U.S. ARMY ENGINEER DIVISION

HUNTSVILLE, ALABAMA

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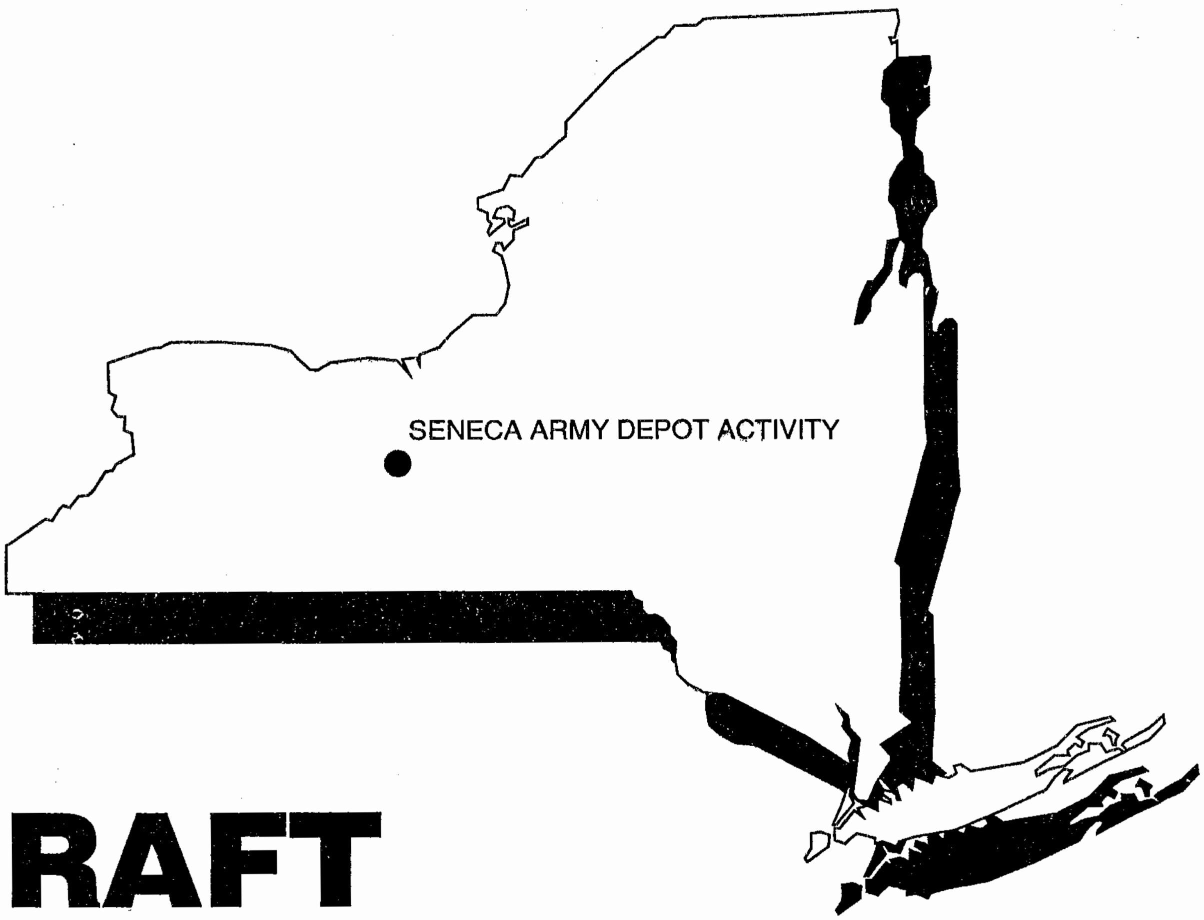

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SEAD-45
PROJECT SCOPING PLAN FOR PERFORMING A CERCLA REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AT THE OPEN DETONATION GROUNDS, SENECA ARMY DEPOT ACTIVITY

SEPTEMBER 1995

PROJECT SCOPING PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
AT SEAD-45
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Prepared For:

Seneca Army Depot Activity
Romulus, New York

Prepared By:

Parsons Engineering Science, Inc.
Prudential Center
Boston, Massachusetts

726511 September 1995

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LIST OF ACRONYMS

AA	Atomic absorption
AMC	U.S. Army Material Command
AN	Army-Navy
AOC	Area 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
atm	atmosphere
BCF	Bioconcentration Factor
BOD	Biological Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
C	Celsius
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
Eh	Oxidation-Reduction Potential
EM-31	Electromagnetic
EPA	Environmental Protection Agency
ESI	Expanded Site Inspection

LIST OF ACRONYMS (CONT.)

FS	Feasibility Study
ft	feet
ft/ft	feet per foot
ft/sec	feet per second
ft/yr	feet per year
GA	Water Classification: The best usage of Class GA waters is as a source of potable water supply. Class GA waters are fresh groundwaters
GC	Gas chromatograph
gpm	Gallons per minute
GPR	Ground penetrating radar
GRI	Gas Research Institute
GSSI	Geophysical Survey Systems, Inc.
HSWA	Hazardous and Solid Waste Amendments
IAG	Interagency Agreement
kg	kilogram
k_{obs}	psuedo-first-order rate constant
K_{oc}	Organic carbon partition coefficient
K_{ow}	Octanol-water partition coefficient
lb	pound
L/min	Liters per minute
MCL	Maximum Contaminant Level
m	meter
mg	milligram
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
mol	mole
MS	Mass spectrometry
MSL	Mean sea level
mV	millivolts

LIST OF ACRONYMS (CONT.)

MW	Monitoring Well
NA	Not analyzed or not available
NBS	National Bureau of Standards
NGVD	National Geologic Vertical Datum
NO_2/N	Nitrite-Nitrogen
NO_3/N	Nitrate-Nitrogen
NPL	National Priority List
NTU	Nephelometric turbidity units
NYSDEC	New York State Department of Environmental Conservation
OB	Open Burning
OD	Open Detonation
OVM	Organic Vapor Meter
Pb	Lead
PAH	Polynuclear Aromatic Hydrocarbon
Parsons ES	Parsons Engineering Science, Inc.
PCB	Polychlorinated biphenyls
PID	Photoionization detector
ppm	parts per million
ppmv	parts per million per volume
PSCR	Preliminary Site Characterization Report
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RAGS	EPA Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RF	Response factor
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RQD	Rock Quality Designation
SB	Soil boring
SCS	Soil Conservation Service
SD	Sediment sample

LIST OF ACRONYMS (CONT.)

SEAD	Seneca Army Depot (old name)
SEDA	Seneca Army Depot Activity
sec	seconds
SOW	Statement of Work
SS	Soil sample
SVO	Semivolatile Organic Compound
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
μg/g	micrograms per gram
μg/kg	micrograms per kilogram
μg/mg	micrograms per milligram
μg/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
VOST	Volatile Organic Sampling Train
Vs	Volt Second

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

The purpose of this Remedial Investigation/Feasibility Study (RI/FS) Project Scoping Plan is to provide site specific information for the RI/FS project at the SEAD-45 operable unit at the Seneca Army Depot Activity (SEDA) in Romulus, NY. This plan outlines work to be conducted at SEAD-45 based upon recommendations specified in the Draft Final Seven High Priority SWMUs Expanded Site Inspection (ESI) Report (Parsons ES, May 1995).

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

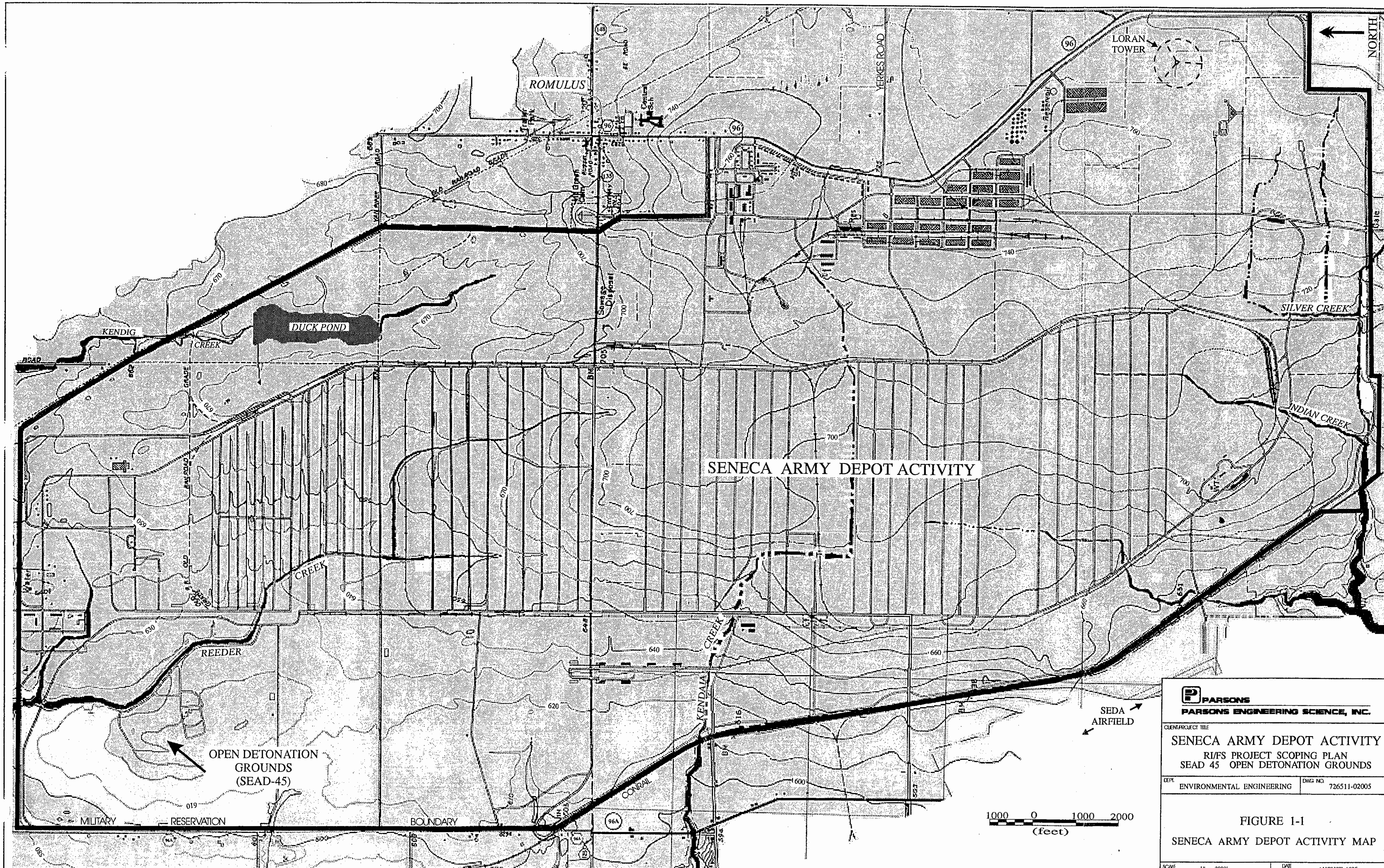
This RI/FS Project Scoping Plan is based upon a conceptual site model that identified potential source areas, release mechanisms, and receptor pathways; determined data requirements for an evaluation of risks to human health and the environment; and developed a task plan to address the data requirements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

1.2 REPORT ORGANIZATION

The remaining sections of this report are organized to describe the overall site conditions, provide a scoping of the RI/FS and to provide task plans for the RI and FS. Section 2.0, Site Conditions, presents a description of regional geological and hydrogeological conditions, and the results of previous investigations. Section 3.0, Scoping of the RI/FS, presents the conceptual site model, potential receptors and exposure scenarios, scoping of potential remedial action technologies, preliminary identification of Applicable or Relevant and Appropriate Requirements (ARARs), data quality objectives, and data gaps and needs. The task plans for the RI and FS are discussed in Sections 4.0 and 5.0, respectively. Section 6.0, Plans and Management, discusses scheduling and staffing.

1.3 SITE BACKGROUND

SEAD-45 is the Open Detonation (OD) Grounds at Seneca Army Depot Activity (SEDA) in Romulus, NY, as shown in Figure 1-1. The OD Grounds cover approximately 60 acres and



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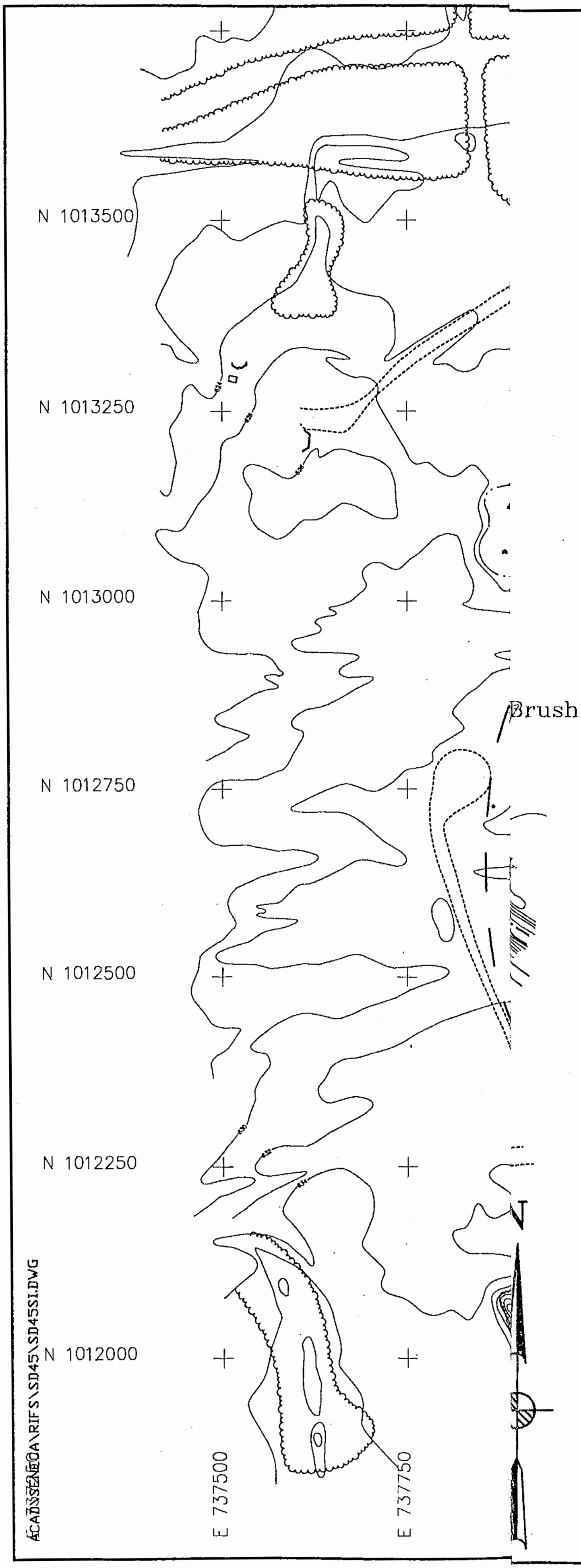
together with the Open Burning (OB) Grounds comprise the 90-acre demolition area at SEDA. Since 1941, the OD Grounds have been used to demolish waste munitions. The main feature of the OD facility is a detonation mound which covers approximately 1.0 acre, as shown in Figure 1-2. The mound is composed of soil from the surrounding area which was moved via bulldozer to create the mound. Aerial photos from 1968 show that the mound was previously located at least 200 feet west of its present location. Waste munitions are placed in a bulldozed hole in the hill with additional demolition material, covered with a minimum of 8 feet of soil, and detonated remotely using blasting caps and primer cord. A Resource Conservation and Recovery Act (RCRA) Subpart X permit application is pending New York State Department of Environmental Conservation (NYSDEC) approval, and the operation of the OD facility is currently under interim status.

In May 1979, the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) began an environmental evaluation of SEDA. This evaluation was undertaken "to assess the environmental quality of SEDA with regard to the use, storage, treatment, and disposal of toxic and hazardous materials" and "define any conditions which may adversely affect the health and welfare or result in environmental degradation" (USATHAMA, 1980). The report concluded that the detonation/burning ground is potentially contaminated with metals and explosives, geological conditions are such that contaminants could migrate in surface or subsurface waters, and further investigation of the area was warranted.

Subsequent to the site assessment, five groundwater monitoring wells (MW-1 through MW-5) were installed. The wells are located at the perimeter of SEAD-45 approximately 400-600 feet to the north, south, east, west, and southwest of the demolition mound. Two rounds of groundwater samples were taken in 1979, in 1982 samples were collected quarterly, and from 1984 through 1987 samples were collected semi-annually.

In response to information acquired as a result of this and other surveys performed at similar installations, U.S. Army Environmental Hygiene Agency (USAEHA) performed a four phased evaluation of the OB/OD Grounds for the U.S. Army Materials Command (USAMC). Phase I involved screening the USAMC installations for potential soil, surface water, and groundwater contamination in and around the OB/OD areas. The Phase II study of the USAEHA Program was conducted in 1982 at the SEDA OB/OD Grounds. During this phase, eight surface soil samples were taken from the detonation mound. The remainder of the Phase II study and the subsequent phased studies focused on the OB Grounds.



LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
- BRUSH LINE
- LANDFILL EXTENTS
- RAILROAD
- 760 GROUND SURFACE ELEVATION CONTOUR
- ROAD SIGN
- DECIDUOUS TREE
- GUIDE POST
- FIRE HYDRANT
- MANHOLE
- COORDINATE GRID (250' GRID)
- POLE
- UTILITY BOX
- MAILBOX/RR SIGNAL
- OVERHEAD UTILITY POLE
- SURVEY MONUMENT
- LOCATION OF DETONATION MOUND IN 1968

100 0 100 200
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	726510-03001

FIGURE 1-2
SITE PLAN

SCALE	DATE	REV
1" = 200'	AUGUST 1995	A

In 1988 The OD facility was designated a Solid Waste Management Unit (SWMU), SEAD-45, and was added to SEDA's application for a Part B, RCRA permit. Under the RCRA Hazardous and Solid Waste Amendments of 1984 (HSWA), Part B Permits issued after November 8, 1984, require identification and corrective action at any SWMU located on the installation that is releasing hazardous constituents or hazardous wastes to the environment.

SEAD-45 is classified as a High Priority Area of Concern (AOC) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). In accordance with the decision process outlined in the Interagency Agreement (IAG) between the U.S. Army Corps of Engineers (USACE) the U.S. Environmental Protection Agency (EPA) Region II, and the New York State Department of Environmental Conservation (NYSDEC), an Expanded Site Inspection was performed at SEAD-45 in 1993 and 1994. The draft final ESI Report (Parsons ES, May 1995) indicated a release of metals and nitroaromatic compounds that has primarily impacted surface soil and sediment. A semi-volatile compound release has also impacted surface soil and sediment to a lesser extent. The ESI report also indicated that the presence of metals in the OD mound and drainage ditches of the mound may pose a threat.

As part of the draft final ESI Report, a CERCLA RI/FS was recommended to be performed at SEAD-45. This RI/FS Project Scoping Plan along with the Generic Installation RI/FS Workplan outlines the recommended approach and methodologies for completion of an RI/FS at this site in accordance with EPA CERCLA guidelines.

2.0 SITE CONDITIONS

2.1 PHYSICAL SETTING

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

2.2 REGIONAL GEOLOGICAL SETTING

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

2.3 REGIONAL HYDROGEOLOGICAL SETTING

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

2.4 RESULTS OF PREVIOUS INVESTIGATIONS

2.4.1 1979 Study

In 1979, wells MW-1 through MW-4 and Reeder Creek (both upstream and downstream of the OB/OD Grounds) were sampled twice. Analyses were performed for conventional pollutants and explosives. One explosive compound, 4-amino-2,6-dinitrotoluene, was detected in groundwater from wells MW-1 to MW-4 and from both Reeder Creek sample locations at concentrations of 1.36 to 1.96 ppb. Iron was also found in excess of New York State Groundwater Standards (NYSGWS) in wells MW-1 to MW-4 and in Reeder Creek (upstream) at concentrations of 0.49 to 310 ppm. Monitoring well installation data and analytical results are presented in Tables 2-1, 2-2, and 2-3.

2.4.2 1982 Study

In 1982, the USAEHA analyzed eight soil samples collected from the demolition mound. Analyses were performed for heavy metals and explosives. The analytical results indicated the presence of cadmium in all samples at concentrations of 0.19 to 0.45 ppm which were below the 1.0 ppm Extraction Procedure Toxicity Limit. Explosives were also found in each

TABLE 2-1
1979 STUDY
MONITORING WELL CONSTRUCTION DATA [1]

Well No.	Depth Drilled	Depth to Rock	Soil Type	Ground Elevation	Casing Height	Screen Setting[2]	Elevation of Water		
							9/7	9/13	10/5
MW-1	13	12	Till	100.0	4.3	7-12	95.9	94.8	95.0
MW-2	7	6.5	Till	85.1	3.7	1-6	82.2	81.4	81.4
MW-3	11	9.5	Till	95.1	5.5	4.5-9.5	93.0	91.3	90.8
MW-4	10	9.5	Till	98.7	3.0	4.5-9.5	92.1	92.4	92.6
MW-5	15	13.5	Till	97.0	-	-	-	-	-

(1) All values reported in feet.

(2) Feet below the ground surface

Note: Data obtained from "Report, Munitions Destruct Study, Seneca Army Depot, APAP Study No. D 1031-W" for Department of the Army, New York District, Corps of Engineers by O'Brien & Gere dated November 1979. Year water elevations measured assumed to be 1979.

TABLE 2-2
1979 STUDY
WATER QUALITY MONITORING DATA
EXPLOSIVES

Parameter[(1)]	Well No.				Reeder Creek	
	MW-1	MW-2	MW-3	MW-4	Upstream	Downstream
2,4,6 Trinitrotoluene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
4-amino-2,6-dinitrotoluene[(2)]	1.36	1.66	1.78	1.96	1.87	1.66
2-amino-4,6-dinitrotoluene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3,5-dinitroaniline	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

(1) Values reported in ug/l (ppb)

(2) Cochromatographed, cochromatography is not proof of structure.

Note: Data obtained from "Report, Munitions Destruct Study, Seneca Army Depot, APAP Study No. D 1031-W" for Department of the Army, New York District, Corps of Engineers by O'Brien & Gere dated November 1979. Date sampled not available on original table.

TABLE 2-3
1979 STUDY
WATER QUALITY MONITORING DATA
CONVENTIONAL POLLUTANTS

Well No.	Date	pH	TOC	COND	TDS	TIP	TKN	NO_2	NO_3	CN	FE	PB	HG	Al	Cl
MW-1	9/7	8.3	48	770	630	0.06	1.6	<0.001	0.70	<0.1	2.4	<0.01	0.79	3.0	9.7
	10/5	8.1	3	700	880	-	-	-	-	-	18	-	-	-	
	10/5*		10		-	-	-	-	-	-	<0.01	-	-	-	
MW-2	9/7	8.0	68	790	570	0.06	1.6	0.039	<0.01	<0.1	2.6	<0.01	0.79	22.	7.5
	10/5	8.2	160	820	970	-	-	-	-	-	310.	-	-	-	
	10/5*		8		-	-	-	-	-	-	<0.01	-	-	-	
MW-3	9/7	7.9	83	790	630	0.21	0.30	0.002	<0.01	<0.1	2.1	<0.01	1.20	16.	1.8
	10/5	8.6	<1	650	750	-	-	-	-	-	15.	-	-	-	
	10/5*		13	-	-	-	-	-	-	-	0.01	-	-	-	
MW-4	9/7		260	4	470	<0.01	0.30	0.035	<0.01	<0.1	0.09	<0.01	0.79	0.5	7.0
	10/5	8.7	21	1000	1100	-	-	-	-	-	38.	-	-	-	
	10/5*		23		-	-	-	-	-	-	0.05	-	-	-	
Reeder Creek (UP)	8/31		56		660	0.52	0.30	<0.001	<0.01	-	0.49	<0.01	1.6	3.7	
	10/5				-	-	-	-	-	-	0.12	-	-	-	
Reeder Creek (DN)	8/31		49		630	0.10	0.30	<0.001	<0.01	-	0.009	<0.01	0.79	0.50	
	10/5				-	-	-	-	-	-	0.22	-	-	-	

* Filtered Samples

Note: 1. All results except pH and COND are reported as mg/l. HG reported as ug/l. COND reported as umhos/cm.

2. Data obtained from "Report, Munitions Destruct Study, Seneca Army Depot, APAP Study No. D 1031-W" for Department of the Army, New York District, Corps of Engineers by O'Brien & Gere dated November 1979. Year samples collected assumed to be 1979.

sample. RDX was found at concentrations of 1.4 to 1.7 ppb, Tetryl at 1.6 to 16.3 ppb, 2,4,6-TNT at 2.2 to 61 ppb, and 2,4-DNT 1.1 to 19 ppb. Analytical results are presented in Table 2-4.

2.4.3 1982-1987 Groundwater Sampling

In 1982 through 1987, wells MW-1 through MW-5 were sampled on a quarterly or semi-annual basis. No explosives were detected in the wells during that period. Iron was found in excess of NYSGWS in MW-1 at a concentration of 0.44 ppm. Manganese was found in four samples from MW-2 in excess of NYSGWS at concentrations of .070 to .210 ppm. Manganese was also found in four samples from MW-5 in excess of NYSGWS at concentrations of 0.100 to 0.270 ppm. Nitrate was detected in MW-5 in excess of NYSGWS at a concentration of 10 ppm. A summary of the analyses is presented in Table 2-5.

2.4.4 1988 Metcalf & Eddy Study

In 1988, Metcalf and Eddy, Inc. sampled MW-1 through MW-5 as part of an investigation involving the OB Grounds. No explosives were detected. Lead was detected at levels above NYSGWS in each of the five wells; chromium was found in excess of NYSGWS in MW-1, MW-4, and MW-5; cadmium was detected at a level above NYSGWS in MW-4; and selenium was found in excess of NYSGWS in MW-5. A summary of the analyses is presented in Table 2-6.

2.4.5 1989-1993 Groundwater Sampling

The five wells were sampled in March of 1989, then on a semi-annual basis from 1990 to 1992, and then in 1993 the five wells were sampled on a quarterly basis as part of the OB Grounds Quarterly Sampling Program. The complete analyses from March 1989 through April 1993 can be found in Tables 2-7 through 2-11.

2.4.6 1991-1992 Open Burning Grounds Remedial Investigation

As part of the OB Grounds RI, surface water and sediment samples were taken from drainages into Reeder Creek and from Reeder Creek itself. Nine of the samples taken were in areas influenced by the OD Grounds. The locations of these samples are shown in Figure 2-1.

TABLE 2-4
1982 STUDY
OPEN DETONATION GROUNDS SOIL DATA

	EP Toxicity[a]								Explosives[bc]					
Sample No. and Description	As	Ba	Cd	Cr	Hg	Pb	Se	Ag	HMX	RDX	Tetryl	2,4,6 -TNT	2,6- DNT	2,4- DNT
4727-001 Demolition Crater No. 2	ND	ND	0.19	ND	ND	ND	ND	ND	ND	1.4	ND	ND	ND	1.6
-002 Demolition Crater No. 2	ND	ND	0.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.9
-003 Demolition Crater No. 4	ND	ND	0.16	ND	ND	ND	ND	ND	ND	1.4	1.6	ND	ND	1.9
-004 Demolition Crater No. 4	ND	ND	0.16	ND	ND	ND	ND	ND	ND	ND	32.0	ND	ND	ND
-005 Demolition Crater No. 6	ND	ND	0.17	ND	ND	ND	ND	ND	ND	1.3	16.3	2.2	ND	ND
-006 Demolition Crater No. 6	ND	ND	0.18	ND	ND	ND	ND	ND	ND	1.2	ND	ND	ND	1.7
-007 Demolition Crater No. 8	ND	ND	0.17	ND	ND	ND	ND	ND	ND	1.7	ND	1.4	ND	1.1
-008 Demolition Crater No. 8	ND	ND	0.45	ND	ND	ND	ND	ND	ND	ND	ND	61	ND	ND

NOTES:
ND - Not Detected
a - all units in mg/l
b - all units in ug/g
c - detection limits for all explosives was 1.0 ug/g

Source: Appendix E, Table E-1, Phase 2, Hazardous Waste Management Special Study No. 39-26-0147-83 DARCOM Open Burning/Open Detonation Grounds Evaluation, Seneca Army Depot, Seneca, New York, 2-13 May 1982.

TABLE 2-5
1982 THROUGH 1987 GROUNDWATER SAMPLING
SUMMARY OF GROUNDWATER ANALYSES
WELLS MW-1 THROUGH MW-7

Chemical	EPA Maximum Contaminant Level (ug/l)	New York State Groundwater Standard (ug/l)	Method Detection Limit (ug/l)	Concentration Range Detected (ug/l)	Total Number of Samples	Number of Samples Exceeding Detection Limit	Number of Samples Exceeding NYSGWS	Number of Wells Exceeding NYSGWS
Inorganics								
Arsenic	50	25	10	ND	26	0	0	
Barium	1,000	1,000	100	ND	26	0	0	
Cadmium	10	10	5	ND	26	0	0	
Chromium	50	50	10	ND	26	0	0	
Mercury	2	2	0.2	ND	26	0	0	
Lead	50	25	10	ND	26	0	0	
Selenium	10	20	5	ND	26	0	0	
Silver	50	50	10	ND	26	0	0	
Iron	NA	300	2-100	ND-1,020	65	40	3	1
Manganese	NA	300	1-30	ND-320	65	02	17	2,5
Fluoride	4,000	1,500	100	100-300	27	27	0	
Nitrate	10,000[a]	10,000[a]	50	ND-10,000	27	23	1	5
Explosives								
HDX	NA	(35)[b]	100	ND	46	0	0	
RDX	NA	(35)[b]	30	ND	46	0	0	
Tetryl	NA	(1)[b]	10	ND	46	0	0	
2,4,6-TNT	NA	(1)[b]	1	ND	46	0	0	
2,6-DNT	NA	(1.1)[c]	1	ND	46	0	0	
2,4-DNT	NA	(1)2[b]	1	ND	46	0	0	
pH	NA	(6.5-8.5)[d]		6.7-8.1[d]	300	300	0	

TABLE 2-5 (continued)
1982 THROUGH 1987 GROUNDWATER SAMPLING
SUMMARY OF GROUNDWATER ANALYSES
WELLS MW-1 THROUGH MW-7

Chemical	EPA Maximum Contaminant Level (ug/l)	New York State Groundwater Standard (ug/l)	Method Detection Limit (ug/l)	Concentration Range Detected (ug/l)	Total Number of Samples	Number of Samples Exceeding Detection Limit	Number of Samples Exceeding NYSGWS	Number of Wells Exceeding NYSGWS
TOC	NA	NA	100	1,000-54,000	340	340	NA	
TOX	NA	NA	10	ND-130	335	133	NA	

NOTES:

[a] Groundwater standard is for nitrate only.
[b] Guidelines proposed from "Criteria Development Report for the Closure of Nine Burning Pads" (M&E, October 1989).
[c] EPA Water Quality Criteria for 10^{-5} risk
[d] Units are pH.

