOB NO.:

EST. GROUND ELEV.:

START DATE: 11/8/93

FINISH DATE: 11/9/93

CONTRACTOR: Empire

DRILLER: Bob

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	Hme	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		0-2000	0-7	1415	11/8/93			Partly cloudy
Dust		0-.99	0	145	11/8/93			

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:

No Downwind monitoring.

Only used 1 OVM.

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.:

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: ACOE

BORING #: MW13-5/5

MONITORING			
INSTRUMENT	INTERVAL	BGD	TIME
OVM	0-2000	0-7	1415
DUST	0-.99	0	1415

COMMENTS:

DRILLER: Empire

INSPECTOR: Bob

DATE: 11/8/93

DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS
	BLOWS PER 6 INCHES	PENETRATION RANGE (FEET)	RECOVERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN			
	12	0	1.8'	0	13-5.1			Dk. gray weathered SHALE, some SILT, wet		∇
1	14			1						
	17			1	13-5.2	0	—	Lt. brown fine SAND, little Silt, oxidation, moist, dense		
	20	2		1.8				NR		
2	16	2	1.6	2	13-5.3	0	—	Lt. brown SILT, some Clay, little shale fragments (to .5"), moist, dense.		
3	27									
	36			3.6						
	45	4								
4	12	4	1.6	4	13-5.4	0	—	Lt. brown SILT, some Clay, little Shale fragments (to 1.5" dia) very dense, dry.		
5	37									
	58			5.6						
	53	6								
6	45	6	1.7	Y		0	—	AA.		
7	55									
	55									
	66	8								
8	22	8	2.0	X		0	—			
9	49									
	86									
10	100/.5	10						10.2	∇	
	25	10	20	X		0	—	Gray SILT, some clay, trace Shale fragments (appears to be weathered Shale zone), moist		
11	55									
	100/.5									
		12								
12	45	12	1.3		13-5.6	0	—			
13	110/.5									
		14								
14										
15										
16'										
20										

Spoon Refusal @ 13.0'

Augered to 16.0'

Water @ 10.2' (measured 10/9/93)

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

BORING #:

PAGE OF

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC.

CLIENT: ACOE

BORING #: MW13-6/SB13-

MONITORING			
INSTRUMENT	INTERVAL	BGD	TIME
OVM	0-2000	0	1420
DUST		0	1420

COMMENTS:

DRILLER: Empire / Scott

INSPECTOR: ES/MB/KK

DATE: 12-15-93

DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS
	BLOWS PER 6 INCHES	PENE-TRATION RANGE (FEET)	RECOV-ERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN			
1 2	2 8 6 3	0 2	1.8	0 2	13-6.1	/ 0	X	Organics Gray weathered SHALE fill Dark brown to gray SILT, some Clay, moist		
3 4	8 12 15 22	2 4	1.4	2 4	13-6.2	0	X	Dark brown SILT and CLAY, little fine to med. Gravel, moist to wet, dense,		
5 6	10 12 18 22	4 6	1.8	4 6	13-6.3	0	X	Drk. brown to gray SILT and shale fragments, moist;		
7 8	40 100/.3	6 8	1.0	6 8	13-6.4	0	X	Gray weathered SHALE and Clay, most.		
9	100/.3							Spoon refusal at 8.3' Augered to 10.0'		
10 11 12 13 14										

PAGE OF SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS BORING #:

ver. 05-Nov-93 OBBORP3.WK1

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

at SB13-3

ENGINEERING-SCIENCE, INC. **CLIENT:** **WELL #:** MW 13-7

PROJECT: 10 Swmu ESI
LOCATION: Seneca Army Depot, Romulus, NY
PROJECT NO: 720478-01001
INSPECTOR: KK BH
CHECKED BY:

DRILLING CONTRACTOR: EMPIRE SOILS
DRILLER: JOHN / ED
DRILLING COMPLETED: 1-24-94
BORING DEPTH: 8.0 Ft.
DRILLING METHOD(S): Hollow Stem Auger
BORING DIAMETER(S): 8.5 in
ASSOCIATED SWMU/AOC: SEAD 13
POW DEPTH: 8.0 Ft.
INSTALLATION STARTED: 1-24-94
INSTALLATION COMPLETED: 1-24-94
SURFACE COMPLETION DATE: 1-25-94
COMPLETION CONTRACTOR/CREW: NA
BEDROCK CONFIRMED (Y/[✓ N])
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 2 in LENGTH:

RISER:
TR: + 2.5 ft. TYPE: PVC DIAMETER: 2 in LENGTH:

SCREEN:
TSC: 5.0 ft. TYPE: PVC DIAMETER: 2 in LENGTH: 2 ft SLOT SIZE: 1/100 in

POINT OF WELL: (SILT SUMP)
TYPE: PVC BSC: 7.0 ft POW: 8.0

GROUT: NA
TG: TYPE: LENGTH:

SEAL: TBS: 3.0 ft. TYPE: bentonite pellets LENGTH: 1.0 ft.

SAND PACK: TSP: 4.0 ft. TYPE: #3 RDC – 8.0 to 4.5 ft #1 RDC – 4.5 to 4.0 ft LENGTH:

SURFACE COLLAR:
TYPE: Quikrete RADIUS: 1 ft. THICKNESS CENTER: 3.0 ft THICKNESS EDGE: .5 ft.

CENTRALIZER DEPTHS NA
DEPTH 1: DEPTH 2: DEPTH 3: DEPTH 4:

COMMENTS:

* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. CLIENT: USACOE

BORING #: MW 13-7

DRILLER: EMPIRE - JOHN / EDWA

INSPECTOR: KK / BH

DATE: 1-24-94

MONITORING			
INSTRUMENT	INTERVAL	BGD	TIME
ovm	0-2000 ppm	0ppm	1330

COMMENTS: Re-installation of MW13-3 MW13-3 was dry. MW13-7 located 8ft N of MW13-3

DEPTH (FT)	SAMPLING			SAMPLE			
	BLOWS PER 6 INCHES	PENETRATION RANGE (FEET)	RECOVERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN
		.5		0			
1	2		1.2ft		NA	0	NA
	5						
	14	2		2			
2	10	2		2			
3	14		1.3ft		NA	0	NA
	42						
	50	4		4			
4	14	4		4			
5	29		1.3ft		NA	0	NA
	100/.4						
		6		6			
6	33	6		6			
	112		.8ft	7	NA	0	NA
7		7					

SAMPLE DESCRIPTION

(As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)

USCS CLASS

STRATUM CLASS

.5-1.7 Olive gray CLAY, some gray and rustorange pods of clay, trace subangular black shale clasts (<.5cm) wet, medium stiff, high organic content [pod of red sand ~1.2ft]

2.0-2.6 SAME

2.6-3.3 Olive gray SILT\CLAY, some subangular to subrounded black shale clasts (< 6cm) – both competent and weathered shale – moist, stiff

4.0-5.3 Olive gray SILT/CLAY, some subang to subround black shale clasts (<3cm) and trace rounded gravel. Stiff, moist (but drier than above)