NA Not Available
ND Not Detected

Data summarized from the 1987 USAEHA Groundwater Contamination Survey

TABLE 2-6
1988 METCALF AND EDDY STUDY
GROUNDWATER ANALYSIS DATA

Chemical	EPA Maximum Contaminant Level (ug/l)	New York State Groundwater Standard (ug/l)	Method Detection Limit (ug/l)	Detection Range Wells 1-6 (ug/l)	No. of Times Greater Than Detected Wells 1-6	Times Detected Greater Than Standards Wells 1-6
Inorganics						
Arsenic	50	25	10	ND - 19.3	1	0
Barium	1000	1000	200	ND - 859	5	0
Cadmium	10	10	5	ND - 18.8	1	1(4)
Chromium	50	50	10	21.5-152	6	3(1,4,5)
Mercury	2	2	0.2	ND - 0.58	2	0
Lead	50	25	5	38.9-206	6	5(1,2,3,4,5)
Selenium	10	50	5	ND - 14.3	2	1(5)
Explosives						
PETN	NA	NA	4.5	ND - 45	2	NA
HMX	NA(35)[a]	NA	1.3	ND	0	NA
RDX	NA(35)[a]	NA	0.63	ND - 1.84	2	NA
Tetryl	NA(1)[a]	NA	0.66	ND - 0.96	1	NA
2,4,6-TNT	NA(1)[a]	NA	0.78	ND	0	NA
2,6-DNT	NA(1.1)	NA	0.55	ND	0	NA
2,4-DNT	NA	NA	0.6	ND	0	NA

NOTE: [a]Proposed Guidelines from Criteria Development Report for the Closure of the Nine Burning Pads (M&E, October 1988)

TABLE 2-7
1989 THROUGH 1993 GROUNDWATER SAMPLING
MONITORING WELL MW-1

PARAMETER	UNITS	Mar-89	Mar-90	Sept-90	Mar-91	Sept-91	Jan-93
METALS							
ALUMINUM	mg/l	-	-	-	-	-	129
ANTIMONY	mg/l	-	-	-	-	-	0.0537
ARSENIC	mg/l	ND	-	-	-	-	0.0044
BARIUM	mg/l	0.09	-	-	-	-	1.05
BERYLLIUM	mg/l	-	-	-	-	-	0.011
CADMIUM	mg/l	0.002	-	-	-	-	0.0089
CALCIUM	mg/l	-	-	-	-	-	600
CHROMIUM	mg/l	ND	-	-	-	-	0.161
COBALT	mg/l	-	-	-	-	-	0.181
COPPER	mg/l	-	-	-	-	-	0.792
IRON	mg/l	0.022	1.5	-	ND	-	167
LEAD	mg/l	ND	-	-	-	-	0.495
MAGNESIUM	mg/l	-	-	-	-	-	119
MANGANESE	mg/l	-	0.015	-	ND	-	6.71
MERCURY	mg/l	0.002	-	-	-	-	0.0035
NICKEL	mg/l	-	-	-	-	-	0.356
POTASSIUM	mg/l	2.7	-	-	-	-	18.4
SELENIUM	mg/l	ND	-	-	-	-	0.0126
SILVER	mg/l	ND	-	-	-	-	ND
SODIUM	mg/l	6.7	8.6	-	12.5	-	14
THALLIUM	mg/l	-	-	-	-	-	ND
VANADIUM	mg/l	-	-	-	-	-	0.167
ZINC	mg/l	-	-	-	-	-	6.66
MISCELLANEOUS							
CYANIDE	ug/l	-	-	-	-	-	ND
CHLORIDE	mg/l	8.6	3.4	-	4.3	-	3.7
SULFATE	mg/l	220	280	-	292	-	260
NITRATE	mg/l	-	-	-	-	-	1.33
NITRITE	mg/l	-	-	-	-	-	ND
TOX	mg/l	ND	0.04	ND	0.007	-	ND
CONDUCTANCE(LAB)	umhos/cm	-	860	1400	845	-	839
CONDUCTANCE(FLD)	umhos/cm	-	-	-	-	-	-
PHENOL	mg/l	ND	ND	-	ND	-	-
pH (LAB)	Standard	-	-	-	6.6	-	6.98
pH (FLD)	Standard	-	-	-	-	-	-
TOC	mg/l	6.1	5	4.7	8.9	-	3.9
TURBIDITY	NTU	-	-	-	-	-	-
EXPLOSIVES							
HMX	ug/l	ND	ND	ND	ND	-	ND
RDX	ug/l	ND	ND	ND	ND	-	ND
TNB 1,3,5	ug/l	-	-	-	-	-	ND
DNB 1,3	ug/l	-	-	-	-	-	ND
TETRYL	ug/l	ND	ND	ND	ND	-	ND
TNT 2,4,6	ug/l	ND	ND	ND	ND	-	ND
DNT 4-AMINO-2,6	ug/l	-	-	-	-	-	ND
DNT 2-AMINO-4,6	ug/l	-	-	-	-	-	ND
DNT 2,6	ug/l	ND	ND	ND	ND	-	ND
DNT 2,4	ug/l	ND	ND	ND	ND	-	ND

TABLE 2-8
1989 THROUGH 1993 GROUNDWATER SAMPLING
MONITORING WELL MW-2

PARAMETER	DATE/ UNITS	Mar-89	Mar-90	Sept-90	Mar-91	Sept-91	Jan-93
METALS							
ALUMINUM	mg/l	-	-	-	-	-	42
ANTIMONY	mg/l	-	-	-	-	-	ND
ARSENIC	mg/l	ND	-	-	-	-	0.0035
BARIUM	mg/l	0.078	-	-	-	-	0.51
BERYLLIUM	mg/l	-	-	-	-	-	0.0032
CADMIUM	mg/l	ND	-	-	-	-	0.0034
CALCIUM	mg/l	-	-	-	-	-	201
CHROMIUM	mg/l	ND	-	-	-	-	0.0609
COBALT	mg/l	-	-	-	-	-	0.0449
COPPER	mg/l	-	-	-	-	-	0.233
IRON	mg/l	0.032	1.4	-	ND	-	67.8
LEAD	mg/l	ND	-	-	-	-	0.116
MAGNESIUM	mg/l	-	-	-	-	-	34.2
MANGANESE	mg/l	-	0.011	-	ND	-	1.95
MERCURY	mg/l	0.002	-	-	-	-	0.00099
NICKEL	mg/l	-	-	-	-	-	0.146
POTASSIUM	mg/l	0.8	-	-	-	-	7.65
SELENIUM	mg/l	ND	-	-	-	-	0.0041
SILVER	mg/l	ND	-	-	-	-	ND
SODIUM	mg/l	6.8	3.5	-	14.4	-	14.9
THALLIUM	mg/l	-	-	-	-	-	ND
VANADIUM	mg/l	-	-	-	-	-	0.068
ZINC	mg/l	-	-	-	-	-	0.45
MISCELLANEOUS							
CYANIDE	ug/l	-	-	-	-	-	ND
CHLORIDE	mg/l	6.2	2.6	-	2.6	-	2
SULFATE	mg/l	220	73	-	103	-	97
NITRATE	mg/l	140	-	-	-	-	0.03
NITRITE	mg/l	-	-	-	-	-	ND
TOX	mg/l	ND	0.05	ND	0.012	-	ND
CONDUCTANCE(LAB)	umhos/cm	-	520	1700	585	-	626
CONDUCTANCE(FLD)	umhos/cm	-	-	-	-	-	-
PHENOL	mg/l	ND	ND	-	0.003	-	-
pH (LAB)	Standard	-	-	-	6.8	-	7.29
pH (FLD)	Standard	-	-	-	-	-	-
TOC	mg/l	4.5	6.4	7.1	250	-	2.2
TURBIDITY	NTU	-	-	-	-	-	-
EXPLOSIVES							
HMX	ug/l	ND	ND	ND	ND	-	ND
RDX	ug/l	ND	ND	ND	ND	-	ND
TNB 1,3,5	ug/l	-	-	-	-	-	ND
DNB 1,3	ug/l	-	-	-	-	-	ND
TETRYL	ug/l	ND	ND	ND	ND	-	ND
TNT 2,4,6	ug/l	ND	ND	ND	ND	-	ND
DNT 4-AMINO-2,6	ug/l	-	-	-	-	-	ND
DNT 2-AMINO-4,6	ug/l	-	-	-	-	-	ND
DNT 2,6	ug/l	ND	ND	ND	ND	-	ND
DNT 2,4	ug/l	ND	ND	ND	ND	-	ND

TABLE 2-9
1989 THROUGH 1993 GROUNDWATER SAMPLING
MONITORING WELL MW-3

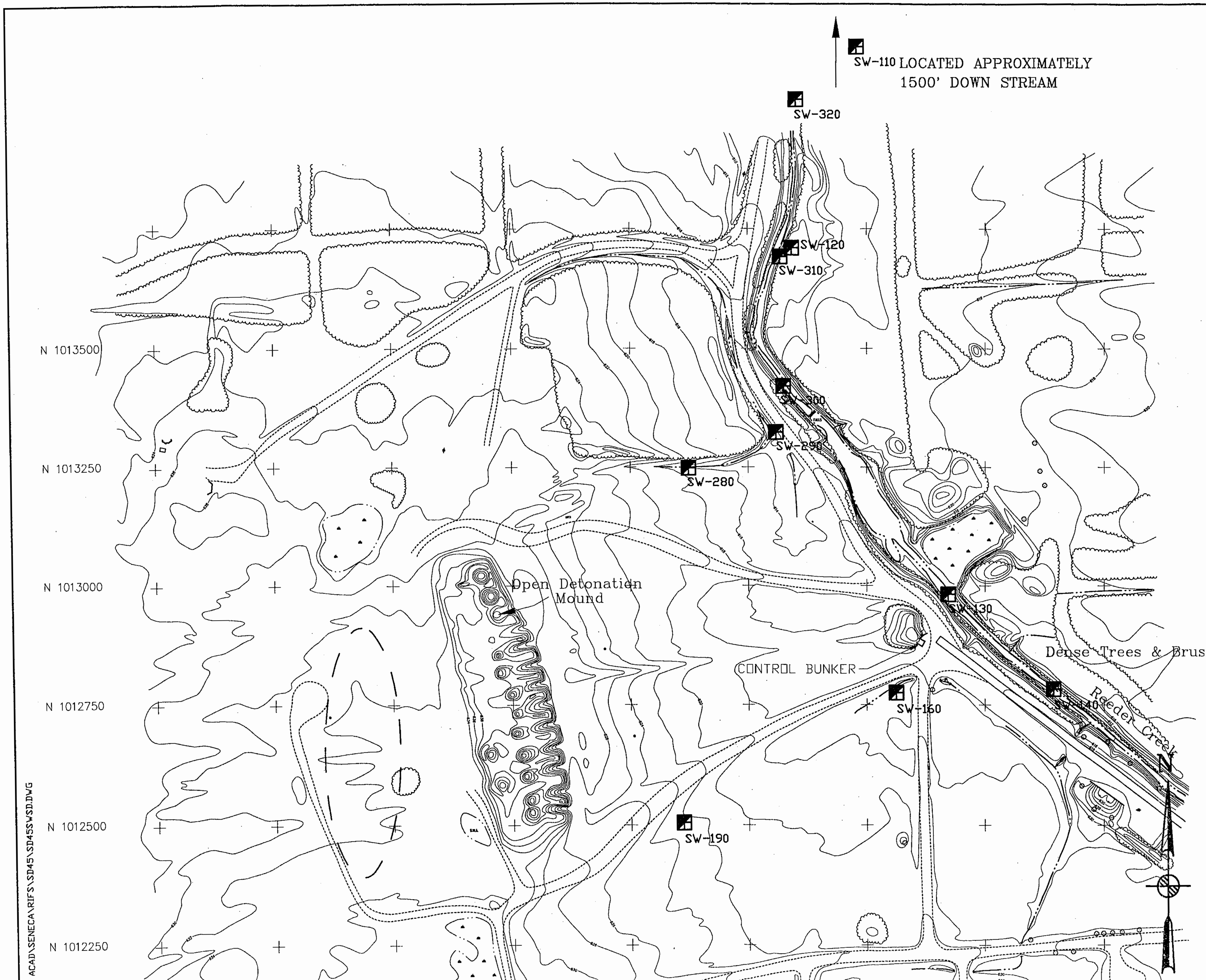
PARAMETER	DATE/ UNITS	Mar-89	Mar-90	Sept-90	Mar-91	Sept-91	Jan-93
METALS							
ALUMINUM	mg/l	-	-	-	-	-	0.367
ANTIMONY	mg/l	-	-	-	-	-	ND
ARSENIC	mg/l	ND	-	-	-	-	ND
BARIUM	mg/l	0.058	-	-	-	-	0.0468
BERYLLIUM	mg/l	-	-	-	-	-	ND
CADMIUM	mg/l	ND	-	-	-	-	ND
CALCIUM	mg/l	-	-	-	-	-	128
CHROMIUM	mg/l	ND	-	-	-	-	ND
COBALT	mg/l	-	-	-	-	-	ND
COPPER	mg/l	-	-	-	-	-	0.0022
IRON	mg/l	0.043	0.67	-	ND	-	0.462
LEAD	mg/l	ND	-	-	-	-	0.0017
MAGNESIUM	mg/l	-	-	-	-	-	25.4
MANGANESE	mg/l	-	ND	-	ND	-	0.0248
MERCURY	mg/l	ND	-	-	-	-	0.00015
NICKEL	mg/l	-	-	-	-	-	ND
POTASSIUM	mg/l	0.9	-	-	-	-	0.958
SELENIUM	mg/l	ND	-	-	-	-	0.0012
SILVER	mg/l	ND	-	-	-	-	ND
SODIUM	mg/l	3.7	3.4	-	3.5	-	3.99
THALLIUM	mg/l	-	-	-	-	-	ND
VANADIUM	mg/l	-	-	-	-	-	ND
ZINC	mg/l	-	-	-	-	-	0.0062
MISCELLANEOUS							
CYANIDE	ug/l	-	-	-	-	-	ND
CHLORIDE	mg/l	13	4	-	4.3	-	3.2
SULFATE	mg/l	210	100	-	60	-	96
NITRATE	mg/l	-	-	-	-	-	0.03
NITRITE	mg/l	-	-	-	-	-	ND
TOX	mg/l	ND	0.06	ND	9.2	ND	ND
CONDUCTANCE(LAB)	umhos/cm	-	650	1400	575	838	742
CONDUCTANCE(FLD)	umhos/cm	-	-	-	-	-	-
PHENOL	mg/l	ND	ND	-	ND	-	-
pH (LAB)	Standard	-	-	-	6.8	7.1	7.27
pH (FLD)	Standard	-	-	-	-	-	-
TOC	mg/l	5.6	6.2	5.9	7.3	15.6	3
TURBIDITY	NTU	-	-	-	-	-	-
EXPLOSIVES							
HMX	ug/l	ND	ND	ND	ND	ND	ND
RDX	ug/l	ND	ND	ND	ND	ND	ND
TNB 1,3,5	ug/l	-	-	-	-	-	ND
DNB 1,3	ug/l	-	-	-	-	-	ND
TETRYL	ug/l	ND	ND	ND	ND	ND	ND
TNT 2,4,6	ug/l	ND	ND	ND	ND	ND	ND
DNT 4-AMINO-2,6	ug/l	-	-	-	-	-	ND
DNT 2-AMINO-4,6	ug/l	-	-	-	-	-	ND
DNT 2,6	ug/l	ND	ND	ND	ND	ND	ND
DNT 2,4	ug/l	ND	ND	ND	ND	ND	ND

TABLE 2-10
1989 THROUGH 1993 GROUNDWATER SAMPLING
MONITORING WELL MW-4

PARAMETER	DATE/ UNITS	Mar-89	Mar-90	Sept-90	Mar-91	Sept-91	Jan-93
METALS							
ALUMINUM	mg/l	-	-	-	-	-	71.3
ANTIMONY	mg/l	-	-	-	-	-	ND
ARSENIC	mg/l	ND	-	-	-	-	0.004
BARIUM	mg/l	0.072	-	-	-	-	0.721
BERYLLIUM	mg/l	-	-	-	-	-	0.0048
CADMIUM	mg/l	0.001	-	-	-	-	0.0196
CALCIUM	mg/l	-	-	-	-	-	429
CHROMIUM	mg/l	ND	-	-	-	-	0.104
COBALT	mg/l	-	-	-	-	-	0.0617
COPPER	mg/l	-	-	-	-	-	0.505
IRON	mg/l	0.042	4.1	-	ND	-	113
LEAD	mg/l	ND	-	-	-	-	0.12
MAGNESIUM	mg/l	-	-	-	-	-	70.5
MANGANESE	mg/l	-	0.064	-	0.03	-	2.7
MERCURY	mg/l	ND	-	-	-	-	0.0111
NICKEL	mg/l	-	-	-	-	-	0.186
POTASSIUM	mg/l	4.1	-	-	-	-	13.5
SELENIUM	mg/l	ND	-	-	-	-	0.0039
SILVER	mg/l	ND	-	-	-	-	ND
SODIUM	mg/l	9	16	-	22.3	-	23.3
THALLIUM	mg/l	-	-	-	-	-	ND
VANADIUM	mg/l	-	-	-	-	-	0.0985
ZINC	mg/l	-	-	-	-	-	0.817
MISCELLANEOUS							
CYANIDE	ug/l	-	-	-	-	-	ND
CHLORIDE	mg/l	6.4	3.5	-	4.3	-	2.8
SULFATE	mg/l	130	220	-	232	-	240
NITRATE	mg/l	-	-	-	-	-	0.04
NITRITE	mg/l	-	-	-	-	-	ND
TOX	mg/l	0.02	0.02	ND	0.005	-	ND
CONDUCTANCE(LAB)	umhos/cm	-	890	1400	900	-	875
CONDUCTANCE(FLD)	umhos/cm	-	-	-	-	-	-
PHENOL	mg/l	ND	ND	-	ND	-	-
pH (LAB)	Standard	-	-	-	6.6	-	7.17
pH (FLD)	Standard	-	-	-	-	-	-
TOC	mg/l	11.3	5	9	3.6	-	3.4
TURBIDITY	NTU	-	-	-	-	-	-
EXPLOSIVES							
HMX	ug/l	ND	ND	ND	ND	-	ND
RDX	ug/l	ND	ND	ND	ND	-	ND
TNB 1,3,5	ug/l	-	-	-	-	-	ND
DNB 1,3	ug/l	-	-	-	-	-	ND
TETRYL	ug/l	ND	ND	ND	ND	-	ND
TNT 2,4,6	ug/l	ND	ND	ND	ND	-	ND
DNT 4-AMINO-2,6	ug/l	-	-	-	-	-	ND
DNT 2-AMINO-4,6	ug/l	-	-	-	-	-	ND
DNT 2,6	ug/l	ND	ND	ND	ND	-	ND
DNT 2,4	ug/l	ND	ND	ND	ND	-	ND

TABLE 2-11
1989 THROUGH 1993 GROUNDWATER SAMPLING
MONITORING WELL MW-5

PARAMETER	DATE/ UNITS	Mar-89	Mar-90	Sept-90	Mar-91	Sept-91	Jan-93
METALS							
ALUMINUM	mg/l	-	-	-	-	-	2.39
ANTIMONY	mg/l	-	-	-	-	-	ND
ARSENIC	mg/l	ND	-	-	-	-	ND
BARIUM	mg/l	0.06	-	-	-	-	0.0729
BERYLLIUM	mg/l	-	-	-	-	-	ND
CADMIUM	mg/l	ND	-	-	-	-	ND
CALCIUM	mg/l	-	-	-	-	-	112
CHROMIUM	mg/l	ND	-	-	-	-	0.0023
COBALT	mg/l	-	-	-	-	-	ND
COPPER	mg/l	-	-	-	-	-	0.0022
IRON	mg/l	0.024	0.79	-	ND	-	2.83
LEAD	mg/l	ND	-	-	-	-	0.0013
MAGNESIUM	mg/l	-	-	-	-	-	27
MANGANESE	mg/l	-	0.028	-	0.02	-	0.0622
MERCURY	mg/l	ND	-	-	-	-	ND
NICKEL	mg/l	-	-	-	-	-	ND
POTASSIUM	mg/l	0.8	-	-	-	-	1.1
SELENIUM	mg/l	ND	-	-	-	-	0.0016
SILVER	mg/l	ND	-	-	-	-	ND
SODIUM	mg/l	6.9	5.3	-	15.9	-	16.6
THALLIUM	mg/l	-	-	-	-	-	ND
VANADIUM	mg/l	-	-	-	-	-	0.0031
ZINC	mg/l	-	-	-	-	-	0.0085
MISCELLANEOUS							
CYANIDE	ug/l	-	-	-	-	-	ND
CHLORIDE	mg/l	6.2	2.8	-	3.5	-	2.5
SULFATE	mg/l	100	70	-	94	-	107
NITRATE	mg/l	-	-	-	-	-	5
NITRITE	mg/l	-	-	-	-	-	ND
TOX	mg/l	ND	0.03	0.02	ND	-	ND
CONDUCTANCE(LAB)	umhos/cm	-	3500	1700	730	-	767
CONDUCTANCE(FLD)	umhos/cm	-	-	-	-	-	-
PHENOL	mg/l	ND	ND	-	ND	-	-
pH (LAB)	Standard	-	-	-	6.9	-	7.23
pH (FLD)	Standard	-	-	-	-	-	-
TOC	mg/l	3.5	6.2	4.3	6	-	1.7
TURBIDITY	NTU	-	-	-	-	-	-
EXPLOSIVES							
HMX	ug/l	ND	ND	ND	ND	-	ND
RDX	ug/l	ND	ND	ND	ND	-	ND
TNB 1,3,5	ug/l	-	-	-	-	-	ND
DNB 1,3	ug/l	-	-	-	-	-	ND
TETRYL	ug/l	ND	ND	ND	ND	-	ND
TNT 2,4,6	ug/l	ND	ND	ND	ND	-	ND
DNT 4-AMINO-2,6	ug/l	-	-	-	-	-	ND
DNT 2-AMINO-4,6	ug/l	-	-	-	-	-	ND
DNT 2,6	ug/l	ND	ND	ND	ND	-	ND
DNT 2,4	ug/l	ND	ND	ND	ND	-	ND



LEGEND

MINOR WATERWAY
MAJOR WATERWAY
FENCE
UNPAVED ROAD
BRUSH LINE
LANDFILL EXTENTS
RAILROAD
760 GROUND SURFACE ELEVATION CONTOUR
ROAD SIGN
DECIDUOUS TREE
GUIDE POST
FIRE HYDRANT
MANHOLE
COORDINATE GRID (250' GRID)
POLE
UTILITY BOX
MAILBOX/RR SIGNAL
OVERHEAD UTILITY POLE
SURVEY MONUMENT
LOCATION OF DETONATION MOUND IN 1968
EXISTING SURFACE WATER SEDIMENT SEDIMENT SAMPLE LOCATION

100 0 100 200
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS

DEPT. ENVIRONMENTAL ENGINEERING	Dwg. No. 726510-03001

FIGURE 2-1
OPEN BURNING GROUNDS REMEDIAL INVESTIGATION
SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

SCALE	DATE	REV
1" = 200'	AUGUST 1996	A

The explosive RDX was detected in the surface water samples SW-120 and SW-160DL. RDX was detected in SW-160DL at a concentration of 9.4 ppb. Of the three surface water sample locations in Reeder Creek, only the sample SW-120 contained explosives. A concentration of 0.67 ppb of RDX was detected there. New York State has no established criteria for explosives in Class D surface water.

Based on Class D surface water criteria, the only surface water sample exceeding New York standards for heavy metals was SW-290 with a concentration of 59.8 ppb of copper. In eight of the nine samples, barium was detected, but there is no Class D surface water criteria for barium. The Level IV analyses for the surface water samples are presented in Table 2-12.

Of the sediment samples taken at the same locations, only SD-190 and SD-290 contained explosives. SD-190 contained all six of the explosives for which the samples were analyzed. RDX had the highest reported sediment concentration of 500 ppb in this sample. The maximum concentration of HMX reported was 130 ppb which was found in the sample SD-290.

Heavy metals exceeding NYSDEC sediment criteria were found at each of the nine sediment locations sampled for the OB RI. The metals found in exceedance were arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc. Copper and iron exceeded NYSDEC criteria in eight of the nine samples, and lead, nickel, and zinc exceeded NYSDEC criteria in seven of the nine samples. The Level IV analyses for the sediment samples is presented in Table 2-13.

2.4.7 1993 ESI

The ESI conducted at SEAD-45 by Engineering-Science, Inc. in 1993 involved completing 14 test pits in and near the demolition mound; installing four groundwater monitoring wells up and downgradient of the demolition mound; and the collection of surface soil, subsurface soil, surface water, groundwater, and sediment samples. Figure 2-2 shows the locations for all of the test pits and samples collected. The Level IV analyses for the soil, groundwater, surface water and sediment samples can be found in Tables 2-14 through 2-17.

A total of nine surface soil and five subsurface soil samples were collected at SEAD-45. Four surface water and four sediment samples were collected from the drainage swales and low-lying areas at the site, and eight groundwater samples were collected from the newly installed wells, MW45-2 through MW45-4, as well as the pre-existing wells MW-1 through MW-5.

TABLE 2-12

SURFACE WATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
OB GROUNDS REMEDIAL INVESTIGATION

	FREQUENCY OF DETECTION	MAXIMUM DETECTED	NYS STANDARDS (a)	NUMBER OF REEDER CRI SAMPLES ABOVE NYS STANDARDS	NUMBER OF WETLAND SAMPLES ABOVE NYS STANDARDS	WATER SW-110 11/07/91 Reeder Creek	WATER SW-120 11/07/91 Reeder Creek	WATER SW-120 12/12/91 Reeder Creek	WATER SW-120 11/12/91 Reeder Creek	WATER SW-120 12/12/91 Reeder Creek	WATER SW-130 11/07/91 Reeder Creek	(Upstream) WATER SW-196 11/12/91 Reeder Creek
VOCs (ug/L)												
Methylene Chloride	3.3%	8	5	1	0	5 U	5 U	5 U	N	N	5 U	5 U
Acetone	6.7%	10	-	NA	NA	10 U	10 U	10	N	N	10 U	10 U
Carbon Disulfide	3.3%	3	-	NA	NA	5 U	5 U	5 U	N	N	5 U	5 U
1,2-Dichloroethane	3.3%	2	0.8	1	0	5 U	5 U	5 U	N	N	5 U	5 U
Trichloroethene	3.3%	10	3	0	1	5 U	5 U	5 U	N	N	5 U	5 U
Semivolatiles (ug/L)												
bis(2-Ethylhexyl)phthalate	3.2%	21	0.6	0	1	10 U	11 U	10 U	N	N	10 U	10 U
Explosives (ug/L)												
RDX	18.8%	9.4	-	NA	NA	0.12 U	0.67	0.12 U	N	N	0.12 U	0.12 U
Tetryl	3.1%	0.52	-	NA	NA	0.12 U	0.12 U	0.4 U	N	N	0.12 U	0.4 U
Metals (ug/L)												
Aluminum	33.3%	5220	NA	NA	NA	109 U	300	102 J	N	N	109 U	97.5 U J
Arsenic	10.0%	3.7	190.0	0	0	2.8 U	2.8 U	2.9 U J	N	N	2.8 U	3.7 U J
Barium	86.7%	112	NA	NA	NA	66.6 J	65.7 J	48.9 J	N	N	52.3 J	52.2 U J
Beryllium	10.0%	1.4	NA	NA	NA	3.5 U	3.5 U	1.4 J	N	N	3.5 U	1.2 U J
Calcium	100.0%	138000	NA	NA	NA	121000	114000	96000 J	N	N	100000	65800 J
Chromium	3.3%	8.6	3076.0	0	0	9.6 U	9.5 U	6.1 U J	N	N	9.5 U	6.1 U J
Copper	33.3%	59.8	34.2	0	1	19.7 U	19.6 U	14.4 U J	N	N	19.6 U	14.4 U J
Iron	73.3%	2310	300.0	3	11	98.4 J	670	142 J	N	N	236	75.3 J
Lead	56.7%	10.8	200.0	0	0	0.7 U	2.2 J	1.2 U J	N	N	0.7 U	0.7 U J
Magnesium	100.0%	33800	NA	NA	NA	18700	17300	13700 J	N	N	14400	8980 J
Manganese	86.7%	186	NA	NA	NA	14.6 J	121	43.7 J	N	N	34.5	16.8 R
Mercury	10.0%	0.08	0.2	0	0	0.08 U	0.08 U	0.08 U J	N	N	0.08 U	0.08 U J
Nickel	3.3%	5.6	3135.0	0	0	35.2 U	34.9 U	15.8 U J	N	N	35 U	15.9 U J
Potassium	56.7%	3800	NA	NA	NA	3800 J	3800 J	949 J	N	N	3070 J	2420 J
Selenium	50.0%	2.7	NA	NA	NA	1.7 U	1.7 U	1 U J	N	N	1.7 U	1.7 U J
Sodium	93.3%	59100	NA	NA	NA	26500	24700	21900 J	N	N	24100	59100 J
Vanadium	20.0%	39.2	190.0	0	0	30.9 U	30.7 U	30.3 U J	N	N	30.7 U	39.2 J
Zinc	3.3%	13.4	573.0	0	0	13.6 U	15.1 R	14.1 R	N	N	13.5 U	13.4 J
Cyanide	6.7%	14.9	22.0	0	0	10 U	10 U	10 U J	N	N	10 U	10 J

NOTES: a) Water Quality Regulations for Surface Waters and Groundwaters,.
6 NYCRR Parts 700-705, September 1991, NYSDEC Division of Water;
Class D surface water criteria were used. Selected metals values are based on a hardness of 201.
b) NA = not applicable
c) N = Compound was not analyzed.
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.

TABLE 2-12

SURFACE WATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
OB GROUNDS REMEDIAL INVESTIGATION

	FREQUENCY OF DETECTION	MAXIMUM DETECTED	NYS STANDARDS (a)	NUMBER OF REEDER CR SAMPLES ABOVE NYS STANDARDS	NUMBER OF WETLAND SAMPLES ABOVE NYS STANDARDS	WATER SW-300 12/08/92 Reeder Creek	WATER SW-310 12/08/92 Reeder Creek	WATER SW-320 12/08/92 Reeder Creek	WATER SW-160 11/12/91 Wetland	WATER SW-160 DL 1114/91 Wetland	WATER SW-290 12/07/92 Wetland
VOCs (ug/L)											
Methylene Chloride	3.3%	8	5	1	0	8 J	10 U	10 U	5 U	N	10 U
Acetone	6.7%	10	-	NA	NA	10 U	10 U	10 U	10 U	N	10 U
Carbon Disulfide	3.3%	3	-	NA	NA	10 U	10 U	10 U	5 U	N	10 U
1,2-Dichloroethane	3.3%	2	0.8	1	0	10 U	10 U	10 U	5 U	N	10 U
Trichloroethene	3.3%	10	3	0	1	10 U	10 U	10 U	5 U	N	10 U
Semivolatiles (ug/L)											
bis(2-Ethylhexyl)phthalate	3.2%	21	0.6	0	1	21 U	10 U	14 U	10 U	N	10 U
Explosives (ug/L)											
RDX	18.8%	9.4	-	NA	NA	0.21 U	0.15 U	0.14 U	9.4 R	9.4	0.24 U
Tetryl	3.1%	0.52	-	NA	NA	0.12 U	0.12 U	0.12 U	0.4 U	2 U R	0.12 U
Metals (ug/L)											
Aluminum	33.3%	5220	NA	NA	NA	126 R	62.6 U	130 R	98.3 U J	N	2100
Arsenic	10.0%	3.7	190.0	0	0	1.2 U	1.2 U	1.2 U	3.7 U J	N	1.2 U
Barium	86.7%	112	NA	NA	NA	51.7 J	47.2 J	51.3 J	68.5 R	N	112 J
Beryllium	10.0%	1.4	NA	NA	NA	0.3 U	0.3 U	0.3 U	1.2 U J	N	0.3 U
Calcium	100.0%	138000	NA	NA	NA	93800	93100	97800	93300 J	N	138000
Chromium	3.3%	8.6	3076.0	0	0	2 U	2 U	2 U	6.2 U J	N	2 U
Copper	33.3%	59.8	34.2	0	1	1.9 U	1.9 U	1.9 U	14.5 U J	N	59.8
Iron	73.3%	2310	300.0	3	11	276 R	170 R	326 R	189 J	N	2310
Lead	56.7%	10.8	200.0	0	0	0.9 U	0.9 U	0.89 U	1.4 J	N	10.8
Magnesium	100.0%	33800	NA	NA	NA	15500	15500	16400	9320 J	N	33800
Manganese	86.7%	186	NA	NA	NA	47	32	53	14.9 R	N	186
Mercury	10.0%	0.08	0.2	0	0	0.06 U	0.06 U	0.06 U	0.08 U J	N	0.06 U
Nickel	3.3%	5.6	3135.0	0	0	3.5 U	3.5 U	3.5 U	16 U J	N	5.6 J
Potassium	56.7%	3800	NA	NA	NA	1890 R	1780 R	1300 R	1860 J	N	2100 R
Selenium	50.0%	2.7	NA	NA	NA	1.2 J	1.6 J	1.4 J	1.7 U J	N	2.7 J
Sodium	93.3%	59100	NA	NA	NA	11900	10300	10600	4170 J	N	7290
Vanadium	20.0%	39.2	190.0	0	0	2.1 U	2.1 U	2.1 U	37.2 J	N	2.1 U
Zinc	3.3%	13.4	573.0	0	0	3 R	3 R	5.3 R	13.5 U J	N	97.4 R
Cyanide	6.7%	14.9	22.0	0	0	14.9	10 U	10 U	10 U	N	10 U

NOTES: a) Water Quality Regulations for Surface Waters and Groundwaters,.
6 NYCRR Parts 700-705, September 1991, NYSDEC Division of Water;
Class D surface water criteria were used. Selected metals values are based on a
b) NA = not applicable
c) N = Compound was not analyzed.
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.

TABLE 2-13

SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
OB GROUNDS REMEDIAL INVESTIGATION

	FREQUENCY OF DETECTION	MAXIMUM DETECTED	NYSDEC SEDIMENT CRITERIA FOR AQUATIC LIFE (a)	NUMBER OF SAMPLES ABOVE NYSDEC SEDIMENT CRITERIA	SW-120 12/10/91	SW-120 12/10/91	SW-120 11/07/91	SW-130 11/07/91	SW-140 11/08/91	SW-150 11/15/91	SW-150 11/08/91	SW-150 11/08/91	SW-160 11/12/91	SW-170 11/12/91	SW-180 11/08/91	SW-180 12/12/91
VOCs (ug/kg)																
Acetone	5.9%	34	-	NA	10 J	N	19 U	19 U	23 U	17 U	21 U	20 U	16 U	18 U	13 U	25 U
Carbon Disulfide	5.9%	6	-	NA	6 U	N	9 U	9 U	11 U	9 U	10 U	10 U	8 U	9 U	7 U	10 U
Chloroform	17.6%	20	-	NA	2 J	N	9 U	9 U	11 U	9 J	20 J	9 J	2 J	9 U	3 J	10 U
Trichloroethene	2.9%	18	-	NA	6 U	N	9 U	9 U	11 U	9 U	10 U	10 U	8 U	9 U	7 U	10 U
Semivolatiles (ug/kg)																
4-Methylphenol	9.4%	350	6 (b)	3	350 J	350 J	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	N
Naphthalene	6.3%	24	-	NA	800 U	800 U	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	N
2-Methylnaphthalene	3.1%	12	-	NA	800 U	800 U	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	N
2,6-Dinitrotoluene	3.1%	120	-	NA	800 U	800 U	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	N
2,4-Dinitrotoluene	12.5%	1600	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
N-Nitrosodiphenylamine (1)	12.5%	120	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Phenanthrene	15.6%	76	1390	0	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Anthracene	3.1%	77	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Carbazole	6.7%	27	-	NA	N	N	N	N	N	N	N	N	N	N	N	N
Di-n-butylphthalate	18.8%	730	1197(c)	0	250 J	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Fluoranthene	9.4%	140	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Pyrene	12.5%	110	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Benzo(a)anthracene	3.1%	48	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Chrysene	6.3%	62	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
bis(2-Ethylhexyl)phthalate	46.9%	96	1197(c)	0	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Benzo(b)fluoranthene	3.1%	52	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
benzo(k)fluoranthene	3.1%	54	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Benzo(a)pyrene	3.1%	38	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Indeno(1,2,3-cd)pyrene	3.1%	37	-	NA	800 U	N	810 U	3100 U	790 U	980 U	N	N	1000 U	1000 U	900 U	960 U
Pesticides/PCBs (ug/kg)																
4,4'-DDE	9.4%	10	500	0	39 U	N	39 U	38 U	38 U	43 U	N	N	49 U	49 U	44 U	47 U
4,4'-DDT	6.3%	13	500	0	39 U	N	39 U	38 U	38 U	43 U	N	N	49 U	49 U	44 U	47 U
Explosives (ug/kg)																
HMX	6.5%	130	-	NA	1000 U	N	120 U	1000 U	120 U	1000 U	N	N	1000 U	1000 U	120 U	1000 U
RDX	3.2%	500	-	NA	120 U	N	120 U	120 U	120 U	120 U	N	N	120 U	120 U	120 U	120 U
2,4,6-Trinitrotoluene	3.2%	100	-	NA	120 U	N	120 U	120 U	120 U	120 U	N	N	120 U	120 U	120 U	120 U
4-amino-2,6-Dinitrotoluene	3.2%	160	-	NA	120 U	N	120 U	120 U	120 U	120 U	N	N	120 U	120 U	120 U	120 U
2-amino-4,6-Dinitrotoluene	6.5%	180	-	NA	120 U	N	120 U	120 U	120 U	120 U	N	N	120 U	120 U	120 U	120 U
2,4-Dinitrotoluene	9.7%	98	-	NA	120 U	N	120 U	120 U	120 U	120 U	N	N	120 U	120 U	120 U	120 U
Metals (mg/kg)																
Aluminum	93.8%	25800	-	NA	10700 J	N	10600	6450 U	15600	N	11900 U	13700	17300	19000	25800	17500 J
Antimony	6.3%	28.3	-	NA	6.4 U J	N	8 U R	7.5 U R	7 U R	N	8.8 U R	13.7 U R	10.7 U R	15 U R	10.4 U R	8.3 J
Arsenic	75.0%	9.5	5	11	7.4 J	N	3.9 R	5 U	3.9 R	N	3.4 U R	3.7 R	4.8	7.1	5.1 R	2.5 J
Barium	78.1%	1780	-	NA	53.9 J	N	39.3 R	23.6 J	55.3 R	N	35.6 R	47 R	158	245	385 R	149 J
Beryllium	68.8%	1.6	-	NA	0.68 R	N	0.64 R	0.45 U	0.81 R	N	0.67 U R	0.94 R	1	1.1 J	1.2 R	0.9 R
Cadmium	71.9%	9.7	2.5	10	2.3 J	N	2.7 J	1.8 U	3.4 J	N	2.7 U J	2.4 J	4.1	4.2	3.3 J	2 J
Calcium	100.0%	104000	-	NA	24200 J	N	27700	31100	28900	N	28200	17800	9500	12100	2420	2020 J
Chromium	75.0%	41.8	26	6	21.5 J	N	20.2 R	14.4 U	28.1 R	N	21.7 U R	26.5 R	27.1	28.5	35.5 R	24.3 J
Cobalt	75.0%	17.8	-	NA	10.2 J	N	8 R	6.5 U	11 R	N	10 U R	10.8 R	14.6	11 J	11.6 R	10.9 J
Copper	93.8%	3790	19	30	49.7 J	N	25.3 J	18.7 U	31.6 J	N	31.4 U J	32.6 J	88 J	158 J	105 J	84.5 J
Iron	100.0%	40900	24,000	28	24400 J	N	27500	24200	38500	N	28300	32800	32900	31300	37100	24100 J
Lead	96.9%	7400	27	23	311 J	N	28.3	21 U	20.3	N	49.9 J	24.6	66	131	274	36.5 J
Magnesium	100.0%	12000	-	NA	6030 J	N	5660	3720	7930	N	6260	7020	6260	6270	7010	4690 J
Manganese	100.0%	1520	428	15	339 J	N	540	346 J	596	N	373 J	367	1520 J	362 J	468	383 J
Mercury	68.8%	2	0.11	10	0.69 J	N	0.12 R	0.04 U	0.04 R	N	0.15 U	0.07 R	1.1	0.91	0.13 R	0.09 J
Nickel	75.0%	64.4	22	24	35.7 J	N	33.5 R	22.1 U	44 R	N	39.9 U R	43 R	43	45.3	41.6 R	29.8 J
Potassium	100.0%	3530	-	NA	1010 J	N	1030	574 J	1510	N	1120 J	1750	2000	2660	3340	1460 J
Selenium	43.8%	1.8	-	NA	0.22 U J	N	0.22 R	0.37 U J	0.16 U R	N	0.23 U R	0.29 R	3 U J	0.4 U J	0.22 U R	0.13 U J
Silver	15.6%	1.9	-	NA	1 U J	N	1.2 U R	1.2 U	1 U R	N	1.3 U R	2 U R	1.7 U	2.4 U	1.6 U R	1.2 U J
Sodium	59.4%	191	-	NA	63.9 J	N	64.5 J	70.4	96 J	N	67.8 J	105 U	97.9 J	107 J	79.8 U	43.9 U J
Vanadium	75.0%	37.9	-	NA	17.1 J	N	17.3 R	10.4 U	23.4 R	N	19.7 R	23.4 R	24	30.8	39.8 R	26.3 J
Zinc	81.3%	1200	85	19	122 J	N	90.3 R	39.6 U	108 R	N	60.2 U R	87.1 R	233	272	131 R	107 J
Cyanide	6.3%	0.77	-	NA	0.66 U J	N	0.72 U	0.62	0.66 U	N	0.77	0.79 U	0.91 U	0.88 U	0.77 U	0.81 U J

NOTES: a) NYSDEC Sediment Criteria - 1989.
b) NYSDEC 1989 guidelines for total phenols
c) Used NYSDEC 1989 guideline for phthalates (bis(2-Ethylhexyl) phthalate.
d) NA = not applicable
e) N = Compound was not analyzed.
f) U = Compound was not detected.
g) J = The reported value is an estimated concentration.
h) R = The data was rejected in the data validation process.

SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
OB GROUNDS REMEDIAL INVESTIGATION

	FREQUENCY OF DETECTION	MAXIMUM DETECTED	NYSDEC SEDIMENT CRITERIA FOR AQUATIC LIFE (a)	NUMBER OF SAMPLES ABOVE NYSDEC SEDIMENT CRITERIA	SW-190 11/06/91	SW-191 11/06/91	SW-192 11/13/91	SW-192 11/13/91	SW-193 11/13/91	SW-194 11/13/91	SW-195 11/13/91	SW-196 11/12/91	SW-197 11/15/91	SD-200 12/03/92	SD-200RE 12/03/92	SD-210 12/03/92
VOCs (ug/kg)																
Acetone	5.9%	34	-	NA	11 U	25 R	28 U	20 U	16 U	14 U	19 U	12 U	17 U	14 U	N	13 U
Carbon Disulfide	5.9%	6	-	NA	6 U	10 U	10 U	10 U	8 U	7 U	9 U	6 U	8 U	14 U	N	13 U
Chloroform	17.6%	20	-	NA	6 U	10 U	10 U	10 U	8 U	7 U	9 U	6 U	8 U	14 U	N	13 U
Trichloroethene	2.9%	18	-	NA	6 U	10 U	10 U	10 U	8 U	7 U	9 U	6 U	8 U	14 U	N	13 U
Semivolatiles (ug/kg)																
4-Methylphenol	9.4%	350	6 (b)	3	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	470 U	440 U
Naphthalene	6.3%	24	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	470 U	440 U
2-Methylnaphthalene	3.1%	12	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	470 U	440 U
2,6-Dinitrotoluene	3.1%	120	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	470 U	440 U
2,4-Dinitrotoluene	12.5%	1600	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	130 J	140 J	440 U
N-Nitrosodiphenylamine (1)	12.5%	120	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	87 J	80 J	440 U
Phenanthrene	15.6%	76	1390	0	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	76 J	440 U
Anthracene	3.1%	77	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	77 J	440 U
Carbazole	6.7%	27	-	NA	N	N	N	N	N	N	N	N	N	470 U	27 J	440 U
Di-n-butylphthalate	18.8%	730	1197(c)	0	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	730 J	460 J	210 J
Fluoranthene	9.4%	140	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	140 J	440 U
Pyrene	12.5%	110	-	NA	100 J	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	110 J	440 U
Benzo(a)anthracene	3.1%	48	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	48 J	440 U
Chrysene	6.3%	62	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	62 J	440 U
bis(2-Ethylhexyl)phthalate	46.9%	96	1197(c)	0	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	54 J	61 J	57 J
Benzo(b)fluoranthene	3.1%	52	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	52 J	440 U
benzo(k)fluoranthene	3.1%	54	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	54 J	440 U
Benzo(a)pyrene	3.1%	38	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	38 J	440 U
Indeno(1,2,3-cd)pyrene	3.1%	37	-	NA	740 U	2600 U	1700 U	N	960 U	1000 U	1200 U	780 U	1200 U	470 U	37 J	440 U
Pesticides/PCBs (ug/kg)																
4,4'-DDE	9.4%	10	500	0	36 U	130 U	80 U	N	46 U	51 U	59 U	38 U	57 U	2.8 J	N	2.8 J
4,4'-DDT	6.3%	13	500	0	36 U	130 U	80 U	N	46 U	51 U	59 U	38 U	57 U	4.7 U	N	13
Explosives (ug/kg)																
HMX	6.5%	130	-	NA	120 J	120 U	1000 U	N	1000 U	1000 U	1000 U	1000 U	1000 U	120 U	N	120 U
RDX	3.2%	500	-	NA	500	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U
2,4,6-Trinitrotoluene	3.2%	100	-	NA	100 J	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U
4-amino-2,6-Dinitrotoluene	3.2%	160	-	NA	160	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U
2-amino-4,6-Dinitrotoluene	6.5%	180	-	NA	180	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U
2,4-Dinitrotoluene	9.7%	98	-	NA	98 J	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U	N	93 J
Metals (mg/kg)																
Aluminum	93.8%	25800	-	NA	18700	19100	22900	N	16000	15800	14000	8310	15400	18000	N	14300
Antimony	6.3%	28.3	-	NA	9.5 U R	37.3 U R	21.2 U R	N	11.8 U R	12.9 U R	14.1 U R	10.3 U R	11.4 U R	28.3 J	N	8.8 UJ
Arsenic	75.0%	9.5	5	11	4.9 R	4.7 R	7.4	N	6	3.8	5.7	4.4	6.6	5.1	N	4.2
Barium	78.1%	1780	-	NA	183 R	701 R	313	N	106	196	170	44.1	106	1780	N	373
Beryllium	68.8%	1.6	-	NA	1 R	2.4 U R	1.6 J	N	0.97 J	0.98 J	1.1 J	0.71 J	1	0.93 J	N	0.8
Cadmium	71.9%	9.7	2.5	10	9.7 J	6.3 J	5	N	2.3	2.8	2.8	2	2	2.3	N	2.6
Calcium	100.0%	104000	-	NA	28700	11900	10100	N	5720	15100	3130	104000	2840	5640	N	12300
Chromium	75.0%	41.8	26	6	27.4 R	34.6 R	41.8	N	25.3	24.6	23.5	15.2	21.7	30.3	N	25.2
Cobalt	75.0%	17.8	-	NA	12.8 R	21.8 U R	17.7 J	N	16.1	11.3 J	9.5 J	7.5 J	11.3	14.3	N	13.6
Copper	93.8%	3790	19	30	416	259	217 J	N	21.2 J	82.4 J	69.4 J	22.4 J	24.4 J	3790	N	301
Iron	100.0%	40900	24,000	28	34300	31700	40900	N	33000	31100	23700	23900	28600	35800	N	31800
Lead	96.9%	7400	27	23	59.3	463	280	N	331.9	268	73.6	15.4	31.7	7400	N	829
Magnesium	100.0%	12000	-	NA	7860	8100	9900	N	5410	6500	4430	12000	4310	6700	N	5760
Manganese	100.0%	1520	428	15	659	586	439 J	N	555 J	532 J	322 J	468 J	338 J	530	N	598
Mercury	68.8%	2	0.11	10	2	0.29 R	0.18 J	N	0.04 U	0.54	0.1 J	0.17	0.06 U	0.14	N	0.08 J
Nickel	75.0%	64.4	22	24	39.1 R	56.8 R	64.4	N	40.8	38.2	31.6	23.3	30.2	42.2	N	43
Potassium	100.0%	3530	-	NA	2940	3350 J	3530	N	2210	1980	1920	938	1540	1990	N	1180
Selenium	43.8%	1.8	-	NA	0.12 U R	0.62 R	0.45 U J	N	0.4 U J	0.49 U J	0.57 U J	0.31 U J	0.35 U J	1.6 J	N	0.74 J
Silver	15.6%	1.9	-	NA	1.8 R	5.6 R	3.4 U	N	1.9 U	2.1 U	2.3 U	1.7 U	1.8 U	0.9 J	N	1.9
Sodium	59.4%	191	-	NA	73 U	285 U	123 U	N	68.5 U	74.5 U	81.7 U	194 U	65.8 U	159 J	N	59.3 J
Vanadium	75.0%	37.9	-	NA	30.3 R	38.1 R	37.9	N	24.6	22.6	21.9	10.9	27.2	28.7	N	23
Zinc	81.3%	1200	85	19	360	419	655	N	100	251	281	76	89	1200	N	386
Cyanide	6.3%	0.77	-	NA	0.67 U	2 U	1.3 U	N	0.81 U	0.82 U	1 U	0.71 U	0.98 U	0.51 U	N	0.59 U

NOTES: a) NYSDEC Sediment Criteria - 1989.
b) NYSDEC 1989 guidelines for total phenols
c) Used NYSDEC 1989 guideline for phthalates (bis(2-Ethylhexyl) phthalate.
d) NA = not applicable
e) N = Compound was not analyzed.
f) U = Compound was not detected.
g) J = The reported value is an estimated concentration.
h) R = The data was rejected in the data validation process.

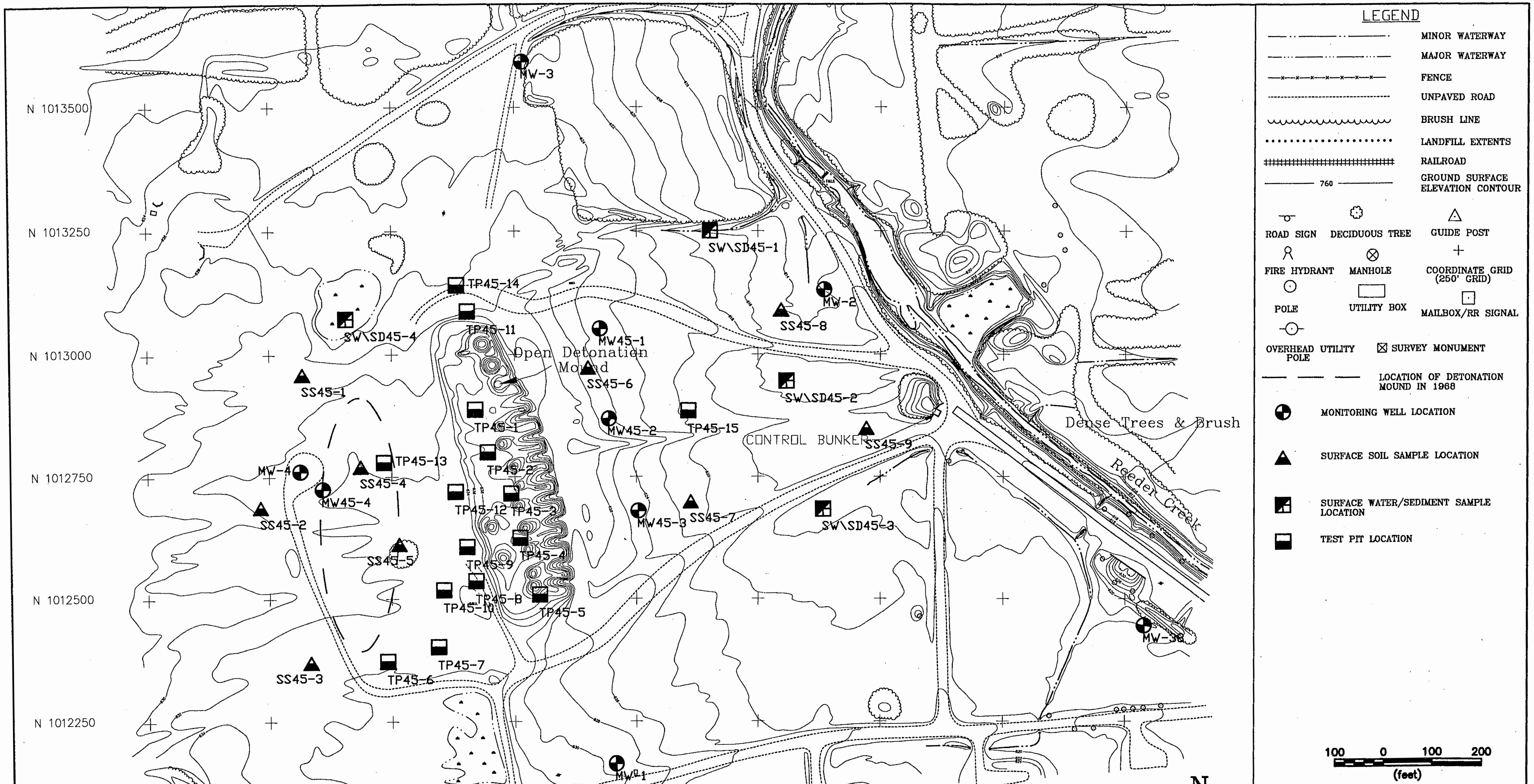
TABLE 2-13 (continued)

SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
OB GROUNDS REMEDIAL INVESTIGATION

	FREQUENCY OF DETECTION	MAXIMUM DETECTED	NYSDEC SEDIMENT CRITERIA FOR AQUATIC LIFE (a)	NUMBER OF SAMPLES ABOVE NYSDEC SEDIMENT CRITERIA	SD-220 12/03/92	SD-230 12/03/92	SD-240 12/04/92	SD-250 12/04/92	SD-260 12/07/92	SD-261 12/07/92	SD-261RE 12/07/92	SD-270 12/07/92	SD-280 12/07/92	SD-290 12/07/92	SD-300 12/08/92	SD-310 12/08/92	SD-320 12/08/9
VOCs (ug/kg)																	
Acetone	5.9%	34	-	NA	14 U	13 U	34	13 U	13 U	13 U	N	14 U	13 U	14 U	13 U	11 U	22 U
Carbon Disulfide	5.9%	6	-	NA	14 U	13 U	2 J	6 J	13 U	13 U	N	14 U	13 U	14 U	13 U	11 U	13 U
Chloroform	17.6%	20	-	NA	14 U	13 U	13 U	13 U	13 U	13 U	N	14 U	13 U	14 U	13 U	11 U	13 U
Trichloroethene	2.9%	18	-	NA	14 U	18	13 U	13 U	13 U	13 U	N	14 U	13 U	14 U	13 U	11 U	13 U
Semivolatiles (ug/kg)																	
4-Methylphenol	9.4%	350	6 (b)	3	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	130 J
Naphthalene	6.3%	24	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	18 J	24 J
2-Methylnaphthalene	3.1%	12	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	12 J	400 U	450 U
2,6-Dinitrotoluene	3.1%	120	-	NA	120 J	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
2,4-Dinitrotoluene	12.5%	1600	-	NA	1600	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	42 J	400 U	450 U
N-Nitrosodiphenylamine (1)	12.5%	120	-	NA	120 J	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	100 J	400 U	450 U
Phenanthrene	15.6%	76	1390	0	26 J	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	19 J	20 J	36 J
Anthracene	3.1%	77	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
Carbazole	6.7%	27	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
Di-n-butylphthalate	18.8%	730	1197(c)	0	510	450 U	15 J	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
Fluoranthene	9.4%	140	-	NA	22 J	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	29 J
Pyrene	12.5%	110	-	NA	25 J	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	21 J
Benzo(a)anthracene	3.1%	48	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
Chrysene	6.3%	62	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	18 J
bis(2-Ethylhexyl)phthalate	46.9%	96	1197(c)	0	96 J	91 J	49 J	37 J	22 J	20 J	N	35 J	39 J	36 J	15 J	24 J	39 J
Benzo(b)fluoranthene	3.1%	52	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
benzo(k)fluoranthene	3.1%	54	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
Benzo(a)pyrene	3.1%	38	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
Indeno(1,2,3-cd)pyrene	3.1%	37	-	NA	480 U	450 U	470 U	460 U	420 U	390 U	N	540 U	410 U	490 U	370 U	400 U	450 U
Pesticides/PCBs (ug/kg)																	
4,4'-DDE	9.4%	10	500	0	10	4.5 U	4.7 U	4.6 U	4.3 U	4.5 U	4.5 U	4.6 U	4.2 U	4.9 U	3.6 U	4 U	4.4 U
4,4'-DDT	6.3%	13	500	0	2.3 J	4.5 U	4.7 U	4.6 U	4.3 U	4.5 U	4.5 U	4.6 U	4.2 U	4.9 U	3.6 U	4 U	4.4 U
Explosives (ug/kg)																	
HMX	6.5%	130	-	NA	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U	120 U	130	120 U	120 U	120 U
RDX	3.2%	500	-	NA	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U
2,4,6-Trinitrotoluene	3.2%	100	-	NA	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U
4-amino-2,6-Dinitrotoluene	3.2%	160	-	NA	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U
2-amino-4,6-Dinitrotoluene	6.5%	180	-	NA	120 U	120 U	120 U	120 U	120 U	120 U	N	120 U	120 U	85 J	120 U	120 U	120 U
2,4-Dinitrotoluene	9.7%	98	-	NA	86 J	120 U	120 U	120 U	120 U	120 U	N	120 U	120 U	120 U	120 U	120 U	120 U
Metals (mg/kg)																	
Aluminum	93.8%	25800	-	NA	17500	16000	16300	12900	10800	10500	N	15900	15900	13100	13100	12300	7560
Antimony	6.3%	28.3	-	NA	10 UJ	12 UJ	8.2 UJ	10.8 UJ	10.7 UJ	9.9 UJ	N	13.7 UJ	7.1 UJ	9.7 UJ	8.1 UJ	7.6 UJ	7.6 UJ
Arsenic	75.0%	9.5	5	11	5	9.5	4	2.5	3.4	2.1	N	7.2	3.2	2.1 J	7.2	5.7	4.5
Barium	78.1%	1780	-	NA	637	156	120	138	92.7	91	N	142	96.5	98.5	94.8	39.5	28.1 J
Beryllium	68.8%	1.6	-	NA	1.5	1.1	0.82	0.51 J	0.86 J	0.5 J	N	1.1 J	0.6 J	1.1	0.48 J	0.67	0.28 J
Cadmium	71.9%	9.7	2.5	10	2.3	0.74 J	0.47 U	0.62 U	0.61 U	0.57 U	N	0.78 U	0.41 U	2	1.3	0.55 J	0.44 U
Calcium	100.0%	104000	-	NA	8690	4330	3030	5680	85500	83000	N	3500	34500	10500	18400	30300	14300
Chromium	75.0%	41.8	26	6	28.7	22.4	22.1	18.7	17.6	16.8	N	21.5	25.6	21	24.5	23.4	16.7
Cobalt	75.0%	17.8	-	NA	13.7	7.7 J	12.5	8.6 J	9.8 J	9.3	N	10.4 J	8.2	10.6	11.2	9.9	6.1 J
Copper	93.8%	3790	19	30	445	40.5	24.2	22.9	25.7	19.3	N	23.7	31	88.7	2380	35.2	23.2
Iron	100.0%	40900	24,000	28	36400	29600	28100	26000	23300	21600	N	29200	28600	24900	36600	33100	21300
Lead	96.9%	7400	27	23	1120	62.4	38.6	32.3	11	6.6	N	22.4	12.5	24.1	332	34.7	115
Magnesium	100.0%	12000	-	NA	6240	4700	4170	4110	10800	9830	N	4110	7280	4920	6720	7150	3930
Manganese	100.0%	1520	428	15	619	196	775	313	378	410	N	365	340	357	420	477	274
Mercury	68.8%	2	0.11	10	0.07 J	0.06 J	0.04 J	0.06 J	0.03 U	0.03 J	N	0.1 J	0.07 J	0.83	0.1 J	0.07 J	0.27
Nickel	75.0%	64.4	22	24	44.6	32	28.8	24.7	32.8	29.6	N	22.9	35.7	34.9	42.3	37.3	28.1
Potassium	100.0%	3530	-	NA	1840	1840	1220	1010	1040	1140	N	1500	1390	1370	1280	1070	533 J
Selenium	43.8%	1.8	-	NA	0.76 J	1.2 J	0.84 J	0.52 J	1.2 J	1.8 J	N	1.5 J	0.96 J	0.71 J	1.4 J	1.1 J	0.76 J
Silver	15.6%	1.9	-	NA	0.59 U	0.71 U	0.49 U	0.64 U	0.63 U	0.58 U	N	0.81 U	0.42 U	1.3 J	0.68 J	0.45 U	0.49 J
Sodium	59.4%	191	-	NA	81.7 J	93.9 J	70.7 J	59.6 U	191 J	189 J	N	75.6 U	105 J	85.5 J	112 J	112 J	70.2 J
Vanadium	75.0%	37.9	-	NA	28.2	27.7	26.7	22.2	17.2	16.1	N	31.2	23.2	19.9	20.1	18.3	11.8
Zinc	81.3%	1200	85	19	647	86.3	71.9	68.9	68.3	61	N	60.2	113	208	497	106	68.5
Cyanide	6.3%	0.77	-	NA	0.72 U	0.66 U	0.7 U	0.87 U	0.78 U	0.65 U	N	0.97 U	0.7 U	0.85 U	0.5 U	0.72 U	0.88 U

NOTES: a) NYSDEC Sediment Criteria - 1989.
b) NYSDEC 1989 guidelines for total phenols
c) Used NYSDEC 1989 guideline for phthalates (bis(2-Ethylhexyl) phthalate.
d) NA = not applicable
e) N = Compound was not analyzed.
f) U = Compound was not detected.
g) J = The reported value is an estimated concentration.
h) R = The data was rejected in the data validation process.



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	726510-03001

FIGURE 2-2
EXPANDED SITE INSPECTION
SAMPLE LOCATIONS

SCALE	DATE	REV
1" = 200'	AUGUST 1995	A

TABLE 2-14

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-45 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-45 0-0.2 10/25/93 SS45-1 202506	SOIL SEAD-45 0-0.2 10/25/93 SS45-2 202507	SOIL SEAD-45 0-0.2 10/25/93 SS45-3 202508	SOIL SEAD-45 0-0.2 10/25/93 SS45-4 202509	SOIL SEAD-45 0-0.2 10/25/93 SS45-5 202512	SOIL SEAD-45 0-0.2 10/25/93 SS45-10 202517 SS45-5DUP	SOIL SEAD-45 0-0.2 10/25/93 SS45-6 202511	SOIL SEAD-45 0-0.2 10/25/93 SS45-7 202514	SOIL SEAD-45 0-0.2 10/25/93 SS45-8 202515
VOLATILE ORGANICS														
Tetrachloroethene	ug/kg	19	35.7%	1400	0	12 U	11 U	12 U	11 UJ	12 U	12 U	11 U	11 U	12 U
HERBICIDES														
MCPA	ug/kg	9400	14.3%	NA	NA	9400	6300	6000 U	5400 U	5900 U	6000 U	5500 U	5700 U	6300 U
NITROAROMATICS														
HMX	ug/kg	470	42.9%	NA	NA	130 U	130 U	130 U	130 U	120 J	140 J	130 U	130 UJ	130 UJ
RDX	ug/kg	5800	78.6%	NA	NA	130 U	130 U	100 J	82 J	280 J	290 J	1800	83 J	130 UJ
1,3,5-Trinitrobenzene	ug/kg	190	42.9%	NA	NA	130 U	130 U	100 J	100 U	130 UJ	130 UJ	120 J	130 UJ	130 UJ
Tetryl	ug/kg	330	28.6%	NA	NA	130 U	130 U	130 U	90 J	130 UJ	130 J	330	130 UJ	130 UJ
2,4,6-Trinitrotoluene	ug/kg	1400	64.3%	NA	NA	130 U	130 U	96 J	130 U	84 J	80 J	190	130 UJ	130 UJ
4-amino-2,6-Dinitrotoluene	ug/kg	270	7.1%	NA	NA	130 U	130 U	130 U	130 U	130 UJ	130 UJ	130 U	130 UJ	130 UJ
2-amino-4,6-Dinitrotoluene	ug/kg	680	57.1%	NA	NA	130 U	130 U	99 J	130 U	280 J	270 J	590	130 UJ	130 UJ
2,4-Dinitrotoluene	ug/kg	190	57.1%	NA	NA	130 U	130 U	130 U	110 J	150 J	140 J	160	130 UJ	130 UJ
SEMIVOLATILE ORGANICS														
Hexachloroethane	ug/kg	1100	35.7%	NA	NA	410 U	380 U	400 U	360 U	390 U	390 U	21 J	380 U	420 U
Naphthalene	ug/kg	30	28.6%	13000	0	410 U	380 U	400 U	360 U	21 J	390 U	360 U	380 U	420 U
Acenaphthylene	ug/kg	30	14.3%	41000	0	410 U	380 U	400 U	360 U	30 J	390 U	360 U	380 U	420 U
2,6-Dinitrotoluene	ug/kg	700	14.3%	1000	0	410 U	380 U	400 U	360 U	390 U	390 U	41 J	380 U	420 U
2,4-Dinitrotoluene	ug/kg	14000	50.0%	NA	NA	410 U	380 U	400 U	360 U	160 J	75 J	830	380 U	420 U
Diethylphthalate	ug/kg	35	7.1%	7100	0	410 U	380 U	400 U	360 U	390 U	390 U	360 U	380 U	420 U
N-Nitrosodiphenylamine	ug/kg	1600	35.7%	50000 *	0	410 U	380 U	400 U	360 U	390 U	390 U	110 J	380 U	420 U
Hexachlorobenzene	ug/kg	62	57.1%	410	0	410 U	380 U	400 U	20 J	43 J	41 J	55 J	380 U	420 U
Phenanthrene	ug/kg	46	50.0%	50000 *	0	410 U	380 U	400 U	360 U	38 J	31 J	25 J	380 U	420 U
Anthracene	ug/kg	18	14.3%	50000 *	0	410 U	380 U	400 U	360 U	18 J	390 U	360 U	380 U	420 U
Di-n-butylphthalate	ug/kg	6800	50.0%	8100	0	410 U	380 U	400 U	360 U	110 J	31 J	900	380 U	420 U
Fluoranthene	ug/kg	68	64.3%	50000 *	0	410 U	380 U	400 U	23 J	66 J	44 J	42 J	380 U	22 J
Pyrene	ug/kg	110	71.4%	50000 *	0	410 U	380 U	400 U	35 J	100 J	76 J	79 J	380 U	30 J
Benzo(a)anthracene	ug/kg	50	42.9%	220	0	410 U	380 U	400 U	360 U	50 J	32 J	31 J	380 U	420 U
Chrysene	ug/kg	68	64.3%	400	0	410 U	380 U	400 U	19 J	68 J	55 J	52 J	380 U	20 J
bis(2-Ethylhexyl)phthalate	ug/kg	740	50.0%	50000 *	0	410 U	380 U	700	430	740	700	360 U	210 J	470
Benzo(b)fluoranthene	ug/kg	55	50.0%	1100	0	410 U	380 U	400 U	360 U	55 J	33 J	36 J	380 U	420 U
Benzo(k)fluoranthene	ug/kg	58	35.7%	1100	0	410 U	380 U	400 U	360 U	58 J	18 J	360 U	380 U	420 U
Benzo(a)pyrene	ug/kg	82	42.9%	61	1	410 U	380 U	400 U	360 U	82 J	44 J	45 J	380 U	420 U
Indeno(1,2,3-cd)pyrene	ug/kg	52	28.6%	3200	0	410 U	380 U	400 U	360 U	52 J	390 U	360 U	380 U	420 U
Benzo(g,h,i)perylene	ug/kg	66	35.7%	50000 *	0	410 U	380 U	400 U	360 U	39 J	27 J	360 U	380 U	420 U

TABLE 2-14

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-45 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-45 0-0.2 10/25/93 SS45-1 202506	SOIL SEAD-45 0-0.2 10/25/93 SS45-2 202507	SOIL SEAD-45 0-0.2 10/25/93 SS45-3 202508	SOIL SEAD-45 0-0.2 10/25/93 SS45-4 202509	SOIL SEAD-45 0-0.2 10/25/93 SS45-5 202512	SOIL SEAD-45 0-0.2 10/25/93 SS45-10 202517 SS45-5DUP	SOIL SEAD-45 0-0.2 10/25/93 SS45-6 202511	SOIL SEAD-45 0-0.2 10/25/93 SS45-7 202514	SOIL SEAD-45 0-0.2 10/25/93 SS45-8 202515
PESTICIDES/PCB														
Endosulfan I	ug/kg	2.2	35.7%	900	0	2.1 U	2 U	2 U	1.8 U	1.8 J	2 U	1.8 U	1.9 U	2.1 U
Dieldrin	ug/kg	3.2	23.1%	44	0	4.1 U	3.8 U	4 U	2.5 J	3.9 U	3.8 U	3.2 J	3.8 U	4.1 U
4,4'-DDE	ug/kg	4.2	42.9%	2100	0	4.1 U	3.8 U	4 U	3.2 J	3.9 U	3.4 J	4.2 J	3.8 U	4.1 U
4,4'-DDT	ug/kg	3.4	30.8%	2100	0	4.1 U	3.8 U	4 U	3.6 U	3.9 U	3.4 J	2.8 J	3.8 U	4.1 U
alpha-Chlordane	ug/kg	2	23.1%	540	0	2.1 U	2 U	2 U	1.5 J	2 U	1.1 J	2 J	1.9 U	2.1 U
Aroclor-1254	ug/kg	110	7.6%	1000(a)	0	41 U	38 U	40 U	36 U	39 U	110 J	36 U	38 U	41 U
METALS														
Aluminum	mg/kg	22800	100.0%	15523	15	17300	19400	18900	14900	17600	15600	16300	18000	18600
Arsenic	mg/kg	8.2	100.0%	7.5	1	5	5.5	5.1	5.1	6.2	6.4	5.5	6.8	6.4
Barium	mg/kg	365	100.0%	300	1	122	194	115	143	161	151	160	163	365
Beryllium	mg/kg	1.1	100.0%	1	1	0.7 J	0.77 J	0.83 J	0.63 J	0.72 J	0.7 J	0.71 J	0.82 J	0.69 J
Cadmium	mg/kg	13.1	100.0%	1	12	2.8	2.4	1.1	3.9	9.5 J	9.5 J	8.8	1.6 J	4.8 J
Calcium	mg/kg	47000	100.0%	120725	0	8510	10300	21800	47000	26000	47000	23400	6930	16800
Chromium	mg/kg	39.3	100.0%	24	14	24.1	39.3	27.4	22.9	26.9	23.8	24.2	24.8	27.2
Cobalt	mg/kg	24.3	100.0%	30	0	10.8	24.3	14.1	12.4	12.9	12.2	11.7	13.1	12.1
Copper	mg/kg	1240	100.0%	25	16	79.4	192	55.8	155	538	405	491	69.8	293
Iron	mg/kg	75700	100.0%	28986	13	25800	75700	30500	26700	31400	30400	28100	29900	29400
Lead	mg/kg	87.8	100.0%	30	12	20.4	15.7	12	34.9	63.6	54.9	63.2	21.9	66.9
Magnesium	mg/kg	9270	100.0%	12308	0	5530	5950	6790	8420	7320	7000	6440	5170	6740
Manganese	mg/kg	1380	100.0%	759	5	562	1150	627	530	575	599	555	1050	489
Mercury	mg/kg	4.3	100.0%	0.1	16	0.43	0.63	0.17	0.43	1.5 J	2.1 J	2.4	0.41 J	1.9 J
Nickel	mg/kg	51	100.0%	37	8	29.4 R	41.3 R	40.5 R	35.2 R	40.5	36.4	34.2 R	35.1	39.4
Potassium	mg/kg	3280	100.0%	1548	16	2310	3140	2720	2100	2140	1980	2060	2080	2530
Selenium	mg/kg	1.1	0.0%	2	0	0.27 U	0.18 U	0.21 U	0.23 U	0.18 UJ	0.22 UJ	0.18 U	0.22 UJ	0.24 UJ
Silver	mg/kg	26.2	57.1%	0.5	11	1.3 UJ	1.5 UJ	2.1	1 UJ	3.5 J	2.7 J	4.3	1.2 UJ	2.3 J
Sodium	mg/kg	418	100.0%	114	9	67.1 J	100 J	114 J	142 J	110 J	104 J	112 J	136 J	93.5 J
Vanadium	mg/kg	38	100.0%	150	0	28.6	35.4	30.5	23.7	27.9	25.8	27.3	32.5	30
Zinc	mg/kg	557	100.0%	90	9	148 R	122 R	115 R	208 R	427	361	347 R	126	306
Cyanide	mg/kg	8.3	14.3%	NA	NA	0.56 U	0.57 U	0.58 U	0.54 U	0.72 U	0.67 U	0.52 U	0.66 U	0.72 U
OTHER ANALYSES														
Nitrate/Nitrite-Nitrogen	mg/kg	28	100.0%	NA	NA	0.42	0.38	0.05	1.34	0.13	0.06	11.8	6	0.12
Total Solids	%W/W	91.9				80.4	85.7	82.6	91.9	84	84.2	91.6	87.4	78.7

TABLE 2-14

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-45 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-45 0-0.2 10/25/93 SS45-9 202516	SOIL SEAD-45 3 11/08/93 TP45-1 203646-203648	SOIL SEAD-45 3 11/08/93 TP45-11 203656-203658 TP45-1DUP	SOIL SEAD-45 3 11/08/93 TP45-2 203650-203652	SOIL SEAD-45 3 11/08/93 TP45-3 203654	SOIL SEAD-45 3 11/09/93 TP45-4 204026-204028	SOIL SEAD-45 3 11/09/93 TP45-5 204030-204032
VOLATILE ORGANICS												
Tetrachloroethene	ug/kg	19	35.7%	1400	0	12 U	4 J	6 J	8 J	19	2 J	3 J
HERBICIDES												
MCPA	ug/kg	9400	14.3%	NA	NA	5900 U	5600 U	5500 U	5800 U	6000 U	6900 U	5600 U
NITROAROMATICS												
HMX	ug/kg	470	42.9%	NA	NA	130 UJ	250 J	430 J	470 J	240 J	350	200
RDX	ug/kg	5800	78.6%	NA	NA	5800 J	2500 J	1600 J	2700 J	2500 J	4300	1300
1,3,5-Trinitrobenzene	ug/kg	190	42.9%	NA	NA	130 UJ	150 J	170 J	190 J	130 UJ	180	140
Tetryl	ug/kg	330	28.6%	NA	NA	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 U	180 J
2,4,6-Trinitrotoluene	ug/kg	1400	64.3%	NA	NA	1400 J	330 J	340 J	600 J	400 J	330	280
4-amino-2,6-Dinitrotoluene	ug/kg	270	7.1%	NA	NA	270 J	130 UJ	130 UJ	130 UJ	130 UJ	130 U	130 U
2-amino-4,6-Dinitrotoluene	ug/kg	680	57.1%	NA	NA	130 UJ	430 J	430 J	680 J	530 J	480	350
2,4-Dinitrotoluene	ug/kg	190	57.1%	NA	NA	130 UJ	130 UJ	140 J	190 J	120 J	110 J	90 J
SEMIVOLATILE ORGANICS												
Hexachloroethane	ug/kg	1100	35.7%	NA	NA	390 U	72 J	68 J	1900 U	1100	41 J	36 J
Naphthalene	ug/kg	30	28.6%	13000	0	390 U	30 J	27 J	1900 U	24 J	30 J	370 U
Acenaphthylene	ug/kg	30	14.3%	41000	0	390 U	19 J	17 J	1900 U	400 U	460 U	370 U
2,6-Dinitrotoluene	ug/kg	700	14.3%	1000	0	390 U	370 U	360 U	700 J	400 U	460 U	370 U
2,4-Dinitrotoluene	ug/kg	14000	50.0%	NA	NA	390 U	100 J	190 J	14000	84 J	59 J	230 J
Diethylphthalate	ug/kg	35	7.1%	7100	0	390 U	370 U	360 U	1900 U	400 U	35 J	370 U
N-Nitrosodiphenylamine	ug/kg	1600	35.7%	50000 *	0	390 U	370 U	30 J	1600 J	20 J	460 U	25 J
Hexachlorobenzene	ug/kg	62	57.1%	410	0	30 J	62 J	54 J	1900 U	52 J	48 J	42 J
Phenanthrene	ug/kg	46	50.0%	50000 *	0	18 J	46 J	38 J	1900 U	38 J	44 J	34 J
Anthracene	ug/kg	18	14.3%	50000 *	0	390 U	17 J	360 U	1900 U	400 U	460 U	370 U
Di-n-butylphthalate	ug/kg	6800	50.0%	8100	0	390 U	35 J	170 J	6800	27 J	75 J	230 J
Fluoranthene	ug/kg	68	64.3%	50000 *	0	30 J	59 J	50 J	1900 U	52 J	68 J	58 J
Pyrene	ug/kg	110	71.4%	50000 *	0	36 J	110 J	98 J	100 J	90 J	110 J	97 J
Benzo(a)anthracene	ug/kg	50	42.9%	220	0	390 U	32 J	30 J	1900 U	22 J	36 J	32 J
Chrysene	ug/kg	68	64.3%	400	0	27 J	46 J	44 J	1900 U	37 J	51 J	47 J
bis(2-Ethylhexyl)phthalate	ug/kg	740	50.0%	50000 *	0	350 J	65 J	50 J	1900 U	400 U	460 U	370 U
Benzo(b)fluoranthene	ug/kg	55	50.0%	1100	0	20 J	38 J	36 J	1900 U	24 J	39 J	42 J
Benzo(k)fluoranthene	ug/kg	58	35.7%	1100	0	390 U	28 J	26 J	1900 U	21 J	34 J	23 J
Benzo(a)pyrene	ug/kg	82	42.9%	61	1	390 U	46 J	41 J	1900 U	28 J	45 J	42 J
Indeno(1,2,3-cd)pyrene	ug/kg	52	28.6%	3200	0	390 U	37 J	360 U	1900 U	400 U	29 J	26 J
Benzo(g,h,i)perylene	ug/kg	66	35.7%	50000 *	0	390 U	66 J	58 J	1900 U	34 J	53 J	45 J