6.0-6.6 SAME

6.6-6.8 Transitional olive gray SILT/CLAY and weathered SHALE interbedded very stiff, drier than above, but still moist

PAGE 1 OF

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACOE	BORING NO.: SB13-7

PROJECT : SEAD

LOCATION : Romulus NY SEAD 13

JOB NO.:

EST. GROUND ELEV.:

START DATE: 12-7-93

FINISH DATE: 12-7-93

CONTRACTOR: Empire

DRILLER: Bob/DW

INSPECTOR: BH/MB

CHECKED BY:

CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL
HSA	8¼		2" X3	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	
DVM	PID	0-2000	0	0950	12-7-93			Cloudy cold
RAD		0-100	14-16	0950	12-7-93			
DUST		0-.99	0	0950	12-7-93			
DVM			0	1325	12-7-93			
RAD			13-15	1325	12-7-93			
DUST			0	1325	12-7-93			

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		

PAGE 1 OF

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

BORING NO.:

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACOE	BORING #: SB83-7

MONITORING				COMMENTS:	
INSTRUMENT	INTERVAL	BGD	TIME		DRILLER: JMN/ISS
OVM	0-2000	0	0950		INSPECTOR: BJS/MCS
RAD	0-100	14-16	0950		
MSI	0-59	0	0950		DATE: 12-2-97

	DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION (As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS
		BLOWS PER 6 INCHES	PENE-TRATION RANGE (FEET)	RECOV-ERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN			
		3	0		0	13			organics shale		
0950	1	7		2		7.1	0	X	shale sand		
		5				13			shale clay sand		
		8	2		2	7.10					
	2	10	2		2	13			clay		
0955	3	12					0	X			
		26		1.4		7.2					
	4	46	4		4						
		15	4		4	13					
	5	46					0				
1030		39		1.6				X	clay		
	6	46	6		6	7.3					
		25	6		6	13			wet		
1035	7	45					0	X			
		58		1.4		7.4					
	8	100/4	8		8				shale		
		25	8		8	13					
	9	60									
1047		85		2.0		7.5	0	X			
	10	100/.4	10		10						
		62	10		10	13			Med. brown SILT, and Shale fragments,		
	11	100/4		0.9			0	X	Some Clay, wet. ~~[illegible]~~		
1300											
			12		12	7.6					
	12	100/4	12		12				gray SHALE fragments;		
	13			0.2		X	0	X			
1310											
			14		14						
	14	100/.2									
1320	15								Spoon refusal at 14.2.		
	16										
									MRD sample 0-2'		
	20										

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC.	**CLIENT:** USACOE	**BORING NO.:** SB13-8

PROJECT : SEAD
LOCATION : Romulus, NY SEAD 13

JOB NO. :
EST. GROUND ELEV.:
START DATE: 12-7-93
FINISH DATE: 12-7-93
CONTRACTOR: Empire
DRILLER: John/Rob
INSPECTOR: BH-MA
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL
HSA	8½"		2" x 3'	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	1430	12-7-93			cloudy cool
RAD		0-100	12-14	1430	12-7-93			
DUST		0-.99	0	1430	12-7-93			
OVM			0	1450	12-7-93			
RAD			12-15	1450	12-7-93			
DUST			0	1450	12-7-93			

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		

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** | **BORING #:** S013-8

MONITORING				COMMENTS
INSTRUMENT	INTERVAL	BGD	TIME	
OVM	0-2000	0	1430	
RAD	0-100	h-1H	1430	
DUST	0-.99	0	1430	

DRILLER: Jbh~/Bob

INSPECTOR: BH/MCB

DATE: 12-7-93

	DEPTH (FT)	SAMPLING			SAMPLE				SAMPLE DESCRIPTION	USCS CLASS	STRATUM CLASS
		BLOWS PER 6 INCHES	PENETRATION RANGE (FEET)	RECOVERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN	(As per Burmeister: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)		
		2	0		0	13-			organic dark Root		
		4				8.1	0	X			
1430	1	6	2	1.9	2				clay sand no rocks		
		11									
	2	14	2		2	h-			Sand, Clay		
1435	3	16		1.7			0	X			
		19				8.2					
		28	4		4						
	4	24	4		4	13-					
	5	28		1.2			0	X	Clay Sand Rocks		
1447		[illegible]	6		6	8.3					
	6								Auger refusal 6.3'		
	7										
	8										
	9										
	10										
	15										
	20										

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** ACOE | **BORING NO.:** SB 13-9

PROJECT : 10 SWMU
LOCATION : SEAD 13

JOB NO. :
EST. GROUND ELEV.:
START DATE: 12-16-93
FINISH DATE: 12-16-93
CONTRACTOR: Empire
DRILLER: Scott
INSPECTOR: KK/MKB
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING	HOLE	DEPTH	SAMPLER		HAMMER	
METHOD	DIA.	INT.	SIZE	TYPE	TYPE	WT/FALL
HSA	8 1/2"		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	DETECTOR	RANGE	BACKGROUND			CALIBRATION		
TYPE	TYPE/ENERGY		READING	TIME	DATE	TIME	DATE	WEATHER
OVM		0-2000	0.					

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: USACOE BORING #: SB13-9

MONITORING				COMMENTS
INSTRUMENT	INTERVAL	BGD	TIME	
OVM	0-2000	0.00		

DRILLER: Empire / Scott
INSPECTOR: KK / MCB
DATE: 12-16-93

DEPTH (FT)	SAMPLING: BLOWS PER 6 INCHES	SAMPLING: PENETRATION RANGE (FEET)	SAMPLING: RECOVERY RANGE (FEET)	SAMPLE: DEPTH INT (FEET)	SAMPLE: NO.	SAMPLE: VOC	SAMPLE: RAD SCRN	SAMPLE DESCRIPTION (As per Burmester: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS
1 2	1 2 5 10		1.9	0 2	SB13- 9-1	0	X	Topsoil / organic ~ 5" Primarily CLAY - brown with green and grey nodules (<5cm) some oxidation, some shale particles subordinate silt Shale (~ .5')		
3 4	8 18 18 22		1.6	2 4	SB13- 9-2	0	X	Brown CLAY subordinate silt, weathered shale particles subrounded gravel (< 5cm)		
5 6	10 17 24 26		1.9	4 6	SB13- 9-3	0	X	Brown CLAY w/ subangular clasts of shale and chert?) (< 6cm) w/ silt		
7 8	50 55 66 74		1.0	6 8	SB13- 9-4	0	X	Same		
9 10	28 45 57 65		1.7	8 10	SB13- 9-5	0	X	Same		
11 12	42 52 75 100		2.0	10 12	SB13- 9-6	0	X	transition from brown to Gray CLAY w/ sub. silt subrounded to subangular clasts (< 8cm) very dry, very dense		
13 14	100/.3			12 14	X			SS Refusal - Auger to 14' Gray CLAY w/ abundant subangular shale clasts, ~ .5' recovery dry		
15 16	38 75 100/.3			14 16	X			SS Refusal - Auger to 16' GRAY CLAY with abundant [illegible] abundant [illegible] [illegible] dry		
17 18	95 100/.4			16 18	X			SS refused - Auger to 15' [illegible] [illegible] - dry SS [illegible]		
20			0	18 20				[illegible]		