TABLE 2-14

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-45 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-45 0-0.2 10/25/93 SS45-9 202516	SOIL SEAD-45 3 11/08/93 TP45-1 203646-203648	SOIL SEAD-45 3 11/08/93 TP45-11 203656-203658 TP45-1DUP	SOIL SEAD-45 3 11/08/93 TP45-2 203650-203652	SOIL SEAD-45 3 11/08/93 TP45-3 203654	SOIL SEAD-45 3 11/09/93 TP45-4 204026-204028	SOIL SEAD-45 3 11/09/93 TP45-5 204030-204032
PESTICIDES/PCB												
Endosulfan I	ug/kg	2.2	35.7%	900	0	1 J	1.9 J	2.2 J	1.9 J	1.6 J	2.4 U	1.9 U
Dieldrin	ug/kg	3.2	23.1%	44	0	3.8 U R	3.7 U	3.6 U	3.8 U	4 U	2.4 J	3.7 U
4,4'-DDE	ug/kg	4.2	42.9%	2100	0	3.3 J	3.7 U	3.6 U	3.8 U	4 U	3.2 J	1.9 J
4,4'-DDT	ug/kg	3.4	30.8%	2100	0	3.8 U R	3.7 U	2.3 J	3.8 U	2.9 J	4.6 U	3.7 U
alpha-Chlordane	ug/kg	2	23.1%	540	0	2 U R	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Aroclor-1254	ug/kg	110	7.6%	1000(a)	0	38 U R	37 U	36 U	38 U	40 U	46 U	37 U
METALS												
Aluminum	mg/kg	22800	100.0%	15523	15	17800	20100	16500	20800	22800	20600	17300
Arsenic	mg/kg	8.2	100.0%	7.5	1	6.1	6.8	6.3	7.1	8.2	6 J	5.1 J
Barium	mg/kg	365	100.0%	300	1	202	208	177	201	248	216	174
Beryllium	mg/kg	1.1	100.0%	1	1	0.79 J	0.9 J	0.8	0.91 J	1.1 J	0.94 J	0.8 J
Cadmium	mg/kg	13.1	100.0%	1	12	5.5 J	10.4 J	9.6 J	9.5 J	13.1 J	10.9 R	7.4 R
Calcium	mg/kg	47000	100.0%	120725	0	22600	42700	31500	26400	32500	36400	32100
Chromium	mg/kg	39.3	100.0%	24	14	27.4	31.3	25.7	30.1	35.5	32.1	27.6
Cobalt	mg/kg	24.3	100.0%	30	0	15	13.2	13.2	12.8	16.9	15.3	12.1
Copper	mg/kg	1240	100.0%	25	16	267	722	555	561	791	1240 J	449 J
Iron	mg/kg	75700	100.0%	28986	13	32500	35700	31900	31500	41300	37600	31600
Lead	mg/kg	87.8	100.0%	30	12	77.7	54.1	73.3	69.4	87.8	74.7	61.9
Magnesium	mg/kg	9270	100.0%	12308	0	7110	7910	7780	7800	9270	8940	7570
Manganese	mg/kg	1380	100.0%	759	5	912	1380	613	605	827	726	600
Mercury	mg/kg	4.3	100.0%	0.1	16	1.9 J	3.1 J	1.4 J	3.1 J	4 J	3.6	4.3
Nickel	mg/kg	51	100.0%	37	8	42.5	41.8	39.1	40.5	51	48.3	39.2
Potassium	mg/kg	3280	100.0%	1548	16	2260	3040	1960	3280	3010	2400	1960
Selenium	mg/kg	1.1	0.0%	2	0	0.24 UJ	0.23 UJ	0.15 UJ	0.16 UJ	0.23 UJ	0.27 UJ	0.2 UJ
Silver	mg/kg	26.2	57.1%	0.5	11	1.3 J	3.2 J	4.7 J	5 J	6.6 J	26.2 J	3.9 J
Sodium	mg/kg	418	100.0%	114	9	93.4 J	141 J	105 J	116 J	135 J	136 J	122 J
Vanadium	mg/kg	38	100.0%	150	0	28.9	32.4	26.7	34.4	38	32.6	27.3
Zinc	mg/kg	557	100.0%	90	9	383	345	360	390	538	557 J	333 J
Cyanide	mg/kg	8.3	14.3%	NA	NA	0.7 U	0.7	0.54 U	0.55 U	0.55 U	0.62	0.51 U
OTHER ANALYSES												
Nitrate/Nitrite-Nitrogen	mg/kg	28	100.0%	NA	NA	0.55	27	28	19.5	18.8	9.8	13.3
Total Solids	%W/W	91.9				85.2	90.3	90.7	86.7	82.9	72.2	89.3

Notes:
a) The TAGM value for PCBs is 1000 ug/kg for surface soils and 10,000 ug/kg for subsurface soils.
b) * = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm.
c) NA = Not Available
d) U = Compound was not detected.
e) J = the reported value is an estimated concentration.
f) R = the data was rejected in the data validating process.
g) UJ = the compound was not detected; the associated reporting limit is approximate.

TABLE 2-15

GROUNDWATER ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-45 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	NO. ABOVE CRITERIA	WATER SEAD-45 02/03/94 MW45-2 210258	WATER SEAD-45 02/03/94 MW45-3 210259	WATER SEAD-45 01/26/94 MW45-4 209413	WATER SEAD-45/OD 02/01/94 MW1 210059	WATER SEAD-45/OD 02/02/94 MW2 210193	WATER SEAD-45/OD 02/01/94 MW3 210060	WATER SEAD-45/OD 02/02/94 MW4 210194	WATER SEAD-45/OD 02/02/94 MW5 210195
VOLATILE ORGANICS													
Tetrachloroethene	ug/L	1	12.5%	5	0	10 U	10 U	10 U	1 J	10 U	10 U	10 U	10 U
NITROAROMATICS													
HMX	ug/L	0.5	12.5%	NA	NA	0.13 UJ	0.13 U	0.13 U	0.5	0.13 U	0.13 U	0.13 U	0.13 U
1,3-Dinitrobenzene	ug/L	0.067	12.5%	5	0	0.13 UJ	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.067 J
SEMIVOLATILE ORGANICS													
bis(2-Ethylhexyl)phthalate	ug/L	33	50.0%	50	0	23	11 U	11 U	33	11 U	12	11	10 U
METALS													
Aluminum	ug/L	63300	87.5%	NA	NA	42 U	7510	63300	124 J	828	83.5 J	17700	821
Antimony	ug/L	52.1	87.5%	3	7	26.8 J	36.7 J	21.6 UJ	24.3 J	23.1 J	52.1 J	49.6 J	28.1 J
Arsenic	ug/L	9.5	37.5%	25	0	1.4 U	1.8 J	9.5 J	1.4 U	1.4 U	1.4 U	1.7 J	1.4 U
Barium	ug/L	751	100.0%	1000	0	27.2 J	62.1 J	751	56.5 J	50.8 J	25.5 J	195 J	82.8 J
Beryllium	ug/L	5	37.5%	3	1	0.4 U	0.52 J	5	0.4 U	0.4 U	0.4 U	0.87 J	0.4 U
Cadmium	ug/L	3.8	50.0%	10	0	2.9 J	3.2 J	2.1 U	2.2 J	2.1 U	2.1 U	3.8 J	2.1 U
Calcium	ug/L	660000	100.0%	NA	NA	232000	211000	660000	118000	94600	91700	152000	123000
Chromium	ug/L	106	62.5%	50	1	2.6 U	16.1	106	2.6 U	4.1 J	2.6 U	28.9	2.6 J
Cobalt	ug/L	94.4	50.0%	NA	NA	4.4 U	14.6 J	94.4	4.4 U	5.3 J	4.4 U	11 J	4.4 U
Copper	ug/L	123	62.5%	200	0	3.1 U	11.9 J	123	3.1 U	7.2 J	3.9 J	79.2	3.1 U
Iron	ug/L	113000	100.0%	300	5	48.5 J	14100	113000	207	940	109	27500	1220
Lead	ug/L	75.6	100.0%	25	1	0.71 J	9.5	75.6	0.71 J	0.66 J	0.73 J	15.7	1.1 J
Magnesium	ug/L	77900	100.0%	35000	3	57800	77900	73500	26400	15700	15800	31600	27700
Manganese	ug/L	4640	100.0%	300	4	1400	625	4640	4.4 J	23.7	2.9 J	384	55
Mercury	ug/L	0.29	37.5%	2	0	0.04 U	0.08 J	0.29	0.04 U	0.04 U	0.04 U	1.8	0.04 U
Nickel	ug/L	209	50.0%	NA	NA	10.2 J	30.7 J	209	4 U	4 U	4 U	43.9	4 U
Potassium	ug/L	18700	62.5%	NA	NA	9660	18700	13900	910 U	1050 J	904 U	6540	907 U
Selenium	ug/L	2.5	62.5%	10	0	2.5 J	1.9 J	0.7 U	0.99 J	0.7 U	0.7 U	1.9 J	1.5 J
Silver	ug/L	4.6	12.5%	50	0	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.6 J	4.2 U
Sodium	ug/L	40000	100.0%	20000	1	40000	18600	17300	10000	13100	3400 J	15800	16100
Vanadium	ug/L	93.1	37.5%	NA	NA	3.7 U	11.7 J	93.1	3.7 U	3.7 U	3.7 U	29.7 J	3.7 U
Zinc	ug/L	321	100.0%	300	1	31.6	81.1	321	15.3 J	23	14 J	164	24.5
OTHER ANALYSES													
Nitrate/Nitrite-Nitrogen	mg/L	8.7	100.0%	10	0	0.41	0.12	0.02	1.23	0.06	0.15	0.13	8.7
pH	standard units	7.54				NR	7.5	7.31	7.5	7.49	7.53	7.43	7.54
Specific Conductance	umhos/cm	750				NR	750	600	455	315	340	450	465
Turbidity	NTU	9860				0.4	368	9860	9.4	4.4	3.4	193	107

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

TABLE 2-16

SURFACE WATER ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-45 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYS GUIDELINES CLASS D (a)	EPA AWQC ACUTE (b)	EPA AWQC CHRONIC (b)	NO. ABOVE CRITERIA	WATER SEAD-45 11/01/93 SW45-1 202940	WATER SEAD-45 11/01/93 SW45-2 202941	WATER SEAD-45 11/01/93 SW45-3 202942	WATER SEAD-45 11/01/93 SW45-4 202943
NITROAROMATICS											
HMX	ug/L	0.49	50.0%	NA	NA	NA	NA	0.13 U	0.45	0.49	0.13 U
RDX	ug/L	2	50.0%	NA	NA	NA	NA	0.24 J	2	0.13 U	0.13 U
METALS											
Aluminum	ug/L	37500	100.0%	NA	750	87	4	29000	4370	968	37500
Arsenic	ug/L	2.3	25.0%	360	360	190	0	1.2 U	1.2 U	1.2 U	2.3 J
Barium	ug/L	439	100.0%	NA	NA	NA	NA	204	82.5 J	33.5 J	439
Beryllium	ug/L	1.5	50.0%	NA	130	5.3	0	1.3 J	0.3 U	0.3 U	1.5 J
Cadmium	ug/L	11.2	25.0%	NA	3.9	1.1	1	3.3 U	3.3 U	3.3 U	11.2
Calcium	ug/L	194000	100.0%	NA	NA	NA	NA	194000	38500	33800	105000
Chromium	ug/L	50.8	75.0%	4270	4270	509	0	45.4	3.4 J	2.5 U	50.8
Cobalt	ug/L	18.2	50.0%	NA	NA	NA	NA	15.2 J	4.9 U	4.9 U	18.2 J
Copper	ug/L	612	100.0%	50	50	30	3	203	119	24.8 J	612
Iron	ug/L	60400	100.0%	300	NA	1000	4	47700 J	5920 J	1270 J	60400 J
Lead	ug/L	68.7	100.0%	330	330.6	12.9	2	27.2	10.9	1.9 J	68.7
Magnesium	ug/L	24300	100.0%	NA	NA	NA	NA	24300	4680 J	3280 J	19300
Manganese	ug/L	1250	100.0%	NA	NA	NA	NA	841	56.7	21.1	1250
Mercury	ug/L	3	100.0%	NA	2.4	0.012	4	0.32	0.5	0.18 J	3
Nickel	ug/L	74.2	100.0%	4250	3592.5	399.4	0	72.7	8.1 J	4.2 J	74.2
Potassium	ug/L	9670	100.0%	NA	NA	NA	NA	6650	5020	1530 J	9670
Sodium	ug/L	4340	100.0%	NA	NA	NA	NA	2810 J	899 J	1080 J	4340 J
Vanadium	ug/L	54.9	75.0%	190	NA	NA	0	45.9 J	6.1 J	3.3 U	54.9
Zinc	ug/L	883	100.0%	800	296.8	268.9	1	226	98.9	23.3	883
Cyanide	ug/L	47.7	25.0%	22	22	5.2	1	8.3 U	8.3 U	8.3 U	47.7
OTHER ANALYSES											
Nitrate/Nitrite-Nitrogen	mg/L	1.06	100.0%	NA	NA	NA	NA	0.01	0.03	1.06	0.04

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.

TABLE 2-17

SEDIMENT ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-45 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-45 0-0.5 11/01/93 SD45-1 202996	SOIL SEAD-45 0-0.5 11/01/93 SD45-2 202997	SOIL SEAD-45 0-0.5 11/01/93 SD45-3 202998	SOIL SEAD-45 0-0.5 11/01/93 SD45-4 202999
NITROAROMATICS												
RDX	ug/kg	210	25.0%	NA	NA	NA	NA	NA	130 U	210	130 U	130 U
Tetryl	ug/kg	140	25.0%	NA	NA	NA	NA	NA	130 U	140 J	130 U	130 U
2,4,6-Trinitrotoluene	ug/kg	120	25.0%	NA	NA	NA	NA	NA	130 U	120 J	130 U	130 U
2-amino-4,6-Dinitrotoluene	ug/kg	260	25.0%	NA	NA	NA	NA	NA	130 U	260	130 U	130 U
2,4-Dinitrotoluene	ug/kg	83	25.0%	NA	NA	NA	NA	NA	130 U	83 J	130 U	130 U
SEMIVOLATILE ORGANICS												
Naphthalene	ug/kg	24	25.0%	NA	NA	NA	NA	NA	420 U	530 U	500 U	24 J
Hexachlorobenzene	ug/kg	40	50.0%	75680	1.5	120	NA	NA	420 U	40 J	500 U	30 J
Phenanthrene	ug/kg	34	75.0%	1390	NA	NA	NA	NA	420 U	34 J	24 J	25 J
Di-n-butylphthalate	ug/kg	25	25.0%	1197(c)	NA	NA	NA	NA	420 U	25 J	500 U	440 U
Fluoranthene	ug/kg	60	75.0%	NA	NA	NA	NA	NA	420 U	60 J	47 J	31 J
Pyrene	ug/kg	110	75.0%	NA	NA	NA	NA	NA	420 U	110 J	59 J	61 J
Benzo(a)anthracene	ug/kg	32	50.0%	NA	13	NA	NA	NA	420 U	32 J	23 J	440 U
Chrysene	ug/kg	50	75.0%	NA	13	NA	NA	NA	420 U	50 J	36 J	20 J
Benzo(b)fluoranthene	ug/kg	37	50.0%	NA	13	NA	NA	NA	420 U	37 J	28 J	440 U
Benzo(k)fluoranthene	ug/kg	28	50.0%	NA	13	NA	NA	NA	420 U	28 J	26 J	440 U
Benzo(a)pyrene	ug/kg	37	50.0%	NA	13	NA	NA	NA	420 U	37 J	28 J	440 U
Indeno(1,2,3-cd)pyrene	ug/kg	32	25.0%	NA	13	NA	NA	NA	420 U	32 J	500 U	440 U
Benzo(g,h,i)perylene	ug/kg	48	25.0%	NA	NA	NA	NA	NA	420 U	48 J	500 U	440 U

TABLE 2-17

SEDIMENT ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-45 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-45 0-0.5 11/01/93 SD45-1 202996	SOIL SEAD-45 0-0.5 11/01/93 SD45-2 202997	SOIL SEAD-45 0-0.5 11/01/93 SD45-3 202998	SOIL SEAD-45 0-0.5 11/01/93 SD45-4 202999
PESTICIDES/PCB												
Endosulfan I	ug/kg	2.7	50.0%	0.3	NA	NA	NA	NA	2.2 U	2.7 J	1.3 J	2.3 U
Dieldrin	ug/kg	7.4	25.0%	195	1.3	7.7	NA	NA	4.2 U	5.3 U	5 U	7.4 J
4,4'-DDE	ug/kg	12	50.0%	500	0.1	10	NA	NA	4.2 U	4.3 J	5 U	12 J
Endrin aldehyde	ug/kg	3.2	25.0%	NA	NA	NA	NA	NA	4.2 U	5.3 U	5 U	3.2 J
alpha-Chlordane	ug/kg	5.7	25.0%	0.06	0.01	0.06	NA	NA	2.2 U	2.7 U	2.6 U	5.7 J
Aroclor-1254	ug/kg	580	50.0%	NA	0.008	195	NA	NA	42 U	74	50 U	580 J
METALS												
Aluminum	mg/kg	35000	100.0%	NA			NA	NA	14400	35000	22300	21100
Arsenic	mg/kg	16.1	100.0%	5			33	0	6.9	4.2	7.3	16.1
Barium	mg/kg	308	100.0%	NA			NA	NA	85.4	308	187	176
Beryllium	mg/kg	1.4	100.0%	NA			NA	NA	0.62 J	1.4	0.94 J	0.83
Cadmium	mg/kg	25.6	100.0%	0.8			10	2	0.76 J	14.9	5.6	25.6 J
Calcium	mg/kg	84400	100.0%	NA			NA	NA	84400	21700	25100	25100
Chromium	mg/kg	48.4	100.0%	26			111	0	22.5	48.4	31.4	31.8
Cobalt	mg/kg	19.7	100.0%	NA			NA	NA	11.2	19.7	12.9	13.2
Copper	mg/kg	814	100.0%	19			114	3	63.9	814	323	241
Iron	mg/kg	50500	100.0%	24000			40000	1	25600	50500	32600	33200
Lead	mg/kg	101	100.0%	27			250	0	19.8	101	52.8	72.9
Magnesium	mg/kg	10200	100.0%	NA			NA	NA	9720	10200	7630	7510
Manganese	mg/kg	935	100.0%	428			1100	0	458	692	616	935
Mercury	mg/kg	5.3	100.0%	0.11			2	3	0.38	5.3	4.4	2.2 J
Nickel	mg/kg	67.7	100.0%	22			90	0	40.1	67.7	41.6	44.6
Potassium	mg/kg	4680	100.0%	NA			NA	NA	2580	4680	3360	2840
Silver	mg/kg	5.8	75.0%	NA			NA	NA	1.3 U	5.8	3.1	2.5 J
Sodium	mg/kg	377	100.0%	NA			NA	NA	208 J	377 J	146 J	130 J
Vanadium	mg/kg	53.7	100.0%	NA			NA	NA	23.9	53.7	37.2	32.9
Zinc	mg/kg	755	100.0%	85			800	0	104	755	312	329
OTHER ANALYSES												
Nitrate/Nitrite-Nitrogen	mg/kg	0.13	100.0%	NA			NA	NA	0.04	0.06	0.13	0.12
Total Solids	%W/W	78.7							78.7	62	66.3	74.1

NOTES:

a) NYSDEC Sediment Criteria - 1989.
b) LOT = limit of tolerance; represents point at which significant toxic effects on benthis species occur.
c) Used NYSDEC 1989 guideline for phthalates (bis(2-Ethylhexyl)phthalate.
d) NA = Not Available
e) U = compound was not detected
f) J = the reported value is an estimated concentration
g) UJ = the coumpound was not detected; the associated reporting limit is approximate.

In the 14 soil samples collected, 21 semivolatile organic compounds were detected, but only SS45-2 exceeded Technical and Administrative Guidance Manual (TAGM) criteria for one compound. The concentration of benzo(a)pyrene was 82 ppb, which slightly exceeds the TAGM value of 61 ppb.

No explosives were detected in SS45-1, SS45-2, or SS45-8. The remaining soil samples all contained explosives at varying concentrations. A total of eight explosives were detected. RDX and 2,4,6-TNT were detected with the greatest frequency and at the greatest concentrations. SS45-9, collected from a low-lying area between the OD mound and Reeder Creek, contained the highest concentration of RDX (5,800 ppb) and 2,4,6-TNT (1,400 ppb). Aside from SS45-9, the subsurface samples collected from the detonation mound tended to have the greatest concentrations of explosives.

A number of the soil samples collected at SEAD-45 were found to contain various metals at concentrations that exceeded the associated TAGM or site background values. Of the 24 metals reported, 16 of these were found in one or more samples at concentrations above the associated TAGM values. While several of these exceedances were for only 1 or 2 samples, the majority of the TAGM exceedances were more significant. Of particular note are the metals cadmium, chromium, copper, lead, mercury, silver, and zinc where a large percentage of the samples exceeded the criteria value and where the concentrations of the exceedances are generally an order of magnitude or greater above the criteria value.

Fourteen of the 16 soil samples analyzed had cadmium concentrations above the criteria value of 1 ppm. The highest cadmium concentration was identified in sample TP45-3, where 13.1 ppm was reported. This test pit soil sample was collected from the center of the OD mound. This sample also had elevated concentrations of all the other metals of note, and had the highest detected concentrations of lead, nickel, and vanadium, and the second highest detected concentrations of copper and mercury. In all of the soil samples collected, copper and mercury exceeded TAGM criteria. The subsurface samples taken from the mound contained the highest concentrations for both of the metals. In general, the highest concentrations for all of the metals were found in the samples collected from the five test pits completed in the OD mound. The exception was chromium, where the highest concentration (39.3 ppm) was found in the surface soil sample SS45-2, collected west of the OD mound. Even though the highest metals concentrations were in the test pit soil samples, there were

TAGM exceedances in the surface soil samples as well. The highest metals concentrations in the surface soil samples were in the samples SS45-5, collected just west of the OD mound, and SS45-6 and SS45-9, collected east of the OD mound.

In the groundwater investigation for the ESI, four new monitoring wells were installed. Well construction details are presented in Table 2-18. One of the wells was dry, so three of the four new wells were sampled as part of the ESI along with the five existing wells.

Tetrachloroethene was detected in MW-1, but not exceeding NYSGWS. Bis(2-ethylhexyl)phthalate was detected in three wells MW45-2, MW-3, and MW-4, but all concentrations were below NYSGWS. No other volatile or semivolatile compounds were found in groundwater. The explosives HMX and 1,3-dinitrobenzene were detected in groundwater samples. MW-1 contained 0.5 ppb HMX and MW-5 contained 0.067 ppb 1,3-dinitrobenzene. New York State has no groundwater criteria for HMX, and the 5 ppb criteria for 1,3-dinitrobenzene is well above the concentration found in MW-5

Eight metals, beryllium chromium, iron, lead, magnesium, manganese, sodium and zinc were present in one or more of the groundwater samples at concentrations exceeding the NYSGWS. Most of the high concentrations were in well MW45-4, which had a turbidity of 9,860 nephelometric turbidity units (NTU) and are likely the result of suspected silt in the water.

Two explosives, HMX and RDX were detected in three of the surface water samples. SS45-1 contained 0.24 ppb RDX, SS45-2 contained 0.45 ppb HMX and 2 ppb RDX, and SS45-3 contained 0.49 ppb HMX.

Metals were detected in the surface water, with aluminum, cadmium, copper, iron, lead, mercury, zinc and cyanide all present in at least one sample at concentrations exceeding the most stringent Ambient Water Quality Criteria (AWQC). All four surface water samples collected contained aluminum, iron, and mercury exceeding EPA chronic AWQC.

Five explosives were detected in SD45-2 at varying concentrations, the highest being 260 ppb of 2-amino-4,6-dinitrotoluene. No explosives were detected in the remaining three sediment samples. Semivolatile organic compounds, pesticides, and PCBs were detected in three sediment samples, SD45-2, SD45-3, and SD45-4, but detections were primarily at low concentrations. There are no appropriate standards to compare to the detected

TABLE 2-18

EXPANDED SITE INSPECTION
MONITORING WELL CONSTRUCTION DATA

SENECA ARMY DEPOT ACTIVITY
SEAD-45

	Well Number	Depth of Well Relative to Ground Surface (ft)	Depth of Well Relative to Top of PVC (ft)	Well Screen Length (ft)	Screened Interval Relative to Ground Surface (ft)	Thickness of Bentonite Seal (ft)	Height of PVC Well Stickup (ft)	Elevation of Top of PVC Well (MSL) (ft)
1	MW45-1	6.0	8.65	2	3.25-5.25	0.8	2.65	625.08
2	MW45-2	10.0	12.41	4	5.33-9.33	1.2	2.41	626.76
2	MW45-3	11.33	14.07	4	6.6-10.6	1.25	2.74	626.45
4	MW45-4	7.0	9.74	2	4.25-6.25	0.5	2.74	633.04

Notes:
1. All wells were installed by Empire Soils Investigations, Inc. under the supervision of Engineering-Science, Inc.
2. Data obtained from Well Development forms and UXB survey summary (3/8/94).
3. All wells were installed in Till/Weathered Shale.
4. All wells were constructed of 2-inch PVC well casing with 0.010 inch PVC well screen.

concentrations because the NYSDEC sediment criteria applies to wetlands that support aquatic life, and there is no aquatic life in the standing water at the OD Grounds. Cadmium, copper, iron, and mercury were also detected in sediment at concentrations exceeding Limit of Tolerance criteria.

A geophysical investigation was conducted across the OD Grounds, including the OD mound, to locate any subsurface features. The test pits excavated in the mound uncovered various components of high explosives and fuzes. The test pits excavated away from the detonation mound located the electrical conduits that served the previous locations of the detonation mound.

3.0 SCOPING OF THE RI/FS

This section describes the current understanding of SEAD-45 based upon the results of the ESI Report. This includes the development of a conceptual model describing all known contaminant sources and receptor pathways based upon actual sampling data. This conceptual model will be used to develop and implement additional studies which may be required to fully assess risks to human health and the environment. Other considerations which are discussed are data quality objectives (DQOs) and potential remedial actions for SEAD-45. These considerations will also be integrated into the scoping process to ensure that adequate data is collected to complete the RI/FS process.

3.1 CONCEPTUAL SITE MODEL

The conceptual site model for SEAD-45 takes into account both site conditions and accepted pollutant behavior to formulate an understanding of the site. These will serve as a basis for determining necessary additional studies for the RI. The model was developed by evaluating the following aspects:

- **Historical site usage**

- **Physical site characteristics:** This considers the physical aspects of environmental conditions and the effect these conditions may have on potential pollutant migration. These include soil characteristics, topography, subsurface geology, groundwater characteristics and local terrain.

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

3.1.1 Physical Site Characterization

The OD Grounds are located in the northwestern portion of SEDA, as shown in Figure 1-1. It is characterized by an unvegetated, elongate detonation mound that is surrounded by an unvegetated area to the east and lightly vegetated grassland to the west, north and south. The mound is approximately 500 feet long and 14 feet high and contains many smaller excavated areas on its east side, as shown in Figure 1-2. These excavated areas are used to

bury the explosives that are destroyed during detonation events. A small soil-covered bunker, from which the detonation events are controlled, is present in the eastern portion of the site near Reeder Creek. Topography on-site slopes to the east.

Approximately 700 feet east of the detonation mound is Reeder Creek, which defines the eastern boundary of the site. Reeder Creek drains to the north-northwest and eventually discharges to Seneca Lake west of the site, as shown in Figure 3-1. At the southern boundary of the site is a crushed shale road which separate the OD Grounds from the OB Grounds. Grassland and low brush are located to the west and north of the site.

Vehicular access to the site is provided via a paved roadway that leads from North South Baseline Road, however, access to the OD Grounds is restricted by a locking gate. In the southeastern portion of the site the paved roadway divides into several dirt roads which provide direct access to the detonation mound. The OD Grounds are not fenced, but access to the site is restricted since it is located within the Ammunition Storage Area.

The SEDA property boundary is approximately 2,000 feet from the OD Grounds. Land use adjacent to the northwestern corner of SEDA is sparse residential areas with some farmland. Records provided by the Town of Varick show that approximately 15 residences adjacent to the northwestern border of SEDA are within 2500 feet of the OD Grounds. These residences all obtain drinking water from private water wells.

3.1.1.1 Local Geology

Based on the results of the drilling program performed during the ESI, till and calcareous black shale (with minor limestone layers) are the two major types of geologic materials present on-site. The till lies stratigraphically above the shale. In most of the overburden soil borings, a very thin soil horizon was observed with till present at most locations within one foot of the ground surface. The depths of the overburden soil borings at this site were up to 11 feet below the ground surface.

The till is dark brown to gray and composed of silt and clay, some fine sand, and some black shale and limestone fragments; however, larger shale fragments (rip-up clasts) were observed at many locations near the till/weathered shale contact. Oxidized areas of till were noted in the upper portion of the till strata.

FIGURE 3-1
LOCATION OF REEDER CREEK

R:\GRAPHICS\SENECA\SEAD-45\SITEMAP.CDR(CVM)

Black calcareous shale was encountered at depths between approximately 4 and 11 feet below the ground surface. The elevations of the competent bedrock determined during the drilling and seismic programs indicate that the shale slopes to the east mimicking the land surface. The upper portion of the competent shale (2 to 3 feet) is weathered.

3.1.1.2 Local Hydrology and Hydrogeology

From the detonation mound, surface water flow is in all directions. In general, the drainage ditches at the site flow from the west to the east, and the culverts and the roads channel the surface water into Reeder Creek. Figure 3-2 shows the suspected surface water flow patterns and flow within drainage ditches at the site.

Reeder Creek is a small, second order perennial stream that originates within the SEDA property boundary, as shown in Figure 3-1. Reeder Creek flows in a northwesterly direction past the OB/OD Grounds, turns sharply to the west after leaving the SEDA property, and discharges into Seneca Lake. The normal width of Reeder Creek is 4 to 10 feet, and typical maximum depths range from 1 to 7 inches. Sections of the stream which have been influenced by beaver dams are up to 15 feet wide and 3 feet deep.

The overburden aquifer is unconfined and exists in till and weathered shale immediately overlying the competent bedrock. The primary groundwater flow direction in the till/weathered shale aquifer on the site is to the east based on the groundwater elevations measured in nine monitoring wells on April 4, 1994 (Table 3-1 and Figure 3-3). From groundwater levels measured in monitoring wells at the OB Grounds in January 1992, it is suspected that a north-south trending groundwater divide exists approximately 300 feet to the west of the demolition mound.

On-site hydraulic conductivity determinations were performed by M&E (1989) for monitoring wells MW-8 through MW-17 at the adjacent OB Grounds. These monitoring wells are all screened within the glacial till unit. The data were analyzed according to a procedure described by Hvorslev (1951). The average hydraulic conductivity measured for the ten monitoring wells was 5.0×10^{-1} ft/day (1.8×10^{-4} cm/sec). The hydraulic conductivities ranged from 2.02×10^{-2} ft/day (7.06×10^{-6} cm/sec) to 1.47 ft/day (5.19×10^{-4} cm/sec). These hydraulic conductivity measurements were within an order of magnitude agreement with previous results reported by O'Brien and Gere (1984). O'Brien and Gere determined the average hydraulic conductivity of the till material to be approximately 2.8×10^{-1} ft/day (9.9×10^{-5} cm/sec).