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. | **CLIENT:** ACOE | **BORING NO.:** SB13-10

PROJECT : 10 SWMU

LOCATION : SEAD 13

JOB NO.:

EST. GROUND ELEV.:

START DATE: 12-17-93

FINISH DATE: 12-17-93

CONTRACTOR: Empire

DRILLER: Scott

INSPECTOR: ES/MCB

CHECKED BY:

CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL
HSA	8 1/2"		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		0-2000	0.0	900	12-17-93			
Dust		0-0.99	0.02	900	12-17 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		

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: ACOE	BORING #: SB13-10

MONITORING

INSTRUMENT	INTERVAL	BGD	TIME
OVM	0-2000	0	900
Dust		.02	900

COMMENTS:

DRILLER: Empire/Scott

INSPECTOR: ES/MB

DATE: 12-17-93

DEPTH (FT)	SAMPLING: BLOWS PER 6 INCHES	SAMPLING: PENETRATION RANGE (FEET)	SAMPLING: RECOVERY RANGE (FEET)	SAMPLE: DEPTH INT (FEET)	SAMPLE: NO.	SAMPLE: VOC	SAMPLE: RAD SCRN	SAMPLE DESCRIPTION (As per Burmester: color, grain size, MAJOR COMPONENT, Minor Components with amount modifiers and grain-size, density, stratification, wetness, etc.)	USCS CLASS	STRATUM CLASS
1 2	3 4 5 5	0 2	1.7	0 2	13-10.1 10.1D 10.1MRD	0	X	Topsoil and weath. SHALE Lt. brown SILT, little Clay, trace fine Gravel, oxidation, moist		
3 4	6 14 18 22	2 4	2.0	2 4	13-10.2	0	X	Lt. brown SILT, some Clay, trace fine GRAVEL, moist, dense		
5 6	18 26 44 42	4 6	2	4 6	13-10.3	0	X	Lt. brown SILT, some Clay, little fine GRAVEL (.25 to 1." dia) rounded fragments oxidation.		
7 8	75 100/4	6 8	2	6 8	13-10.4	0	X			
9 10	55 68 70 70	8 10	2	8 10	13-10.5	0	X	Gray weath. SHALE, some SILT, dry. Gray weath. SHALE		
11 12	100/4	10 12	0.2	10 12	X		X	Spoon refusal at 10.4'		
13 14								Auger Refusal at 17.5'		
15 16										
17 18										
19 20										

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

MONITORING WELL INSTALLATION DIAGRAMS

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. **CLIENT:** ACOE **WELL #:** MW13-1

PROJECT: 10 SWMU.
LOCATION: SEAD 13

PROJECT NO:
INSPECTOR: ES
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: John
DRILLING COMPLETED: 12-3-93
BORING DEPTH: 12'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC: 13

POW DEPTH: 12'
INSTALLATION STARTED: 12-8-93
INSTALLATION COMPLETED: 12-8-93
SURFACE COMPLETION DATE:
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?)
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4"x 4" LENGTH:

RISER:
TR: TYPE: PVC 40 DIAMETER: 2" LENGTH:

SCREEN:
TSC: 4.3' TYPE: PVC 40 DIAMETER: 2" LENGTH: 2' + 4' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 11.1' POW: 12.0'

GROUT:
TG: Ground TYPE: Cement-bentonite LENGTH: 2.0'

SEAL: TBS: 2.0' TYPE: bentonite pellets LENGTH: 1'

SAND PACK: TSP: 3.0' #1 3.5' #3 TYPE: #3 and #1 LENGTH: 9.0'

SURFACE COLLAR:
TYPE: RADIUS: 2' x 2' THICKNESS CENTER: 1' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: DEPTH 2: DEPTH 3: DEPTH 4:

COMMENTS:

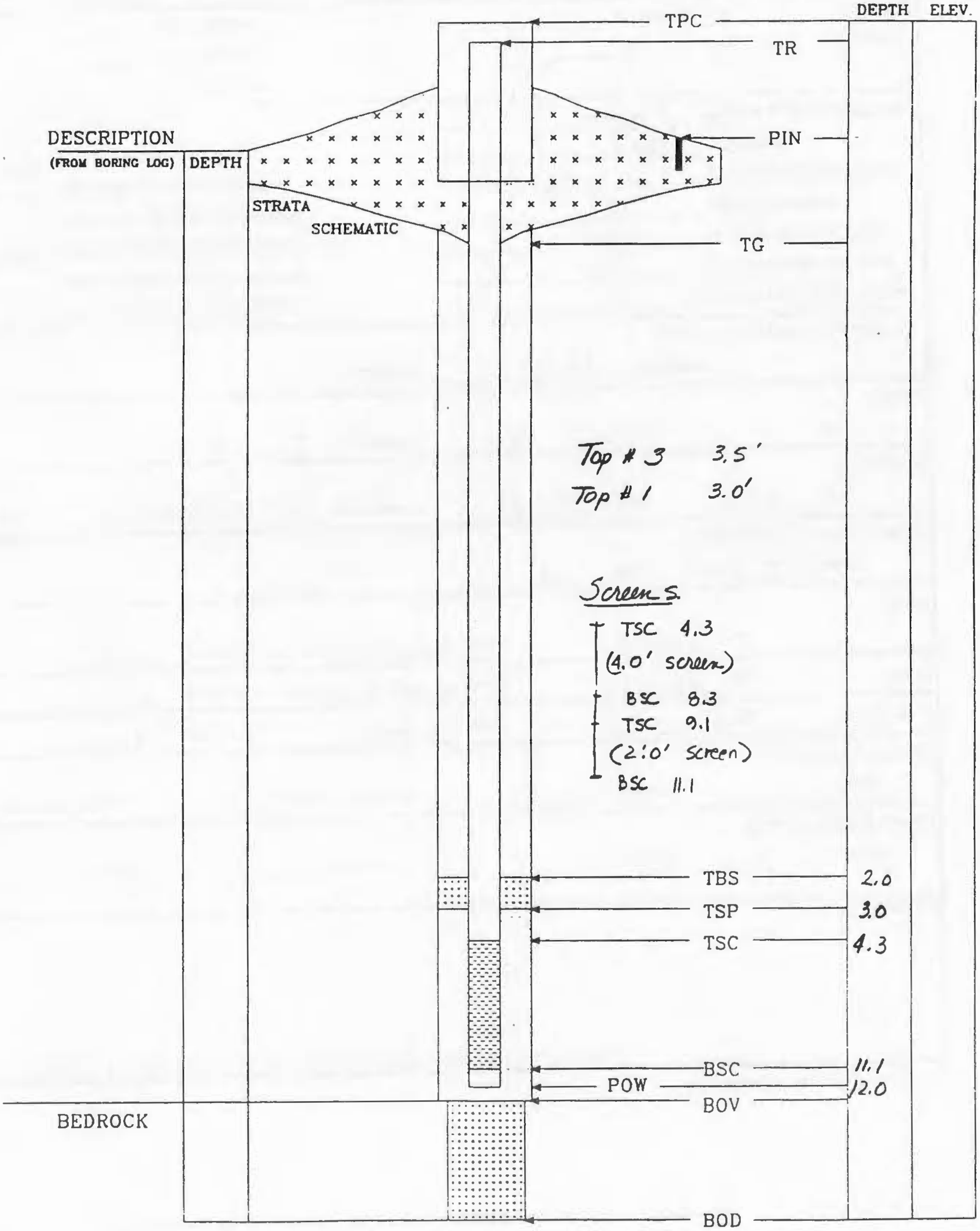
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT:	WELL #: 13-1

DATE: 12-8-93



	DEPTH	ELEV.
TPC		
TR		
PIN		
TG		
TBS	2.0	
TSP	3.0	
TSC	4.3	
BSC	11.1	
POW	12.0	
BOV		
BOD		

Top # 3 3.5'
Top # 1 3.0'

Screens
TSC 4.3
(4.0' screen)
BSC 8.3
TSC 9.1
(2.0' Screen)
BSC 11.1

Note: depth measured from ground.

* NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
ROADWAY BOX – SURFACE COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT: ACOE WELL #: MW 13-2

PROJECT: 10 SWMU
LOCATION: SEAD 13

PROJECT NO:
INSPECTOR: ES
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Bob
DRILLING COMPLETED: 11/9/93
BORING DEPTH: 16.0'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC: 13

POW DEPTH: 160'
INSTALLATION STARTED: 11/9/93
INSTALLATION COMPLETED: 11/9/93
SURFACE COMPLETION DATE:
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?)
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4"x 4" Steel LENGTH: 5' total

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH:

SCREEN:
TSC: 6.3' TYPE: PVC-40 DIAMETER: 2" LENGTH: 9.0 SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC Cap BSC: 15.3' POW: 16.0

GROUT:
TG: Ground TYPE: Cement-bentonite LENGTH: 3.0'

SEAL: TBS: 3.0' TYPE: Benton-pellets LENGTH: 1.0'

SAND PACK: TSP: #3 - 5.3' #1-4.6' TYPE: #3+ #1 Silica LENGTH: 10.2'

SURFACE COLLAR:
TYPE: Cement RADIUS: 2'x 2' THICKNESS CENTER: 1' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: DEPTH 2: DEPTH 3: DEPTH 4:

COMMENTS:

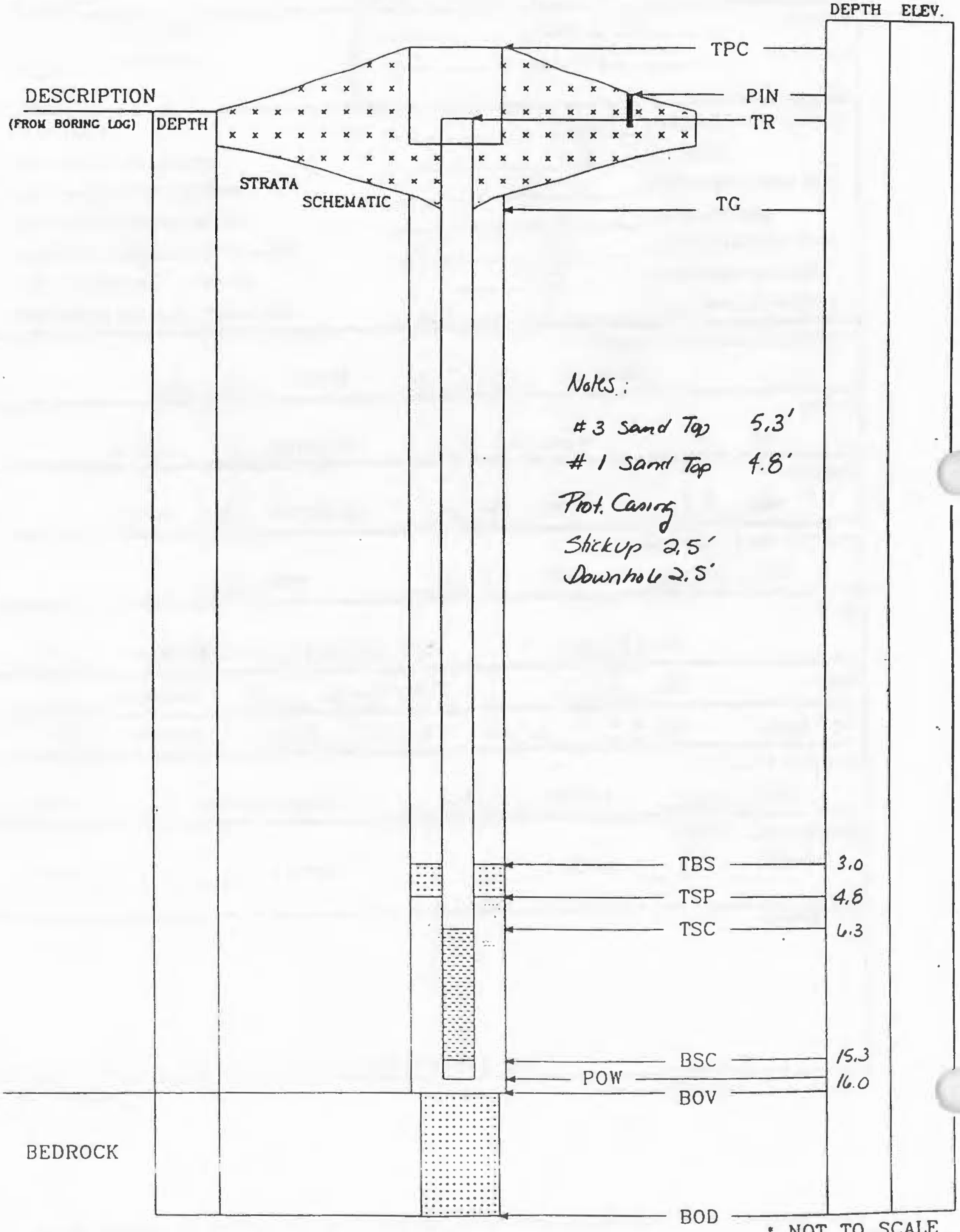
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
ROADWAY BOX INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT.	WELL #: MW13-2

DATE 11/9/93



	DEPTH	ELEV.
TPC		
PIN		
TR		
TG		
TBS	3.0	
TSP	4.8	
TSC	6.3	
BSC	15.3	
POW	16.0	
BOV		
BOD		

Notes:

#3 Sand Top 5.3'

#1 Sand Top 4.8'

Prot. Casing

Stickup 2.5'

Downhole 2.5'

• NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT: ACOE WELL #: MW13-3

PROJECT: 10 Swmu
LOCATION: SEAD 13
PROJECT NO:
INSPECTOR:
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Bob
DRILLING COMPLETED: 12-13-93
BORING DEPTH: 24.0'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC: 13
POW DEPTH: 24.0'
INSTALLATION STARTED: 12-8-93
INSTALLATION COMPLETED: 12-13-93
SURFACE COMPLETION DATE: 12-13-93
COMPLETION CONTRACTOR/CREW:
BEDROCK CONFIRMED (Y/N?) N
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4" x 4' Steel LENGTH: 5'