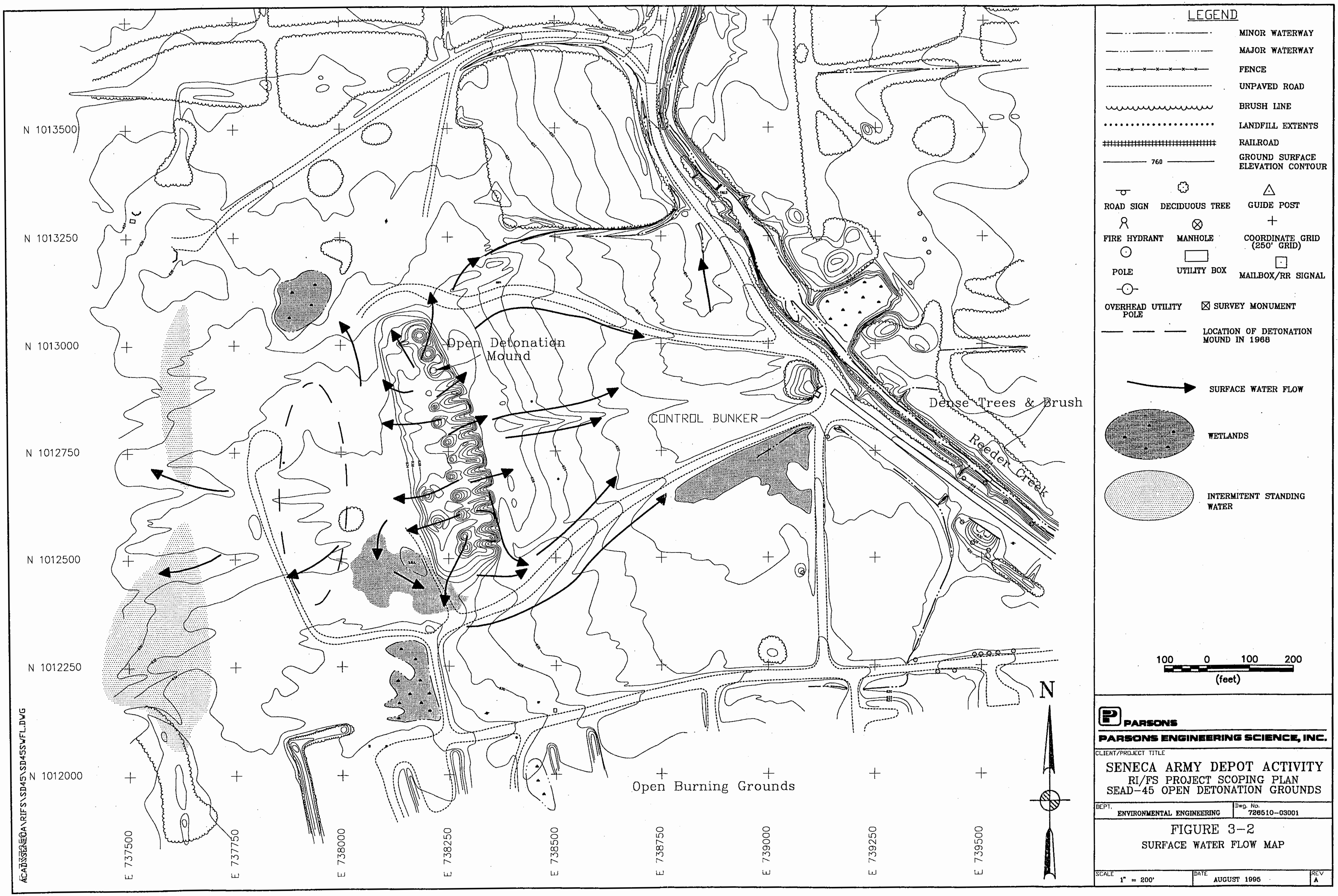
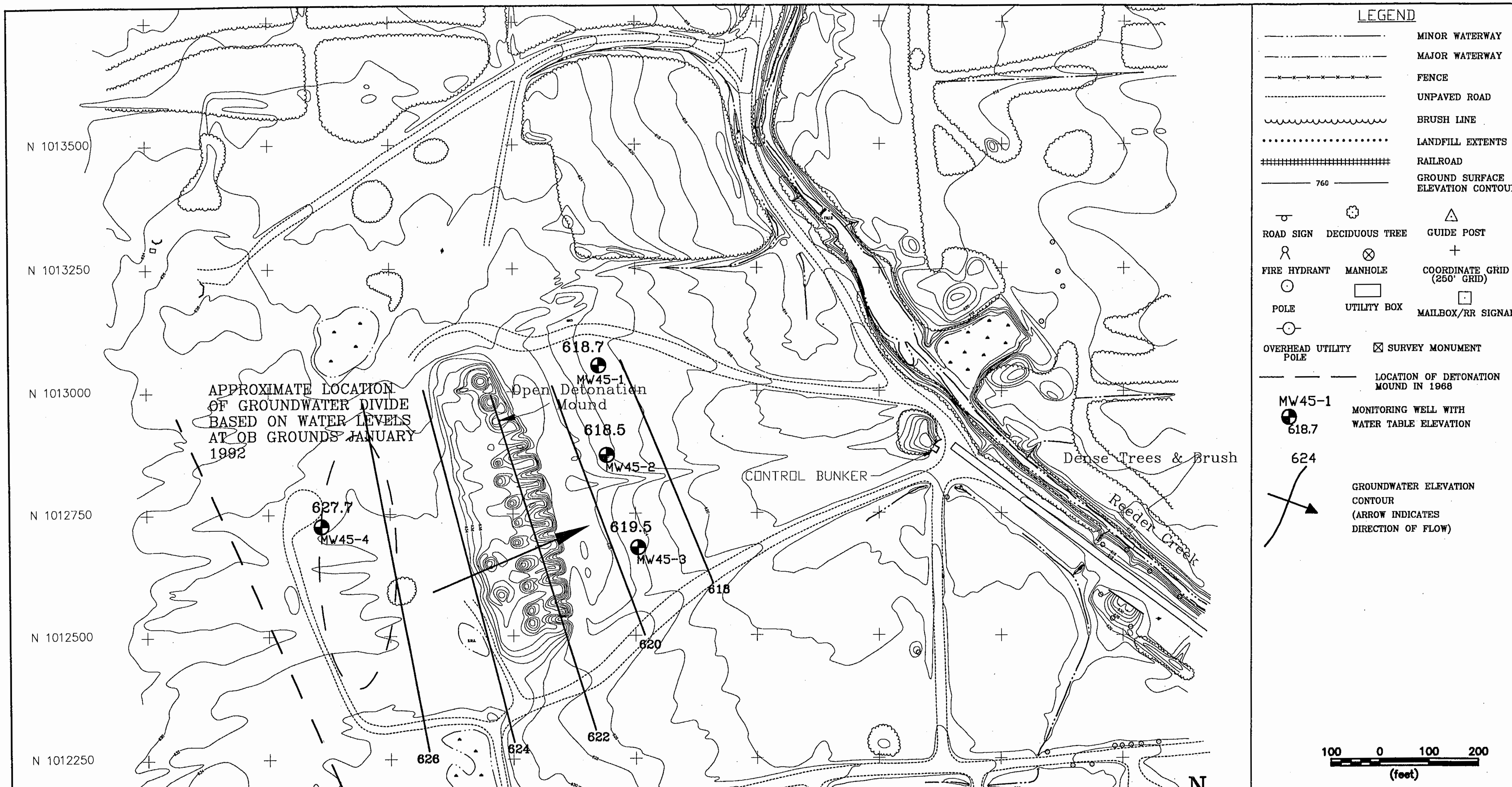

LEGEND
MINOR WATERWAY
MAJOR WATERWAY
FENCE
UNPAVED ROAD
BRUSH LINE
LANDFILL EXTENTS
RAILROAD
760
GROUND SURFACE ELEVATION CONTOUR
ROAD SIGN
DECIDUOUS TREE
GUIDE POST
FIRE HYDRANT
MANHOLE
COORDINATE GRID (250' GRID)
POLE
UTILITY BOX
MAILBOX/RR SIGNAL
OVERHEAD UTILITY POLE
SURVEY MONUMENT
LOCATION OF DETONATION MOUND IN 1968
SURFACE WATER FLOW
WETLANDS
INTERMITENT STANDING WATER
100 0 100 200
(feet)
N 1013500
N 1013250
N 1013000
N 1012750
N 1012500
N 1012250
N 1012000
E 737500
E 737750
E 738000
E 738250
E 738500
E 738750
E 739000
E 739250
E 739500
Open Detonation Mound
CONTROL BUNKER
Dense Trees & Brush
Reeder Creek
Open Burning Grounds
N
ACADSSENECA\RIFS\SD45\SD45SWFL.DWG
PARSONS
PARSONS ENGINEERING SCIENCE, INC.
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS
DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 726510-03001
FIGURE 3-2
SURFACE WATER FLOW MAP
SCALE 1" = 200'
DATE AUGUST 1995
REV A

TABLE 3-1
MONITORING WELL WATER LEVEL SUMMARY

SENECA ARMY DEPOT ACTIVITY
SEAD-45

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)
MW45-1	625.08	1/17/94	7.87	617.21	3/4/94	7.87	617.21	4/4/94	6.41	618.67
MW45-2	626.76	1/17/94	10.96	615.80	2/2/94	10.76	616.00	4/4/94	8.24	618.52
MW45-3	626.45	1/17/94	9.07	617.38	2/2/94	9.87	616.58	4/4/94	6.97	619.48
MW45-4	633.04	11/12/93	6.64	626.40	1/26/94	7.97	625.07	4/4/94	5.3	627.74
MW-1	634.22				2/1/94	8.41	625.81	4/4/94	6.24	627.98
MW-2	NA				2/2/94	6.38		4/4/94	5.75	
MW-3	NA				2/1/94	6.44		4/4/94	6.49	
MW-4	NA				2/1/94	8.3		4/4/94	6.58	
MW-5	637.99				2/1/94	3.36	634.63	4/4/94	2.91	635.08



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS

DEPT. ENVIRONMENTAL ENGINEERING	Dwg. No. 726610-03001

FIGURE 3-3
GROUNDWATER ELEVATION MAP
APRIL 4, 1994

SCALE 1" = 200'	DATE AUGUST 1995	REV A

A comparison of the measured values with the typical range of hydraulic conductivities for glacial tills indicates that the glacial till at the site is at the more permeable end of typical glacial till values.

3.1.2 Environmental Fate of Constituents at SEAD-45

The potential contaminants of concern at SEAD-45 are explosive compounds, metals, and SVOCs and their environmental fate is discussed below. The discussion is meant to present general information on the fate of the potential contaminants of concern. Further discussion of these potential contaminants of concern, and all contaminants of concern at SEDA, is presented in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan. A summary of fate and transport characteristics of selected SVOCs is presented in Table 3-2.

3.1.2.1 Explosive Compounds

According to the USATHAMA the major explosive compounds used by the Army are HMX, RDX, TNT, and Tetryl, so these compounds along with their breakdown products are constituents of concern at SEAD-45.

Table 3-2 presents the information which will serve as a basis for understanding the likely environmental fate of explosive compounds at SEDA. Explosive compounds are considered to be semivolatile organic compounds (SVOCs). This is based upon the high molecular weights of these compounds and their low vapor pressures, typical of most SVOCs. The most volatile of the five explosive compounds considered at this site is 2,6-dinitrotoluene (2,6 DNT), with a vapor pressure of 0.018 millimeters mercury (mm Hg). Compared to benzene, a volatile compound, which has a vapor pressure of 95.2 mm Hg it is apparent that volatilization of this compound is expected to be low, especially in soil which has a high clay content. Soil with a high clay content generally has a high, i.e. >50%, ratio of water filled to air filled porosity, therefore, there is a small amount of air space through which vapor can migrate. Compounds such as RDX and HMX have extremely low vapor pressures and would not volatilize through the soil. Consequently, volatilization of RDX and HMX are not expected to represent a significant environmental pathway.

The potential for explosive compounds to leach to the groundwater is a complicated consideration and influenced by many factors such as solubility, cation exchange capacity, clay content and percolation rate. For this evaluation, solubility has been considered as the most representative parameter for leaching potential. Of the six explosive compounds considered, the most soluble of the explosive compounds are the di- and trinitrotoluenes. Their

TABLE 3 - 2

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
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-n-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	
Explosives							
HMX	66	3.90E-09		5.08E+02	1.30E-01		
RDX	50	4.10E-09	2.00E-05	5.38E+02	7.80E-01		
1,3,5-Trinitrobenzene	35	2.20E-04	1.30E+00	5.20E+02			
1,3-Dinitrobenzene	470			1.50E+02	4.17E+01		
Tetryl							
2,4,6-Trinitrotoluene	130	0.0001	1.37E-06	5.34E+02	1.90E+00		
4-amino-2,6-Dinitrotoluene							
2-amino-4,6-Dinitrotoluene							
2,6-Dinitrotoluene	182	0.018	3.27E-06	2.49E+02	1.00E+02	4	4.6
2,4-Dinitrotoluene	270	0.0051	5.09E-06	2.01E+02	1.00E+02	5	

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).

solubilities range from approximately 130 mg/l to 270 mg/l. These are similar to thesolubilities of organic hydrocarbons such as toluene, (500 mg/l), or the xylenes, (150 mg/l).

This range of solubilities is considered to represent a moderate degree of leaching potential. Compounds which would represent a high degree of leachibility, i.e., high solubility, would be methylene chloride, (20,000 mg/l), benzene (1,780 mg/l) and TCE, (1,100 mg/l). The solubilities of HMX and RDX are approximately four times less than that for the di- and trinitrotoluenes and therefore represent a smaller potential for leaching.

A review of the melting points of these compounds indicates that explosive compounds are solids at the soil temperatures that are likely at SEDA and therefore would not migrate through soil as separate liquid phases. Instead, as soil moisture interacts with these solid residues a small portion would dissolve or erode away. Complete leaching would require a long interaction period.

Field studies have confirmed the long-term potential for leaching of explosive compounds into the groundwater. An evaluation of the critical parameters affecting the migration of explosive compounds through soil indicated that at a former propellant manufacturing facility, 2,4-DNT leached from soil contaminated with smokeless powder for over 35 years after cessation of operations (USATHAMA, 1985). At another facility, leaching of 2,4-DNT into groundwater from former burning grounds has been documented to occur for as long as 10 years after operations had been discontinued.

Another factor to examine is the tendency of explosive compounds to adsorb to the soil. The compounds considered in this evaluation show K_{oc} values which range from approximately 100 to 500 mL/g. The SEDA site soil has been shown to possess a high percentage of fines including clay, thereby increasing the sorption potential of these compounds to the soil. As shown in Table 3-2, for the range of K_{oc} exhibited by explosive compounds, i.e., 100-500 mL/g, these compounds would be considered intermediately mobile.

Environmental degradation of these parent organic compounds has been shown to occur by various investigators. The information available on this subject is substantial and a detailed discussion is beyond the scope of this document. However, a review of the available information indicates that nitroaromatic compounds and nitroamine compounds are susceptible to environmental transformations. Since some of the byproducts of these transformations may be environmentally persistent, there is a potential for concern.

Much of the available research has been conducted on the environmental transformation of TNT. A summary of the identified breakdown products resulting from environmental degradation of TNT and 2,4-DNT is provided in the Generic Installation RI/FS Workplan. The environmental fate of RDX is less defined than that of the other two compounds previously mentioned. An overview of the expected degradation pathways and the byproducts produced as a result of the environmental degradation of RDX is also provided in the Generic Installation RI/FS Workplan. Clearly, the breakdown byproducts which have been identified are diverse. Analytical methods have only recently been developed which are capable of accurately detecting these compounds. The widespread application of these analytical techniques are greatly limited by the availability of standards which are essential for the analyses. Responding to the need for accurate analytical procedures and recognizing that standards for every breakdown product are not available, USATHAMA has developed Method 8330 (A copy of this method is included in Appendix C). This method is intended for the analysis of explosive compound residues in water, soil and sediment.

3.1.2.2 Metals

In general, metals tend to be persistent and relatively insoluble in the environment. The behavior of 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 metals from soil is controlled by numerous factors. The most important consideration for leaching of metals is the chemical form of the metal (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 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 metal salts may be dissolved, increasing their mobility and increasing the potential for leaching to the groundwater.

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 base metallic form, bullet or projectile casings for example, will tend to dissolve much 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 the other 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.

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. This is because 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).

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

Barium is a highly reactive metal that occurs naturally only in the combined state. Most barium released to the environment from industrial sources is in forms that do not become widely dispersed. Barium in soil may be taken up to a small extent either by vegetation, or transported through soil with infiltration of precipitation. Barium is not very mobile in most soil systems. The higher the level of organic matter, the greater the adsorption. The presence of calcium carbonate will also limit mobility, since barium will form $BaCO_3$, an insoluble carbonate. In aquatic media, barium is likely to precipitate out of solution as an insoluble salt, or adsorb to suspended particulate matter. Sedimentation of suspended solids removes a large portion of the barium from surface waters. Barium in sediment is found largely in the form of barium sulfate. Bioconcentration in freshwater aquatic organisms is minimal.

Copper is considered to be among the more mobile of the metals in surface environments. Seasonal fluctuations have been observed in surface water copper concentrations, with higher levels in fall and winter, and lower levels in the spring and summer. Copper is not expected

to volatilize from water. Since copper is an essential nutrient, it is strongly accumulated by all plants and animals, but is probably not biomagnified. The degree of persistence of copper in soil depends on the soil characteristics and the forms of copper present. For example, in soil of low organic content, soluble copper compounds may move into groundwater at a significant rate. On the other hand, the presence of organic complexing agents may restrict movement in soil, and copper may be immobilized in the form of various inorganic complexes. Copper is not expected to volatilize from soil. Several processes determine the fate of copper in aquatic environments, these being: formation of complexes, especially with humic substances; sorption to hydrous metal oxides, clays, and organic materials; and bioaccumulation. Organic complexes of copper are more easily adsorbed on clay and other surfaces than the free form. The aquatic fate of copper is highly dependent on factors such as pH, oxidation-reduction potential, concentration of organic matter, and the presence of other metals. With regard to the latter, it has been demonstrated that co-precipitation of copper with hydrous oxides of iron effectively scavenges copper from solution, although in most surface waters organic materials prevail over inorganic ions in complexing copper.

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 (Gough, et al., 1979). 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.

Zinc is stable in dry air, but upon exposure to moist air will form a white coating composed of basic carbonate. Zinc loses electrons (oxidizes) in aqueous environments. In the environment, zinc is found primarily in the +2 oxidation state. Elemental zinc is insoluble; most zinc compounds show negligible solubility as well, with the exception of elements (other than fluoride) from Group VII of the Periodic Table compounded with zinc (i.e., $ZnCl_2$, ZnI_2)

showing a general 4:1 compound to water solubility level. In contaminated waters, zinc often complexes with a variety of organic and inorganic ligands. Therefore, the overall mobility of zinc in an aqueous environment, or through moist-to-wet soil, may be accelerated by compounding/complexing reactions.

Zinc has a tendency to adsorb to soil, sediment and suspended solids in water. Adsorption to sediments and suspended solids is the primary fate for zinc in aqueous environments, and will greatly limit the amount of solubilized zinc. Zinc is an essential element and, therefore, is accumulated by all organisms. Zinc concentrations in air are relatively low except near industrial sources. Volatilization is not an important process from soil or water.

3.1.2.3 Semivolatile Organic Compounds (SVOCs)

Polynuclear aromatic hydrocarbons (PAHs) and explosive compounds are the SVOCs that were detected most frequently in the samples collected for the SEAD-45 ESI. The environmental fate of explosives is discussed in the preceeding section. PAH compounds have a high affinity for organic matter and low water solubility. Water solubility tends to decrease and affinity for organic material tends to increase with increasing molecular weight. When present in soil or sediment, PAHs tend to remain bound to the soil particles and dissolve only slowly into the groundwater or the overlying water column. Because of the high affinity for organic matter, the physical fate of the chemicals is usually controlled by the transport of particles. Thus, soil, sediment and suspended particulate matter (in air) represents important media for the transport of the chemicals. Fate and transport parameters for selected SVOCs are presented in Table 3-2.

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

Several factors can degrade PAH compounds in the environment. Biodegradation on soil microorganisms is an important process affecting the concentrations of the chemicals in soil, sediment and water. Volatilization may also occur. This mechanism is effective for the

lighter molecular weight compounds. However, the volatilization of higher molecular weight PAH compounds occurs slowly.

3.1.3 Data Summary and Conclusions

Characterization studies included geophysical surveys, monitoring well construction and groundwater, soil, surface water and sediment sampling. These efforts have identified the presence of explosive compounds, metals and SVOCs in the surface soil, sediment, surface water, and to a lesser extent, in the groundwater at SEAD-45. This section will summarize the data collected to date and draw conclusions as to the likely environmental impacts these constituents have had to the site.

3.1.3.1 Soil Data

The first soil samples taken from the detonation mound in 1982 detected no metals at concentrations exceeding the Extraction Procedure Toxicity Limits. There were, however, three explosive compounds and the decay product of an explosive compound detected in these samples.

The five subsurface samples taken from the demolition mound during the ESI in 1993 contained high concentrations of explosive compounds and metals, notably cadmium, copper, mercury, and silver. The surface soil samples taken from nine locations at the site also contained high concentrations of explosive compounds, cadmium, copper, and mercury.

The evaluation of the information collected to date indicates that metals and explosive compounds have been transported away from the demolition mound. Surface water transport may be a significant pathway by which soil is eroded from the demolition mound, and the unvegetated nature of the OD Grounds suggests that wind erosion may also be a pathway by which contaminants are transported from the mound to the surrounding surface soil. No air monitoring has been performed during a detonation event, so air has not been evaluated as a transport pathway. Aside from the samples taken from the test pits at the demolition mound, no subsurface soil sampling was conducted at the site. There is no information, therefore, about the vertical extent of the contamination.

3.1.3.2 Groundwater Data

When originally sampled in 1979, the monitoring wells MW-1 to MW-4 contained iron in

excess of New York State Ground Water Standards (NYSGWS). Each of the monitoring wells, as well as samples taken from Reeder Creek, also contained explosive compounds.

Groundwater sampling conducted from 1982 through 1988 detected no explosive compounds in the monitoring wells, but NYSGWS were exceeded for metals in MW-1 (chromium, iron, lead), MW-2 (manganese, lead), MW-3 (lead), MW-4 (cadmium, chromium, lead), and MW-5 (chromium, manganese, lead, selenium). Verbal communication with USAEHA suggests that the collected groundwater samples were invalid due to high turbidity.

During the Quarterly Sampling Program for the OB Grounds, explosive compounds were detected on two different occasions in MW-4. Groundwater standards were exceeded for metals in MW-1 (iron, mercury), MW-2 (iron, mercury, antimony), MW-3 (iron), MW-4 (iron, magnesium, sodium), and MW-5 (iron). In most of the samples collected in January 1993, various metals, including iron, mercury, and zinc were found exceeding NYSGWS. These samples were extremely turbid, and the validity of the samples is questionable.

During the groundwater sampling program conducted for the ESI, explosive compounds were detected in MW-1 and MW-5. A variety of metals, particularly antimony, iron and manganese were found to exceed the NYSGWS in each of the eight monitoring wells sampled.

Cadmium, chromium, iron, lead, manganese, mercury, selenium, sodium, and zinc have all been detected in the OD monitoring wells at concentrations exceeding the NYSGWS, but no explosive compounds have been detected at concentrations exceeding the NYSGWS. Since explosive compounds are not naturally occurring compounds it must be concluded that they are the result of demolition activities carried out in the OD Grounds. Monitoring wells MW-1 and MW-5 lie between the detonation ground and the burning pads and could reflect the result of activities conducted at either area, but the remaining six monitoring wells discussed above are primarily influenced by the OD Grounds. This groundwater data suggests that metals and explosive compounds have leached from the demolition mound into the on-site groundwater.

3.1.3.3 Surface Water Data

Surface water sampling that was conducted during the OB RI detected both an explosive compound and metals in areas influenced by runoff from the OD mound. The surface water samples were taken from standing water in an area between the OB Grounds and the OD Grounds, from drainage swales leading from the OD mound into Reeder Creek, and from

Reeder Creek itself. RDX was the only explosive compound found. It was detected in SW-120, collected from Reeder Creek, and SW-160DL, collected from standing water between the OB Grounds and the OD Grounds. New York State has no water quality guideline for RDX in Class D surface water. Various metals were detected, but only SW-290, a sample from a drainage swale leading into Reeder Creek, contained metals (Cu, Fe) in concentrations above New York State guidelines.

Surface water samples taken during the ESI conducted at SEAD-45 detected both explosive compounds and metals as well. The surface water samples were collected from drainage ditches leading from the demolition mound to Reeder Creek and from standing water near the mound. The explosive compounds RDX and HMX were detected in SW45-2, collected from a drainage between the demolition mound and Reeder Creek; RDX was detected from SW45-1, located in the same drainage swale that SW-290 was collected. HMX was detected in SW45-3 collected from standing water between OB and OD where SW-160DL was collected.

Metals including aluminum, cadmium, copper, iron, lead, mercury, and zinc were found in the surface water. Of those, aluminum, iron, and mercury exceeded New York State guidelines in each of the four samples collected, and copper exceeded New York State guidelines in three of the four samples.

Explosive compounds and metals have been detected in standing water near the demolition mound, in water draining from the demolition mound, and in the Reeder Creek, which is the main transport pathway of water from the site. Some of the standing water collected and the water taken from Reeder Creek is in the area influenced by both the OB and the OD Grounds, and contamination could be a result of activities at either area. The surface water data suggests that surface runoff via overland flow is a significant pathway for contaminants to be transported away from the demolition mound and off of the site.

3.1.3.4 Sediment Data

Sediment samples for the OB RI were collected from the same locations as the surface water samples were collected for the OB RI. Two explosive compounds were detected in SD-290, located in a drainage swale leading from the demolition mound into Reeder Creek. HMX was detected at a concentration of 130 ppb, and 2-amino-4,6-dinitrotoluene was detected at a concentration of approximately 85 ppb. No explosive compounds were detected in the surface water collected at that location, but metals exceeding New York State surface water

guidelines were found there. Six explosive compounds were detected at SD-190, collected in a drainage ditch between the OB and OD Grounds. The explosive compounds detected were HMX (120 ppb), RDX (500 ppb), 2,4,6-trinitrotoluene (100 ppb), 4-amino-2,6-dinitrotoluene (160), 2-amino-4,6-dinitrotoluene (180 ppb), and 2,4-dinitrotoluene (98 ppb). This location was dry at the time of sampling, so there is no surface water data from this location.

Metals exceeding NYSDEC sediment criteria were found at each of the nine sediment locations sampled for the OB RI. These metals were arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc. Copper and iron exceeded NYSDEC criteria in eight of the nine samples, and lead, nickel, and zinc exceeded NYSDEC criteria in seven of the nine samples.

Sediment samples collected during the ESI conducted at SEAD-45 were also collected at the same location as the corresponding surface water sample. Explosive compounds were detected at only one of the sample locations, SD45-2. Five explosive compounds were detected there, RDX (210 ppb), Tetryl (140 ppb), 2,4,6-trinitrotoluene (120 ppb), 2-amino-4,6-dinitrotoluene (260 ppb), and 2,4-dinitrotoluene (83 ppb). The surface water sample at that location also contained explosive compounds.

Metals in excess of NYSDEC sediment criteria were detected at three of the four sampling locations. SD45-2, SD45-3, and SD45-4 each contained copper and mercury in excess of NYSDEC criteria SD45-2 also contained cadmium and iron, and SD45-4 also contained cadmium.

The explosive compounds and metals detected in the sediment does not correlate directly with the explosive compounds found in the surface water samples, but the contaminants found in each of the two mediums do suggest that the contaminants are being transported by the surface water and are being deposited in the drainages leading from the demolition mound.

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 the OD Grounds, based upon the results of the conceptual site model, which was described in the previous section.

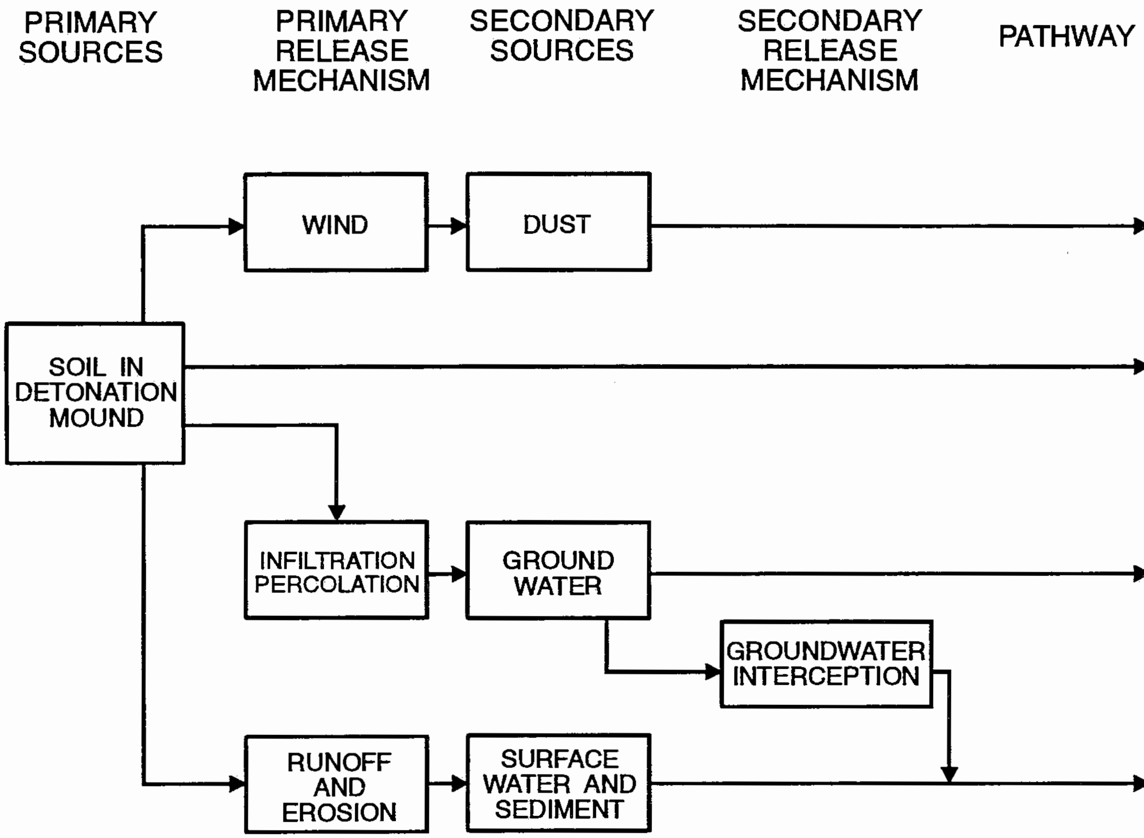
The complete potential exposure pathways from sources to receptors is shown schematically in Figure 3-4, the Exposure Pathway Model.

Section 3.2 discusses the current understanding of site risks for SEAD-45 based upon the data gathered from the ESI. This information will be used to assess whether sources of contamination, release mechanisms, exposure routes and receptor pathways developed in the conceptual site models for SEAD-45 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. This will serve to better determine risks to human health and the environment, define the Applicable or Relevant and Appropriate Requirements (ARARs), and develop appropriate remedial actions.

A conceptual site model was developed for SEAD-45 and was presented in the draft final ESI Report (Parsons ES, May 1995). The model identified potential source areas, release mechanisms, exposure pathways and receptors. It was based upon an understanding of historical usage, physical site characteristics and current site usage. Previous environmental sampling data was available for SEAD-45 prior to the ESI. Using the additional sampling data gathered during the ESI, the conceptual sit model was re-evaluated for SEAD-45. The following sections describe potential source areas, release mechanisms, exposure pathways and receptors for the various media investigated during the ESI.

This is a generic discussion. The future use scenario and the required degree of cleanup will be proposed as part of the feasibility study. The future plans for the site will be taken into account at that time. Currently, the Army has no plans to change the use of this facility or to transfer the ownership. In early July 1995, the Base Realignment and Closure Act (BRAC) Commission voted to recommend closure of SEDA. Until the BRAC Commission recommendations are voted on by the President and the Congress, the installation will remain open.

The President must approve the entire list at which time the list is forwarded to Congress. If Congress approves the recommendations they will become public law on October 1, 1995. If BRAC applies to SEDA, future use of the sites will be determined by the Army. In accordance with BRAC regulations, the Army will perform any additional investigations and remedial actions to assure that any change in intended land use is protective of human health and the environment.



EXPOSURE ROUTE	RECEPTOR: HUMAN — FUTURE ON-SITE RESIDENT	RECEPTOR: HUMAN — CURRENT SITE WORKERS	RECEPTOR: BIOTA — TERRESTRIAL	RECEPTOR: BIOTA — AQUATIC
INHALATION	●	●	●	NA
DERMAL CONTACT	●	●	●	NA
INGESTION	●	●	●	NA
DERMAL CONTACT	●	●	●	NA
INGESTION	●	NA	NA	NA
INHALATION	●	NA	NA	NA
DERMAL CONTACT	●	NA	NA	NA
INGESTION	●	●	●	●
DERMAL CONTACT	●	●	●	●

● 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-45 OPEN DETONATION GROUNDS

DEPT. ENVIRONMENTAL ENGINEERING | DWG NO. 726511-02005

FIGURE 3-4
EXPOSURE PATHWAY SUMMARY

SCALE NA | DATE AUGUST 1995

H:\ENG\SENECA\SCOPING\SEAD45\45EXP.CDR

At this time, the specific details for closure procedures, projected timetables of closure, discussion of the Army's future intention for the sites, and a detailed account of notification methods to prospective purchasers are unavailable for inclusion in this Workplan. If it is decided that the base will be closed, then closure procedures will be obtained.

3.2.1 Potential Source Areas and Release Mechanisms

The suspected source area of the metals and explosive compounds at the OD Grounds is the soil that comprises the detonation mound. The mound is composed of soil which is moved via bulldozer before and after each detonation event. This area has been demonstrated to contain various explosive compounds and metals. Other potential source areas are the previous locations of the detonation mound. Air photos from 1968 show the detonation mound located 200 feet west of the present location. The different orientations of the electrical conduits found from the geophysical and test pit investigation for the ESI suggest that the mound may have been located in yet a third position. The continual movement of the soil in the mound due to earth moving activities associated with the detonation events is a mechanism by which the mound may be continually changing position.

The primary release mechanism from the source area is surface water run-off via overland flow and surface soil erosion. Leaching of metals and explosive compounds have been demonstrated by the presence of these contaminants in the groundwater, but the relatively low permeability of the till suggests that the leaching of explosive compounds and metals is not as significant a release mechanism compared to surface water runoff and erosion. The source area is contained primarily in surface soil, but the movement of contaminants with fugitive dust and direct dispersion of dust and/or volatile organic compounds into the air during periodic detonation events may constitute a significant release mechanism. Volatilization of the di- and trinitrotoluene compounds from primary and secondary sources may also constitute a less significant release mechanism.

These sources have the potential to contaminate the groundwater beneath the site, the sediment and surface water of the drainage areas on the OD Grounds, the sediment and surface water of Reeder Creek and the surface soil in and around the OD Grounds.

3.2.2 Potential Exposure Pathways and Receptors - Current Uses

The complete potential exposure pathways from sources to receptors are shown schematically in Figure 3-4. Access to the Open Detonation Grounds is restricted since it is located within

the Ammunition Storage Area. Access is further restricted by a locked gate at the entrance to the OB/OD Grounds. There are three primary receptor populations for potential releases of contaminants from the OD Grounds:

- Current site workers and visitors
- Terrestrial biota at or near the OD Grounds
- Aquatic biota in Reeder Creek

The exposure pathways and media of exposure are described below as they may affect the various receptors. The numerical assumptions that will be used in the risk assessment for the current use exposure scenario are listed in Table 4-1 of the Generic Installation RI/FS Workplan.

3.2.2.1 Ingestion and Dermal Exposure Due to Surface Water and Sediment

Surface water run-off flows to the wetlands and drainage swales on-site which discharge to Reeder Creek. Two small wetlands are located east of the detonation mound and one to the northwest of it. Surface soil eroded from the site is deposited as sediment within the on-site drainage swales and wetlands.

Current site workers and visitors could be exposed by way of ingestion or dermal contact to surface water or sediment in the drainage ditches or in Reeder Creek. Terrestrial biota that ingest or come in contact with surface water or sediment in the drainage ditches or Reeder Creek may be exposed. Aquatic biota in the drainage ditches or Reeder Creek may also be exposed.

3.2.2.2 Dust Inhalation and Dermal Contact

Contaminated fugitive dust may be released from the OD Grounds due to high winds, vehicle traffic through the area, or disturbance of the soil during site use. The receptors of fugitive dust releases by way of inhalation and dermal contact are current site workers, visitors and terrestrial biota.

3.2.2.3 Incidental Soil Ingestion and Dermal Contact

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

3.2.2.4 Ingestion of Groundwater

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

3.2.3 Potential Exposure Pathways and Receptors - Future Uses

Under current site conditions, access to the site is limited. While strict land use control can not be ensured in future uses, limitations may be imposed through zoning restrictions or deed restrictions. Potential future uses of the site include light industrial and unrestricted residential or other private development.

For future uses of the Open Detonation Grounds, the receptor population that would differ from the above-mentioned receptors would be on-site residents. For the ingestion of soil, surface water, and sediment and dermal contact with surface water and sediment, the receptors would be primarily children. Dermal contact with soil; ingestion of, inhalation of, and dermal contact with groundwater; and inhalation and dermal contact with fugitive dust are potential exposure pathways for all future on-site residents.

The numerical assumptions that will be used in the risk assessment for the future use exposure scenario are listed in Table 4-1 of the Generic Installation RI/FS Workplan.

3.3 SCOPING OF POTENTIAL REMEDIAL ACTION ALTERNATIVES

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

Based upon sampling data gathered during the ESI, the media of concern at SEAD-45 for protection of human health and the environment and compliance with ARARs are:

- surface soil (0-2 inches) and sediment containing metals and explosive compounds
- groundwater containing metals
- surface water containing metals and explosive compounds

Human health concerns for SEAD-45 would focus primarily on inhalation and dermal contact of surface soil for current site usage. For future site usage, groundwater ingestion would be an additional human health concern as well as compliance with ARARs.

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

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

Identification 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.

3.5 DATA QUALITY OBJECTIVES (DQOs)

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

Any further investigations conducted at SEAD-45 either as part of this scoping document, or other additional work, will conform with all of the stated DQOs. Additional sampling of groundwater, soil, sediment and surface water will generally require Level IV quality data.

3.6 DATA GAPS AND DATA NEEDS

The investigations conducted during the ESI at SEAD-45 were conducted to gain a preliminary understanding of the nature and extent of contamination. These data were to be used to evaluate the potential for risks to human health and the environment. A conceptual site model was also developed identifying potential source area release mechanisms and receptor pathways. The result of the investigations at SEAD-45 were used to refine the conceptual site model and 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 gaps and subsequent data needs for SEAD-45 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:

Groundwater Data

- Verify the results from the monitoring wells already established at the OD site. This will entail the redevelopment and sampling of six existing monitoring wells.
- Install and sample five additional overburden monitoring wells. Collected data will establish contaminant concentrations in the aquifer.
- Establish database to determine compliance with ARARs in clean-up goals.
- In addition to assessing the ground water quality, the hydraulic conductivity of the aquifer will be determined to assess contaminant migration and potential remedial actions.

Surface Water/Sediment Data

- Determine nature and extent of contamination for on-site and off-site surface waters and sediment. Sample collection will include standing water at the OD Grounds, drainages leaving the OD Grounds, Reeder Creek, and smaller creeks to the west of the OD Grounds.
- Establish concentration levels in Reeder Creek, upstream and downstream from the OB/OD site.
- Compare SEAD-45 sediment data to site-wide sediment background data that has been compiled from the ESIs performed at 25 SEADs and RIs completed at the OB Grounds and at the Ash Landfill.
- Establish database for environmental compliance with ARARs or clean-up goals, to perform baseline risk assessment and to develop remedial action alternatives.
- Total Organic Carbon (TOC) and grain size analysis will be performed on sediment samples to assess the sorptive potential of the sediment.