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH:

SCREEN: Two screens - 4' and 9'
TSC: 8.9' TYPE: PVC-40 DIAMETER: 2" LENGTH: 13' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC-point BSC: 22.9' POW: 24.0'

GROUT:
TG: Ground TYPE: Cem-bentonite LENGTH: 5.5'

SEAL: TBS: 5.5' TYPE: bentonite pellets LENGTH: 2.0'

SAND PACK: TSP: #3-8' #1-7.5' TYPE: #3 + #1 LENGTH: 16.5'

SURFACE COLLAR:
TYPE: RADIUS: 2'x2' THICKNESS CENTER: 1' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: DEPTH 2: Ø DEPTH 3: DEPTH 4:

COMMENTS:

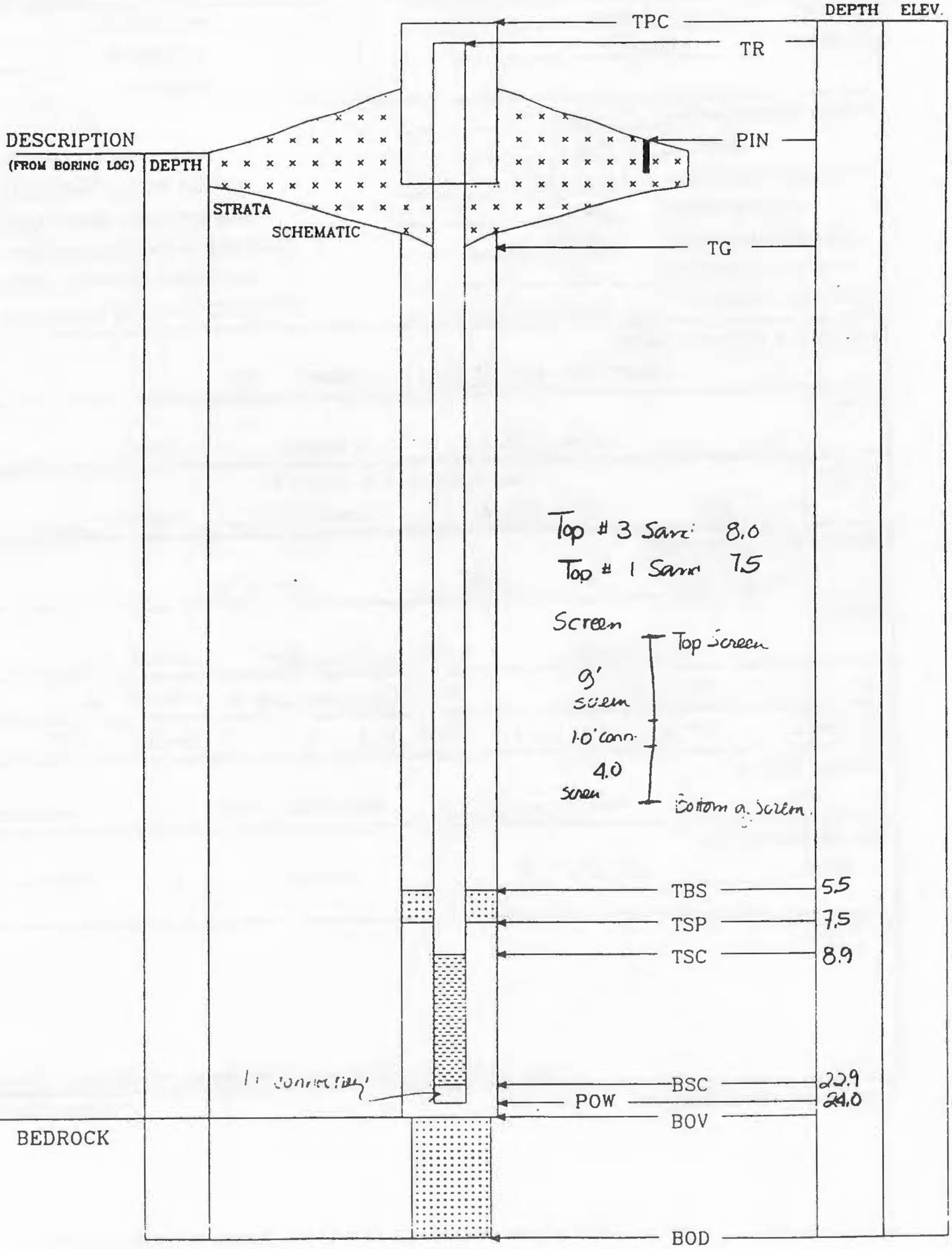
• ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	WELL #: MW 13-3

DATE: 12-13-93



	DEPTH	ELEV.
TPC		
TR		
PIN		
TG		
TBS	5.5	
TSP	7.5	
TSC	8.9	
BSC	22.9	
POW	24.0	
BOV		
BOD		

Top # 3 Sand 8.0
Top # 1 Sand 7.5

Screen
Top Screen
9' screen
1.0' conn.
4.0 screen
Bottom a. Screen

Depth measured to ground surface

• NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT: ACOE WELL #: MWI3-4

PROJECT: 10 SWMU
LOCATION: SEAD 13
PROJECT NO:
INSPECTOR: ES/MB/KK
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Scott
DRILLING COMPLETED:
BORING DEPTH: 8.5'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC: 13
POW DEPTH: 8.5'
INSTALLATION STARTED: 12-15-93
INSTALLATION COMPLETED:
SURFACE COMPLETION DATE:
COMPLETION CONTRACTOR/CREW: Empire/Scott
BEDROCK CONFIRMED (Y/N?)
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4" x 4" Steel LENGTH:

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH:

SCREEN:
TSC: 2.5' TYPE: PVC 40 DIAMETER: 2" LENGTH: 4.0' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 7.5' POW: 8.5'

GROUT:
TG: Ground TYPE: Cement-bentonite LENGTH: 1.5'

SEAL: TBS: 1.5' TYPE: bentonite pellets LENGTH: 1.0'

SAND PACK: TSP: #1-2.5' #3-3.0' TYPE: #3 and #1 LENGTH: 6.0'

SURFACE COLLAR:
TYPE: RADIUS: 2'x2' THICKNESS CENTER: 1' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: DEPTH 2: DEPTH 3: DEPTH 4:

COMMENTS:

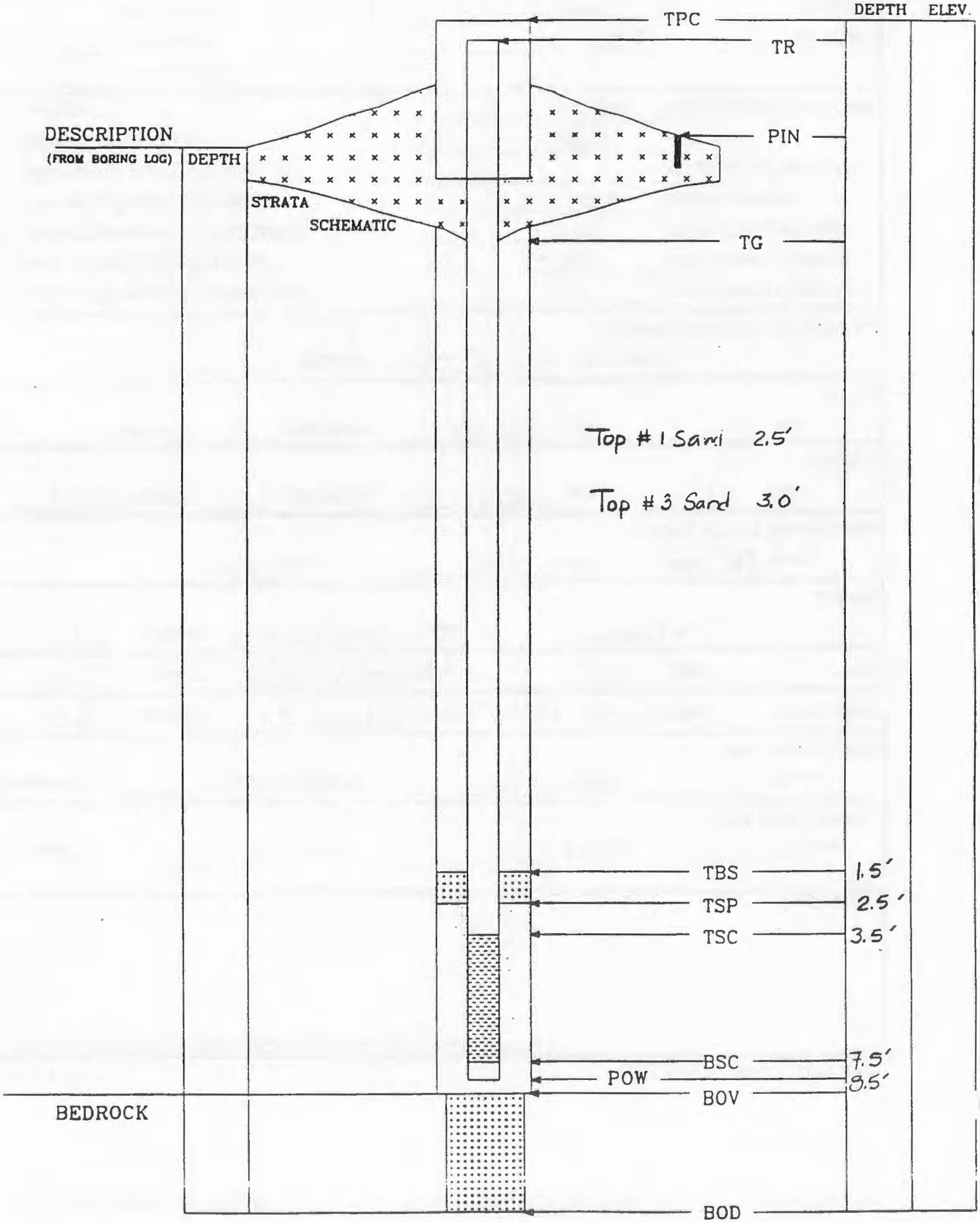
• ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	WELL #: MW13-4

DATE: 12-15-93



Top #1 Sand 2.5'

Top #3 Sand 3.0'

TBS 1.5'

TSP 2.5'

TSC 3.5'

BSC 7.5'

POW 8.5'

BOV

BOD

• NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
ROADWAY BOX – SURFACE COMPLETION

ENGINEERING–SCIENCE, INC. | CLIENT: ACoE | WELL #: MW 13-5

PROJECT: 10 SWMU
LOCATION: SEAD 13
PROJECT NO:
INSPECTOR: ES/LB
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Bob
DRILLING COMPLETED: 11/9/93
BORING DEPTH: 16.0'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC: 13

POW DEPTH: 16.0'
INSTALLATION STARTED: 11/8/93
INSTALLATION COMPLETED: 11/9/93
SURFACE COMPLETION DATE:
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?)
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4" x 4" Steel LENGTH: 5.0' total

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH:

SCREEN:
TSC: 6.3' TYPE: PVC-40 DIAMETER: 2" LENGTH: 9.0' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC Cap BSC: 15.3 POW: 16.0'

GROUT:
TG: Ground TYPE: Cement-bentonite LENGTH: 3.0'

SEAL: TBS: 3.0' TYPE: Bentonite pellets LENGTH: 1.8'

SAND PACK: TSP: #3 – 5.3' #1 – 4.8' TYPE: #3 + #1 Silica LENGTH: 10.2'

SURFACE COLLAR:
TYPE: Cement RADIUS: 2' x 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

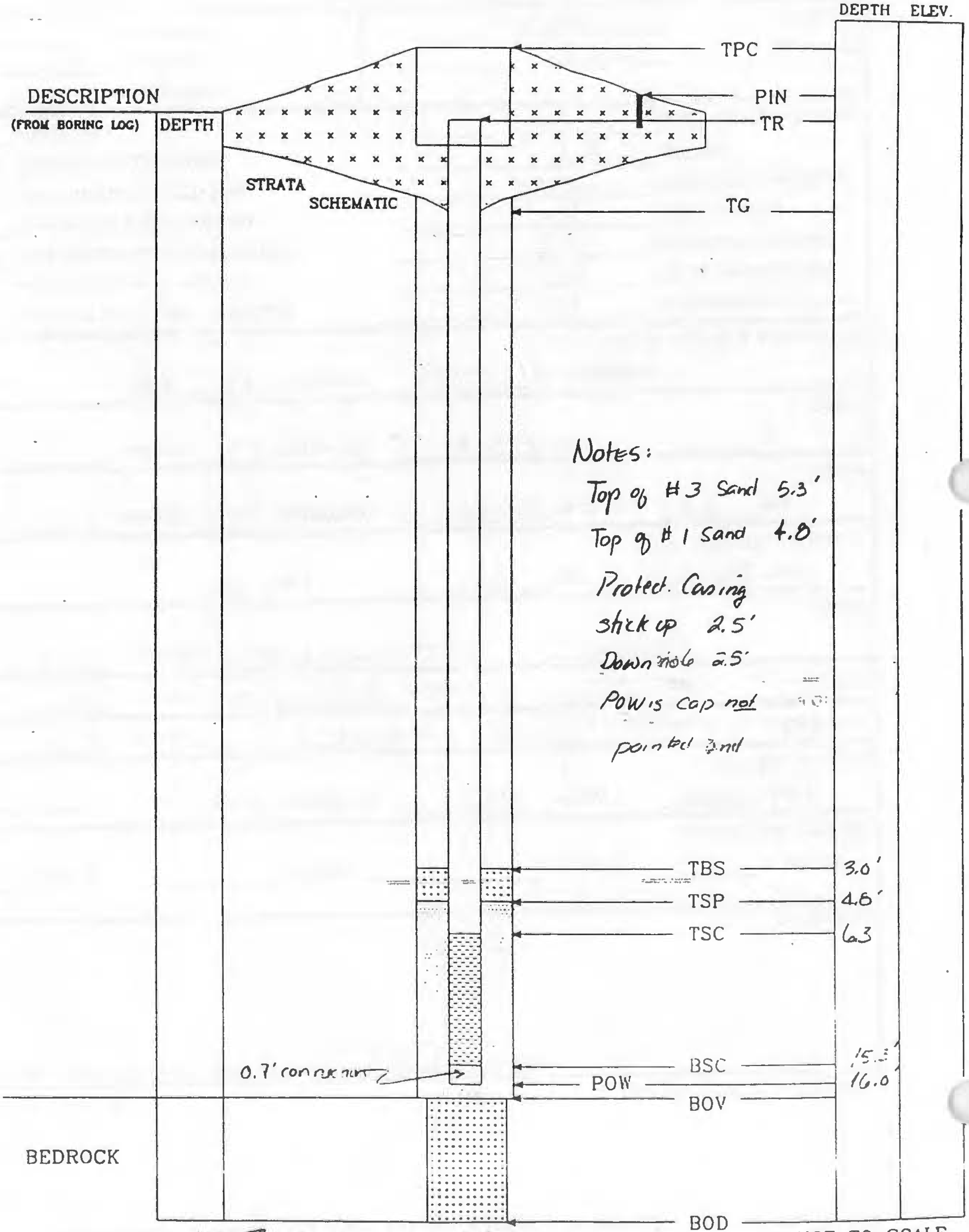
OVERBURDEN MONITORING WELL
ROADWAY BOX INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.