Soil Data

- Determine the nature and extent of contamination across the site. Number and depth of soil borings are more completely described in Section 4, the Task Plan for the RI. There will be 47 soil boring locations across approximately 30-acres of the site at a 200 foot spacing. Collect samples for risk evaluation.

- Compare SEAD-45 soil data to site-wide soil background data that has been compiled from 57 background samples obtained from the ESIs performed at 25 SEADs and RIs completed at the OB Grounds and the Ash Landfill.
- TOC and grain size analysis will be performed at two soil boring locations to assess the sorptive potential of the soil.
- Establish database for environmental compliance with ARARs or clean-up goals, to perform baseline risk assessment and to develop remedial action alternatives.

Ecological Data

- Ecological Assessment to systematically document visual observations discriminating between obviously and potentially impacted and non-impacted areas. This will determine where and if there is a need for further investigation.
- Establish database for environmental compliance with ARARs or clean-up goals, 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 for completion of the Remedial Investigation (RI) at SEAD-45. These include:

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

4.1 PRE-FIELD ACTIVITIES

The pre-field activities will include the following:

- A site inspection to familiarize key project personnel with site conditions and finalize direction and scope of field activities
- A comprehensive review of the Health & Safety Plan with field team members to insure that the hazards that might occur and preventive and protective measures for those are completely understood
- An inspection of all equipment necessary for field activities to insure proper functioning and usage
- A comprehensive review of sampling and work procedures with field team members
- Unexploded ordnance (UXO) clearance

4.2 FIELD INVESTIGATIONS

Five major tasks comprise the field investigation of the RI:

- Soil Investigation
- Surface Water and Sediment Investigation
- Groundwater Investigation
- Ecological Investigation

The purpose of the field investigation program is to:

- Determine the nature and extent of contamination across the site
- Determine if the constituents exceed background levels
- Provide a database for the site risk assessment
- Provide a database for the feasibility study

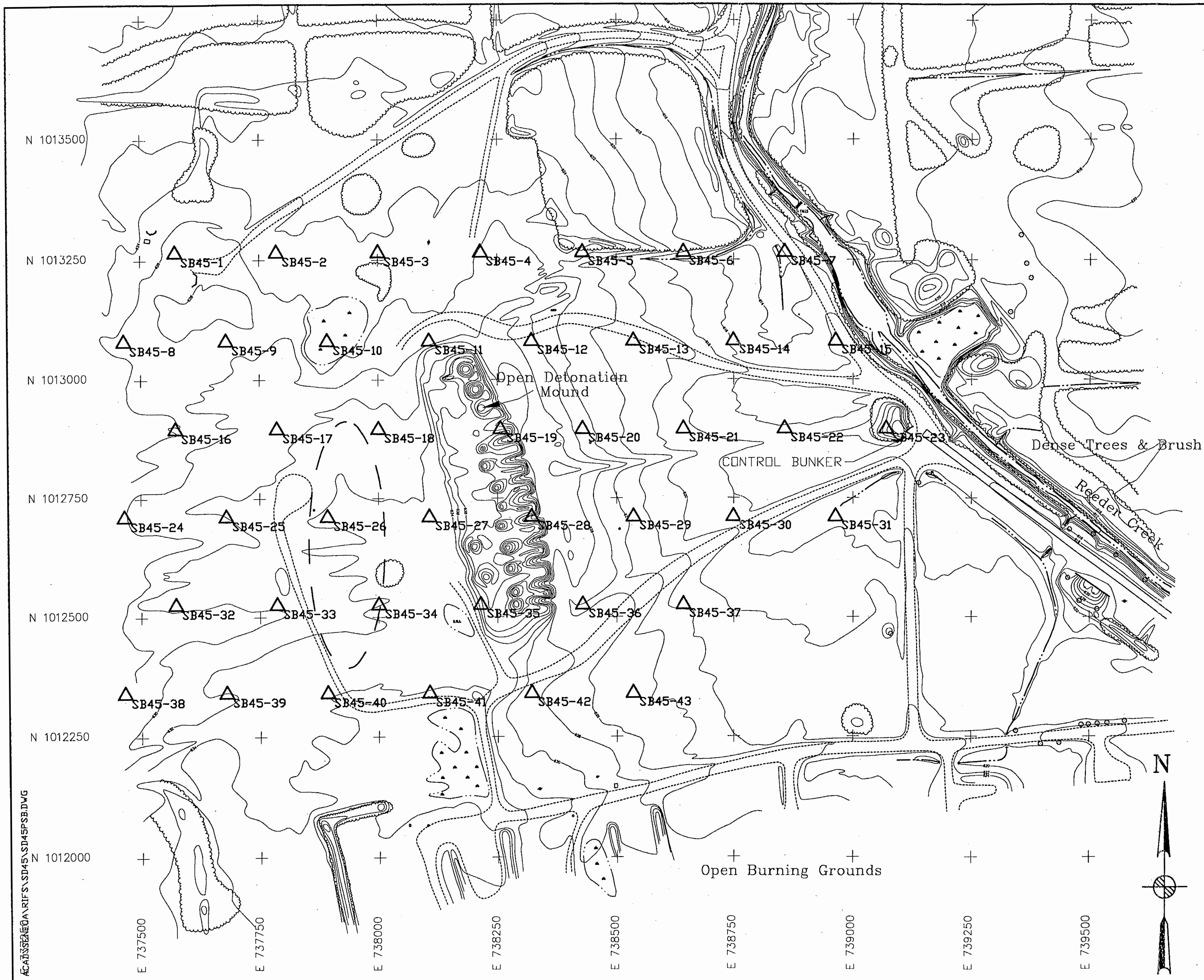
The following sections describe the general scope of work involved in each of these tasks. The data collected during this program will be used to assess these potential exposure pathways.

4.2.1 Soil Investigation

The program will consist of both subsurface and surface soil samples. Subsurface soil samples will be collected from a grid of soil borings across the site. Surface soil samples will be collected from areas where elevated levels of explosives and metals were detected in previous investigations. Additional surface soil samples will be taken within 2000 feet of the OD grounds to evaluate the extent of downwind contamination at the site. Background soil concentrations have been determined in previous investigations performed at SEDA, and those values will be used to compare with the analytical results for soil in this investigation.

4.2.1.1 Soil Boring Program

Surface water runoff soil erosion from the detonation mound has been determined to be the primary mode of transport of constituents away from the mound source area. Because precipitation drains off of the mound in all directions, and because no subsurface soil data exists at the OD grounds, a grid of soil borings will be drilled across the OD Grounds, as shown in Figure 4-1. The grid will cover approximately 30 acres. The boundaries of the grid will be Reeder Creek, and approximately 800 feet west, 400 feet north, and 100 feet south of the detonation mound. The grid extends 800 feet west of the detonation mound for two reasons: 1) air photos from 1968 show that the detonation mound was previously located approximately 400 feet to the west of its present location, and 2) current air photos show that soil disturbed by bulldozing activity extends approximately 800 feet from the mound. The grid extends only 100 feet to the south because any soil borings performed further than that would be within the OB Grounds, where a Remedial Investigation has already been performed.



LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
- BRUSH LINE
- LANDFILL EXTENTS
- RAILROAD
- 760 GROUND SURFACE ELEVATION CONTOUR
- ROAD SIGN
- DECIDUOUS TREE
- GUIDE POST
- FIRE HYDRANT
- MANHOLE
- COORDINATE GRID (250' GRID)
- POLE
- UTILITY BOX
- MAILBOX/RR SIGNAL
- OVERHEAD UTILITY POLE
- SURVEY MONUMENT
- LOCATION OF DETONATION MOUND IN 1968
- PROPOSED SOIL BORING

100 0 100 200 (feet)

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RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS

DEPT. ENVIRONMENTAL ENGINEERING | Dwg. No. 726510-03001

FIGURE 4-1
PROPOSED SOIL BORING LOCATIONS

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

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Because of the suspected wide distribution of impacts to surface soils at the site, the proposed sampling program is designed to evaluate the entire OD Grounds. Sample locations were selected using a random-start equilateral triangular grid method ("Statistical Methods For Evaluating the Attainment of Cleanup Standards, Volume 3: Referenced-Based Standards for Soils and Soil Media," EPA, Policy, Planning and Evaluation, EPA 230-R-94-004). This method provides uniform coverage of the area to be sampled, whereas random sampling can leave subareas that are not sampled. Using the method, a distance of 214 feet between sampling points was determined. After laying out the individual sampling points in the area to be sampled, the resulting grid contains 43 points, as shown in Figure 4-1.

At each soil boring location, a surface soil (0-2") sample will be collected. Because there is no existing subsurface soil data, soil borings will be performed by the continuous split spoon method. Samples will be collected every two feet from the ground surface to the water table and will be sent to the laboratory for Level II screening for metals and explosives. Approximately 215 subsurface soil samples are expected to be collected from the 43 soil borings and submitted to the laboratory for Level II screening. Continuous split spoon sampling will continue for the remainder of the soil boring. The samples below the water table will not be submitted to the laboratory for analyses, with the exception of samples submitted for grain size and total organic carbon (TOC) analysis.

The soil sampling will be performed until split-spoon refusal is encountered. Normally, refusal is defined as when 100 blows to the split spoon using a 140 lb hammer dropped from a height of 30 inches fails to drive the spoon half of a foot into the earth. From previous drilling programs conducted at the site, split-spoon refusal is expected to occur at 10 feet.

The geologist may decide to continue split-spoon sampling if it is believed that split-spoon refusal at shallow depths is due to a reason other than penetration into weathered or competent shale. However, since UXOs may be encountered at the site, the definition of refusal may be modified. For the safety of the drilling contractor, refusal may be a field decision by the UXO clearance personnel that an object other than bedrock has been encountered. If the soil boring is not stopped due to UXO concerns, the soil boring will continue until auger refusal is reached. Auger refusal for this project is defined in Appendix A, Field Sampling and Analysis Plan. All sampling and drilling will be performed according to the procedures outlined in Appendix A, Field Sampling and Analysis Plan.

Because UXOs are a concern across the entire grid of soil borings, each soil boring location will be cleared for UXOs before drilling and all drilling activities will be continuously monitored by UXO clearance personnel. Because the detonation mound cannot be cleared of UXOs, soil borings located on the detonation mound will be offset to the nearest location off of the mound. The drilling, decontamination, and UXO clearance procedures are described fully in Appendix A, Field Sampling and Analysis Plan.

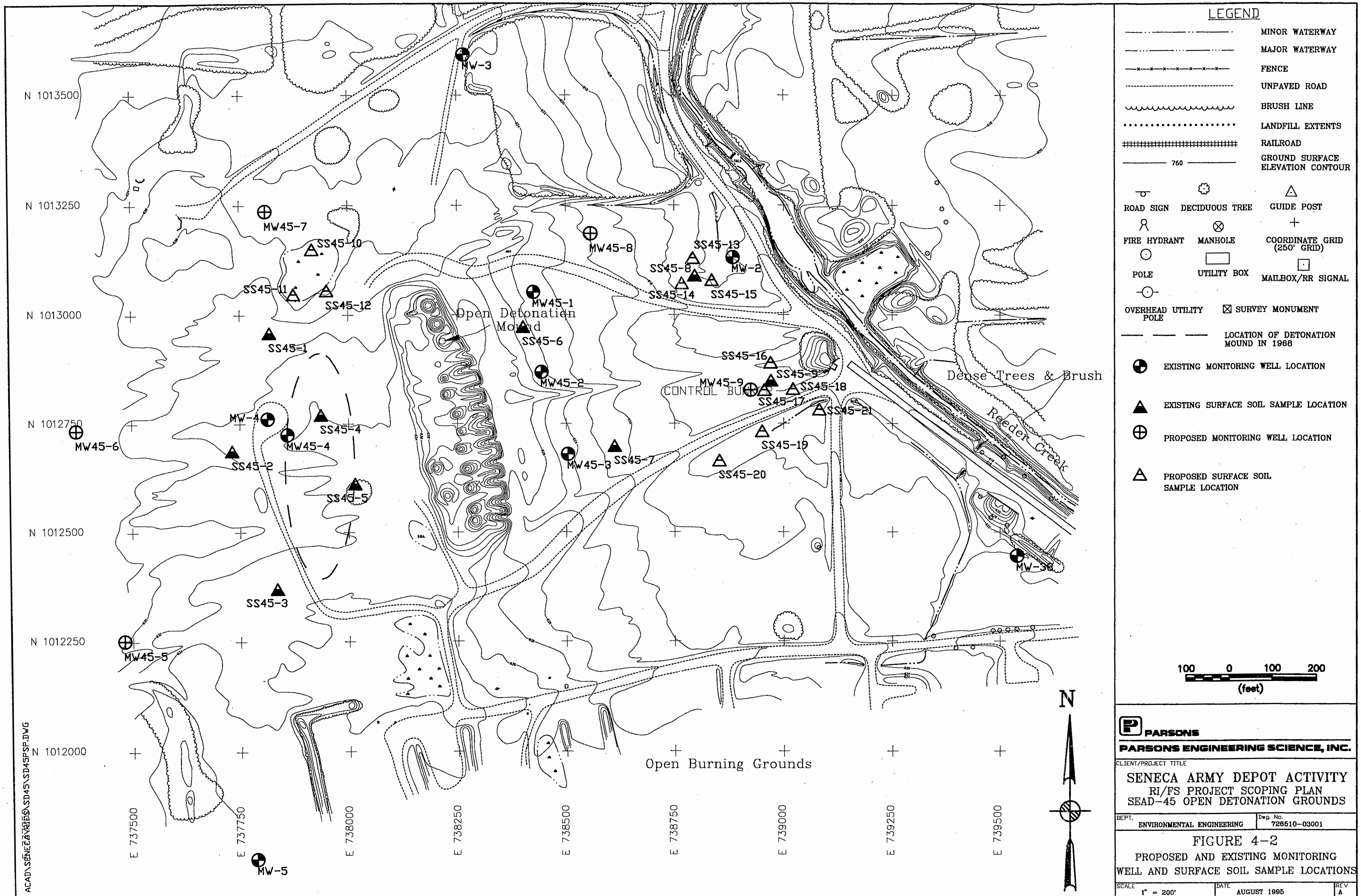
All subsurface soil samples collected from the 43 soil borings will undergo Level II screening analyses for TNT, mercury and copper. By screening the soil samples to determine which ones contain the highest concentrations of TNT, mercury, and copper, it will not be necessary to perform the Level IV analyses on all of the subsurface sample collected. TNT, mercury and, copper are judged to be good indicator compounds because they were found to be prevalent in earlier soil investigations and at elevated concentrations. Level II screening is being incorporated into this investigation because it will allow a large grid covering the OD grounds to be investigated while keeping the laboratory costs to a minimum. Based upon the Level II data, a select portion of these samples will undergo NYSDEC CLP Level IV analysis. Overall, there will be three complete Level IV analyses per borehole, the surface sample and two subsurface samples. The Level II screening is discussed fully in section 4.2.5.2,Analytical Program, Level II Screening.

In addition, grain size analysis and TOC analysis will be performed at two soil boring locations. At each of the two soil borings selected, three subsurface samples (one near the surface, one below the water table, and one intermediate) will be submitted for these analyses.

All surface soil samples will undergo the Level IV analyses specified in Section 4.2.5.2, Analytical Program, Level IV Analyses. No Level II screening will be performed on the surface soil samples.

4.2.1.2 Surface Soil Program

In addition to the surface soil sample that will be collected at each of the soil boring locations, surface soil samples will be collected in four areas where previous sampling detected elevated levels of metals and explosives. At these four locations, three surface soil samples will be collected at an approximate fifty foot spacing around the previous sample location to determine the extent of the elevated concentrations of contaminants. The proposed surface soil sample locations are shown in Figure 4-2.



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SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS

DEPT. ENVIRONMENTAL ENGINEERING	Dwg. No. 726510-03001

FIGURE 4-2
PROPOSED AND EXISTING MONITORING WELL AND SURFACE SOIL SAMPLE LOCATIONS

SCALE 1" = 200'	DATE AUGUST 1995	REV A

Surface samples will also be collected to evaluate the potential for downwind transport of contaminants from the detonation mound. In order to assess wind as a transport and exposure pathway, surface soil samples will be collected 1000, 1500, 2000, and 2500 feet away from the detonation mound in the two primary wind directions. The primary wind directions at SEDA are to the north-northwest and the south-southeast. All of the downwind sample locations along the north-northwest/south-southeast azimuth and the wind rose used to determine the primary wind direction are shown in Figure 4-3. The wind rose data, which is representative of the wind patterns at SEDA, was gathered from the airport in Ithaca, New York.

A total of 12 surface soil samples will be collected at the OD Grounds and a total of 8 surface soil samples will be collected downwind of the OD Grounds. All samples will be collected from 0-2 inches below the surface organic material. Surface soil sample collection procedures are described in Appendix A, Field Sampling and Analysis Plan. The downwind surface soil samples will be tested according to the analyses specified in section 4.2.5.2, Analytical Program, Level IV Analyses. All of the surface soil samples submitted to the laboratory will undergo NYSDEC CLP Level IV analyses. No Level II screening will be performed on surface soil samples.

4.2.1.3 Soil Sampling Summary

One surface soil sample will be collected at each of 43 soil boring locations resulting in 43 surface soil samples. Three surface soil samples will be collected at four locations where high concentrations of contaminants were noted from the results of the ESI sampling, resulting in 12 surface soil samples. Four surface soil samples will be taken from two downwind directions from the detonation mound resulting in 8 surface soil samples. A total of 63 surface soil samples will be submitted to the laboratory to undergo NYSDEC CLP Level IV analyses. Approximately five subsurface soil samples from each of 43 soil borings will be submitted to the laboratory for Level II analysis resulting in approximately 215 Level II analyses. Of those submitted, two subsurface samples from each soil boring will undergo NYSDEC CLP Level IV analysis resulting in 86 subsurface soil samples that will undergo Level IV analysis.

4.2.2 Surface Water and Sediment Investigation

The intent of the surface water and sediment investigation is to determine the nature and extent of impacts to the on-site and off-site surface waters. While sample collection will focus

FIGURE 4-3
PROPOSED DOWNWIND SURFACE SOIL SAMPLE LOCATIONS

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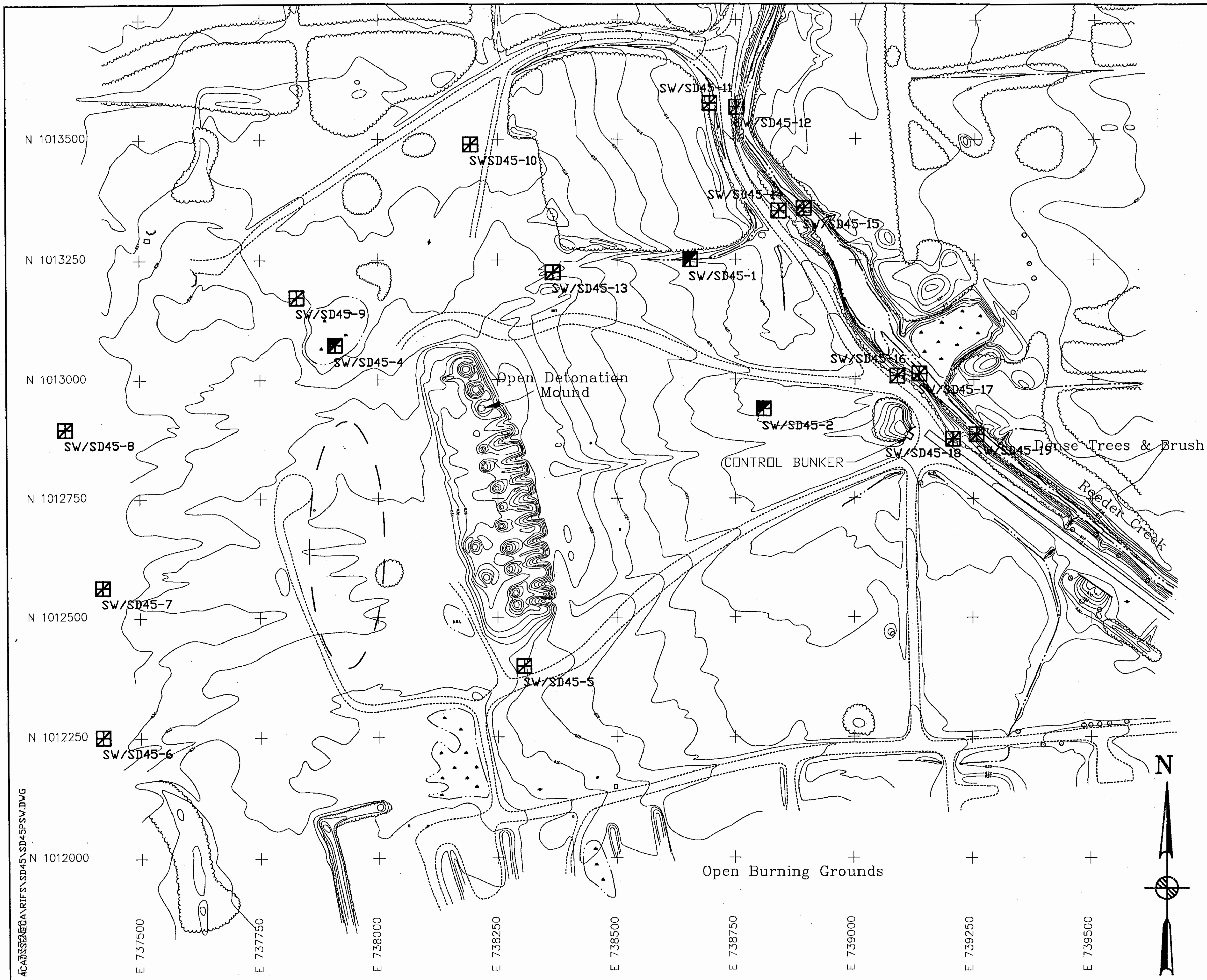
on standing water near the detonation mound and Reeder Creek, as shown in Figure 4-4, three smaller creeks to the west of the OD Grounds will be sampled as well, as shown in Figure 4-5. Concentrations of constituents in Reeder Creek, upstream of the OD site, will be used as background.

The migration of groundwater toward Reeder Creek has been identified previously by M&E (1989). Streamflow and surface elevation measurements of Reeder Creek were obtained during the OB RI, and the findings supported M&E's conclusion. The relationship between groundwater and surface water is of concern since a groundwater plume, if detected, may be discharging to Reeder Creek. Since an extensive investigation of Reeder Creek was performed for the OB RI, and Reeder Creek is not suspected to have significantly changed since then, no investigation will be performed on Reeder Creek for this RI/FS.

Before the surface water and sediment sampling begins, the freshwater wetlands within the OD Grounds will be surveyed and mapped at a scale of 1 inch = 200 feet using the 1987 Corps of Engineers Wetland Delineation Manual. The surface water and sediment sampling plan may be modified if the wetland information indicates that sampling would be more effective in different locations.

A total of 23 surface water and sediment samples will be collected at the locations shown in Figures 4-4 and 4-5. Seven on-site surface water samples will be collected around the demolition mound at SEAD-45. Four samples will be collected from the west bank of Reeder Creek where drainage swales from the OD grounds discharge to Reeder Creek, and 4 more samples will be collected from Reeder Creek adjacent to these locations. Four samples from Reeder Creek will also be collected downstream of the OD grounds; two at the mouth of the creek near the discharge to Seneca Lake, 1 at the SEDA property boundary, and 1 at the culvert that restricts the creek's flow approximately 2000 feet downstream of the OD Grounds. Additionally, 3 samples will be taken from smaller streams discharging into Seneca Lake directly west of the OD grounds. Finally, 1 upstream sample will be taken where Reeder Creek enters the OD grounds.

At each sampling location, a surface water and a sediment sample will be collected. The surface water and sediment sampling procedures are described in Appendix A, Field Sample and Analysis. The surface water and sediment will be tested according to the analyses described in section 4.2.5.2,Analytical Program, Level IV Analyses. Each sediment sample will also undergo grain size analysis.



LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
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- MAILBOX/RR SIGNAL
- OVERHEAD UTILITY POLE
- SURVEY MONUMENT
- LOCATION OF DETONATION MOUND IN 1968
- EXISTING SURFACE WATER AND SEDIMENT LOCATION
- PROPOSED SURFACE WATER AND SEDIMENT LOCATION

100 0 100 200
(feet)

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RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS

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FIGURE 4-4
PROPOSED AND EXISTING ON-SITE SURFACE WATER AND SEDIMENT LOCATIONS

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

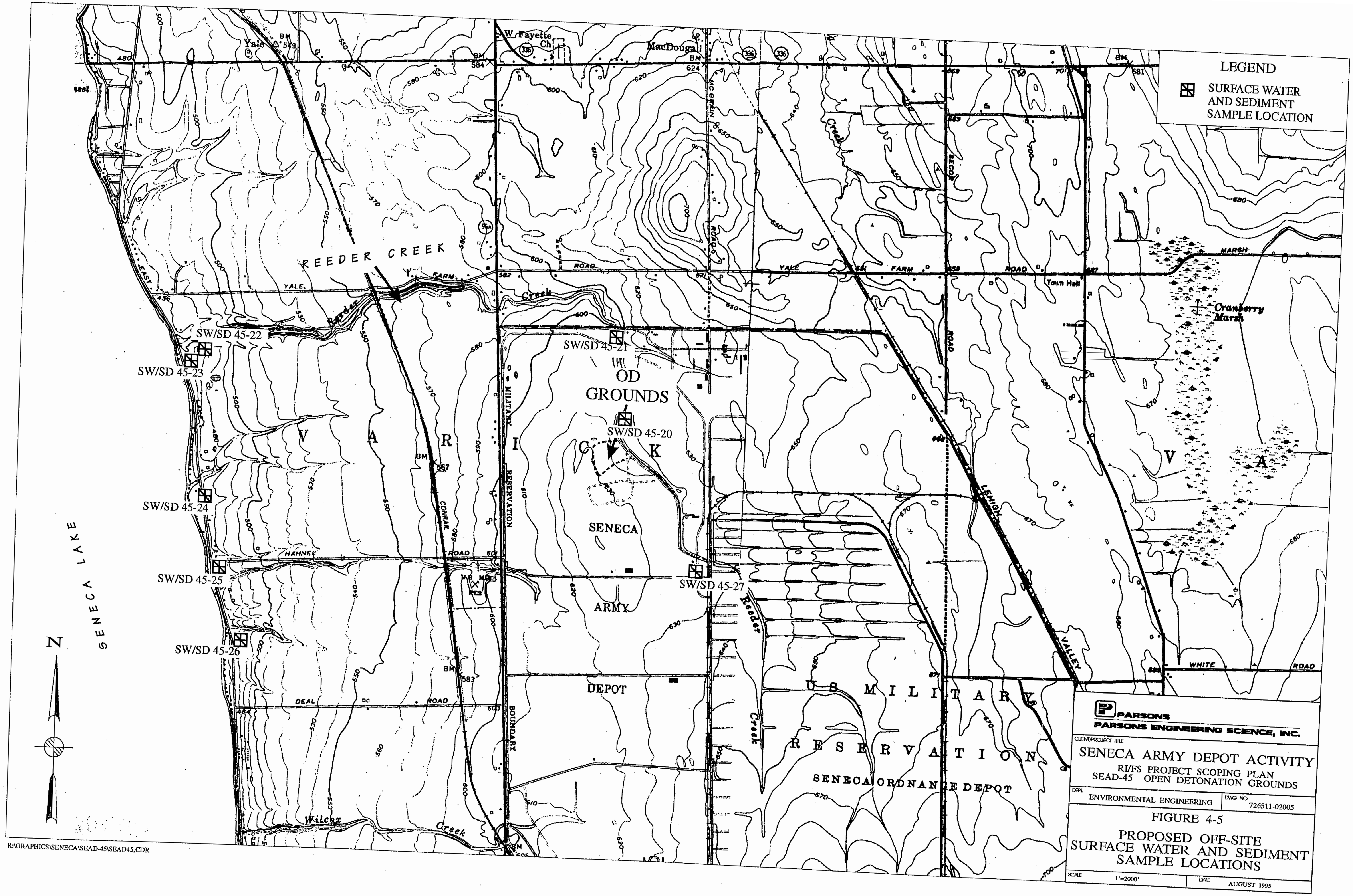

FIGURE 4-5
PROPOSED OFF-SITE SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

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4.2.3 Groundwater Investigation

4.2.3.1 Monitoring Well Installation

Although 9 monitoring wells exist and have been previously sampled at the OD grounds, the lateral extent of potential pollutant migration from the detonation mound has not been fully characterized. In addition, water levels measured in the area for the OB Grounds RI indicate that a groundwater divide may exist to the west of the OD mound, as shown in Figure 3-3, and the potential for constituents to leach from the surface soil and migrate westward has not been investigated.

Consequently, the goals of the proposed groundwater investigation are to:

- Verify the data from previous groundwater sampling
- Evaluate the lateral extent groundwater impacts
- Gather additional potentiometric data to confirm groundwater flow direction and determine hydraulic conductivity
- Determine whether a groundwater divide exists to the west of the OD mound

To accomplish those goals, 5 additional overburden monitoring wells will be installed at various locations around the demolition mound. The investigation will include the re-development and sampling of 7 of the 9 existing monitoring wells as well as the 5 proposed monitoring wells. The two existing monitoring wells that will not be sampled are MW45-1 and MW-4. MW45-1 will not be sampled because it is a dry well. MW-4 is located only 50 feet from MW45-4, so of those two monitoring wells, only MW45-4 will be sampled. The locations of the existing and proposed monitoring wells are shown in Figure 4-2.

Monitoring well installation and development procedures for overburden monitoring wells are described in Appendix A, Field Sampling and Analysis Plan. All monitoring wells will be properly developed prior to sampling. Two separate rounds of groundwater sampling will be performed approximately 3 to 4 months apart. Groundwater sampling procedures are described in Appendix A, Field Sampling and Analysis Plan. The groundwater samples will be tested according to the analyses described in section 4.2.5.2,Analytical Program, Level IV Analyses.

4.2.3.2 Aquifer Testing

Aquifer testing will be performed at the 12 monitoring wells. In-situ hydraulic conductivity tests will be performed on the seven monitoring wells using either a rising or falling head test. Three rounds of water levels will be measured at each of the monitoring wells at SEAD-45 to further define the existing data on groundwater flow at the site. Water levels will also be measured at the monitoring wells at the adjacent OB grounds to obtain a more complete map of groundwater elevations. The first round of groundwater levels will be measured at the time that the monitoring wells are developed, the second round will be measured at the time of the first round of groundwater sampling, and the third round of groundwater levels will be measured at the time of the second round of groundwater sampling. Procedures for in-situ conductivity tests and water level measurements 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 analyses of the samples collected for the RI, described in Sections 4.2.1 through 4.2.3.

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 and if they were present at the site prior to contaminant introduction; and if they were present prior to contaminant introduction, to provide the appropriate information to design a remedial investigation of the resources. The information to be

gathered includes site maps, descriptions of aquatic and terrestrial resources at the site, the assessment of the value of the aquatic and terrestrial resources, and the appropriate contaminant-specific and site-specific regulatory criteria applicable to the remediation of the identified aquatic and terrestrial resources.

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

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

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

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

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

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

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

4.2.4.2 Contaminant-Specific Impact Analysis

Information from the site description developed in Section 4.2.4.1 and from the characterization of the contaminants at the site developed from the results of the RI will be used to assess the impacts of contaminants on aquatic and terrestrial resources. The impact analysis will involve three steps, each using progressively more specific information and fewer conservative assumptions and will depend upon the conclusion reached at the previous step regarding the degree of impact. If minimal impact can be demonstrated at a specific step, additional steps will not be conducted.

Pathway Analysis

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

Criteria-Specific Analysis

Presuming that the presence of contaminated resources and pathways of migration of site-related contaminants has been established, the contaminant levels identified in the field investigation will be compared with available numerical criteria or criteria developed according to methods established as part of the criteria. If contaminant levels are below criteria, the

impact on resources will be considered to be minimal and additional impact analyses will not be performed. If numerical criteria are exceeded or if they do not exist and cannot be developed, an analysis of the toxicological effects will be performed.

Analysis of Toxicological Effects

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

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

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

- **Population Analysis**–A population level analysis is relevant to and will be used for the evaluation of chronic toxicological effects of contaminants to an entire population or to the acute toxicological effect of contaminant exposure limited to specific classes of organisms within a population.

- **Community Analysis**– A community with highly interdependent species including highly specialized predators, highly competitive species, or communities whose composition and diversity is dependent on a key-stone species, will be analyzed for alternations in diversity due to contaminant exposure.

- **Ecosystem Analysis**–If contaminants are expected to uniformly affect physiological processes that are associated with energy transformation within a specific trophic level, an analysis of the effects of contaminant exposure on trophic structure and trophic function within an ecosystem will be performed. Bioconcentration, bioaccumulation, biomagnification, etc., are concepts that may be used to evaluate the potential effects of contaminant transfer on trophic dynamics.

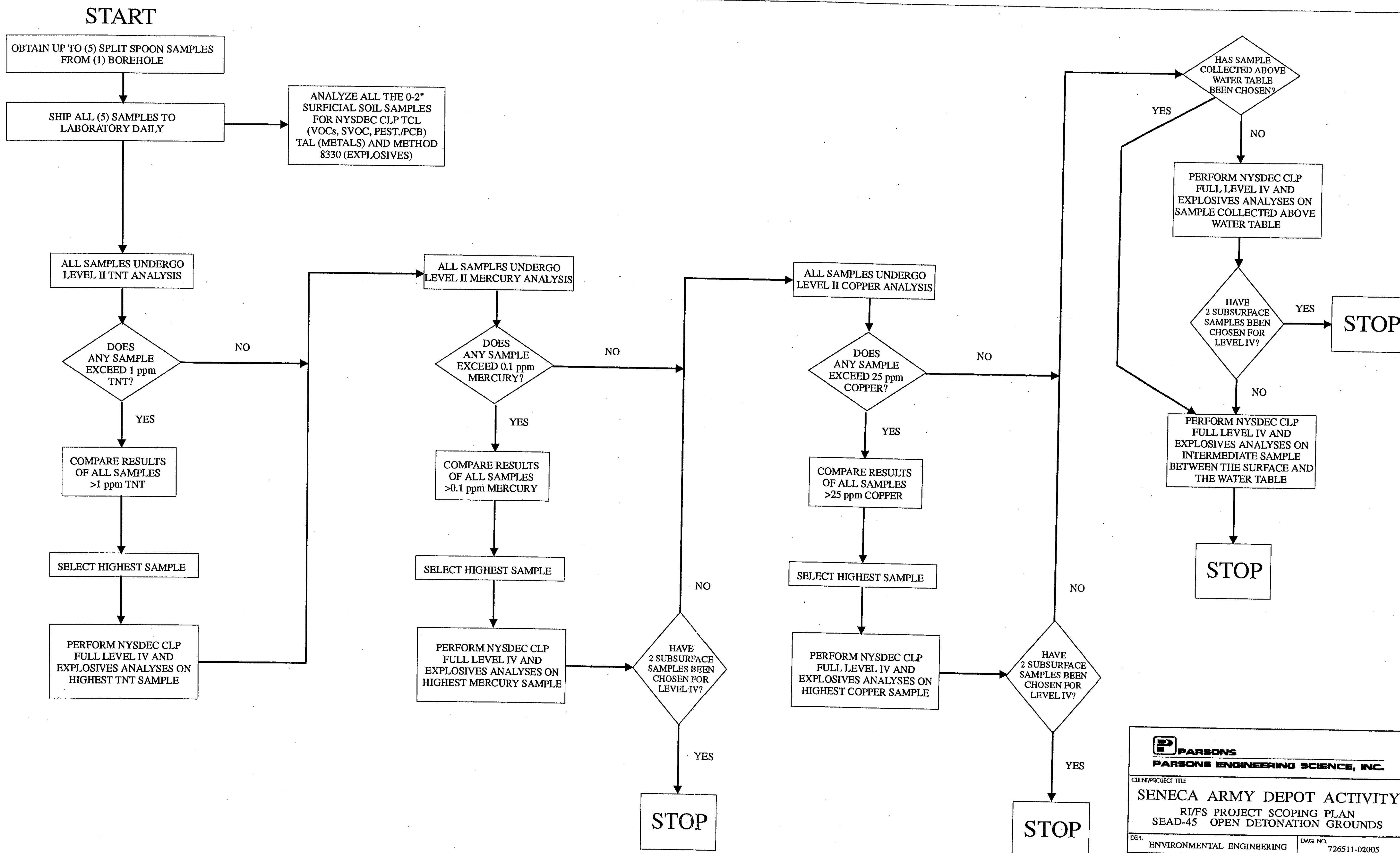
4.2.5 Analytical Program

4.2.5.1 Level II Screening

Level II screening analyses for TNT, mercury and copper will be performed in the laboratory on all subsurface samples collected from the 43 soil borings that are proposed to be performed at the OD Grounds. Level II screening is being incorporated into this investigation because it will allow a large grid covering the OD grounds to be investigated while keeping the laboratory costs to a minimum. By screening the soil samples to determine which ones contain the highest concentrations of TNT, mercury, and copper, it will not be necessary to perform the Level IV analyses on all of the subsurface sample collected. The Level IV analyses can be performed on the samples identified by the screening as having the highest concentrations of explosive compounds and metals impacts. In addition to using the Level II screening data to select the subsurface samples that will undergo the Level IV analyses, the Level II screening data will be used to evaluate the extent of vertical and horizontal impacts at the site.