CLIENT: ACOE

WELL #: MW13-5

DATE 11/19/93



TBS 3.0'

TSP 4.8'

TSC 6.3

BSC 15.3'

POW 16.0'

BOV

BOD

Notes:

Top of #3 Sand 5.3'

Top of #1 Sand 4.8'

Protect. Casing

stick up 2.5'

Down hole 2.5'

POW is cap not

pointed end

Note: All depths measured from ground surface

• NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. **CLIENT:** ACOE **WELL #:** 13-6

PROJECT: 10 SWMU
LOCATION: SEAD 13
PROJECT NO:
INSPECTOR: ES/MB/KK
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Scott
DRILLING COMPLETED: 12-15-93
BORING DEPTH: 10.0'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC: 13

POW DEPTH: 10.0'
INSTALLATION STARTED: 12-15-93
INSTALLATION COMPLETED: 12-15-93
SURFACE COMPLETION DATE: 12-17-93
COMPLETION CONTRACTOR/CREW: Empire/Scott
BEDROCK CONFIRMED (Y/N?)
ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:
DIAMETER: 4"x 4" Steel LENGTH:

RISER:
TR: TYPE: PVC-40 DIAMETER: 2" LENGTH:

SCREEN:
TSC: 5.0' TYPE: PVC-40 DIAMETER: 2" LENGTH: 4' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 9.0' POW: 10.0

GROUT:
TG: Ground TYPE: Cem-bentonite LENGTH: 2.5'

SEAL: TBS: 2.5' TYPE: bentonite pellets LENGTH: 1.0'

SAND PACK: TSP: 3.5'-#1 9.0-#3 TYPE: #3 + #1 LENGTH: 6.5'

SURFACE COLLAR:
TYPE: RADIUS: 2'x2' THICKNESS CENTER: 1' THICKNESS EDGE: 1'

CENTRALIZER DEPTHS
DEPTH 1: DEPTH 2: DEPTH 3: DEPTH 4:

COMMENTS:

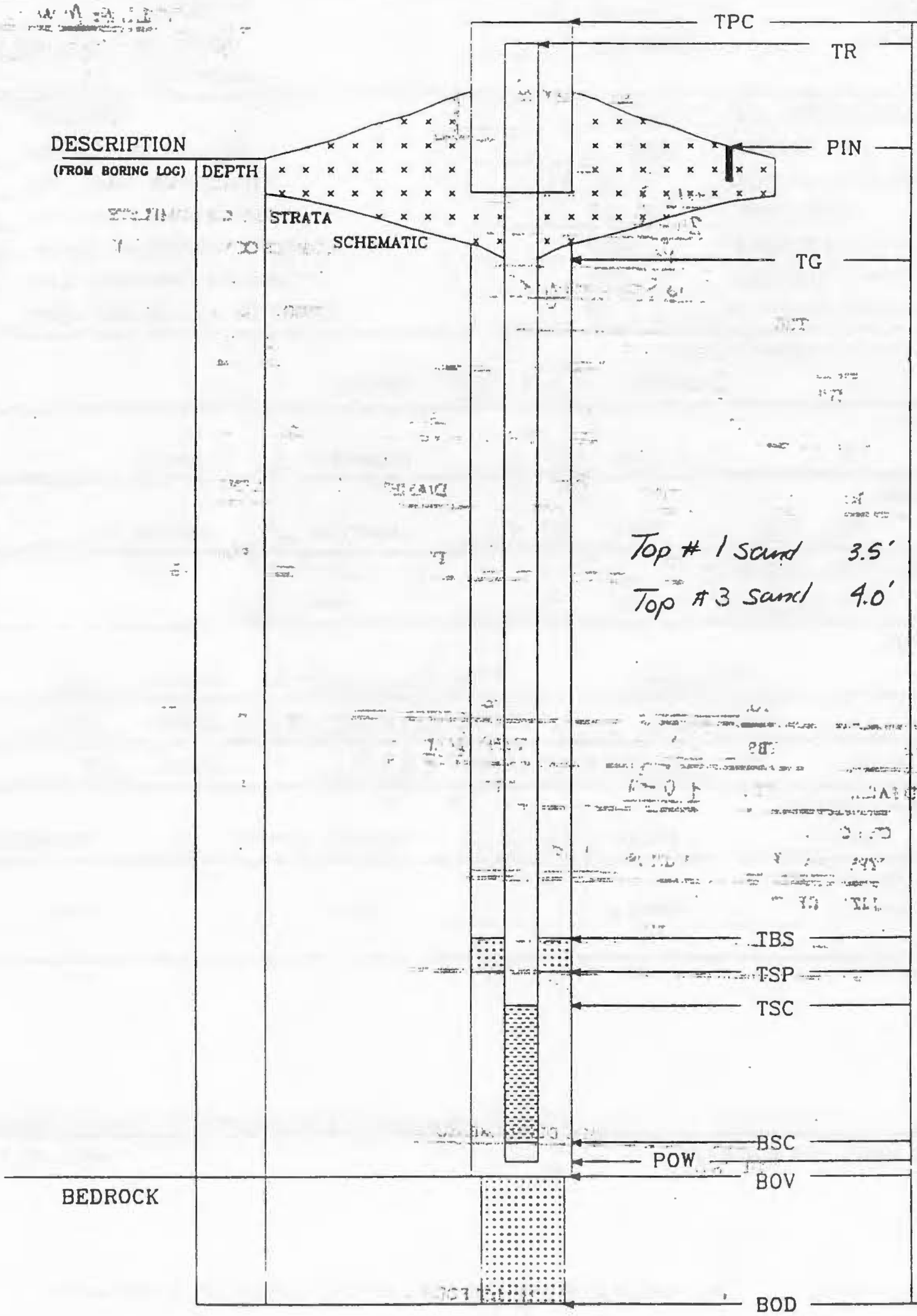
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING–SCIENCE, INC. | CLIENT: ACOE | WELL #: MW13-6

DATE: __________



Top # 1 sand 3.5'

Top # 3 sand 4.0'

	DEPTH	ELEV.
TPC		
TR		
PIN		
TG		
TBS	2.5	
TSP	3.5	
TSC	5.0	
BSC	9.0'	
POW	10.0'	
BOV		
BOD		

• NOT TO SCALE

PAGE 1 OF 2

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT:

WELL #: MW 13-7

PROJECT: 10 SWMU ESI

LOCATION: Seneca Army Depot, Romulus, NY

PROJECT NO: 720478-01001

INSPECTOR: KY BH

CHECKED BY:

DRILLING CONTRACTOR: EMPIRE SOILS

DRILLER: JOHN / ED

DRILLING COMPLETED: 1-24-94

BORING DEPTH: 8.0 ft

DRILLING METHOD(S): Hollow Stem Auger

BORING DIAMETER(S): 8.5 in

ASSOCIATED SWMU/AOC: SEAD 13

POW DEPTH: 8.0 ft

INSTALLATION STARTED: 1-24-94

INSTALLATION COMPLETED: 1-24-94

SURFACE COMPLETION DATE: 1-25 94

COMPLETION CONTRACTOR/CREW: NA

BEDROCK CONFIRMED (Y [✓ N])

ESTIMATED GROUND ELEVATION:

PROTECTIVE SURFACE CASING:

DIAMETER: 2 in LENGTH:

RISER:

TR: +2.5 ft. TYPE: PVC DIAMETER: 2 in LENGTH:

SCREEN:

TSC: 5.0 ft. TYPE: PVC DIAMETER: 2 in LENGTH: 2 ft SLOT SIZE: 1/100 in

POINT OF WELL: (SILT SUMP)

TYPE: PVC BSC: 7.0 ft POW: 8.0

GROUT: NA

TG: TYPE: LENGTH:

SEAL: TBS: 3.0 ft TYPE: bentonite pellets LENGTH: 1.0 ft.

SAND PACK: TSP: 4.0 ft. TYPE: #3 ECL - 8.0 to 4.5 ft
#1 EX. - 4.5 to 4.0 ft LENGTH:

SURFACE COLLAR:

TYPE: Quikrete RADIUS: 1 ft. THICKNESS CENTER: 3.0 ft THICKNESS EDGE: .5 ft.

CENTRALIZER DEPTHS NA

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

p 2 of 3

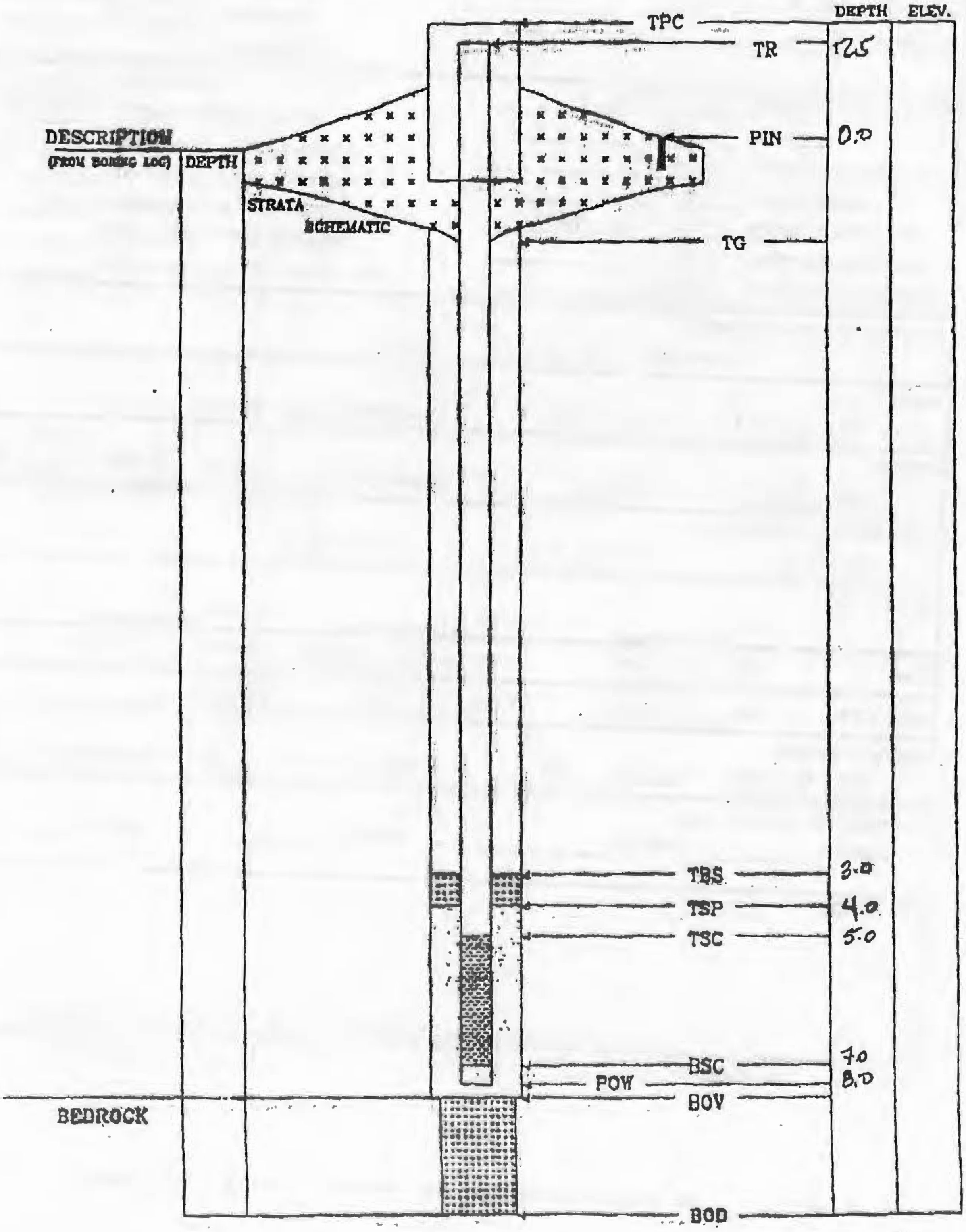
OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.

CLIENT: USACOE

WELL #: MW13-7

DATE: 1-24-94



	DEPTH	ELEV.
TPC		
TR	125	
PIN	0.0	
TG		
TBS	3.0	
TSP	4.0	
TSC	5.0	
BSC	7.0	
POW	8.0	
BOV		
BOD		

* NOT TO SCALE