TNT was the explosive compound that was most frequently detected in the samples collected during the ESI, and mercury and copper were the most frequently detected metals at high concentrations. Each of the subsurface samples will be undergo Level II screening for these three constituents. Approximately five subsurface soil samples will be collected from each of the soil borings. Based on the results of the screening analyses for TNT, mercury and copper, two of the five subsurface soil samples will be selected from each soil boring to undergo the full Level IV NYSDEC CLP analyses that are specified in Section 4.2.5.2. The order in which the Level II screening analyses will be performed on each sample and the criteria by which the samples will be selected for the Level IV analyses are presented in the flow chart in Figure 4-6.

Approximately 215 subsurface samples will be collected from the 43 soil borings that will be performed at the OD Grounds. Level IV quality data is required to perform the baseline risk assessment and to demonstrate compliance with ARARs, but to perform the Level IV NYSDEC CLP analyses on each of these samples would be cost and time prohibitive. By performing the Level II screening analyses for the constituents that were determined to be indicators for explosive compounds and metals, the Level IV analyses can be performed on the areas with the greatest explosives and metals impacts.



PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-45 OPEN DETONATION GROUNDS

DEPT. ENVIRONMENTAL ENGINEERING | DWG NO. 726511-02005

FIGURE 4-6

CRITERIA FOR LEVEL II AND LEVEL IV ANALYSES FOR SOIL BORING SAMPLES

SCALE | DATE AUGUST 1995

R:\GRAPHICS\SENECA\SEAD-45\LEVELII.CDR(KLK)

The Level IV analyses will meet the requirements of the baseline risk assessment and will be used to demonstrate compliance with ARARs. It will also be used to verify the Level II data for the samples that did undergo the Level IV analyses and will be used to evaluate the Level II data from the samples that did not undergo the Level IV analyses. After being compared to the Level IV quality data, the Level II quality data may be used to evaluate the vertical and horizontal extent of impacts.

The Level II method for the analyses of copper and mercury will be the same procedure as the Level IV analyses which are described in Appendix C, Chemical Data Acquisition Plan. The difference between the Level II method and the Level IV method is that the Level IV analysis will be supported by a more stringent Quality Assurance data package. The method detection limits are 0.1 ppm for copper and .02 ppm for mercury. Explosive compounds will be screened according to the USATHMA method for TNT in soil. The detection limit is 0.5 ppm. This method has been found to have a good recovery (80-100%) for moderately contaminated soil. A detailed description of this method is presented in Appendix C, Chemical Data Acquisition Plan.

In summary, all subsurface soil samples collected will undergo Level II screening for TNT, mercury and copper. Based on the results of the screening analyses, two subsurface soil samples from each borehole will undergo Level IV NYSDEC CLP analysis. The Level IV analyses will meet the data requirements of the risk assessment and will be used to demonstrate compliance with ARARs. Relationships between Level II results and the Level IV results will be evaluated to verify the Level II analyses.

4.2.5.2 Level IV Analyses

A total of 149 soil samples, 23 surface water and sediment samples and 24 groundwater samples (two rounds of samples from 11 monitoring wells) will be collected at SEAD-45 for Level IV chemical testing. All of these samples will be analyzed for the following: Target Compound List (TCL) VOCs (EPA Method 524.2 on groundwater only), TCL SVOCs and Target Analyte List (TAL) metals according to the NYSDEC CLP Statement of Work, explosive compounds by EPA Method 8330, and nitrate nitrogen by EPA Method 352.1. Additional analyses for specific media are given below.

Six (6) subsurface soil samples from two soil borings will also be analyzed for total organic carbon by EPA Method 415.1 and grain size distribution (including the silt and clay size fraction) by ASTM Method D:422-63.

The 23 surface water samples will also be analyzed for hardness by EPA Method 130.2, pH by EPA Method 150.1 and total organic carbon by EPA Method 415.1.

The 23 sediment samples will also be analyzed for total organic carbon by EPA Method 415.1 and grain size distribution (including the silt and clay size fraction) by ASTM Method D:422-63.

The 22 groundwater samples will be analyzed for volatile organic compounds by EPA Method 524.2.

A detailed description of these methods, as well as lists of individual compounds included in each of the analyses is presented in Appendix C, Chemical Data Acquisition Plan. Analyses for all media to be sampled are summarized in Table 4-1.

4.2.6 Surveying

Surveying will be performed at the OD grounds 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 locations of the soil borings, monitoring wells (new and existing), surface soil samples, surface water samples, and sediment samples will be plotted on the site base map to show their location with respect to surface features within the project area.

Table 4-1

Summary of Sampling and Analyses
Seneca Army Depot Activity
SEAD-45

MEDIA	Screen Level II	VOCs Method 524.2	VOCs TCL NYSDEC CLP	SVOCs TCL NYSDEC CLP	Pest/PCBs TCL NYSDEC CLP	Explosives Method 8330	Metals TAL NYSDEC CLP	Nitrate Nitrogen Method 352.1	Grain Size* ASTM or Similar Method	pH Method 150.1	Hardness Method 130.2	TOC Method 415.1
Soil Surface	0	0	63	63	63	63	63	63	0	0	0	0
Subsurface	215	0	86	86	86	86	86	86	6	0	0	6
Groundwater	0	24	0	24	24	24	24	24	0	0	0	0
Surface water	0	0	23	23	23	23	23	23	0	23	23	23
Sediment	0	0	23	23	23	23	23	23	23	0	0	23

Notes:
1) * Grain size analysis includes determination of the grains size distribution within the silt and clay size fraction.
2) QA/QC sampling requirements are described in Section 5.3 of Appendix C of the Generic Installation RI/FS Workplan.

Site surveys will be performed in accordance with good land surveying practices and will conform to all pertinent state laws and regulations governing land surveying. The surveyor shall be licensed and registered in New York. A detailed discussion of the site field survey requirements is presented in Appendix A, Field Sampling and Analysis Plan.

4.3 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.

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.

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.

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-45 is provided in Table 4-1.

5.0 TASK PLAN FOR THE FEASIBILITY STUDY

The task plan for the Feasibility Study 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 OBJECTIVES

A discussion of the development of 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 SCREENING OF ALTERNATIVES

A discussion of the screening of alternatives for the FS is given in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

5.3 DETAILED ANALYSIS OF ALTERNATIVES

A discussion of the detailed analysis of 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.

5.4 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.

6.0 PLANS AND MANAGEMENT

The purpose of this Workplan is to present and describe the activities that will be required for the site Remedial Investigation/Feasibility Study at SEAD-45. 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 performing the RI/FS to be conducted at SEAD-45 is presented in Figures 6-1 and 6-2. Figure 6-1 contains the schedule for the work to be conducted in the field. This schedule assumes that each phase of the field work will be completed before performing the next phase. Figure 6-2 contains the schedule for the reports to be drafted and submitted based on the results of the field investigations.

6.2 STAFFING

A discussion of the staffing for the RI/FS to be conducted at SEAD-45 is presented in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan.

Table 6-1
SEAD-45 RI Field Investigation Schedule
Seneca Army Depot Activity

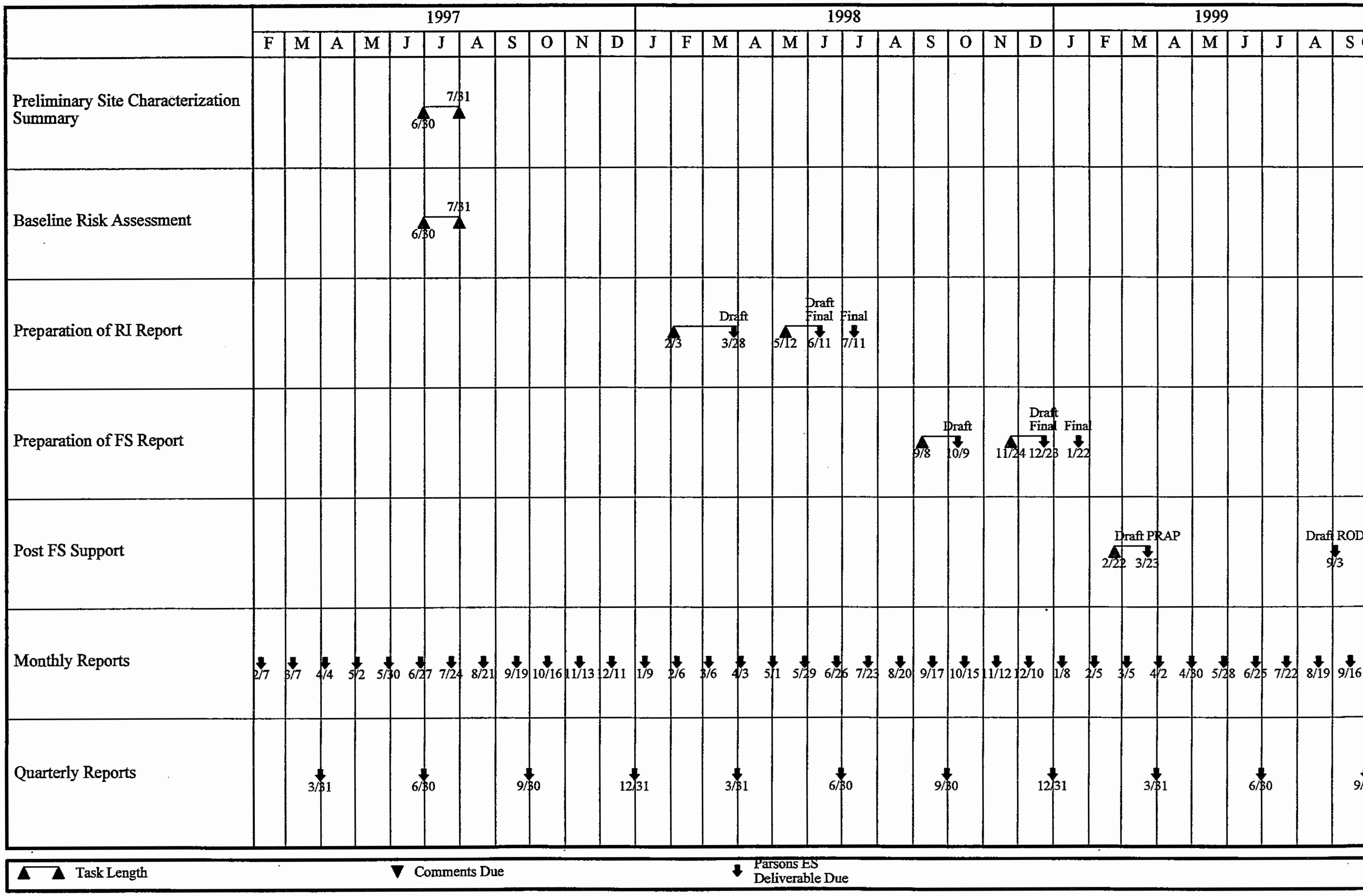
9/14/1995

	1997							
	February	March	April	May	June	July	August	September
Mark Sample Locations	2/3 – 2/4							
Surface Water/Sediment Sampling and Runoff Delineation	2/5 – 2/10							
Ecological Investigation	2/17 – 2/22	3/31	– 4/2					
Surface Soil Sampling	2/11 – 2/19							
Soil Borings	2/20 –	3/21						
Monitoring Well Installation and Development		3/22 – 3/26; 3/31	– 4/5					
Groundwater Sampling			4/14 – 4/19				8/18 – 8/23	
Water Level Measurements		3/31	4/14				8/18	
Aquifer Testing			4/20 – 4/22					
Sample Analysis	2/6 –	3/28	4/15 – 4/25				8/19 – 8/29	
Data Validation		3/31 –		5/5				9/3 – 9/4
Surveying		3/31	– 4/4					
Field Activity Reports	2/7	3/7	4/4	5/2			8/21	9/18
Field Sampling Letter Report								9/30

Task Length   Comments Due   Parsons ES Deliverable Due

Table 6-2
SEAD-45 RI/FS Schedule: Risk Assessment and Reports
Seneca Army Depot Activity

9/13/1995



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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 ACQUISITION PLAN

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

APPENDIX D

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

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

APPENDIX E

RESPONSE TO REVIEW COMMENTS

COMMENTS AND RECOMMENDATIONS
PRE-DRAFT PROJECT SCOPING PLAN
REMEDIAL INVESTIGATION FEASIBILITY STUDY
OPEN DETONATION GROUND (SEAD-45)
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK
FEBRUARY 1995

Comment #1 Page 3-7, Section 3, Figure 3-3, K. Butoryak - Groundwater Elevation Map.

Although the legend states that an arrow indicates direction of groundwater flow, no arrow is depicted on the map.

Recommendation: Please correct this discrepancy.

Response #1 Agreed. The arrow indicating the direction of groundwater flow has been added to Figure 3-3.

Comment #2 Page 3-10, Section 3.1.2.1,K. Butoryak - Explosives.

The document states that "explosives are solids at room temperature and therefore would not migrate through soil as separate liquid phases." The relevance of room temperature in this environment is questionable. The next sentence then seems to contradict this sentence by stating that "as precipitation interacts with these solid residues, a small portion would dissolve or erode away." Additionally, if these solid residues are below ground surface, use of the term "precipitation" to describe soil moisture is also questionable.

Recommendation: A more accurate statement could be made by substituting an estimated maximum or average soil temperature in this region. Also, please resolve the contradiction between these two sentences, and substitute the term "soil moisture" for the term "precipitation."

Response #2 Agreed. The paragraph has been changed as follows:

"A review of the melting points of these compounds indicates that explosive compounds are solids at the soil temperatures that are likely at SEDA and therefore would not migrate through soil as separate liquid phases. Instead, as soil moisture interacts with these solid residues a small portion would dissolve or erode away. Complete leaching would require a long interaction period."

Comment #3 Page 3-20, Section 3.2.2, K. Hoddinott - Potential Exposure Pathways and Receptors.

This discussion should include the numerical assumptions of the exposure

scenarios. This comment also applies to Section 3.2.3.

Recommendation: Include a table or discussion outlining the numerical assumptions associated with the current and future exposure scenarios.

Response #3 Agreed. Table 4-1 in the Generic Installation RI/FS Workplan, which includes the numerical assumption for exposure scenarios, has been referenced in Section 3.2.2 and 3.2.3.

Comment #4 Page 3-21, Section 3.2.2.3, K. Hoddinott and K. Russell - Soil Ingestion and Dermal Contact.

The reasoning the "adults do not normally eat soil" is not sufficient to discount the soil ingestion pathway. The soil ingestion pathway is calculated for incidental soil ingestion, not for people eating soil.

Recommendation: Rewrite this section to find another reason for discounting this pathway or add the pathway to the analysis.

Response #4 Agreed. The section has been rewritten as follows:

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

Comment #5 Page 3-22, Section 3.3, K. Russell - Scoping of Potential Remedial Action Alternatives.

Only surface soil, sediment, and groundwater are mentioned as media of concern. Surface water is not mentioned in this section even though it is mentioned throughout the document as containing high levels of contaminants and 23 new samples will be collected.

Recommendation: Add surface water as "c" the third media of concern.

Response #5 Agreed. Surface water has been added to section 3.3 as a third media of concern.

Comment #6 Page 3-23, Section 3.6, K. Hoddinott - Data Gaps and Data Needs.

The data needs for the soil and sediment must include an adequate determination of the background concentrations, with a statistical comparison with the site data.

Recommendation: Include an adequate determination of the background levels of chemicals in the soil and sediments.

Response #6 Agreed. Site-wide soil background data has been compiled from 57 background samples obtained from the ESIs performed at 25 SEADs, and Remedial Investigations at the OB Grounds and the Ash Landfill. These data

were used to evaluate whether contaminants were present at the 25 SEADs where ESIs were performed and will be used to evaluate RI data from SEAD-45. This information has been added to the soil data needs in Section 3.6.

Comment #7 Page 4-11, Section 4.2.3.1,K. Butoryak - Monitoring Well Installation. This paragraph states that six additional overburden wells will be installed, while only five additional wells are proposed on pages 3-24 and 4-12. Additionally, Figure 4-1 depicts only five proposed monitoring well sites.

Recommendations: Please correct the discrepancy.

Response #7 Agreed. Only five wells are proposed to be installed, and all references to the number of proposed wells have been changed to indicate this.

Comment #8 Page 4-11, Section 4.2.3.1,K. Butoryak - Monitoring Well Installation.

The paragraph states "Although MW-5 has been sampled in the past...it will not be sampled for this RI/FS because one of the new wells will provide coverage of the same area." Why is a new well being installed if the area is already covered? It is also unclear from Figure 4-1 which one of the new wells will provide coverage for this area.

Recommendation: Provide a justification for installing a new well in an area that is already covered. Substitute the proposed well number for the expression "one of the new wells." Reconsider the decision to not sample MW-5, if MW45-5 is the well that is proposed to cover the same area.

Response #8 Agreed. MW-5 will be sampled as part of this Remedial Investigation.

Comment #9 Page 4-18, Table 4-1, K. Russell.

Table 4-1 is a blank page.

Recommendation: Add the table or remove the references to it in Sections 4.2.5.2and 4.6.

Response #9 Agreed. Table 4-1 has been added.

K. Healy

Comment #1 Table 4.1. Part 1: Apparently Table 4.1 was omitted. Please include.

Part 2: Also, recommend including references (Table and associated text) to the number and type of QA/QC samples envisioned.

Response #1 Part 1: Agreed. Table 4-1 has been added.

Part 2: Agreed. The frequency at which QA/QC samples will be collected is

described in Section 5.3 of Appendix C within the Generic Installation RI/FS Workplan. These samples willbe collected in accordance with NYSDEC/EPA and USACE guidance. A footnote has been added to Table 4-1 indicating this.

S. Bradley

Comment #1 Section 1.1, p. 1-1. Please define the purpose of this document as it is not the same as the RI/FS workplan. The purpose statement should define how this scoping document ties into the overall program.

Response #1 Agreed. Section 1.1 has been changed to the following:

"The purpose of this Remedial Investigation/Feasibility Study (RI/FS) Project Scoping Plan is to provide site specific information for the RI/FS project at the SEAD-45 operable unit at the Seneca Army Depot Activity (SEDA) in Romulus, NY. This plan outlines work to be conducted at SEAD-45 based upon recommendations specified in the Draft Final Seven High Priority SWMUs Expanded Site Inspection (ESI) Report (Parsons ES, May 1995).

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

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

Comment #2 Section 1.2, p. 1-1. Please replace the reference to the Generic workplan with a brief overview of the report organization.

Response #2 Agreed. Section 1.2 has been changed to the following:

"The remaining sections of this report are organized to describe the overall site conditions, provide a scoping of the RI/FS and to provide task plans for the RI and FS. Section 2.0, Site Conditions, presents a description of regional geological and hydrogeological conditions, and the results of previous investigations. Section 3.0, Scoping of the RI/FS, presents the conceptual site model, potential receptors and exposure scenarios, scoping of potential remedial action technologies, preliminary identification of Applicable or Relevant and Appropriate Requirements (ARARs), data quality objectives, and data gaps and needs. The task plans for the RI and FS are discussed in Sections 4.0 and 5.0, respectively. Section 6.0, Plans and Management, discusses scheduling and staffing."

Comment #3 Section 3.1.2, p. 3-8. Part 1: In first sentence, please use term "Potential

Contaminants of Concern" and indicate in parenthesis that the Generic workplan addresses all PCOC's, site-wide, as "constituents of concern".

Part 2: This entire section on fate of constituents is too detailed for a scoping document and should be summarized. The details should go in the RI/FS report itself.

Response #3 Part 1: Agreed. The paragraph has been changed as follows:

"The potential contaminants of concern at SEAD-45 are explosive compounds, metals, and SVOCs and their environmental fate is discussed below. The discussion is meant to present general information on the fate of the potential contaminants of concern. Further discussion of these potential contaminants of concern, and all contaminants of concern at SEDA, is presented in the Generic Installation RI/FS Workplan that serves as a supplement to this RI/FS Project Scoping Plan. A summary of fate and transport characteristics of selected SVOCs is presented in Table 3-2.

Part 2: This section on environmental fate of constituents has not been changed. This information, along with environmental fate information on any constituents of concern identified during the RI, will be included in the RI/FS report."

Comment #4 Section 3.2, p. 3-17. Retitle as "Preliminary Identification of Potential Receptors and Exposure Scenarios". This section is too detailed for scoping purposes and should be summarized.

Response #4 Agreed. Section 3.2 has been retitled and summarized.

Comment #5 Figure 3-2. Include surface water elevation in Reeder Creek.

Response #5 Disagree. Because the surface water elevation of Reeder Creek varies with the location and time of year, it will not be included in Figure 3-2. Stream elevations were measured as part of a physical characterization of Reeder Creek that was performed for the Open Burning Grounds RI. These surface elevation measurements, along with the rest of the data gathered in the physical characterization, will be included in the final Open Detonation Grounds RI Report.

Comment #6 Section 4.2.5.4, p. 4-15. Statement in 5th line that Level II and Level IV differ only by documentation is true but misleading. The documentation differs because surrogate analyses requirements are more demanding for metals under Level IV.

Response #6 Agreed. The statement has been changed as follows:

"The Level II method for the analysis of copper and mercury will be the same procedure as the Level IV analysis which is described in Appendix C,

Chemical Data Acquisition Plan. The difference between the Level II method and the Level IV method is that the Level IV analyses are supported by a more stringent Quality Assurance data package."

B. Chaffin

Comment #1

Section 4.2.2.1. The section on soil sampling and boring is not safe due to the expected presence of UXO. A surface clearance is not sufficient. A driller probably will not be able to distinguish an UXO before it may detonate. An UXO team with magnetometer should be available to check borehole for UXO at periodic depths. Attached to comments is an OEW Generic SOW which should be incorporated into site safety and health plan. Section 7 pertains to soil sampling and well drilling.

Response #1

Agreed. The OEW Generic SOW is part of the Generic Installation RI/FS Workplan Health and Safety Plan. These procedures have been incorporated into all of the activities that will be conducted at the site.

To clarify the procedures that will be followed during drilling operations, Section 4.2.2.1 has been changed as follows:

"Since UXOs may be encountered at the site, the definition of refusal may be modified. For the safety of the drilling contractor, refusal may be a field decision by the UXO clearance personnel that an object other than bedrock has been encountered. If the soil boring is not stopped due to UXO concerns, the soil boring will continue until auger refusal is reached. Auger refusal for this project is defined in Appendix A, Field Sampling and Analysis Plan.

Because UXOs are a concern across the entire grid of soil borings, each soil boring location will be cleared for UXOs before drilling and all drilling activities will be continuously monitored by UXO clearance personnel. Because the detonation mound cannot be cleared of UXOs, soil borings located on the detonation mound will be offset to the nearest location off of the mound. The drilling, decontamination, and UXO clearance procedures are described fully in Appendix A, Field Sampling and Analysis Plan."

Comment #2

General. A generic health and safety plan has been approved for SEAD. The generic plan is intended to be updated and made specific for a particular site and scope of work. The generic plan must be made into a site safety and health plan with specific hazards of the site incorporated into the plan.

Response #2

Disagree. The health and safety procedures contained in the Generic Installation RI/FS Workplan Health and Safety Plan addresses all of the hazardous that are expected to be encountered at SEAD-45.

APPENDIX F

SCOPE OF WORK

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

APPENDIX G

EXPANDED SITE INSPECTION SUBSURFACE INVESTIGATIONS

- Boring Logs
- Test Pit Logs
- Monitoring Well Installation Diagrams

BORING LOGS

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC. | **CLIENT:** ACOE | **BORING NO.:** MW-45-1

PROJECT: 10 SWMU
LOCATION: SEAD - 45

JOB NO.: 720477-01001
EST. GROUND ELEV.: 622.794
START DATE: 11/20/93
FINISH DATE: 11/21/93
CONTRACTOR: ENGINEERING SCIENCE
DRILLER: EMPIRE SOILS
INSPECTOR: KS/AW
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 TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND READING	BACKGROUND TIME	BACKGROUND DATE	CALIBRATION TIME	CALIBRATION DATE	WEATHER
OVM	PID	0-2000	0	1:00pm	11/20/93			Cold 30
DUST		0-0.99	0.03	1:00pm	11/20/93			

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.:

OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	BORING #: MW-45-1

MONITORING

INSTRUMENT	INTERVAL	BGD	TIME pm
OVM	0-2000	0	1:05
DUST	0-0.99	0.03	1:05

COMMENTS:

DRILLER: Empire (Bob)
INSPECTOR: AMW / KS
DATE: 11/20/93

DEPTH (FT)	SAMPLING: BLOWS PER 6 INCHES	SAMPLING: PENETRATION RANGE (FEET)	SAMPLING: RECOVERY RANGE (FEET)	SAMPLE: DEPTH INT (FEET)	SAMPLE: NO.	SAMPLE: VOC	RAD SCRN	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
0–2	10, 11, 16, 20	0' ↓ 2'	0' ↓ 1.5'	N/A		Ø		Dk. brown clay with angular shale clasts and rusted areas. Silt.	Till	Till
2–4	25, 25, 36, 32	2' ↓ 4'	2' ↓ 3.8'	N/A		Ø		Same dark brown silt and clay. rust regions within sample. Uniformly mixed sediment/rock/frag.	Till	Till
4–5	75, 100/.2	4' ↓ 4.7'	4' ↓ 4.9'	N/A		Ø		Highly weathered shale, dk. gray. (spoon refusal) dry.	Shale	Shale

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

BORING #:

ver. 05-Nov-93

OBBORP2.WK1

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: ACOE	BORING NO.: MW45-2

PROJECT : 10 SWMU
LOCATION : SEAD 45

JOB NO.: 720477-01001
EST. GROUND ELEV.: 624.666
START DATE: 11/20/93
FINISH DATE: 11/21/93
CONTRACTOR: Empire
DRILLER: John W
INSPECTOR: JC/KS
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL
HSA	8½"		3"x2'	SS	HMR	140/30"

DRILLING ACRONYMS:

HSA	HOLLOW–STEM AUGERS	HMR	HAMMER	SS	SPLIT SPOON
DW	DRIVE–AND–WASH	SHR	SAFETY HAMMER	CS	CONTINUOUS SAMPLING
MRSLC	MUD–ROTARY SOIL–CORING	HHR	HYDRAULIC HAMMER	5I	5 FT INTERVAL SAMPLING
CA	CASING ADVANCER	DHR	DOWN–HOLE HAMMER	NS	NO SAMPLING
SPC	SPIN CASING	WL	WIRE–LINE	ST	SHELBY TUBE
				3S	3 INCH SPLIT SPOON

MONITORING EQUIPMENT SUMMARY

INSTRUMENT TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND READING	BACKGROUND TIME	BACKGROUND DATE	CALIBRATION TIME	CALIBRATION DATE	WEATHER
OVM		0 – 2000	0	1515	11/20/93			
Dust			0.03	1515	11/20/93			

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 #: MW-45-2

MONITORING

INSTRUMENT	INTERVAL	BGD	TIME
OVM	0-2000	0	3:15
DUST	0-0.99	0.03	3:15

COMMENTS: Dust meter maxed at 0.38

DRILLER: Bob/Scott
INSPECTOR: AMW/KS
DATE: 11/20/93

DEPTH (FT)	BLOWS PER 6 INCHES	PENETRATION RANGE (FEET)	RECOVERY RANGE (FEET)	SAMPLE DEPTH INT (FEET)	NO.	VOC	RAD SCRN	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
0–2	10, 13, 18, 25	0' ↓ 2'	0' ↓ 1½'	N/A		∅		Dk. brn. silty clay with angular shale/limestone clasts (¼") Oxidized spots. Rusted metal frag.	Till	
2–4	34, 24, 26, 30	2' ↓ 4'	2' ↓ 3.3'	N/A		∅		Dk. brn. silty clay. Dry & hard packed. Angular Shale clasts (½") with rusting metal. Some wood.	Till	
4–6	10, 36, 48, 55	4' ↓ 6'	4' ↓ 4.7'	N/A		∅		Dk. brown silty clay with sm. shale clasts, rusty areas and one zone of white crystaline powder (¼") round.	Till →	
6–6.4	100/.4	6 ↓ 6.4						spoon refusal @ 6.4'		
8–10	16, 26, 36, 40	8' ↓ 10'	8' ↓ 9.5'	N/A		∅		Dk. grey weathered shale. ↓	Shale	

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

ver. 05–Nov–93 OBBORP3.WK1

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC. | **CLIENT:** SEAD ACOE | **BORING NO.:** MW45-3

PROJECT: SEAD 10 SWMU SEAD45
LOCATION: MW45-3

JOB NO.: 720477-01001
EST. GROUND ELEV.: 623.991
START DATE: 11/21/93
FINISH DATE: 11/22/93
CONTRACTOR: ENGINEERING-SCIENCE
DRILLER: EMPIRE Soils
INSPECTOR: JWC/AS
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL
HSA	8'6"	2' intervals	3" x 24"	SPLIT SPOON	HAMMER	140 lb/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 NO READINGS ABOVE BACKGROUND

INSTRUMENT TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND READING	BACKGROUND TIME	BACKGROUND DATE	CALIBRATION TIME	CALIBRATION DATE	WEATHER
OVM-580B	10.0 eV/bulb	0-2,000 ppm	ø	3:30	11/21/93	8:30 PM	11/21/93	OVERCAST COLD
RAD.-190B	CS-137 Bq	0-100	BACKGROUND 10-18 µR/hr	"	11/21/93	FACTORY CALIBRATED		"
PDM-3	DUST COUNTER WINDOW	0-0.99	0.05	"	11/21/93	Z-BAG CAL.		"
OVM-580B	10.0 eV/bulb	0-2,000 ppm		0900	11/22/93			SUNNY COOL, MILD
VICTOREEN-190B	CS-137 Bq	0-100		"	11/22/93			"
PDM-3	DUST COUNTER WINDOW	0-0.99		"	11/22/93			"

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 SAMPLES – CONTINUOUS SPOONING DOWN TO COMPETENT BEDROCK UNIT
DRILLERS 1 3/4 GETTING WATER
ONE HOUR LATE 11/22/93 (0800 ARRIVAL)
* LIMESTONE UNIT PRESENT

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.:

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OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD USACOE	BORING #: MW45-3

INSTRUMENT	INTERVAL	BGD	TIME
OVM 580B	0–10'	✓	3:30-4:30
RAD-190B	0–10'	✓	"
DUST	0–10'	✓	"

COMMENTS: TILL UNIT THROUGHOUT with interbedded SHALE LAYERS 10" Limestone unit at 3'6" Spoon refusal @

DRILLER: John Warner / Bob Tann
INSPECTOR: JWC / AS
DATE: 11/21/93

DEPTH (FT)	BLOWS PER 6 INCHES	PENETRATION RANGE (FEET)	RECOVERY RANGE (FEET)	DEPTH INT (FEET)	NO.	VOC	RAD SCRN	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
1–2	9, 16, 20, 20	2'	21"	2'	—	∅	BGD	Dark Fill (sandy) layer with small (silty) interbedded shale fragments. Some large rock pieces (limestone)	TILL	LIMESTONE
3–4	20, 30, 32, 36	2'	19"	4'	—	∅	BGD	Top 9" interbedded shale fragments within till. Bottom 10" whole lithic units of limestone (light grey)	TILL	LIMESTONE
5–6	19, 34, 36, 58	2'	16"	6'	—	∅	BGD	Well dispersed shale layers within till unit medium brown-grey in color	TILL	SHALE
7–8	74, 65, 85, 56	2'	22"	8'	—	∅	BGD	Fragmented shale units within weathered shale layer clastic till reaches still evident dark grey	TILL / SHALE	
9–10	14, 50, 80, 77	2'	24"	10'	—	∅	BGD	Fragmented shale units w/ limestone clasts dark grey unit very homogeneous very regular throughout	TILL / SHALE	
11	14, 25, 100/1"	1'	11"	11'	—	∅	BGD	Spoon refusal @ 11'1" Limestone clasts dark till with dark silty fine sand - shale at bottom 1" (wet zone)	SILTY SAND / SHALE	
								AUGER REFUSAL AT 11'4"		
15										
20										

 SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS BORING #: MW45-3

ver. 15–Oct–93 OBBORP2.WK1

OVERBURDEN BORING REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD	BORING NO.: MW45-4

PROJECT: SEAD 10 SWMU INVESTIGATION
LOCATION: SEAD SWMU 45

JOB NO.: 720477-01001
EST. GROUND ELEV.: 630.896
START DATE: 11/22/93
FINISH DATE: 11/22/93
CONTRACTOR: ENGINEERING-SCIENCE
DRILLER: EMPIRE SOILS
INSPECTOR: JWC/AS
CHECKED BY:
CHECK DATE:

DRILLING SUMMARY:

DRILLING METHOD	HOLE DIA.	DEPTH INT.	SAMPLER SIZE	SAMPLER TYPE	HAMMER TYPE	HAMMER WT/FALL
HSA	8'6"	2' INTERVALS	24" x 3"	(SS)	HAMMER	140 lb/30"

DRILLING ACRONYMS:

HSA	HOLLOW–STEM AUGERS	HMR	HAMMER	SS	SPLIT SPOON
DW	DRIVE–AND–WASH	SHR	SAFETY HAMMER	CS	CONTINUOUS SAMPLING
MRSLC	MUD–ROTARY SOIL–CORING	HHR	HYDRAULIC HAMMER	5I	5 FT INTERVAL SAMPLING
CA	CASING ADVANCER	DHR	DOWN–HOLE HAMMER	NS	NO SAMPLING
SPC	SPIN CASING	WL	WIRE–LINE	ST	SHELBY TUBE
				3S	3 INCH SPLIT SPOON

MONITORING EQUIPMENT SUMMARY

INSTRUMENT TYPE	DETECTOR TYPE/ENERGY	RANGE	BACKGROUND READING	BACKGROUND TIME	BACKGROUND DATE	CALIBRATION TIME	CALIBRATION DATE	WEATHER
OVM-580B	10.0 eV/Bulb	0–2,000 PPM						
VICTOREEN 190B	CS-137							
MIE PDM-3	DUST COUNTER WINDOW							

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: SWMU-45 BACKGROUND WELL

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.:

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OVERBURDEN BORING REPORT

ENGINEERING-SCIENCE, INC. | CLIENT: SEAD USACOE | BORING #: MW45-4

MONITORING				COMMENTS:
INSTRUMENT	INTERVAL	BGD	TIME	

DRILLER: Bob Townshend/Glenn
INSPECTOR: JWC/AP
DATE: 11/22/93

DEPTH (FT)	SAMPLING: BLOWS PER 6 INCHES	SAMPLING: PENETRATION RANGE (FEET)	SAMPLING: RECOVERY RANGE (FEET)	SAMPLE: DEPTH INT (FEET)	SAMPLE: NO.	VOC	RAD SCRN	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
0–2	2, 5, 12, 15	2'	18"					TOPSOIL 1" (SILT) TILL UNIT with SHALE FRAGMENTS INTERBEDDED THROUGHOUT IRON STAINED AREA AT 8" INTO the UNIT BOTTOM 9" VERY COMPACTED TILL with Low POROSITY DARK GREY	TILL	TOPSOIL
2–4	21, 31, 38, 38	2'	19"					MEDIUM-GREY TILL w/SOME LIMESTONE CLASTS AND FRAGMENTED SHALE pieces DISPERSED throughout unit in small amounts	TILL	
4–6	73, 100/3", —, —	2'	9"					SPOON REFUSAL 4'9" TOP 3" TILL w/INCREASED SHALE content Bottom 6" WEATHERED SHALE UNIT	SHALE	
6–7	73, 100/3.5"	2'	7"					WET WEATHERED SHALE 6'9" CONFIRMED SHALE UNIT SPOON REFUSAL	SHALE	
8										
9										
10										
15										
20										

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

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TEST PIT LOGS

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACE	TEST PIT #: TP45-1

PROJECT: SEAD 10 SWMU ESI
LOCATION: SWMU 45 - Berm

JOB NUMBER:
EST. GROUND ELEV.
INSPECTOR: D. Kelman
CONTRACTOR: UXB
START DATE: 11/8
COMPLETION DATE:
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
5'	3'	3'	Backhoe / no shoring

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID	0	
Victoreen 190		0	

COMMENTS:

TOTAL SAMPLES:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1						
2						
3	0/0	TP45-1 TP45-1MRP TP45-11 11/3/93 1300 1315 (TP45-11)	3 ft		Dry - silt - clay medium brown some ordnance	Photo #2
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACE	TEST PIT #: TP45-2

PROJECT: SEAD 10 SWMU ESI
LOCATION: SWMU 45 - Berm

JOB NUMBER:
EST. GROUND ELEV.
INSPECTOR: DMK
CONTRACTOR: LWB
START DATE: 11/3/93
COMPLETION DATE: 11/3/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
5'	3'	~~[illegible]~~ 3'	Backhoe / no shoring

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID	0	
Victoreen Rad		0	

COMMENTS:

TOTAL SAMPLES:

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1						
2						
3	0/0	TP45-2 11/3/93 1330	3 ft		Dark-brown-clayey few small rocks some ordnance	Photo #1
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-2

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACE	TEST PIT #: TP45-3

PROJECT: SEAD 10 SWMU ESI
LOCATION: SWMU 45 - Berm

JOB NUMBER:
EST. GROUND ELEV.
INSPECTOR: DMK
CONTRACTOR: WXB
START DATE: 11/8/93
COMPLETION DATE: 11/8/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
5'	3'	3'	Backhoe / no shoring

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID	0	
Victoreen 190		0	

COMMENTS:

TOTAL SAMPLES:

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1						
2						
3	0/0	TP45-3 1415 11/8/93	3 ft		Dark brown clay moist, clumpy some ordnance	Phob #3
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-3

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: USACOE	TEST PIT #: TP45-4

MONITORING DATA — Berm Excavation

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID	0	0900 11/9/93
Victoreen 190		0	0900 11/9/93

DATE START: 11/9/93
DATE FINISH: 11/9/93
INSPECTOR: OMK
CONTRACTOR: UXB

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1						
2						
3	0/0	TP45-4 11/9/93 1245	3 feet		Brown clay and silt East side is moist and very clayey. Rest is dry. No foreign material	Photo #8 Rinsate sample
4						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-4

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: USACOE	TEST PIT #: TP45-5

MONITORING DATA — Berm Excavation

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID	0	0900 11/9/93
Victoreen 190		0	0900 11/9/93

DATE START: 11/9/93
DATE FINISH: 11/9/93
INSPECTOR: DMK
CONTRACTOR: UXB

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1						
2						
3						
4	0/0	TP45-5 11/9/893 1315	3feet		Dark brown dry clay, silt no foreign material	Photo #9

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-5

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TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: US ACOE	TEST PIT #: TP45-1

PROJECT: Seneca Army Depot
LOCATION: Sead-45

JOB NUMBER:
EST. GROUND ELEV.
INSPECTOR: SS/LB
CONTRACTOR:
START DATE: 11/15/93
COMPLETION DATE: 11/15/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
6'	1.5'	3.5'	

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID	0 ppm	1200 11/15/93
DUST monitor		0	1200 11/15/93
Radiation		5 uR/h	1200 11/15/93

COMMENTS:

TOTAL SAMPLES:

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0		0-1'		Burn Pit 20mil ordances nails ash (black) CLAY sand silt rad= 8 dust=.04	
1	0		1-2'		nails hinges small arms remnants (20-50mil) CLAY sand silt black ash rad = 8 white specs dust = .04	
2	0				more of same rad= 10 dust=.04	Picture #10
	0				burn pit ends 2.5' natural material begins	
3					very stiff CLAY 3.5' total depth	
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: 45-1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	TEST PIT #: TP45-2

PROJECT: 10 SWMU
LOCATION: SEAD 45

JOB NUMBER:
EST. GROUND ELEV.
INSPECTOR: SS/LB
CONTRACTOR:
START DATE: 11/15/93
COMPLETION DATE: 11/15/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
4'	2'	1.5'	

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE	
OVM		0 ppm	1230	11/15/93
Miniram		.04	1230	"
Radiation		10 uR/h	1230	"

COMMENTS:

TOTAL SAMPLES:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0		0-1'		filled w/water CLAY silt sand 2pipes at 6" steelpipes w/electrical wires inside shale fragments, some ash	.04 = dust 10 = Radiation
1						picture #9
					1.5' = end of test pit demolition wire (double leaded) (LKB took 2 pictures)	
2						
3						
4					* began to rain, so stopping dust + radiation meters	
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #:

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TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	TEST PIT #: TP 45-3

PROJECT: 10 SMWU	JOB NUMBER:
LOCATION: SEAD 45	EST. GROUND ELEV.
	INSPECTOR: SS/LB
	CONTRACTOR:
	START DATE: 11/15/93
	COMPLETION DATE: 11/15/93
	CHECKED BY:
	DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
20'	2'	2.5'	

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM		0	1300 11/15/93
Miniram		.04	1300 11/15/93
Radiation		10	1300 11/15/93

COMMENTS:

TOTAL SAMPLES:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0		0-1	↕	CLAY, shale fragments metal fragments wire fuzes steel Rod munitions debris, very DISTURBED	
1	0		1-2	↕	Very Stiff CLAY rich glacial till, shale fragments ~~CONDUIT AT 1.4'~~ * + rounded cobbles still disturbed VERY COMPACT	picture # 8
2					10 ue/hr = radiation .04 = dust end of pit	
					1" pipe - galvanized *	
3					NOTES ran E to W trench 160N 285E → 300E based on geophysical grid	
4					160N, 285E = Pipe location runs N-S	
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: 45-3

PAGE OF

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	TEST PIT #: 45-4

PROJECT: 10 SMWU
LOCATION: SEAD 45

JOB NUMBER:
EST. GROUND ELEV.
INSPECTOR: SS/LB
CONTRACTOR:
START DATE:
COMPLETION DATE:
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM		0 ppm	1445 11/15/93
MINIRAM		.04	1445 11/15/93
RADIATION		11uR/h	1445 11/15/93

COMMENTS:

TOTAL SAMPLES:

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0				highly disturbed CLAY w/ silt shale fragments, rounded cobbles, metal fragments	
1	0				location (pit) 230N 280-300E E→W	munitions debris, wood fragments
					HARD CLAY shattered rock fragments	
2					SAme as 2-3'	
				pipe*	dust = .02 Rad = 18 uR/h	
3					*230N pipe (1" galvanized) 296E 2.5' down	picture #6
					pipe runs N→S	
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #:

ver. 1/ 15-Oct-93 TSTPIT.WK1

PAGE OF

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	TEST PIT #: 45-5

PROJECT: 10 SMWU
LOCATION: SEAD 45

JOB NUMBER:
EST. GROUND ELEV.
INSPECTOR: SS/LCS
CONTRACTOR:
START DATE: 11/15/93
COMPLETION DATE: 11/15/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
8'	1.5'	1.5'	

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM		0	1420 11/15/93
MINIRAM		.04	"
RADIATION		13	"

COMMENTS:

TOTAL SAMPLES:

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0				CLAY 1" galvanized pipe at 6" deep goes E to W pit 230 E loca 140 → 148 N metal fragments aluminum oxide - slvr/white wood fragments wire radiation = 12 dust = .04 pipe = 145N 230E runs E-W	photo #7
1						
2						
3						
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: 45-5

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP45-6
PROJECT: SENECA 7 SWMU Investigation		JOB NUMBER: 720477-01000
LOCATION:		EST. GROUND ELEV.
		INSPECTOR: JMC
		CONTRACTOR: ES/UXB
		START DATE: 11/16/93
		COMPLETION DATE: 11/16/93
		CHECKED BY:
		DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
5'	2.5'	2'	BACKHOE

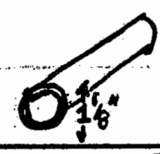
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	∅	9:30 AM

COMMENTS:

TOTAL SAMPLES: NO SAMPLES

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
0–2					FILL UNIT FRAGMENTS OF SHRAPNAL AND AMMO ROUNDS LIGHT BROWN–GREY TILL	★ Geophysical anomaly
2					BOTTOM OF TEST PIT	
3						
4						
5						



SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP45-7

PROJECT: SEAD 7 SWMU Investigation
LOCATION: SEAD 45 TEST PIT #7

JOB NUMBER: 720477-01000
EST. GROUND ELEV.:
INSPECTOR: JMC
CONTRACTOR: ES/UXB
START DATE: 11/16/93
COMPLETION DATE: 11/16/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
10'	2.5-3'	7'7"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	∅	10:50 AM
RADIATION		∅	10:50 AM

COMMENTS: Anomaly - metal Debris

TOTAL SAMPLES: NO SAMPLES

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1					TOPSOIL Light Brown - Grey silty sand	
2					COMPACT SOIL LAYER	
3					FILL UNIT	
4					WOOD FRAGMENTS METAL Debris, Ammo Rounds, fuses	See photo * Geophysical Anomaly
5					TILL	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-7

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP45-7

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
AS ABOVE ON PAGE 1			

DATE START: 11/16/93
DATE FINISH: 11/16/93
INSPECTOR: JWC
CONTRACTOR: ES/UXB

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					TILL	
6					NICE CLAY UNIT	See photo
7					BOTTOM OF TEST PIT 7'7"	
8						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-7

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: SENECA ARMY DEPOT	TEST PIT #: TP46-8

PROJECT: SENECA 10 SWMU Investigation
LOCATION: SEAD 46

JOB NUMBER: 720477-01000
EST. GROUND ELEV.:
INSPECTOR: JWC
CONTRACTOR: JES/UXB
START DATE: 11/16/94
COMPLETION DATE: 11/16/94
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
9'	3'	7'8"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.6 eV	∅	9:05 Am
RADIATION		3.43 µR/hr	9:05 Am

COMMENTS: PURPOSE TO IDENTIFY GEOPHYSICAL ANOMALIES

TOTAL SAMPLES: NO SAMPLES

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					TOPSOIL (DISTURBED)	
1					FILL MATERIAL MED. BROWN-GREY SILT	
2					GOOD INDICATION OF A BURN PIT	
					WOOD Pallette DeBris metal Debris	
3–4					↓ ↓	
5					NAILS WIRE-TUBING	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-8

ver. 1/ 05-Nov-93

TSTPIT.WK1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: SENECA ARMY DEPOT	TEST PIT #: TP45-8

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE

DATE START: 11/16/94
DATE FINISH: 11/16/94

INSPECTOR: JMC
CONTRACTOR: ES/VZB

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					metal Debris @ 5'6"	
6						
7					GROUNDWATER @ 7'	
					BOTTOM OF PIT 7'8"	
8						
9						
10						
11						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-8

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	TEST PIT #: 45-8
MONITORING DATA	105mm SEAD 45	

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE	
OVM		0	1600	11/15/93
Mini Ram		0	1600	11/15/93
Radiation		10	1600	11/15/93

DATE START: 11/15/93
DATE FINISH: 11/15/93

INSPECTOR: SS/LB
CONTRACTOR:

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0				wire pieces of wood CLAY shale fragments disturbed - most dust= 0 Radiation= 15	
1	0				more compact than above very stiff CLAY with shattered wood, metal, + rock fragments metal - rusted	
2	0				as above 1-2' debris to 4-4'	
3	0					
4					dust .02 Radiation 12 end of pit	
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #:

ver. 1/ 15-Oct-93

TSTPITP2.WK1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP45-9

PROJECT: SENECA 7 SWMU
LOCATION: SEAD 45 TEST PIT #9

JOB NUMBER: 720477-01000
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES/JKB
START DATE: 11/16/93
COMPLETION DATE: 11/16/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
8'	2.5'	5'	BACKHOE

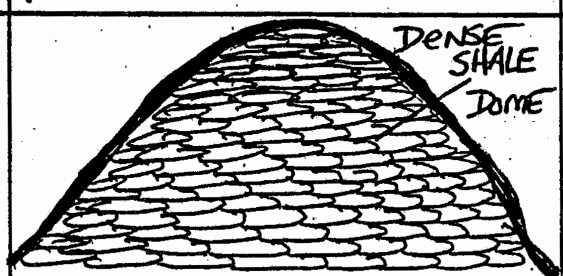
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580 B	10.0 eV	∅	945 Am

COMMENTS: ANOMALY - SHALE PILE (DOME)

TOTAL SAMPLES: NO SAMPLES

SCALE (FT)	VOC./RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
0–2.5					LIGHT GREY SILTY SAND with CLAYED (TILL) COMPOSITION SMALL SHALE FRAGMENTS Possible FILL UNIT	See photo
2.5–3.5					DENSE SHALE DOME	★ Geophysical Anomaly
5					Bottom OF PIT @ 5'	



SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP45-9

TEST PIT REPORT

ENGINEERING–SCIENCE, INC. | CLIENT: SEAD | TEST PIT #: TP45-10

PROJECT: SENECA 7 SWMU
LOCATION: SEAD 45 TEST PIT #10

JOB NUMBER: 720477-01000
EST. GROUND ELEV.:
INSPECTOR: DWC
CONTRACTOR: ES/UXB
START DATE: 11/16/93
COMPLETION DATE: 11/16/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
3'	2.5'	16"	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	100eV	ø	10:30 AM

COMMENTS: ASSUMED 3" PIPE WAS ANOMALY, TERMINATED PIT

TOTAL SAMPLES: NO SAMPLES

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
0–1					TOPSOIL – Disturbed Light BROWN-GREY MED.-COARSE SAND	
1					 BOTTOM OF PIT	See photo * Geophysical ANOMALY
2						
3						
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS   TEST PIT #: TP45-10

ver. 1/ 08-Oct-92   TSTPIT.WK1

MONITORING WELL INSTALLATION DIAGRAMS

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING–SCIENCE, INC. | CLIENT: ACOE | WELL #: MW-45-1

PROJECT: 10 SWMU
LOCATION: SEAD-45

PROJECT NO: 720477-01001
INSPECTOR: KS/AW
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Bob / Scott
DRILLING COMPLETED: 11/20/93
BORING DEPTH: 6.0'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: SEAD-45

POW DEPTH: 6.0'
INSTALLATION STARTED: 11/20/93
INSTALLATION COMPLETED: 11/21/93
SURFACE COMPLETION DATE: 11/21/93
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?) Y
ESTIMATED GROUND ELEVATION: 622.794

PROTECTIVE SURFACE CASING:
DIAMETER: 4" LENGTH:

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

SCREEN:
TSC: 3.25' TYPE: PVC-40 DIAMETER: 2" LENGTH: 20' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 5.25' POW: 6.0'

GROUT:
TG: Ground TYPE: Quikrete Bentonite Slurry LENGTH: 1.5'

SEAL: TBS: 1.5' TYPE: bentonite pellets LENGTH: 0.75'

SAND PACK: TSP: 2.25' TYPE: #3 and #1 LENGTH: 3.75'

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

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

COMMENTS:

* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD 10 SWMU INVESTIGATION	WELL #: MW-45-1

DATE: ______

DESCRIPTION
(FROM BORING LOG)

DEPTH

DARK BROWN CLAY W/ANGULAR SHALE CLASTS
FOREIGN MATERIAL: RUSTED OBJECTS

1'

2'

DARK BROWN SILT & CLAY
EVIDENCE OF RUST within UNIT
ROCK FRAGMENTS

3'

4'

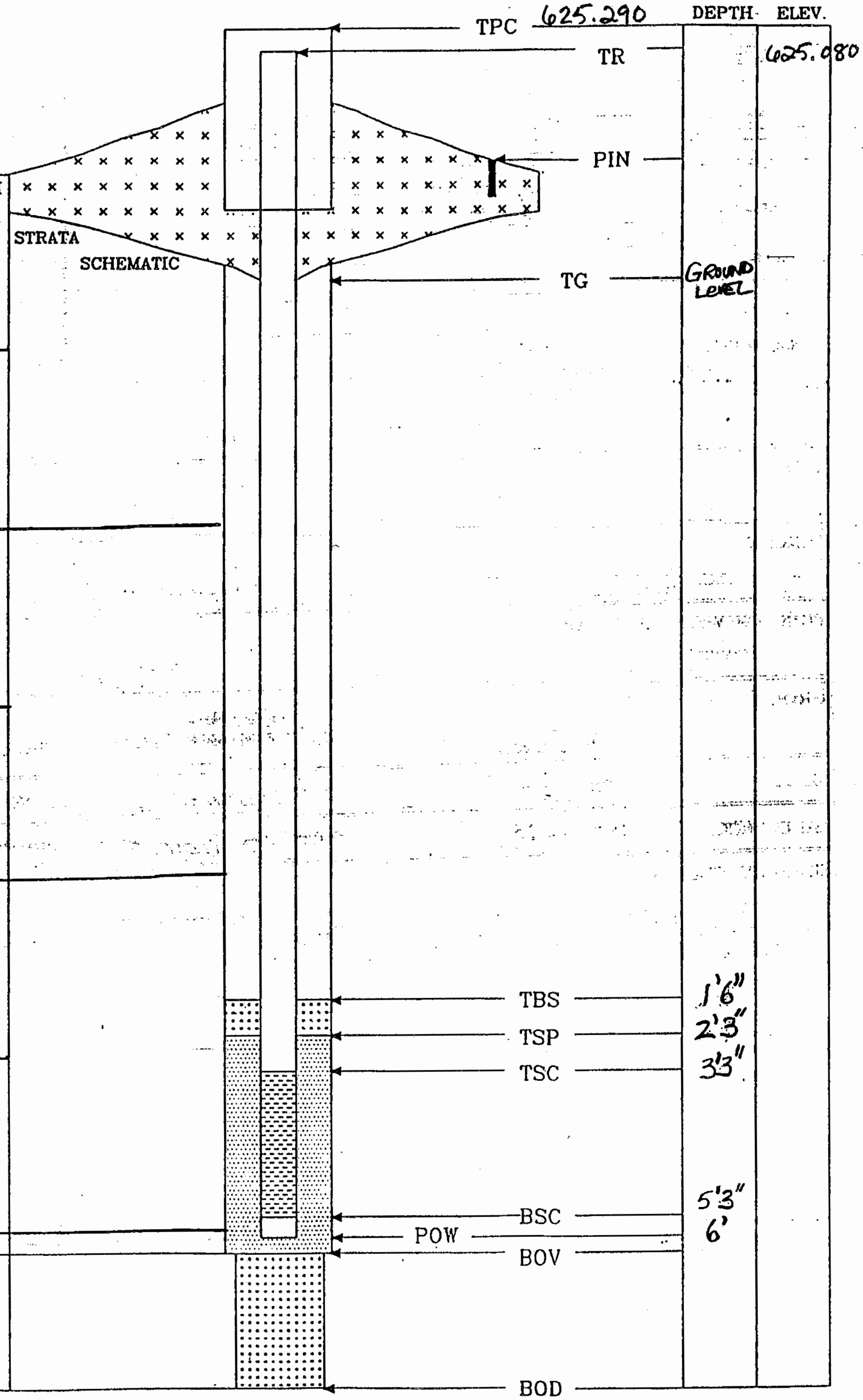
DARK GREY WEATHERED SHALE (SPOON REFUSAL 4.8')

5'

SHALE UNIT
DEMONSTRATED COMPETENCE

6'

BEDROCK



* NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC.	CLIENT:	WELL #: MW-45-2

PROJECT: SEAD WELL INSTALLATION 10SWMU
PROJECT NO: 720477-01001
LOCATION: SEAD-45
INSPECTOR: JWC/a.l
CHECKED BY:

DRILLING CONTRACTOR: EMPIRE SOILS
POW DEPTH: 10'
DRILLER: John WARNER
INSTALLATION STARTED: 11/20/93
DRILLING COMPLETED: 11/21/93
INSTALLATION COMPLETED: 11/21/93
BORING DEPTH: 10'
SURFACE COMPLETION DATE: ~~11/21/93~~
DRILLING METHOD(S): Hollow STEM AUGER
COMPLETION CONTRACTOR/CREW: EMPIRE/JW/BOB
BORING DIAMETER(S): 8 6"
BEDROCK CONFIRMED (Y/N?) Y
ASSOCIATED SWMU/AOC: SWMU-45
ESTIMATED GROUND ELEVATION: 624.666

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

RISER:
TR: +2'6" TYPE: PVC DIAMETER: 2" LENGTH: 4'4"

SCREEN:
TSC: 4'4" TYPE: 10-SLOT DIAMETER: 2" LENGTH: 5' SLOT SIZE: ~~10~~ 0.01"

POINT OF WELL: (SILT SUMP) 10'
TYPE: BSC: 9'4" POW: 10'

GROUT:
TG: Ø (GROUND LEVEL) TYPE: CEMENT QUIKRETE W/BENTONITE SLURRY LENGTH: 2.0'

SEAL: TBS: 2' TYPE: BENTONITE LENGTH: 1' 2"

SAND PACK: TSP: 3'2" TYPE: #3 & #1 LENGTH: ~~1'2"~~ 6'-10"

SURFACE COLLAR:
TYPE: Cement RADIUS: 1' THICKNESS CENTER: 1'9" THICKNESS EDGE: 4"

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

COMMENTS: SLIGHT Problem when AUGER FLIGHTS WERE RAISED. MEASUREMENT Device BECAME JAMMED

-Screen is 4.0' in length. PVC section is 5.0'!

* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

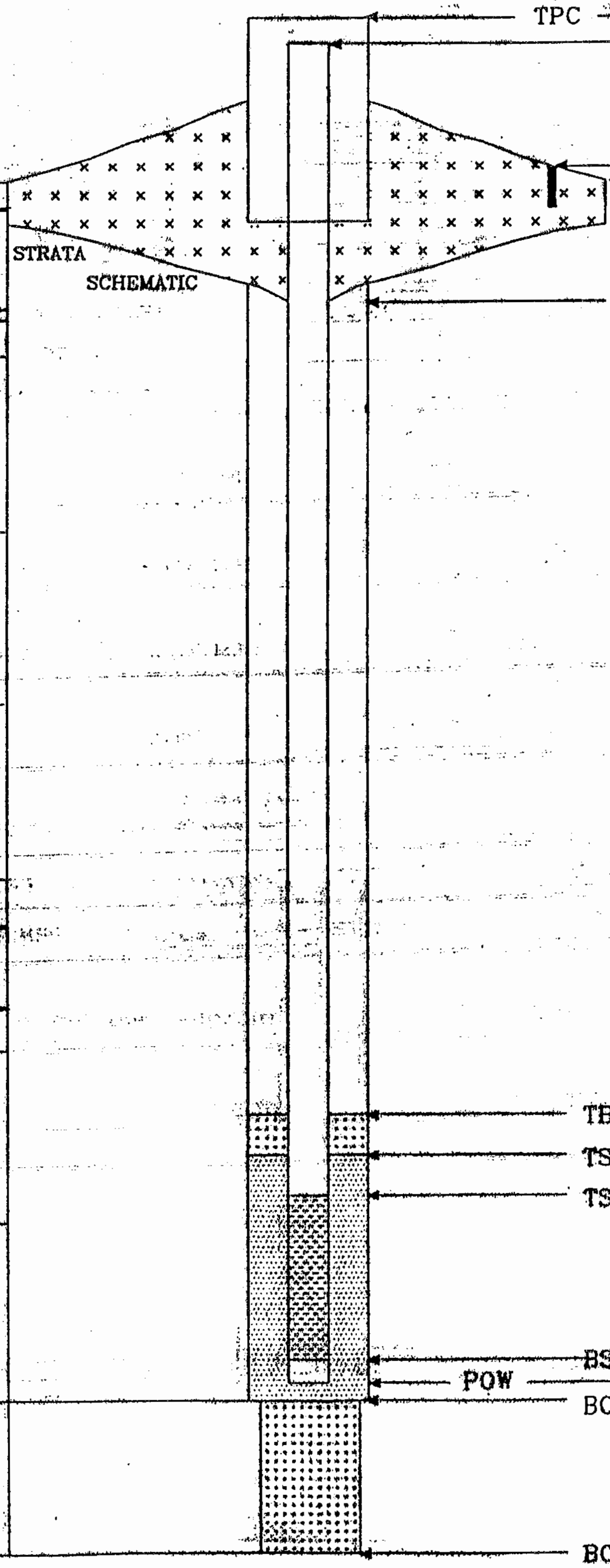
ENGINEERING-SCIENCE, INC. | CLIENT: SEAD | WELL #: MW45-4

DATE: 11/22/93

TPC 632.977

	DEPTH	ELEV.
TR	+2'0"	633.035
PIN		
TG	Ø Ground Level	
TBS	2'9"	
TSP	3'3"	
TSC	4'3"	
BSC	6'3"	
POW / BOV	7"	
BOD		

DESCRIPTION (FROM BORING LOG)	DEPTH
Top Soil	
Iron Stained Area 1"	
Till Unit w/ shale fragments interbedded throughout dark grey	1
Medium grey till w/ some limestone clasts and fragmented shale pieces dispersed throughout in small amounts	2, 3
Till w/ increased shale content	4
Weathered shale unit	5
Shale unit	6
BEDROCK	7



* NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. | CLIENT: | WELL #: MW45-3

PROJECT: SEAD 10 SWMU
LOCATION: SEAD 45

PROJECT NO:
INSPECTOR:
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: John W.
DRILLING COMPLETED: 11/22/93
BORING DEPTH: 11.33'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: 45

POW DEPTH: 11.33'
INSTALLATION STARTED: 11/21/93
INSTALLATION COMPLETED: 11/22/93
SURFACE COMPLETION DATE:
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?)
ESTIMATED GROUND ELEVATION: 623.991

PROTECTIVE SURFACE CASING:
DIAMETER: 4"x4" Steel LENGTH:

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

SCREEN:
TSC: 5'7" TYPE: PVC 40 DIAMETER: 2" LENGTH: 5' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC Point BSC: 10'7" POW: 11'4"

GROUT:
TG: Ground TYPE: Cement-bentonite LENGTH: 2'-9"

SEAL: TBS: 2'-9" TYPE: LENGTH: 1'-3"

SAND PACK: TSP: 4" TYPE: #3 and #1 LENGTH: 7'-4"

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

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

COMMENTS:
Note: Screen is actually 4.0'; PVC Section is 5.0'!

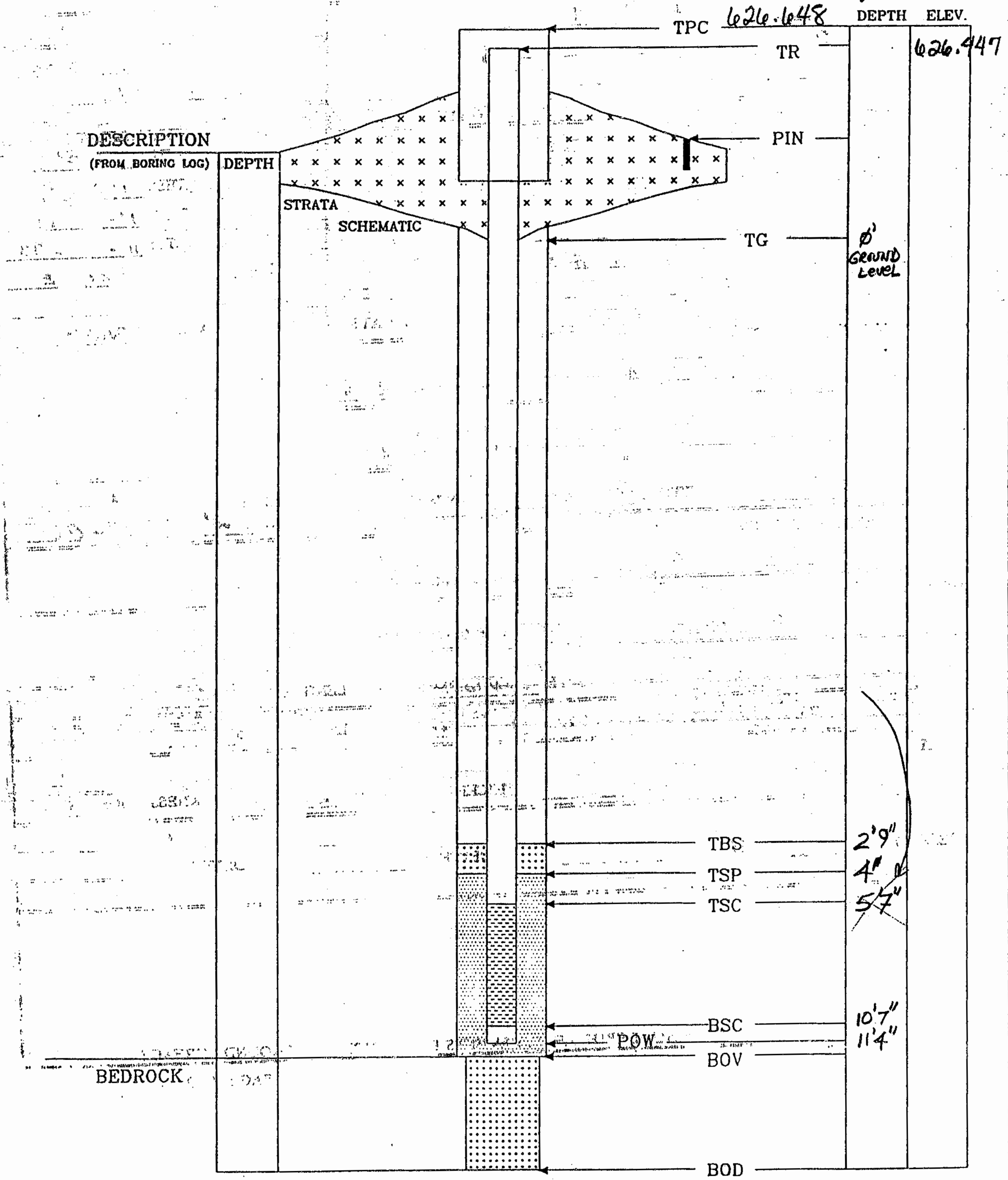
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD	WELL #: MW45-3

DATE: 11/21/93



* NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING–SCIENCE, INC. | CLIENT: SEAD | WELL #: MW 45-4

PROJECT: 10 SWMU
LOCATION: SEAD -45

PROJECT NO: 720477-01001
INSPECTOR: JWC / AS
CHECKED BY:

DRILLING CONTRACTOR: EMPIRE SOILS
DRILLER: BOB / GLEN
DRILLING COMPLETED: 11-22-93
BORING DEPTH: 7.0'
DRILLING METHOD(S): Hollow STEM AUGER
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: SEAD 45

POW DEPTH: 7.0'
INSTALLATION STARTED: 11-22-93
INSTALLATION COMPLETED: 11-22-93
SURFACE COMPLETION DATE: 11 - - 93
COMPLETION CONTRACTOR/CREW: EMPIRE
BEDROCK CONFIRMED (Y/N?): Y
ESTIMATED GROUND ELEVATION: 630.896

PROTECTIVE SURFACE CASING:
DIAMETER: 4" LENGTH: 2' 6"

RISER:
TR: TYPE: PVC DIAMETER: 2" LENGTH: 2' 6"

SCREEN:
TSC: 4' 3" TYPE: PVC DIAMETER: 2" LENGTH: 2' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC BSC: 6' 3" POW: 7.00'

GROUT:
TG: 0.0' TYPE: QUIKRETE BENTONITE slurry LENGTH: 2' 9"

SEAL: TBS: 2' 9" TYPE: BENTONITE LENGTH: 0' 6"

SAND PACK: TSP: 3' 3" TYPE: #3, #1 SAND LENGTH: 3' 9"

SURFACE COLLAR:
TYPE: QUIKRETE - BENTONITE slurry RADIUS: 1' THICKNESS CENTER: 2' 9" THICKNESS EDGE: 4"

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

COMMENTS:

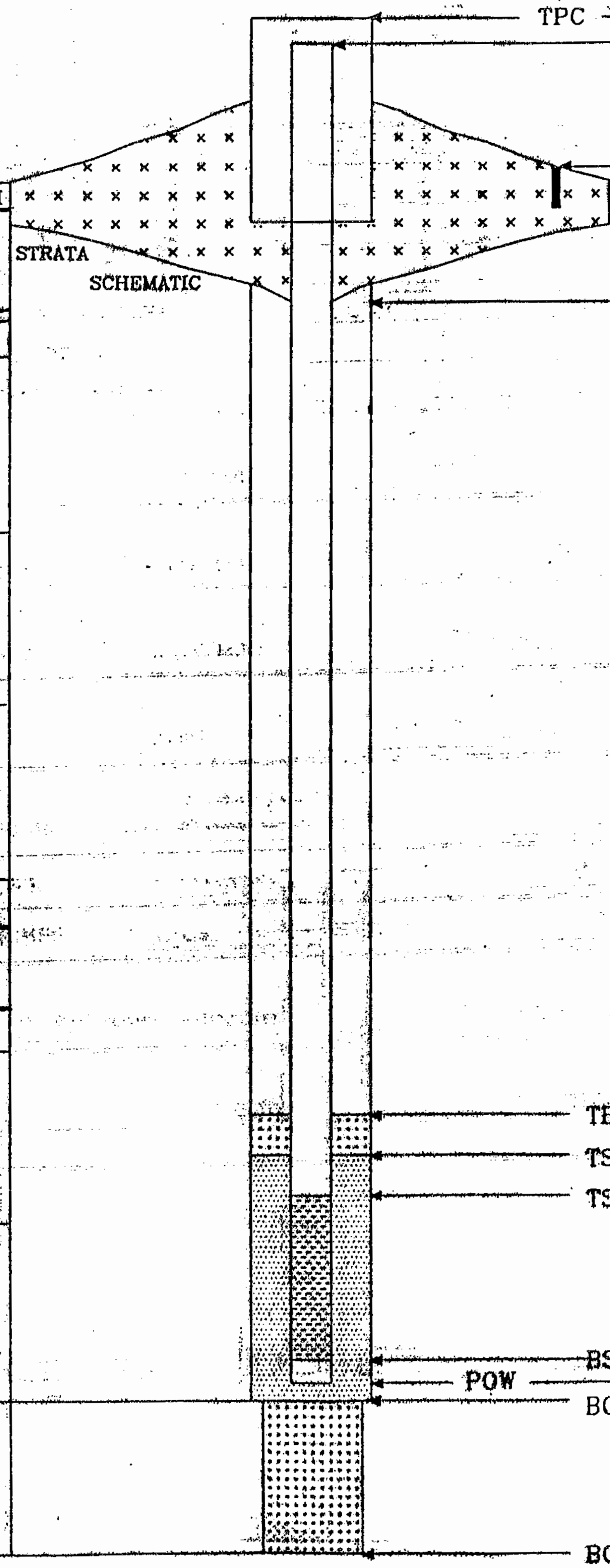
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT: SEAD	WELL #: MW45-4

DATE: 11/22/93



	DEPTH	ELEV.
TPC		632.977
TR	+2'6"	633.035
PIN		
TG	Ø Ground Level	
TBS	2'9"	
TSP	3'3"	
TSC	4'3"	
BSC	6'3"	
POW	7"	
BOV		
BOD		

DESCRIPTION (FROM BORING LOG)*	DEPTH
Top Soil (SILT)	
Iron Stained Area 1"	
Till Unit w/ Shale Fragments Interbedded Throughout Dark Grey	1
	2
Medium Grey Till w/ some Limestone Clasts and Fragmented Shale Pieces Dispersed Throughout in Small Amounts	3
	4
Till w/ Increased Shale Content	
Weathered Shale Unit	5
Shale Unit	
	6
	7
BEDROCK	

* NOT TO SCALE